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Left Sided Trans-thoracic Esophagectomy for Resectable Esophageal and Gastro-esophageal Junction Cancers: Experience from Addis Ababa, Ethiopia

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https://dx.doi.org/10.4314/ecajs.v22i1.1

Background: Surgery is the main stay of treatment for Esophageal Cancer but there is no standard Esophagectomy accepted by all authorities to be superior. The main objective of this study is to present our experience with the left sided trans-thoracic approach in patients with a lower third Esophageal and Gastro-Esophageal junction cancer.

Methods: We retrospectively reviewed 22 patients at the Tikur Anbessa Specialized Hospital in Addis Ababa Ethiopia between January 2013 and 2015. Data collected included the socio-demographic status, diagnostic modalities, the operative details, post operative outcome and follow up.

Results: The majority of the patients were males aged between 35-45 years, and had a clinical stage IIIa cancer. Average duration of surgery was 111 minutes (+17.4 minutes). Resection without macroscopical residual was achieved in 18 of 22 patients (81.8%). A total of 16 complications were recorded among 10 (45.4%) of the patients. One patient died in hospital (Mortality of 4.5%). All the remaining 21 patients were seen at least three times over the subsequent 6 months and were in good post operative condition.

Conclusion: Our finding is in agreement with the collected evidence the sweet’s procedure offers several advantages for tumors in the lower third of the esophagus including the gastro-esophageal junction. The short-term outcome of this procedure is also found acceptable.

Key Words: Sweet’s procedure, left sided trans-thoracic esophagectomy, Esophageal and Gastro- esophageal cancer

Introduction

Esophageal cancer (EC) is the sixth most common cancer worldwide. It kills approximately 400,000 people annually and has a five-year survival rate of approximately 20%. Sub Saharan African countries suffer from the highest burden of esophageal cancer, with more than eight out of ten (83%) cases diagnosed in these nations in 2008. According to a projection by the WHO cancer registry Globcan, the highest incidence of Esophageal cancer is registered in Ethiopia, where standardized incidence rates in 2002 reportedly as high as 28.1 per 100,000 in males, and 19.6 per 100,000 in females. Research related to EC in Ethiopia has also shown that the disease is one of the most common gastro-intestinal cancers seen at the Tikur Anbessa referral Hospital in Addis Ababa, Ethiopia. It is also...
shown that most of these patients come from two particular regions in the country and most patients present to the hospitals at an advanced stage.

Despite recent advances in the field of neo-adjuvant and adjuvant treatment, radical esophagectomy plus lymphadenectomy with curative intent still remains to be the mainstay of treatment for EC. Recent publications have currently established that neo-adjuvant chemo and radiotherapy resulted in better 5-year survival in early esophageal cancer but the overall response to all treatment modalities is unfortunately very low. There is no standard form of esophagectomy accepted by all authorities to be superior, but the surgical approach depends on curative intent, anatomic location of the tumor, the pre-operative patient condition, and probably availability of expertise and facilities. An international survey has shown that the Ivor-Lewis (abdominal and right thoracic) approach is the most commonly performed procedure. In addition, the left thoracic approach (sweet’s procedure) is a less commonly performed procedure in the world, except in China.

Reports from Ethiopia have shown that the trans hiatal (THE) and Ivor-Lewis procedures are the two most commonly performed procedures. The sweet’s approach, however, is not practiced widely. Therefore, the main objective of this study is to present our experience with this approach in patients with a lower third esophageal and gastro-esophageal junction cancer.

**Patients and Methods**

This was a study done at the Tikur Anbessa Specialized Hospital (TASH) in Addis Ababa Ethiopia. The thoracic surgery unit at the hospital is a high-case load esophageal cancer treatment unit where an average of 150-200 patients undergoes surgical treatment for esophageal cancer annually. All patients with EC who underwent left sided thoracic esophagectomy between January 2013 and December 2015 were retrospectively reviewed. Data collected included the socio-economic characteristics of the patients, presentation and clinical findings, the anatomic location, histology and stage of the disease, the details of the surgical procedure and post-operative follow up. For this study, the Ivor-Lewis approach with thoracic anastomosis, McKeown approach with cervical anastomosis, and THE were excluded. All patients were diagnosed with lower esophageal cancer, located within 8 cm margin of the diaphragm.

**The Sweet (Left Thoracic) Operation**

In the Sweet approach, after the patient is intubated (preferably double lumen), the patient is placed in a right lateral position and a soft pillow is placed under the right chest to ease access into the inter-costal spaces. In case double lumen intubation was not successful, a single lumen tube advanced into the right main bronchus was found sufficient. A left postero-lateral thoracotomy is performed along the left seventh or eighth inter-costal space. Once the thoracic space is entered, the deflated left lung is retracted superiorly and anteriorly and pushed out of the way. Cutting the inferior pulmonary ligament may sometimes be necessary. Sharp and blunt dissection around the esophagus is performed to
isolate the esophagus and the tumor, and then the esophagus is suspended with a sling. An NG tube already inserted before intubation eased the identification of the esophagus. Dissection is then continued at least 5 cm proximal to the lesion. Care is taken to avoid injury to the thoracic duct and the left phrenic nerve. Care was also taken to avoid excessive dissection of the esophagus from its bed un-necessarily.

Once the esophagus is completely freed, the diaphragm is entered through a 5-to 6-cm radial incision, taking care to avoid the phrenic nerve and its branches. The stomach is mobilized through the left thoracic cavity, preserving the right gastric and right gastro-epiploic artery and arcades; the short gastric (s) and the left gastric artery/vein are ligated at their origins.

If possible, a complete upper abdominal and mediastinal lymph node dissection is performed with en bloc resection of the distal esophagus and proximal stomach. Standard preparation of the stomach tube is performed in the left chest through diaphragmatic incision and a hand sewn single layered interrupted esophago-gastric anastomosis is done below the level of the aortic arch. A feeding jejunostomy tube was inserted in selected patients and a nasogastric tube positioned in the gastric tube in all.

Figure 1. This picture is adopted from Seong Hyun Kim, MD ● Kyung Soo Lee, MD ● Young Mog Shim, MD Kwhanmien Kim, MD ● Po Song Yang, MD ● Tae Sung Kim, MD “Esophageal Resection: Indications, Techniques, and Radiologic Assessment”
Results-

During the study period (3 years), a total of 455 esophagectomies were performed in the hospital and THE and Ivor-Lewis esophagectomies were found to be the two most commonly used procedures. A total of 25 patients underwent left sided esophagectomy during the three years period. However, the complete records of only 22 patients were recovered and hence were included in the study. The majority of the patients were males, aged between 35-45 years, and had a clinical stage of IIIa cancer. The mean age was 40.4 years and the M:F ration was 2:1. (Table 1 and 2).

Table 1: Socio-demographic characteristics of patients who underwent left sided esophagectomy at the Tikur Anbessa Specialised Hospital, Ethiopia, January 2013-2015.

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Frequency (N=22)</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sex</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>7</td>
<td>31.9</td>
</tr>
<tr>
<td>Male</td>
<td>15</td>
<td>68.1</td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>25-35</td>
<td>1</td>
<td>4.5</td>
</tr>
<tr>
<td>36-45</td>
<td>11</td>
<td>50</td>
</tr>
<tr>
<td>46-55</td>
<td>6</td>
<td>27.2</td>
</tr>
<tr>
<td>56-65</td>
<td>3</td>
<td>15.6</td>
</tr>
<tr>
<td>66-75</td>
<td>1</td>
<td>4.5</td>
</tr>
<tr>
<td><strong>Residence</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Addis Ababa</td>
<td>1</td>
<td>4.5</td>
</tr>
<tr>
<td>Arsi</td>
<td>5</td>
<td>22.7</td>
</tr>
<tr>
<td>Gurage zone</td>
<td>3</td>
<td>15.6</td>
</tr>
<tr>
<td>Bale</td>
<td>4</td>
<td>18.1</td>
</tr>
<tr>
<td>Somalia/Jijiga</td>
<td>5</td>
<td>22.7</td>
</tr>
<tr>
<td>Others</td>
<td>4</td>
<td>18.1</td>
</tr>
</tbody>
</table>

The universal presenting symptom was progressive dysphagia of at least grade 2/4 and significant weight loss in all patients. All patients were diagnosed with lower esophageal cancer, located within 8 cm margin of the diaphragm. Oncological evaluation included upper gastrointestinal barium swallow in all patients, endoscopy with histologic examination in 17 (77.2%), and computerized tomography of the chest and upper abdomen in 15(68.1%). Ultrasound of the abdomen was done in patients where CT was not available (Table 2). Average duration of surgery was 111 minutes (+17.4 minutes) and the average recorded blood loss is around 500 ml. No patient required blood transfusion. Resection without macroscopically residual tumor was achieved in 18 of 22 patients (81.8%)

A total of 16 complications were recorded among 10 (45.4%) of the patients (Table 3) and the average post-operative duration of stay was 9.4 days. All except one patient were discharged improved. One patient died in hospital (4.5%), this was a 64 years old male patient who was re-admitted with left sided pyo-pneumothorax 11 days after discharge (20th post-operative day). Immediate chest tube was put in and very offensive bloody pus
containing gastric content and profuse air bubbles was drained. A diagnosis of delayed anastomosis break down was made and the patient was started with antibiotics, and kept NPO. However, the patient passed away on the 2nd post admission day due to the uncontrolled sepsis.

Table 2: Diagnostic characteristics and complications seen in patients who underwent left sided esophagectomy at the Tikur Anbessa Specialised Hospital, Ethiopia, January 2013-2015

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Frequency (n =22)</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Diagnostic tool used</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Barium swallow</td>
<td>22</td>
<td>100</td>
</tr>
<tr>
<td>Endoscopy and biopsy</td>
<td>17</td>
<td>77.2</td>
</tr>
<tr>
<td>Chest and upper abdominal CT</td>
<td>15</td>
<td>68.1</td>
</tr>
<tr>
<td><strong>Histologic sub-type</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Squamous cell carcinoma</td>
<td>17</td>
<td>77.2</td>
</tr>
<tr>
<td>Adeno-carinoma</td>
<td>5</td>
<td>22.8</td>
</tr>
<tr>
<td><strong>Stage of the disease</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IIb</td>
<td>10</td>
<td>45.4</td>
</tr>
<tr>
<td>IIIa</td>
<td>10</td>
<td>45.4</td>
</tr>
<tr>
<td>IIIb</td>
<td>2</td>
<td>9.0</td>
</tr>
<tr>
<td><strong>Complications seen</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prolonged atelectasis</td>
<td>6</td>
<td>27.2</td>
</tr>
<tr>
<td>Pneumonia</td>
<td>5</td>
<td>22.8</td>
</tr>
<tr>
<td>Pleural effusion</td>
<td>3</td>
<td>15.6</td>
</tr>
<tr>
<td>Post operative edema</td>
<td>1</td>
<td>4.1</td>
</tr>
<tr>
<td>Wound infection</td>
<td>1</td>
<td>4.1</td>
</tr>
<tr>
<td>Anastomotic leak</td>
<td>1</td>
<td>4.1</td>
</tr>
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**Discussion**

There is consensus at the present moment that the mainstay of treatment for esophageal cancer is surgery. However, there is no consensus regarding the “gold standard” surgical procedure. Literature tends to favour esophagectomy coupled with lymph node dissection (radical esophagectomy) as it may be associated with prolonged disease free survival than the standard esophagectomy (with limited lymph node dissection) (10, 12, 14). Although the Ivor-Lewis esophagectomy is advocated by the Chinese Anti-Cancer Association (10), the Sweet’s approach with limited lymphadenectomy remains a priority in China given the debate on the extent of lymphadenectomy necessary and, more importantly, concern about the Ivor-Lewis esophagectomy being associated with higher post-operative complications. In addition, there is a belief that lymph node spread of esophageal cancer is a sign of a systemic disease with little hope of cure; hence the primary intent of surgery is palliation, augmenting the argument that radical lymphadenectomy doesn’t add much to prognosis. Therefore, procedures with low morbidity and mortality such as the trans-hiatal approach and the Sweet’s procedure are preferred.
The Sweet approach was first described by Churchill and Sweet. Collected evidence from many publications and our findings from this report indicate that it offers several advantages for tumors in the lower third of the esophagus. Wound opening and closing are rapid and simple; it requires simple patient positioning with a single incision, reducing operative times and the related post-operative morbidity and mortality are reduced. Exposure of the operative field in the chest cavity, esophagus and hiatus is very good. It also provides adequate exposure of the stomach and excellent access to the short and left gastric arteries through the diaphragm.

Lymph node spread in patients with EC occurs early and may be located in the abdominal, mediastinal or cervical region, owing to the extensive sub-mucosal lymphatic drainage of the esophagus. In this line, several studies have shown a significant survival benefit for patients having undergone a 3-field lymph node dissection compared to 2-field. However, these studies are non-randomized and, therefore, the optimal extent of LND still remains a matter of international debate. LND in the middle and lower peri-esophageal portion, sub-carinal region, lower posterior mediastinum, perigastric region, and those along the left gastric and splenic arteries is possible through the left chest. But clearance of the upper mediastinal nodes is not easy. However, we still recommend the sweet’s procedure in patients with lower third esophageal carcinoma because only a small number of patients have superior mediastinal lymph node metastasis. In addition, whether patients with middle or lower third esophageal lesions benefit from superior mediastinal lymph node dissection is not yet clearly established.

When the Ivor-Lewis and sweet's approaches are grossly compared, the Ivor-Lewis approach required an additional abdominal incision, which needs to be done after re-positioning the patient in the middle of the procedure from supine to left lateral. This is associated with an additional surgical insult by violating two separate body cavities, increased operative times, more blood loss and subsequent transfusion. The reported pulmonary complications in such patients are also increased. In contrast, some reports have indicated that during the Ivor-Lewis procedure, total lymphadenectomy can be performed including lymph nodes along the bilateral recurrent nerves. In addition, a recently published paper from China suggests the superiority of the Ivor-Lewis esophagectomy over the Sweet procedure with regard to short-term outcomes such as lymph node retrieval and overall morbidity for patients with squamous cell cancer in the middle and lower third of the thoracic esophagus. It also stated that further follow-up may elucidate whether the Ivor-Lewis procedure also has an advantage in disease control and long-term survival. However, in the literature, no conclusive evidence is there regarding which surgical approaches has made any significant difference in long-term survival.

In our series, we had one patient who passed away as a result of a possible delayed anastomosis site leak. This is comparable to the 5% leak rate reported by other publications. Reasons for leakage include tension in the anastomotic site, local sepsis, edema and ischemia of the gastric wall and tumor reminisce in the site. Esophageal cancer patients also have significant weight loss, lower serum proteins, and generally reduced...
immunity, hence contributing to the leak rate. However, it remains difficult to distinguish between anastomotic leakage and perforation of the stomach caused by ischemia. The literature tends to agree that anastomotic methods (hand sewn Vs stapler) were not associated with the incidence of leakage. Intra-thoracic leakage usually leads to severe infection, fluid imbalance and malnutrition. Treatment usually involved adequate control of infection, thorough drainage of the thoracic cavity, maintenance of nutrition and correction of fluid imbalance. Although parenteral nutrition was increasingly used in later years, the preferred current method is feeding jejunostomy.

The current modern surgical approach to esophageal resection is laparoscopic. Minimally invasive esophagectomy has many advantages in lymph node dissection, such as reducing pulmonary infection, shortening hospital stay, and improving short-term quality of life. However, in hospitals like ours and in many developing countries with limited such access to minimally invasive facilities, and for patients with advanced esophageal cancer, the author still advocate open trans-thoracic esophagectomy.

**Conclusion**

It is our experience that the Sweet approach is safe, effective, learnable and worthwhile in modern thoracic surgery. It has many advantages in the treatment of lower third esophageal and gastro-esophageal junction carcinoma, especially in terms of reduced intraoperative time, lesser blood loss, lower incidence of postoperative complications and shorter hospital stay. In a country like Ethiopia where the disease burden is very huge and the number of thoracic surgeons very low, this procedure can be learnt by general surgeons to be performed at reasonably set up surgical facility.

**References**


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Fast Track Surgery at the University Teaching Hospital of Kigali: A Randomized Controlled Trial Study in Abdominal Surgery

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https://dx.doi.org/10.4314/ecajs.v22i1.2

Background: Fast Track Surgery is synonymous with Enhanced Recovery after Surgery. It was started in the 1990's initially for colorectal surgery, but later became applicable to other aspects of surgery. Its core elements include epidural or regional anaesthesia, perioperative fluid management, minimally invasive surgical techniques, optimal pain control, early initiation of mobilization and feeding, and early discharge from hospital. The beneficial effects of this practice arise from early mobilization and feeding, and the reduced hospital stay. They include reduced costs, early discharge from hospital, and increased availability of hospital beds. The main aim of this study was to explore the feasibility of Fast Track Surgery in the Rwandan surgical setting and to demonstrate the reported beneficial effects of Fast Track Surgery.

Methods: A randomised control trial was conducted, with cases for Fast Track Surgery (FTS) carefully selected, and compared with the controls (patients going through the conventional surgical care). A total of 62 patients (31 in each group) were studied. Evaluation and comparison of hospital stay, early mobilization, early feeding, complication rate, were done for the two groups.

Results: The FTS patients had a mean hospital stay of 2.1 days, while the controls had a mean hospital stay of 5.3 days. 97% of the FTS patients had early mobilization, within the first 24 hours postoperatively, compared to 77% who got mobilization and feeding on the 3rd postoperative day in the control group.

Conclusion: Fast Track Surgery practice is feasible in the Rwandan surgical setting. It facilitates early discharge from hospital, with minimal complication rates because of early mobilization and early feeding. It also results in reduced postoperative pain, leading to reduced or no opioid demands. All these translate into reduced expenses for the patient and the hospital.

Key words: Fast Track Surgery, hospital stay, mobilization, beneficial effects, Randomised control trial.

Introduction

Fast-track surgery (FTS) was initiated by the Danish surgeon H Kehlet in the field of elective colorectal surgery in the 1990s 1, 2, and has rapidly gained popularity around the world because of its significant benefits and safety 3. The core elements of FTS include: epidural or

regional anesthesia, peri-operative fluid management, minimally invasive techniques, optimal pain control, early initiation of oral feeding and early mobilization. The combination of these approaches has led to a significant reduction in complication rates, morbidity and mortality rates, duration of hospital stay and costs of hospitalization, and finally, greatly improved postoperative recovery. In recent years, FTS has been applied to several surgical diseases including radical prostatectomy, cardiac surgery, total knee replacement, cesarean section, coronary artery bypass grafting, it has also been used for specific procedures in children and the elderly.

With the conventional surgical practice, patients often stay for several days before and after surgery. The average hospital stay for the majority of surgical patients ranges between 3 to 12 days. This results in a chronic shortage of beds, especially in the referral hospitals like CHUK. It also translates into increased medical costs, taking into account the bed and feeding costs per day for both the patient and the care-taker. Some of the reasons for the prolonged hospital stay pre-operatively include limited human resources, limited operating theatre space, limited consumables, and delayed investigations; while postoperatively they include pain, complications, delayed feeding, and delayed mobilization.

In addition, the general mindset of the majority of our patients is that the surgical patient should stay in hospital until the wounds are healed, stitches are removed, and the pain is fully controlled. This is associated with fear to initiate movement or feeding postoperatively. But it is known that prolonged hospital stay often results in many complications including DVT, prolonged pain, cough, pneumonia, and hospital acquired infections. The main aim of this study was to explore the feasibility of Fast Track Surgery in the Rwandan surgical setting and to demonstrate the reported beneficial effects of Fast Track Surgery.

Patients and Methods

This randomized control trial was conducted in one of the referral hospitals of Rwanda: Kigali University Teaching Hospital (CHUK). The study was conducted for a period of three months. The patients who were on appointment for elective abdominal surgery were briefed about the study at admission. Only those who were willing of participate were enrolled and randomly divided into two groups by picking one sealed envelope containing a paper indicating either FTS or conventional surgery. 62 patients were enrolled in the study; 31 patients in the conventional group, and 31 patients in the fast track surgery group. The latter group was further briefed about the core elements of FTS which included epidural or regional anesthesia, peri-operative fluid management, optimal pain control, early initiation of oral feeding, and early mobilization. The peri-operative management of the FTS group went through all those steps. Included were adult patients who underwent elective abdominal surgery, and were classified as ASA 1&2. Excluded were patients whose conditions required ICU monitoring postoperatively, emergency abdominal surgery, and pediatric patients. A standardized data collection questionnaire was used. Patients were enrolled after initial assessment, and monitored as in-patients, until they were discharged from surgical care.
Follow up was done for all the patients one week after discharge to assess for any complications. The follow-up results indicated that the patients in the FTS group did better in terms of mobility wound healing rate. The principal investigator supervised all data collection. Data was recorded using Epi-data 3.1 software. The data processing and statistical analyses were performed using STATA. The limit of significance was established at p≤0.05.

Results

This randomized control trial on fast track surgery versus conventional surgery for elective abdominal surgery patients included 6, with 31 patients in each group. The majority of patients were female (58 %). However, there was balanced gender distribution in both groups. (p=0.345). Figures 1 and 2 show the sex and age distribution in the fast track surgery and control groups.

Age distribution

The population age range was from 17 years to 73 years old with a mean age of 35 years and standard deviation of 15 years. There was equal distribution between the two groups (p=0.361).

Diagnosis

The commonest diagnosis was cholelithiasis accounting for 35 % of all cases combined and was followed by intestinal stoma especially colostomies with 29 cases combined (Figure 3). Others diagnoses included 1 case each of achalasia, gallbladder tumor, entero-cutaneous fistula and of urachal sinus. There was equal distribution for diagnosis in both group (p=0.285)
Procedures
The patients with cholelithiasis underwent either open or laparoscopic cholecystectomy depending on the surgeon’s choice (Figure 4). Other procedures included Heller’s myotomy and toupet fundoplication, abdominal rectopexy, abdominal perineal resection and two open biopsies for abdominal tumor. There is equal distribution for procedures performed in two groups (p=0.563)
Table 1. Postoperative Pain Management

<table>
<thead>
<tr>
<th></th>
<th>Morphine</th>
<th>Morphine+Paracetamol</th>
<th>Paracetamol+Diclofenac</th>
<th>Tramadol</th>
<th>IV Paracetamol</th>
<th>Total</th>
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</thead>
<tbody>
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<td><strong>Control Group</strong></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>18</td>
<td>8</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>31</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>58.1%</td>
<td>25.8%</td>
<td>6.5%</td>
<td>6.5%</td>
<td>3.2%</td>
<td>100.0%</td>
<td></td>
</tr>
<tr>
<td><strong>Fast Track Group</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0</td>
<td>7</td>
<td>13</td>
<td>4</td>
<td>7</td>
<td>31</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.0%</td>
<td>22.6%</td>
<td>41.9%</td>
<td>12.9%</td>
<td>22.6%</td>
<td>100.0%</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>18</td>
<td>15</td>
<td>15</td>
<td>6</td>
<td>8</td>
<td>62</td>
<td>100.0%</td>
</tr>
<tr>
<td></td>
<td>29.0%</td>
<td>24.2%</td>
<td>24.2%</td>
<td>9.7%</td>
<td>12.9%</td>
<td>100.0%</td>
<td></td>
</tr>
</tbody>
</table>

Figure 4. Distribution According to Procedures Performed

Postoperative Analgesia
Table 1 shows the types of analgesics given in the two groups, depending on how severe and prolonged the postoperative pain was. In the control (conventional) group iv morphine alone was used in 58% because pain was felt for a longer duration (average 2 days). A smaller dose of morphine combined with iv paracetamol were used in 25.8%. In the FTS group iv paracetamol was combined with im diclofenac in 41.9% and iv paracetmol alone in 22.5%. However morphine coupled with paracetamol was used in 22.5% (p=0.000). The duration of pain in the FTS group was on average 6 hours.

Postoperative Resumption of Oral Feeding
Early feeding was considered to be the resumption of feeding before 24 hours postoperatively, and late feeding after 24 hours postoperatively. All FTS patients resumed
their oral feeding within 24 hours post operatively, with mean of 8 hours, except one patient who underwent partial gastrectomy for whom the NGT was removed after 24 hours. In the control group resumption of oral feeding occurred later after 24 hours, with a mean of 32 hours. (p=0.000)

Table 2. Resumption of feeding after surgery

<table>
<thead>
<tr>
<th>Group</th>
<th>Early feeding</th>
<th>Late feeding</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>15</td>
<td>16</td>
<td>31</td>
</tr>
<tr>
<td></td>
<td>48.4%</td>
<td>51.6%</td>
<td>100%</td>
</tr>
<tr>
<td>Fast track surgery</td>
<td>30</td>
<td>1</td>
<td>31</td>
</tr>
<tr>
<td></td>
<td>96.8%</td>
<td>3.2%</td>
<td>100%</td>
</tr>
<tr>
<td>Total</td>
<td>45</td>
<td>17</td>
<td>62</td>
</tr>
<tr>
<td></td>
<td>72.6%</td>
<td>27.4%</td>
<td>100%</td>
</tr>
</tbody>
</table>

Table 3. Mobilization Times Postoperative

<table>
<thead>
<tr>
<th>Within 10 hours</th>
<th>Between 10 to 24 Hours</th>
<th>After 24 hours</th>
<th>Total</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control Group</td>
<td>2</td>
<td>5</td>
<td>23</td>
<td>31</td>
</tr>
<tr>
<td></td>
<td>6.45%</td>
<td>16.13%</td>
<td>74.19%</td>
<td>100.00%</td>
</tr>
<tr>
<td>Fast Track Group</td>
<td>16</td>
<td>14</td>
<td>1</td>
<td>31</td>
</tr>
<tr>
<td></td>
<td>51.61%</td>
<td>45.16%</td>
<td>3.23%</td>
<td>100.00%</td>
</tr>
<tr>
<td>Total</td>
<td>18</td>
<td>15</td>
<td>15</td>
<td>62</td>
</tr>
<tr>
<td></td>
<td>29.03%</td>
<td>24.19%</td>
<td>24.19%</td>
<td>100.00%</td>
</tr>
</tbody>
</table>

Table 4. Postoperative Hospital Stay in Days

<table>
<thead>
<tr>
<th>Within 2 days</th>
<th>3 to 4 days</th>
<th>more than 5 days</th>
<th>Total</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control Group</td>
<td>1</td>
<td>6</td>
<td>24</td>
<td>31</td>
</tr>
<tr>
<td></td>
<td>3.2%</td>
<td>19.4%</td>
<td>77.4%</td>
<td>100.0%</td>
</tr>
<tr>
<td>Fast Track Group</td>
<td>27</td>
<td>3</td>
<td>1</td>
<td>31</td>
</tr>
<tr>
<td></td>
<td>87.1%</td>
<td>9.7%</td>
<td>3.2%</td>
<td>100.0%</td>
</tr>
<tr>
<td>Total</td>
<td>18</td>
<td>15</td>
<td>15</td>
<td>62</td>
</tr>
<tr>
<td></td>
<td>29.0%</td>
<td>24.2%</td>
<td>24.2%</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

Postoperative Mobilisation
All FTS started mobilisation within 10 hours postoperatively in 51 % and 97% patient in FTS had started mobilization within 24 hours. The control group started mobilization in 24 hours in 74 % of cases. This shows that there is a significant difference in mobilization times (p=0.000).
Postoperative Hospital Stay

The mean in-hospital stay was 2.1 days in FTS, and 5.3 days in control group (p=0.000). Most of the FTS patients were discharged on second day following surgery (87%). Most of the control group patients spent more than 5 days in hospital postoperatively in 77%, with a mean hospital stay of 5.3 days. There was only one FTS patient who got hospital acquired pneumonia and intra-abdominal sepsis and spent more than 5 days in hospital.

Discussion

This study has proved that fast track surgery is feasible in countries with limited resources like Rwanda. It may form a background for larger studies. The study also indicated that FTS is applicable to a variety of operations. This has also been indicated by other similar studies on the subject.8,9,13

The concept of reducing the time spent in the hospital after major abdominal surgery is an attractive one. FTS offers beneficial effects through increasing the availability of hospital beds and reducing the overall cost of the hospital stay. This issue has been studied and proved in several prospective case series on this subject over the last five years. In this study, 62 patients were studied, with 31 patients in each group. The sample size of 62 patients was similar to many other similar studies.13,14,15

The majority of the FTS patients in this study started feeding early (96.7%), within 24 hours, without any problem. Dongjie Yang conducted a similar study in colorectal surgery and found that it was safe for early feeding; the same author found that FTS reduces the hospital stay by 50% compared to conventional surgery. His findings are comparable to ours in this study. 27 FTS patients (87%) had a mean hospital stay of 2.1 days, compared to the control group in which 77% had a mean hospital stay of 5.3 days. (P=0.000). Suzanna et al, in their study of fast track surgery in open intestinal surgery, found a significant reduction in hospital stay comparable with our findings; they also found that late feeding was associated with delayed mobilization and risk of pneumonia. In this study, 96.8% of our FTS patients had early resumption of feeding within 24 hours, compared to 48% in the control group (P=0.000). Early feeding was found to enhance early mobilization.

The shortened hospital stay and early mobilization, translate into a reduction in the use of hospital resources, and therefore reduced costs for the patient. There is also a reduction of the costs by the hospital: the non-paying visitors to the hospitalized patients, who often use water, toilets, electricity, are reduced if the patient’s stay in hospital is shortened. Numerous clinical trials have provided positive evidence of the beneficial effects of FTS. Klappenbach R, in his study on early feeding versus traditional postoperative care after abdominal surgery, found that early feeding was safe and associated with less complications and their results was comparable with those found by Boelus PG et al concluded that early feeding was associated less ileus and less anastomotic leaked in upper gastrointestinal surgery; those studies were comparable to our findings.17,18,19
Barlow R found that early enteral feeding was associated with significant shortened length of hospital stay and improved clinical outcome; these findings reinforce the potential benefit of early feeding found in our FTS group.\(^2\)

**Conclusion**

Fast Track Surgery practice is feasible in the Rwandan surgical setting. It facilitates early discharge from hospital, with minimal complication rates because of early mobilization and early feeding. It also results in reduced postoperative pain, leading to reduced analgesic demands. All these translate into reduced expenses for the patient and the hospital.

**References**

Strengthening Surgical and Anaesthetic Services at District Level in the African Region: Issues, Challenges and Proposed Actions

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Health care delivery systems are organized at several levels with the district hospital serving as the first referral for comprehensive care in the majority of countries worldwide. The provision of comprehensive surgical services requires several inputs and tools to be in place, among which are an adequately trained surgical, anaesthesia and obstetric healthcare workforce, infrastructure and functioning equipment, and essential medicines and supplies. These, however, are not in place in the majority of commonly received surgical cases, such as trauma, obstetric, abdominal and orthopedic emergencies, thus limiting the capacity of district hospitals to address them. Global and regional public health initiatives have traditionally neglected the necessity of the provision of surgical services despite the fact that these constitute an essential component of comprehensive primary health care (PHC). In fact, because surgery so frequently cannot be safely postponed, this deficiency prevents the transfer of patients to a secondary or tertiary-level hospital where further care can be provided.

Introduction

In 2004, 11% of the world’s Disability Adjusted Life Years (DALYs) were due to surgically treatable conditions, with Southeast Asia and Africa accounting for 54% of these cases. The delays faced by patients needing surgical care, referrals to far-off higher level of care health facilities and the necessity of seeking care in overloaded tertiary hospitals further contribute to the grim outcome statistics. For example, the average maternal mortality ratio (MMR) for the African Region (AFRO) in 2010 was 480 for every 100,000 live births; a significant portion of this was accounted for by delivery complications. In addition, about 5.8 million

people die each year as a result of injuries. This accounts for 10% of the world’s deaths, 32% more than the number of fatalities that result from malaria, tuberculosis, and HIV/AIDS combined. Poor access to timely surgical services, particularly at rural facilities, turns minor surgical pathologies into lethal conditions and a broad range of treatable surgical conditions subsequently result in death and disability.

The importance of strengthening surgical services at the district referral level has been recognized by Member States. Several initiatives have addressed this, among which are the WHO Emergency and Essential Surgical Care (EESC) Programme developed in 2004, the WHO Global Initiative on Emergency and Essential Surgical Care (GIEESC) developed in 2005 and the WHO Integrated Management for Emergency and Essential Surgical Care (IMEESC) Toolkit developed in 2007. Countries have also intensified actions by training general practitioners or non-physician caregivers to perform many emergency and essential surgical care procedures. Most recently, the World Health Assembly unanimously passed Resolution 68.15: Strengthening emergency and essential surgical care and anaesthesia as a component of universal health coverage.

Despite these efforts, the limited capacity of district referral facilities to deliver essential surgical services still persists. This paper highlights a number of these specific issues and associated challenges of delivering effective surgical services at the district referral level in the African region and proposes several actions that may be taken in response.

Issues

Weak Governance: Inadequate provision for surgical services in national health policies and plans, as well as the perception that these services are resource intensive and costly, are issues that must be overcome in the majority of countries in AFRO. At present, there is not enough advocacy or investment to significantly improve delivery of life-saving and disability-preventing surgical services in the district level health system.

Weak human resources: Existing data show that AFRO faces an extreme shortage of trained health workers, particularly surgical, anaesthetic and obstetric specialists. This

8 WHA Resolution 68.15(http://apps.who.int/medicinedocs/documents/s21904en/s21904en.pdf)
shortage of trained staff combined with poor working conditions, heavy workload, low staff morale and inadequate professional career development for these specialists is recognized as one of the major causes of the inability to provide appropriate surgical, anaesthetic and obstetric care. In addition, task-shifting modules, which are required to empower health care workers to provide emergency and essential surgical and anaesthetic care at the district level, are not part of the curricula of most training institutions.

Weak infrastructure: There are severe shortages in all aspects of surgical care systems at the district level facilities, including infrastructure such as safe anaesthesia and surgical equipment\textsuperscript{15}, clean running water, continuous oxygen or pulse oximetry\textsuperscript{16}, and reliable electricity for the safe delivery of surgical interventions.\textsuperscript{17} This lack of appropriate infrastructure precludes attracting qualified surgical and anaesthetic workforce. A survey in 22 low- and middle-income countries (LMICs) \textsuperscript{18} (including 14 countries\textsuperscript{1} in AFRO) reported gaps in access to safe anaesthesia services such as oxygen supply, pulse-oximetry and a functioning safe anaesthesia machine.

Limited access to surgical and anaesthetic services: The unavailability of surgical services, high rates of trauma and obstetric complications, and the large backlog of untreated surgical diseases together create an enormous undue burden on the district level facility. Surgical care is usually concentrated in overloaded specialist referral hospitals that are not accessible to patients who are unable or unwilling to travel. This, coupled with weak referral systems, often result in patients from remote or impoverished communities arriving at the referral healthcare facility in a relatively advanced state of disease, long past whatever curative window was once available.\textsuperscript{19} Many district hospitals also lack the capacity to provide a full range of appropriate surgical services, including obstetric services.\textsuperscript{20,20,21} The obstacles to
providing surgical and anesthetic care services reflect the general shortcomings of district-level care, including poor basic infrastructure, lack of essential equipment, lack of communication with and accepting referral facilities, and weak management.

Inadequate information and evidence on surgical and anaesthetic services: In many countries the acute burden of surgically treatable conditions is not well known. In addition, data assessing the number and types of surgical workforce and procedures available at the district-level facilities are not yet systematically part of the national health information system. Although the WHO Situational Analysis Tool to assess surgical (general, emergency, trauma, obstetrics, and anaesthesia) services was utilized in selected African countries, challenges remain as there is insufficient evidence to answer basic questions about the prevalence and incidence of surgical conditions and the provision of surgical interventions in the African region. Consequently the contribution of surgically treatable conditions to the regional burden of disease and the potential impact of low access to basic surgical services at the first referral level health facility is widely under-appreciated. This lack of information about surgical and anaesthetic services in AFRO hinders evidence-based decision making which would allow for system strengthening.

Challenges

Inadequate consideration for surgical services in national health plans: The lack of a fully embedded comprehensive surgical care plan within the national health plan has greatly hampered prioritization, innovation and investment in surgical services. For example, provision of surgical services is yet to benefit from the extensive use of telemedicine and e-health. Furthermore, although surgical services are recognized as a component of comprehensive PHC, their integration in these services is yet to be fully realized. Indeed, existing data show that in many countries, there is no integration of surgical and anaesthetic services in the general health care package.

Inadequate funding for surgical services: The inadequate investment in health services as a whole significantly impacts investment in surgical services. In a majority of countries, investment in health is below US $44 per capita, which is the recommended minimum to provide a basic package of services. Private expenditure on health is both necessary and significant, the bulk of which is from out-of-pocket spending within households that places further limits on access to essential surgical and anaesthetic services. The substantial use of the private sector, partly due to gaps in service delivery in the public facilities, is most often significantly more expensive than the public sector.


Weak referral systems
In many African countries, patients fail to seek care at health facilities because of economic constraints, inadequate transportation, and fear of or lack of confidence in the quality of care provided. These patients frequently bypass the first level facilities to go directly to the third level. As a consequence, tertiary level hospitals are generally overloaded and do not have enough time to focus on the most complicated cases as they are forced to triage such a large number of less critical patients. This situation results in a disorganized and inefficient referral system in these countries.

Actions Proposed
The following actions are proposed to address the issues and challenges related to strengthening surgical and anaesthetic services at the district referral level.

Improved advocacy: Collection of evidence on the acute burden of surgically treatable disease and the documented gaps in the provision of existing surgical care in AFRO countries is required to drive advocacy efforts. National governments need to commission evidence-based country assessments to determine their need to strengthen surgical and anaesthetic services at the district referral level. Engaging in further research is critical in order to monitor the effects of appropriate surgical services, and to determine its implications on health systems and public health. In addition, multi-disciplinary stakeholders, including surgical specialists, policy makers, health economists, epidemiologists and social scientists, should collaborate to determine priorities for research and training. Policy makers should encourage funders to support surgical capacity building including system integration, data collection, availability of essential medicines, and adequate workforce development, all aimed towards the delivery of high quality, safe and timely surgical services.

Inclusion of surgical services in the national health plan: Surgery must be seen as part of a basic package of health services and not merely a technical profession, and thus, be fully incorporated in national health polices and strategic plans (NHPSP)\textsuperscript{23}. A key component of this will be data collection to allow evidence to drive health policy. Equally important is the focus on implementation of the NHPSP which has been a major challenge in several countries. The required capacity needs to be built and investments made to ensure implementation. Systemic approaches to surgery through people-centred and integrated health services can raise the overall quality and capacity of health care and create an invaluable “ripple effect” of encouraging patients to seek attention for non-surgical conditions. Education targeting the primary level of the health system to allow early recognition, resuscitation and transfer for surgical conditions will be key to effective utilisation of district-level surgical services. Similarly, first-line surgical health services (preventive, diagnostic and curative) should be improved so that common surgical conditions can be diagnosed quickly and appropriate referrals activated. Access to district-level hospitals should be increased and referral patterns fortified while tertiary hospitals serve in a strong supportive function. The incorporation of surgical services in the NHPSP can be promoted by ensuring that a person or unit within the Ministry of Health (MOH) with the

\textsuperscript{23}http://www.lancetglobalsurgery.org/
appropriate background is adequately empowered to promote surgical and anaesthetic health care improvements.

**Improved access to surgical services:** Recent evidence points to a severe surgical workforce deficit in much of AFRO.²⁴ Although some surgical procedures require highly skilled staff, a specialist surgeon is not required to perform many of the procedures.²⁵²⁶ Some data show that in several countries in AFRO many essential surgeries are performed by non-specialists.²⁷ Strengthening local surgical capacity and task-shifting is an approach that would both provide a high degree of financial protection to populations and increase access to surgical and anaesthetic services in a cost-effective manner.²⁸ It is essential, of course, that non-specialist health workers are properly supervised and that their training programs are carefully designed and adequate on-going evaluation. Relatedly, referral mechanisms need to be improved by ensuring adequate capacity to provide surgical services in line with the technical plateau of a given referral level. In addition, ambulance services need to be provided where referral to a higher specialisation level is warranted.

**Improved investment by countries and partners:** The profound shortage of essential equipment and supplies can only be remedied through appropriate budgetary allocations and ensuring regular deliveries of these supplies to prevent shortages²⁹ (refer WHO EEE). Examples include the availability of oxygen and essential medicines for anaesthesia at peripheral health care facilities. There is a need for surgeons and anaesthesiologists to effectively challenge the status quo and advocate for a broader role for surgical services as part of the basic package and its contribution to Universal Health Coverage (UHC). The establishment of a responsible person or unit within the MOH with the appropriate background would empower them to promote surgical and anaesthetic services and could be held accountable for the established system.

**Improved integration for efficiency:** Strengthening the delivery of emergency and essential surgical, anaesthetic and obstetric services at the primary care level should be a priority to reduce death and disability. This was highlighted previously in attempts towards achieving the Millennium Development Goals 4, 5 and 6, now replaced by the Sustainable

²⁹REFER WHO EEEE
Development Goals, particularly Goal 3.\(^{30}\) \(^{298}\) Investment in surgical services in an integrated manner with other health care services and between various-level health facilities will strengthen not only hospital services but the health system itself. Such work may be complemented and enhanced by ensuring that the surgical services provided are comprehensive enough to serve the population’s basic acute and chronic surgical care needs. Investments in workforce skills and infrastructure must be built to meet the surgical, anaesthesia and obstetric service needs of district hospitals and should be addressed in the comprehensive district health care package.\(^{32}\) The presence of a functioning surgical unit at a local district hospital would help to ensure a functioning blood bank, a clinical laboratory, and the emergency transport and communication systems of a hospital, to improve its overall effectiveness.\(^{25}\)

**Monitoring and evaluation:** Routine Monitoring and Evaluation systems need to incorporate monitoring of the provision of surgical services. Likewise, health sector joint reviews should also assess progress and achievements made as well as challenges encountered in the provision of surgical services. This will provide a basis for policy dialogue and investment decisions.

Disclaimer: The authors include WHO staff. The views expressed in this publication reflect their views and not necessarily that of WHO.

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\(^{30}\) 17 Reduce child mortality (4), improve maternal health (5) and combat HIV/AIDS, Malaria and other diseases (6);

\(^{31}\) #29— https://sustainabledevelopment.un.org/sdgs

Evulation of an accelerated Ponseti protocol for the treatment of talipes equinovarus in Nigeria

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https://dx.doi.org/10.4314/ecaajs.v22i1.4

Background: The commonest congenital musculoskeletal deformity worldwide is talipes equinovarus (CTEV). Of the various treatment methods available, the most acceptable treatment currently for CTEV worldwide is serial manipulation and casting using the Ponseti technique. The Ponseti technique consists of weekly manipulation and casting for an average of six to eight weeks followed by bracing of the feet till school age. Some studies have shown evidence that more frequent casts may have similar outcomes with weekly casts using the Ponseti method. This study compared the efficacy of management of idiopathic CTEV using an accelerated protocol of twice weekly casts, with the standard weekly Ponseti protocol.

Methods: The study was a randomized case control study with a group of patients undergoing an accelerated casting protocol involving twice weekly casts compared with another group who went through the normal weekly Ponseti protocol.

Results: A total of 45 feet in 28 patients were studied. The study showed a significantly shorter treatment period in the accelerated protocol (39 days) compared with the standard protocol (52 days); with no significant increase in the number of casts needed for treatment.

Conclusions: A twice weekly Ponseti casting protocol enables completion of the casting period earlier than the standard Ponseti method.

Key words: Talipes equinovarus; Ponseti treatment; Accelerated Ponseti Protocol; Serial Casting

Introduction

Clubfoot refers to a group of disorders where the leg, ankle and foot are shaped like a hockey stick. It is a complex developmental anomaly of which majority of cases are congenital with a worldwide incidence of 1-6.8/1000 live births¹. While a variety of distinct disorders fall under the description of ‘clubfoot’, the commonest type is congenital talipes equinovarus (CTEV). The CTEV deformity consists of equinus at the ankle, varus of the hindfoot, forefoot adduction and cavus². Clubfoot is regarded as the most common and
potentially debilitating congenital musculoskeletal deformity worldwide. It has been identified in the mummified remains of the Egyptian boy king Tutankhamen as well as in several other individuals in history as well as in contemporary times³.

Clubfoot is regarded as a developmental anomaly. A normally developing foot turns into a clubfoot during the second trimester of pregnancy. Ponseti described the clubfoot deformity as occurring mostly in the tarsus⁴. The tarsal bones, which are mostly made of cartilage, are in the most extreme positions of flexion, adduction, and inversion at birth. The talus is in severe plantar flexion, its neck is medially and planterly deflected, and its head is wedge-shaped. The navicular is severely medially displaced, close to the medial malleolus, and articulates with the medial surface of the head of the talus. In addition, the calcaneus is adducted and inverted under the talus. The ligaments of the posterior and medial aspect of the ankle and tarsal joints are very thick and taut, thereby severely restraining the foot in equinus and the navicular and calcaneus in adduction and inversion. The soft tissues around the leg, foot and ankle are also abnormal in clubfoot. Excessive collagen synthesis in the ligaments, tendons, and muscles may persist until the child is 3 or 4 years of age and might be a cause of relapses⁴. Under the microscope, the bundles of collagen fibers display a wavy appearance known as crimp. This crimp allows the ligaments to be stretched. Gentle stretching of the ligaments in the infant causes no harm. The crimp reappears a few days later, allowing for further stretching. That is why manual correction of the deformity is feasible⁴.

A variety of classification systems based on clinical examination have been devised, the most common being the Pirani system which has been shown to have good interobserver reliability and reproducibility⁵,⁶. Children born with CTEV face a lifetime of pain in the feet and inability to wear normal shoes with the associated social stigmatization that comes from living with the deformity. The goal of treatment of clubfoot is to achieve a functional, pain-free, plantigrade foot with good mobility which does not require the patient to wear modified shoes⁷.

Treatment of CTEV has evolved over the last century from exclusively non-operative management, to mainly surgical correction of the deformity and back to mainly non-operative management. Historically, various methods of splinting, binding and casting have been explored over the many centuries during which clubfoot treatment has been recorded⁸. These efforts largely gave way to surgical treatment of the deformity in the early 20th century via various approaches, the most popular of which was the posteromedial release⁹,¹⁰,¹¹. These extensive posteromedial soft tissue releases were common before 1948, but often resulted in stiffness and recurrence¹². Joseph Hiram Kite introduced the principles of non-operative management of clubfoot with his method of serial manipulation and casting. Kite reported a success rate of 90% in patients whose treatment was started before one year of age with a cast duration of 26-49 weeks¹³,¹⁴. Other surgeons were however unable to produce similar results with Kite’s method, achieving only 20-50% success¹⁵. In 1948, Ignatio V. Ponseti at the University of Iowa, U.S.A, introduced his method of clubfoot treatment. He published the first results from patients he managed between 1948 and 1956 showing good results in 71% of his patients¹⁶. Acceptance of the technique was however
slow in the mainstream orthopaedic community until the results of long term follow up for his patients over a range of 10-27 years, showed that 90% of his patients were satisfied with their treatment outcomes\textsuperscript{12}. Even longer follow-up results by Cooper and Dietz showed 78% excellent or good outcomes after a 30 year follow up\textsuperscript{17}. The good long term results from Ponseti’s method encouraged its adoption in many centres and several other surgeons were able to demonstrate high success rates using the Ponseti technique\textsuperscript{17,18,19,20}. In the last decade, it has been established that of the various surgical and non-operative treatment methods available, the most acceptable treatment currently for CTEV worldwide is serial manipulation and casting using the Ponseti method\textsuperscript{21,22}.

The Standard Ponseti clubfoot protocol traditionally consists of weekly manipulation and casting following a definite sequence to correct the deformity\textsuperscript{23}. Immediately after removal of the final cast, the feet are placed in an abduction brace which the child wears throughout the day for the first three months. The bracing duration is then reduced gradually until night-time bracing alone is done till the child is about 4 years old. Strict observance of the bracing protocol is essential to prevent relapse or recurrence.

The relative cheap cost of the casting procedure makes the treatment process particularly relevant to low income communities where a larger percentage of the CTEV patients live. Because many patients with the disease live far away from centres with the expertise for treatment, some parents are forced to relocate to these towns or cities for the duration of the manipulation and casting process. Other parents and care-givers have also desired a shorter casting period to reduce the difficulties faced in handling the casts. These difficulties have prompted investigators to consider various accelerated casting protocols to achieve a more rapid correction of the deformity. It was first revealed that casts changed every five days, instead of the originally prescribed seven days, gave the same results – potentially saving ten to 12 days in the initial casting phase\textsuperscript{24}. Some other studies have also shown evidence that more frequent casts may have similar outcomes with weekly casts using the Ponseti method\textsuperscript{25,26}.

The study was aimed at comparing the efficacy of management of idiopathic CTEV using the standard Ponseti protocol on one hand and an accelerated Ponseti protocol involving twice weekly manipulation and casting on the other hand.

**Patients and Methods**

The study was a case control study whose subjects were infants in the first three months of life who presented with idiopathic CTEV. Ethical approval for the study was obtained from the Ethics and Research Committee of the hospital. Infants who presented with CTEV were divided to two treatment groups after giving consent for inclusion into the study. Patients were randomly assigned to either group by alternatively allocating successive patients to the control and test group in that order according to their chronological hospital numbers. Randomisation was done at the patient level with both feet being treated by the same method in cases of bilateral CTEV.
The Standard Ponseti Protocol (SPP) was taken as the control group (group A), while the Accelerated Ponseti Protocol (APP) was the test group (group B). Group A was managed with the standard Ponseti protocol which consists of serial manipulation and casting which was done once weekly on Thursdays. The serial manipulation was done according to the technique described by Prof I. Ponseti with groin to toe casts applied after each manipulation until correction was achieved.\(^2\)\(^3\)

The test group (group B) was managed with an accelerated protocol consisting of identical serial manipulation and casting which was however done twice weekly (on Mondays and Thursdays) until full correction was achieved.

**Treatment protocol\(^2\)\(^3\):**

Before each cast is applied, the foot is manipulated. The first manipulation is aimed at correcting the cavus (high medial arch) by aligning the forefoot with the midfoot. Subsequently, the head of the talus is stabilised with the thumb of one hand while the forefoot is abducted with the talus serving as the fulcrum. The heel is not touched to allow the calcaneus to abduct with the foot. A light padding is applied on the limb from the toes to the groin. The foot is held in the maximum corrected position while a cast is applied from the toes to the knee. The cast is then molded, while maintaining correction. After moulding, the cast is then extended proximally to just below the groin. The casts are removed in the clinic at every visit and manipulation and casting is repeated weekly until all aspects of the deformity are corrected except the equinus. If there is a residual equinus deformity after other deformities are corrected, a percutaneous Achilles tenotomy is done in the clinic. The Achilles tenotomy involves severing the Achilles tendon about 1.5cm above its insertion into the calcaneus. A final cast is applied with the foot in hyperabduction and the ankle in dorsiflexion. The final cast remains in place for three weeks to allow healing of the Achilles tendon in the elongated state.

Both groups were managed by the same investigator who is a Ponseti clubfoot practitioner of 5 years’ experience. The severity of the deformity in all feet was scored using the Pirani scoring system at each presentation. The end point was determined as the day the last cast was removed after tenotomy had been performed (cavus, forefoot adduction, hind foot varus and equinus deformities are all corrected). This gave a plantigrade foot with Pirani score of 0 (foot abduction of 60\(^\circ\) and dorsiflexion of 15\(^\circ\)).

Children who had open wounds or other soft tissue injuries on the legs or feet that prevented application of the casts and those who had had prior treatment before presentation were excluded from the study.

The data collected was analyzed using the IBM® SPSS version 20.0\(^\circ\). Mean Pirani scores at the beginning of the treatment, and the number of days from application of the first cast to removal of the last cast was compared in both groups. The number of casts applied in both groups were also compared as well as the direct costs incurred for the casting and tenotomy in all patients.
Results

A total of 45 feet in 28 patients were studied. 23 feet in 14 patients were managed with the standard Ponseti protocol (Control group) while 22 feet in 14 patients were managed with the accelerated protocol (Test group). The patients were not matched for age or sex. The patients’ ages ranged from one to 90 days old at commencement of treatment with a mean age of 34.4 days in the SPP group and 56.9 days in the APP group. Male to female ratio was 2.5:1 in the SPP group and 1:1 in the APP group as shown in figure 1.

A total of 64% of the patients in the SPP group had bilateral CTEV, while only 57% of the patients in the APP group had bilateral CTEV as shown in figure 2. There was no significant difference in the Pirani scores at presentation between the SPP group (mean 5.0) and the APP group (mean 4.8) ($p=0.327$).
Figure 3. Number of cast sessions in each group

Figure 4. Penultimate cast applied for a patient in the APP group
All patients had complete correction of their deformity at the end of treatment and all but one had percutaneous Achilles’ tenotomy with the last cast kept in place for three weeks to allow the severed Achilles’ tendon time to heal. All patients had abduction braces applied on the final day of treatment.

Total treatment duration was found to be significantly shorter in the APP group than in the SPP group (p<0.001). The APP group completed their treatment within 39 days on average (range 32 – 49 days) compared with an average of 52 days (range 35 – 77 days) for the SPP group. The APP group however required a higher number of casts applications compared to the SPP group although this was not statistically significant (p=0.193). The number of casting sessions required in each of the groups is shown in Figure 3.

The patients in the APP group incurred higher treatment costs compared to those in the SPP group. (p = 0.039). An average of ₦6650 ($33.4) was spent by the patients in the APP group compared to ₦5560 ($27.9) in the patients in the SPP group.

Discussion

The male to female ratio amongst the 28 patients recruited was 1.5:1. While most studies have shown a male preponderance amongst patients with clubfoot deformity, no evidence was found in the literature suggesting a correlation between the patient’s sex and the severity of clubfoot27,28. Among the 28 patients studied, the ratio of bilateral to unilateral clubfoot was also 1.5:1. This corresponds well with results from other reports where the ratio of bilateral to unilateral clubfoot varies from 1:1 to 2:127,28. Patients with bilateral clubfoot had to have tenotomy and brace application at the same time in both feet. On the rare occasion where one of the feet was ready for tenotomy before the other in bilateral cases, tenotomy was delayed till the second foot was ready according to the Ponseti protocol.

The Ponseti method of clubfoot treatment has attained wide popularity in the last two decades and is currently accepted as the optimal treatment for congenital clubfoot deformity21,22. The Ponseti protocol described by Ignatio Ponseti prescribed a rigid sequence of weekly manipulation and cast application. Ponseti believed that a minimum of five days was required between each cast application. This study however employed a shorter duration between casts (twice weekly).

The study showed that patients who were treated with the accelerated Ponseti protocol of twice weekly casts were able to complete their treatment within a shorter period than those who went through the standard Ponseti protocol. The largest comprehensive study of an accelerated Ponseti method was undertaken by Morcuende et al who undertook a retrospective, non-randomized study of 319 feet in 230 patients with clubfoot who were treated over an 11 year period24. Their patients were divided into two groups based on their location. One group had an accelerated treatment with five-daily cast changes while the second group had the regular weekly cast changes. Their study showed no difference in the number of casts (four) required for treatment of both groups and consequently a shorter
overall treatment period in the five-day group compared with the standard weekly casts. Our study showed a shorter treatment duration with the twice weekly accelerated protocol, it however showed a higher number of cast changes to achieve correction with the accelerated protocol compared with the standard protocol. Morcuende et al performed percutaneous teno Achilles tenotomy for 83% of their patients (85% of the five day group and 81% of the seven day group). In our study, all feet except one, had percutaneous Achilles tenotomy (98%) and she happened to be in the SPP group. The reported tenotomy rates for patients managed by the Ponseti method vary from <50% to 100%. Morcuende et al thought that shorter casting intervals would give rise to problems with swelling in the cast but no patients developed this problem in our study. Harnett et al compared an accelerated Ponseti protocol of three-weekly casts with the standard Ponseti treatment in Malawi. The study involved 61 feet in 40 patients with 29 feet treated with the thrice weekly protocol and 32 feet treated with the standard weekly protocol. Their study showed no difference in the number of casts required between the accelerated group and the standard group. Three of the 19 patients in the accelerated group however did not respond to treatment and had to be switched over to the weekly group. Like this study, theirs did not show any evidence of problems with swelling in the casts despite the accelerated protocol.

Sutcliffe et al reported two cases of a four-weekly casting process using the Ponseti method from Tonga—the country with the highest worldwide incidence of congenital clubfoot. They showed consistent correction of the foot deformity with manipulation and casting, suggesting that manipulation and casting done four times a week is feasible as a treatment alternative for clubfoot. Their cases however involved more manipulation prior to casting than is normally performed. More manipulation prior to cast application for accelerated Ponseti protocols was first advocated by Xu R.J in his study on a twice weekly accelerated Ponseti treatment. Xu’s study also showed a shorter casting period in patients with the accelerated group compared with those managed with the regular Ponseti treatment. There was no significant difference in the number of casts required for either group in his report. He however advocated for a longer period of manipulation (two minutes) prior to casting in patients undergoing accelerated treatment protocols. Patients in our study had similar duration of manipulation in both the standard and accelerated groups. This may be responsible for the higher number of casts in the APP group in this study as compared to the Xu’s study. No reports could be found formally investigating the effect of more manipulation prior to casting though microscopic evaluation of the ligaments in the foot suggests that maintained loading promotes the lengthening or ‘uncrimping’ of these ligaments. Further investigations will need to be done to clinically evaluate the amount of manipulation that is necessary to provide maximum benefit before each cast application.

Because the direct costs of treatment depends on the number of times casts are applied as well as the number of materials used for each cast, patients in the APP group had on average, higher direct treatment costs than those in the SPP group from this study. The older average age at presentation in the APP group may also have resulted in more materials used for each patient hence increasing their direct costs. Overall cost of treatment
however includes cost of transportation, time off work for the caregiver to attend the clinic as well as cost of relocation to treatment centres for those who live far from the Ponseti clinic. The overall cost benefit analysis will therefore need to take these other indirect costs into consideration.

Patients in locations where skill for percutaneous tenotomy is scarce may benefit from accelerated Ponseti protocols that can enable the manipulation and casting process to be performed early enough to make use of available resources for tenotomy whenever it will be available. This was demonstrated in the report of Sutcliffe et al where a surgeon to perform the tenotomy was not always present.

For the purposes of this study a prolonged follow up of the patients to monitor for recurrence or relapse was not possible. It is therefore not known if there was any difference in the rate of relapse or recurrence between both groups studied. Other studies have failed to show any significant difference in the relapse or recurrence rates between patients managed by the standard Ponseti method and those managed with accelerated methods. The two groups were not matched for age and sex. While there is no evidence to show worse outcomes in any gender, older patients at presentation potentially have longer durations of treatment for the same degree of severity because of possible stiffness of the joints. Randomization was done at presentation and the age of all patients recruited was limited to 90 days of life to reduce this bias.

Conclusion

The study has demonstrated that faster correction of idiopathic clubfoot deformity can be achieved with an accelerated Ponseti protocol of twice weekly casts. The accelerated protocol did not demonstrate any untoward effects in terms of swelling of the feet in the casts. Though the number of casts required to achieve correction was higher with the accelerated protocol, further evaluation will be necessary to show if an increase in direct costs incurred from the casts is offset by the time saved in a faster completion of the treatment process. Further studies will also be necessary to show what socioeconomic circumstances of the patient will enable them benefit more from an accelerated or from the standard Ponseti protocol for management of their clubfeet.

References


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This is a case report of a fifteen years old male patient from north Shoa about one hundred and twenty km from the capital city of Ethiopia., who was having a knock-knee deformity since child hood. Even he didn’t remember when he started to notice it. Finally about six months back one remote relative was visiting him and brought him to our Hospital where I gave him hope by telling him that is manageable and I did convince him that he will have a corrected knee within a short period of time and all families were happy. Finally patient was admitted and investigated then I did a two stage procedure (osteotomy-osteoclasis) where on immediate post-operative day it was notable the correction and after a month the cast was removed where the limb was straight.

Key words: Osteotomy, osteoclasis, genuvalgum

Introduction

Genuvalgum deformity is physiological in small children. It is normal part of development and may not cause any symptoms but when it comes to adults and bigger children it manifests as pain in the affected knee and also atypical and awkward walking is noticed. The most common location is distal femur although proximal tibia can be in some cases.in Ethiopia Most children who had had this deformity accept it as if it is a bad omen or something which happen to them due to supernatural power. Most families will not bring such children to the hospital instead they hide them behind the curtain in fear of the stigmata of disability.

Case report

This is a fifteen years old male patient from north Shoa about one hundred and twenty KM from Addis Ababa who came to our Hospital with the knock knee deformity since childhood where was investigated and assessed where he had atypical gait pattern. The positive physical finding were typical knock knee deformity and increase inter malleolar distance. For which I did two stage procedure done one after the other with interval of eight days and safely achieved the correction of deformity.

Technical description

Under general anesthesia and method of asepsis, sterile drapes applied and above knee tourniquets applied. Medial longitudinal incision done. Wound is opened layer by layer and reached bone with minimum spillage of blood. Then I did open wedge osteotomy of distal
femur in a triangular fashion with open angle on the medial side and close the wound without correction of the deformity. Then I applied a long leg cast with the deformity. After a week I did castotomy in the same fashion as the operation and patient was taken to Operation Theater where under general anesthesia I did correct the deformity by closing the wedge. A week lap is taken before closing the wedge b/c the hematoma will organize and the osteoblasts commences to lay down osteoid. With that complete correction achieved and the defect was casted in a correct position. That was followed by physiotherapy. There was no need to staple, to plate, to fix with foreign object. The figures below show the pre-operative, immediate post-operative, and final appearances.

Figure 1

Figure 2

Figure 3
Discussion

Knock knee deformities are a normal part of development, not uncommon to see in children between three and six years of age (physiologic genu valgum). At this time the anatomical angle can be as high as fifteen degree of valgus. This physiological genu valgum gradually remodels to the adult average value of five to seven degree valgus. If deformity persists to the adult age not only the mechanics of gait compromised there is also significant angular deformity and pain in the legs. If deformity persists surgical treatment is the best option of management. In our case I used a two stage procedure osteotomy—osteoclasis and the result was inspiring. Thus this procedure is safe and better way of treating genu valgus deformity in bigger children and in adult.

Conclusion

Osteotomy osteoclasis is the safest way of treating genu valgus deformity even in areas of limited resource. Health education to families of the disabled to bring their children with such deformities to the Hospital.

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Pin Tract Infection after Uniplanar External Fixation of Open Fractures at a National, Teaching and Referral Hospital

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Background: Pin tract infection is the most common complication of external fixation accounting for 43% of complications. The presence of a pin tract infection leads to subsequent pin loosening and fixation failure. It also delays conversion of an external fixator to internal fixation until clearance of the infection is achieved. The incidence of pin tract infections in our setting is not known. This study was aimed at determining the incidence and microbe profile of pin tract infection in patients who have undergone uniplanar external fixation following open fractures at Kenyatta National Hospital.

Methods: Consecutive sampling of patients who had undergone uniplanar external fixation at Kenyatta National Hospital (KNH) was done between September 2016 and December 2016. 73 patients were recruited. Data concerning presence of pin tract infection was collected. Patients with discharging sinuses had a culture and sensitivity done while those with major pin tract infection had immediate x-rays done to rule out radiological changes.

Results: Incidence of pin tract infection was 87.7% (64 of 73 patients). Staphylococcus aureus (30.2%) and coagulase negative staphylococci (16.3%) were the commonest causative organisms.

Conclusion: The incidence of pin tract infection after uniplanar external fixation is high. Better surgical technique and pin-site care is recommended. Staphylococcus aureus is the leading cause of pin site infection.

Introduction

The incidence of pin tract infections is highly variable. Parameswaran et al. in a level 1 trauma setting involving 285 patients with external fixators reported the incidence to be 11.2%, his study was retrospective. Schalamon et al studied the incidence of pin tract
infections in 30 patients of the paediatric age group and found it to be 52%2. Aronson and Tursky in their study of femur fractures involving 42 children found an incidence of 85%3. Regionally, a study by Jellis et al in Lusaka, Zambia, compared the rate of severe pin tract infection in HIV negative and positive patients, his sample size was 47 patients, and he found the rate of severe pin tract infection in HIV positive patients to be only 7% 4.

Most pin site infections are secondary to *Staphylococcus aureus*, followed by *Pseudomonas aeruginosa*. Other organisms that are common include *Escherichia coli, Enterobacteraerogenes, Staphylococcus epidermidis* and *Acinetobacter*5, 6. Multiple factors are associated with the development of pin tract infections including the stability of the external fixator, the type of external fixator, the biomaterials used in the external fixator, the fracture pattern, pin insertion technique used, pin site care, duration of hospital stay and presence of co-morbid conditions such as presence of HIV in the patient. There are several ways of classifying pin tract infections. Two examples are the DAHL classification and the Checketts –Otterburn classification 7. The latter is more commonly used as it also gives treatment guidelines.

**Patients and Methods**

This study was a prospective cross-sectional study, with consecutive sampling of patients. The study was conducted at the orthopedic wards and clinics of Kenyatta National Hospital (KNH). KNH is a metropolitan, tertiary, referral and teaching hospital in Nairobi. It has a 2000 bed capacity and is one of the two main referral hospitals in Kenya, also serving the greater East and Central Africa region. The study duration was between September 2016 and December 2016. The inclusion criteria were patients aged between 18 – 65 years who have undergone uniplanar external fixation after open fractures and have given consent.

Exclusion criteria included patients with known co-morbidities conditions that may increase likelihood of infection such as human immunodeficiency virus infection, diabetes mellitus, liver failure, renal failure, tumours and smoking were excluded – these conditions were thought that they will increase the rate of pin tract infection.

The sample size calculated using Cochran formula (8) was 73. Data concerning presence and grade of pin tract infection was collected. A simplified form of Chicketts-Otterburn classification was used for grading. This is shown below.

**Table 1. Grading of Pin Tract Infection**

<table>
<thead>
<tr>
<th>Grade</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade 1</td>
<td>Redness, Tenderness and no Discharge</td>
</tr>
<tr>
<td>Grade 2</td>
<td>Presence of Discharge</td>
</tr>
<tr>
<td>Grade 3</td>
<td>As in no. 2 but with no Improvement on Oral Antibiotics</td>
</tr>
<tr>
<td>Grade 4</td>
<td>Pin Loosening Present</td>
</tr>
<tr>
<td>Grade 5</td>
<td>Radiographs Show Osteopenia around the Pins</td>
</tr>
<tr>
<td>Grade 6</td>
<td>Radiographs Show Sequestrum and Involucrum</td>
</tr>
</tbody>
</table>
Follow up of patients was done on week 1, week 2 and week 6. All patients with pus discharge had a pus swab for culture and sensitivity.

**Method of obtaining a pus swab:** the area around the infected pin was cleaned with normal saline to remove excess debris or excess necrotic tissue. Excess normal saline after the cleaning process was then removed using sterile gauze. Gloves were changed and sterile ones used. A pus swab was squeezed in between the pin site and the surrounding soft tissue. The aim was to obtain soft tissue exudates from the site of the pins. The swab was placed in Amies transport medium and sent to the lab within 1 hour of collection.

Pus swabs taken were incubated at 37 degrees Celsius for 16 – 18 hours. Both aerobic and anaerobic cultures were done. Aerobic culture medium used was the Sheep Blood Agar or MacConkey agar. Anaerobic cultures were done using Wilkins Chalgren Amikacin Agar Positive aerobic and anaerobic cultures were tested for sensitivity to various antibiotics. All patients had a check x-ray done 6 weeks post external fixation to rule out any radiological involvement around the pins. In addition, patients with major pin tract infection (Chicketts grade 4 and above) had an immediate check x-ray done to rule out radiological involvement. These patients were determined by the presence of pin loosening clinically. The collected data was analyzed using the SPSS version 20. Approval to conduct the study was sought from the Department of Orthopedic Surgery, University of Nairobi as well as Kenyatta National Hospital, Ethics and Research Committee (KNH/UON-ERC). Participants in this study or their next of kin were required to give a written informed consent.

**Results**

Seventy three patients (73) were recruited into the study and followed up for 6 weeks. No patient was lost to follow up as the follow up period was short and most patients were admitted in the wards for longer than the follow up period. Fifty patients (68.5%) were male and 23 patients were female (31.5%). The patients’ age range was 18 to 64 years with a mean age of 34 years. The median age was 32 years with a standard deviation of 11. The diagnoses of patients recruited is summarized in Table 2.

**Table 2:** Diagnosis of patients recruited

<table>
<thead>
<tr>
<th>Site</th>
<th>Number of Patients</th>
<th>Percentage of Total Patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open Tibia-Fibular Fracture</td>
<td>57</td>
<td>78.1</td>
</tr>
<tr>
<td>Open Femur Fracture</td>
<td>10</td>
<td>13.7</td>
</tr>
<tr>
<td>Open Humerus Fracture</td>
<td>1</td>
<td>1.4</td>
</tr>
<tr>
<td>Open Radius Ulna Fracture</td>
<td>3</td>
<td>4.1</td>
</tr>
<tr>
<td>Combined Open Tibia-Fibular And Femur Fractures</td>
<td>2</td>
<td>2.7</td>
</tr>
<tr>
<td>Totals</td>
<td>73</td>
<td>100</td>
</tr>
</tbody>
</table>
### Table 3. Gustillo Classification of the Open Fractures

<table>
<thead>
<tr>
<th>Gustillo Anderson Grade of Open Fracture</th>
<th>Number of Enrolled Patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gustillo II</td>
<td>28</td>
</tr>
<tr>
<td>Gustillo IIIA</td>
<td>38</td>
</tr>
<tr>
<td>Gustillo IIIB</td>
<td>7</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>73</strong></td>
</tr>
</tbody>
</table>

### Table 4. Incidence of Pin Tract Infection in various fracture regions.

<table>
<thead>
<tr>
<th>Site</th>
<th>Number Enrolled</th>
<th>Number Infected</th>
<th>Percentage Infected</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open Tibia – Fibular Fracture</td>
<td>57</td>
<td>49</td>
<td>85.7</td>
</tr>
<tr>
<td>Open Femur Fracture</td>
<td>10</td>
<td>10</td>
<td>100</td>
</tr>
<tr>
<td>Combined Open Tibia – fibular And Femur Fractures</td>
<td>2</td>
<td>1</td>
<td>50</td>
</tr>
<tr>
<td>Open Humerus Fracture</td>
<td>1</td>
<td>1</td>
<td>100</td>
</tr>
<tr>
<td>Open Radius – Ulna Fracture</td>
<td>3</td>
<td>3</td>
<td>100</td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td><strong>73</strong></td>
<td><strong>64</strong></td>
<td><strong>87.6</strong></td>
</tr>
</tbody>
</table>

### Table 5. The incidence of pin tract infections in the various Gustillo Classifications

<table>
<thead>
<tr>
<th>Gustillo Anderson Grade of Open Fracture</th>
<th>Number Enrolled</th>
<th>Number Infected</th>
<th>Percentage Infected</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gustillo II</td>
<td>28</td>
<td>20</td>
<td>71.4</td>
</tr>
<tr>
<td>Gustillo IIIA</td>
<td>38</td>
<td>37</td>
<td>97.4</td>
</tr>
<tr>
<td>Gustillo IIIB</td>
<td>7</td>
<td>7</td>
<td>100</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>73</strong></td>
<td><strong>64</strong></td>
<td><strong>87.6</strong></td>
</tr>
</tbody>
</table>
Sixty-four patients (87.7%) had pin tract infection at some point during the 6 weeks follow up; only nine patients (12.3%) did not develop any grade of pin tract infection throughout the follow up period of 6 weeks. The incidence of pin tract infection in the various fracture regions is shown in Table 4. The pin tract infection grades at different periods of follow up are shown in Figure 1 below. The incidence of pin tract infections in the various Gustillo Classifications is shown in Table 5. The incidence of pin tract infection and duration of hospital stay is shown in Figure 2 below. The organisms responsible for pin tract infection are shown in Figure 3 below.
Discussion

The incidence of pin tract infection was quite high at 87.7%. This compared to a similar study done by Aronson and Tursky who quoted an incidence of 85% - this study involved 132 pediatric age group patients. The incidence was however significantly higher than that quoted by Parameswaran et al of 11.2%. His study involved 285 patients in a level 1 trauma centre but was retrospective.

Despite the high incidence, all the infections were minor – either grade 1, 2 or 3 infection based on the Checketts-Otterburn classification system. None of these infections involved the bone; all were actually soft tissue infections around the pin-sites. This may be possibly explained by the limited follow up period of only 6 weeks as bone infection may take longer to occur.

In keeping with other studies done by Antoci et al and Mahan et al, Staphylococcus aureus was the commonest organism responsible for pin tract infection. Other common organisms isolated - coagulase negative staphylococci, Pseudomonas species, Enterobacter species, Escherichia coli-were also the same ones quoted by these studies.

Conclusions

The incidence of pin tract infection after uniplanar fixation of open fractures in KNH is high (87.7%). Most of these infections are minor – involving soft tissues only. Staphylococcus aureus and coagulase negative staphylococci are the main causative agents of pin tract infection accounting for almost half the cases of infection.
Recommendations

1. Better surgical technique and pin site care is needed to reduce the incidence of pin tract infection.
2. Anaerobic organisms seldom cause pin tract infection and anaerobic cover may not be necessary when treating such.

Acknowledgements

Mrs. Asaneth Nyandika of Pathologists Lancet Kenya for her analysis of the lab samples.

References

Background: The aim of this study was to determine prevalence and factors associated with surgical site infection at Muhimbili Orthopedic Institute.

Method: This was a cross-sectional study conducted at Muhimbili Orthopedic Institute (MOI) in Dar es Salaam, from August, 2015 to October 2015. Convenience sampling technique was used to recruit postoperative patients for this study. Standardized questionnaires were used to obtain demographic, social, and clinical information from respondents. Determination of the relationship between outcome and exposure variables was done using chi square test. Multivariate logistic regression was used to measure the association after controlling for confounders. Odds ratio corresponding to 95% confidence interval with a p value of ≤ 0.05 was considered significant.

Results: Out of 300 study participants 75(25.0%) had surgical site infection. This was highly determined by more than 2 hours length of surgical procedure (AOR= 1.4; 95%CI 1.14-6.69; P value=0.05), none prophylactic use of antibiotics (AOR= 3.4; 95%CI 1.6-7.78; P value=0.03), more than one week stay before surgery (AOR=3.3; 95%CI 2.24-3.34; P value =0.00).

Conclusion: The overall prevalence of surgical site infection at Muhimbili Orthopedic Institute was high. This was associated with more than 2 hours length of surgery, lack of prophylaxis use, and pre-operative hospital stay.

Introduction

Surgical site infections (SSIs) in orthopaedic surgery are globally common and continue to be a major problem among orthopaedic patients. A surgical site infection is clinically defined as presence of pain at a surgically created wound, which is accompanied by erythema, induration and local tenderness or presence of purulent discharge at wound site. Surgical
site infection (SSI) is the infection which occurs within 30 days after surgery or one year if implant left in the site after procedure [5-7]. Worldwide, orthopaedic SSI rates range between 1.4 and 41.9% [3, 8]. Surgical site infections in orthopedic practice can have significant effects on quality of life for the patient. They are associated with considerable morbidity, financial burden to the patient and health care providers and extended hospital stay. Other effects of SSIs include revision surgery, delayed wound healing, increased use of antibiotics, all of which have a significant impact on patients and the cost of health care [1-5, 11].

To alleviate the problem of SSIs among orthopaedic cases several measures have been recommended and taken into action. These include appropriate timing of prophylactic antibiotics administration at about 30 minutes prior incision, use of appropriate antiseptic agents and techniques for surgical site skin preparation, reduction of movements and number of staff in the operating rooms and protection of incision site with sterile dressings [3, 5, 6]. Little is known about the magnitude and risk factors for SSIs among orthopaedic cases in our environment as a limited number of studies about SSIs have been conducted in Tanzania which mainly based on general surgical patients [12]. More over there is no recent survey done on SSI in orthopaedic patients in our setting. Therefore this study determined the magnitude and factors that contribute to post operative surgical site infection in patients with skeletal trauma at Muhimbili orthopaedic institute.

**Patients and Methods**

This study was conducted at Muhimbili orthopedic Institute which is the main referral hospital for orthopedic cases in Dar es Salaam, Tanzania. This was a hospital based cross-sectional study conducted from August, 2015 to October 2015. The study population included patients who had undergone long bones surgical operation admitted in the wards and those attended at the out patients department (OPD) for follow up. Both elective and emergency operated patients were involved. Patients who had initial trauma surgery at another hospital or those who presented with SSIs after being treated at an outside hospital, those with metastatic fractures, back, spine were not included as they fall under different realms. Hand and finger injuries were also excluded from the study. The sample size was calculated to be 300 participants.

Data collection was done from Monday to Friday from 8 am to 2 pm and the convenience method of sampling was used to select participants. All post operative patients who met the inclusion criteria were included in the study. Prior to an interview informed consent was obtained and then by using a standardized questionnaire a participant was asked a series of closed questions about their demographic, clinical and social background information which included the age, sex, marital status, education level, length of surgical procedure, antibiotic use, health condition before surgery, place of dressing, HIV status, length of hospitalization, and time of stay prior surgery. Then the wound site was examined for at least one of the following signs or symptoms of wound infection: pain or tenderness, localized swelling, redness and purulent discharge [4, 5]. The patients` files were also reviewed. Data entry and analysis was carried out using SPSS computer software version 20 and frequency tables.
Descriptive analysis was done by using frequencies, percentages and means where appropriate. Association between explanatory variable and the outcome of interest was done using 2×2 tables. Multivariate logistic regression analyses were used to examine independent variables that influence the outcome variable. Odds Ratios with corresponding 95% confidence interval are presented. All independent variables found significant in the univariate analysis were included in the multivariate analysis. A P-value of ≤ 0.05 was considered statistically significant. Ethical clearance for conducting this research was obtained from the Institutional Research Board of the Hubert Kairuki Memorial University and the permission to carry out the study was obtained from the Muhimbili Orthopedic Institute administration.

Results

The study involved 300 patients. Most of cases were aged below 46 years and the peak age was under 30 years of age. The median age was 46.5 (15-78) years and each group of males and females accounted for almost a half of the study population. About 159 (53.0%) participants were married and 125 (41.7%) had primary education level (Table 1).

Table 1. Frequency Distribution of Demographic Data (N=300).

<table>
<thead>
<tr>
<th>Demographic characteristics</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age</strong></td>
<td></td>
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</tr>
<tr>
<td>15-30</td>
<td>135</td>
<td>45.0</td>
</tr>
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<td>31-46</td>
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<td>47-62</td>
<td>48</td>
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</tr>
<tr>
<td>63-78</td>
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<td>5.0</td>
</tr>
<tr>
<td><strong>Sex</strong></td>
<td></td>
<td></td>
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<tr>
<td>Male</td>
<td>152</td>
<td>50.7</td>
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<tr>
<td>Female</td>
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<td><strong>Marital status</strong></td>
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<td>53.0</td>
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<tr>
<td>Not married (single, divorced, widow, widower)</td>
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<tr>
<td><strong>Education level</strong></td>
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<td></td>
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<tr>
<td>Primary</td>
<td>125</td>
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<td>Secondary</td>
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<td>29.7</td>
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<td>Collage/University</td>
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Table 2. Frequency Distribution of Clinical Characteristics of Study Participants

<table>
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<th>Clinical characteristics</th>
<th>Frequency</th>
<th>Percentage</th>
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<td><strong>Length of surgical procedure</strong></td>
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<td></td>
</tr>
<tr>
<td>Two hours</td>
<td>208</td>
<td>69.3</td>
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<tr>
<td>More than two hours</td>
<td>92</td>
<td>30.7</td>
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<tr>
<td><strong>Use of prophylaxis</strong></td>
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<td></td>
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<tr>
<td>Yes</td>
<td>270</td>
<td>90.0</td>
</tr>
<tr>
<td>No</td>
<td>30</td>
<td>10.0</td>
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<td><strong>Health Condition before surgery</strong></td>
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<tr>
<td>Sick</td>
<td>82</td>
<td>27.3</td>
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<td>Well</td>
<td>218</td>
<td>72.7</td>
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<td><strong>Place of dressing</strong></td>
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<td>Hospital</td>
<td>276</td>
<td>92.0</td>
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<td>Home</td>
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<td>8.0</td>
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<tr>
<td><strong>HIV Status</strong></td>
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<tr>
<td>Positive</td>
<td>34</td>
<td>11.3</td>
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<tr>
<td>Negative</td>
<td>201</td>
<td>67.0</td>
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<tr>
<td>Not tested</td>
<td>65</td>
<td>21.7</td>
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<td><strong>Length of hospitalization</strong></td>
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<td>Less than seven days</td>
<td>217</td>
<td>72.3</td>
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<td>More than seven days</td>
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<td><strong>Time of Stay before Surgery</strong></td>
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<td></td>
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<tr>
<td>Two days</td>
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<td>27.3</td>
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<tr>
<td>More than a week</td>
<td>125</td>
<td>41.7</td>
</tr>
<tr>
<td>More than a month</td>
<td>32</td>
<td>10.7</td>
</tr>
<tr>
<td>Emergency</td>
<td>61</td>
<td>20.3</td>
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</table>

The proportion of surgical wound infection among study participants.
Out of 300 study participants surgical wound infection was observed in 75(25.0%) cases. Surgical site infection was common among those aged above 46 years and in HIV negative patients (P values >0.087). Females, unmarried participants, and those with no formal education commonly developed SSI (P values <0.049). But on multivariate logistic analysis this observation was statistically insignificant. The duration of surgery in most of patients, 69.3% (208/300), was less than 2hours and wound sepsis occurred frequently among those who were operated for more than two hours, 35.5% (33/92). This finding was statistically significant even on multivariate logistic regression analysis.

The majority of cases, 90% (270/300), were given prophylactic antibiotics prior incision. SSI occurred commonly among individuals who did not receive prophylactic antibiotics, 56.7% (17/30), and statistically this result was significant even after controlling for confounders.
**Table 3. Factors associated with Surgical site infection, N=300**

<table>
<thead>
<tr>
<th>Factors</th>
<th>Sepsis (%)</th>
<th>Total (%)</th>
<th>( \chi^2 )</th>
<th>p-value</th>
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<tr>
<td><strong>Age</strong></td>
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<tr>
<td>15-30</td>
<td>30(22.2)</td>
<td>135(100.0)</td>
<td>6.73</td>
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<td>31-46</td>
<td>22(21.6)</td>
<td>102(100.0)</td>
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<tr>
<td>47-62</td>
<td>16(33.3)</td>
<td>48(100.0)</td>
<td></td>
<td></td>
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<td>63-78</td>
<td>7(46.7)</td>
<td>15(100.0)</td>
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<tr>
<td><strong>Sex</strong></td>
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<td></td>
<td></td>
<td></td>
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<tr>
<td>Male</td>
<td>30(19.7)</td>
<td>152(100.0)</td>
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<td>Female</td>
<td>45(30.4)</td>
<td>148(100.0)</td>
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<tr>
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<td>159(100.0)</td>
<td>9.17</td>
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<td>8(100.0)</td>
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<tr>
<td><strong>Length of surgical procedure</strong></td>
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<tr>
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<td>42(20.2)</td>
<td>208(100.0)</td>
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<td>More than two hours</td>
<td>33(35.9)</td>
<td>92(100.0)</td>
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<tr>
<td><strong>Use of prophylaxis</strong></td>
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<tr>
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<td>58(21.5)</td>
<td>270(100.0)</td>
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<td>30(100.0)</td>
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<tr>
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<td>218(100.0)</td>
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<td><strong>Place of dressing</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hospital</td>
<td>65(23.6)</td>
<td>276(100.0)</td>
<td>3.87</td>
<td>0.049</td>
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<td>Home</td>
<td>10(41.7)</td>
<td>24(100.0)</td>
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<td><strong>HIV Status</strong></td>
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<tr>
<td>Positive</td>
<td>8(23.5)</td>
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<td><strong>Length of hospitalization</strong></td>
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<tr>
<td>Less than seven days</td>
<td>22(10.1)</td>
<td>217(100.0)</td>
<td>19.58</td>
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<td>More than seven days</td>
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<td>81(100.0)</td>
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<td>More than a month</td>
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<td><strong>Time of stay before surgery</strong></td>
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<td></td>
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<tr>
<td>Two days</td>
<td>8(9.8)</td>
<td>82(100.0)</td>
<td></td>
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<tr>
<td>More than a week</td>
<td>43(34.4)</td>
<td>125(100.0)</td>
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<tr>
<td>More than a month</td>
<td>10(31.3)</td>
<td>32(100.0)</td>
<td>19.48</td>
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<td>61(100.0)</td>
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Table 4. Multivariate Logistic Regression on Factors Associated with SSI (n=300)

<table>
<thead>
<tr>
<th>Factors</th>
<th>Sepsis (%)</th>
<th>Total (%)</th>
<th>AOR</th>
<th>95% CI</th>
<th>P- value</th>
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<td><strong>Sex</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>30(19.7)</td>
<td>152(100.0)</td>
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</tr>
<tr>
<td>Female</td>
<td>45(30.4)</td>
<td>148(100.0)</td>
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<td>0.343-1.136</td>
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<td></td>
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<tr>
<td>Two hours</td>
<td>42(20.2)</td>
<td>208(100.0)</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>More than two hours</td>
<td>33(35.9)</td>
<td>92(100.0)</td>
<td>1.4</td>
<td>1.14-6.69</td>
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<td><strong>Use of prophylaxis</strong></td>
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</tr>
<tr>
<td>Yes</td>
<td>58(21.5)</td>
<td>270(100.0)</td>
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<tr>
<td>No</td>
<td>17(56.7)</td>
<td>30(100.0)</td>
<td>3.4</td>
<td>1.6-7.78</td>
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</tr>
<tr>
<td>Well</td>
<td>44(20.2)</td>
<td>218(100.0)</td>
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<tr>
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<td>0.467-1.66</td>
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<td><strong>Time of stay before surgery</strong></td>
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<td>82(100.0)</td>
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<td>More than a week</td>
<td>43(34.4)</td>
<td>125(100.0)</td>
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<td>2.24-3.34</td>
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<td>1.13-3.36</td>
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<td>61(100.0)</td>
<td>1.6</td>
<td>0.99-1.8</td>
<td>0.24</td>
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</table>

Wound dressing in the majority of patients was being done in the health facility, 92.0% (276/300), SSI affected commonly those participants who were being cared for their wounds at their homes, 417% (10/24). But this observation was statistically insignificant when analyzed by multivariate logistic regression. Surgical site infection was common among
those who had no HIV infection 27.4% (55/201). Nevertheless this finding was not statistically significant. A total of 83 (27.7 %) of the 300 patients stayed in the hospital for less than 7 days. The majority (52.4%) of cases stayed for more than 1 week in the hospital before surgery. Prolonged hospitalization for more than one week duration of hospital stay prior surgery are statistically associated with development of SSI (Tables 3 and 4).

**Discussion**

Surgical site infection is a major problem among orthopaedic patients. The prevalence of SSI in the current study is higher than that reported by other authors. However, similar prevalence of SSI was observed in other studies done by. The reasons for high prevalence of SSI in this study could be due to inadequate adherence to aseptic techniques perioperative, a significant number of cases having contaminated wounds during surgery, overcrowding of patients in the wards causing high cross infection, inadequate knowledge and poor adherence to aseptic practice in wound care among health personnel causing wound contamination and infection.

As regards to studied factors that contribute to SSI various factors were significantly associated with occurrence of SSI. There is a direct relationship between development of surgical site infection and the length of surgery. Orthopaedic surgeries done for more than 2 hours are at higher risk of infection. Similar finding was noted in the present study. High risk of infection in prolonged surgeries may be due to increased tissue and surgical instruments exposure to the environmental bacteria, surgical team exhaustion enhancing poor adherence to aseptic techniques and decreasing of patient’s micro-organisms systemic defenses as same as it was explained by others.

The use of anti microbial prophylaxis in orthopaedic surgery is important as it helps to minimize or eradicate endogenous microbes and prevent SSI. Prophylactic antibiotics help to decrease SSI rates to 1-3% compared with 4-8% without prophylactic antibiotics. Timing of antimicrobial prophylaxis is extremely important as it is related to the rate of SSI. Antimicrobial prophylaxis should be administered ideally within 30 minutes to 1 hour prior incision. The above explanation given by is confirmed by this survey as most of the patients who did not use prophylactic antibiotics developed SSI and equal observations were reported by other surveyors.

Prolonged hospital stay generally pause a higher risk of developing surgical site infection. This is evidenced by the findings of this current analysis whereby prolonged hospitalization for more than a week was noted to be highly a risk factor for SSI. In particular to preoperative duration of hospital stay the present study observed a significant association between prolonged preoperative length of stay for more than 7 days and occurrence of SSI which is corresponding to the findings obtained in other previous studies. The likely explanation for these observations may be increased preoperative hospital stay period predisposes to skin colonization by hospital microbes that are resistant to antibiotics and so it is important to minimize preoperative hospitalization period in order to lower SSI rate. However found preoperative length of hospitalization not to have
any association with development of SSI. This difference might be reflecting low rate of hospital acquired cross infection or absence of overcrowding there setting. It may also be due to the fact that compared their cases based on more or less than 4 days pre operative hospital stay while in the current and other studies based on seven days.

Although SSI was high in aged patients (>45 years of age) in the present analysis, but this finding was not statistically significant likewise the findings of the study done by 2, 3, 10 indicating age alone not to be a risk factor for SSI. However other authors 1, 11, 13 stress old age to be a risk factor for development of SSI probably mainly due to the elderly associated morbid conditions like depression of the body immunity, reduced appetite causing poor nutrition status and diabetes mellitus 11.

Post surgical appropriate wound care is among the important aspects in reduction of SSI rate. Experts reports that inappropriate wound care contributes to as high as 10% of SSI 14, 16. In this survey some patients were being cared for their wounds at their home places by health care personnel and this was not associated with occurrence of SSI depicting place of wound dressing not to be a mere risk factor for SSI rather than aseptic dressing techniques and other already explained factors.

The presence of the underlying disease processes, systemic infections, metabolic imbalance or endocrine disorders increases the incidence of postoperative SSI. Failure of the immune system in HIV infected patients increase the possibility of developing surgical site infections post operatively 17, 18, 19. In the current study HIV infection was not statistically significantly associated with development of SSI as similar as it was documented by other surveyors (20, 21) reflecting HIV per se not to be a major risk factor for SSI development in orthopaedic practice. However, this observation might be due to small sample size analysed in these studies. In this analysis gender had no influence on occurrence of SSI as same as it was documented in other studies, 4, 5, 7, 8, 11, 13. Also in this study, marital status and level of education were not found to influence development of SSI.

**Conclusion and Recommendation.**

Surgical site infection rate is high at MOI and the independent risk factors for SSI were length of surgical procedure for more than two hours, lack of use of prophylactic antibiotics, prolonged pre operative hospital stay and prolonged hospital stay for more than 1 week. It is therefore recommended that the hospital staff to adhere to aseptic practices and appropriate use of prophylactic antibiotics. The hospital management should try to set the environment that will ensure that cases are managed promptly and discharged home early to minimize acquisition of cross infection.

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Barriers and Factors Affecting Personal Protective Equipment Usage in St. Mary’s Hospital Lacor in Northern Uganda

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Background: To protect health workers (HCWs) from risky occupation exposure, CDC developed the universal precautions (Ups) including Personal Protective Equipment (PPEs). However compliance to it by HCWs has remained poor even in high-risk clinical situation. The objective of this study was to identify and describe the factors that influence a HCWs’ decision to wear PPEs and the barriers that exist in preventing their use.

Methods: A cross-sectional survey was carried out in the St. Mary’s Hospital Lacor in all the wards to collected quantitative information as well as qualitative and observational data on PPE use.

Results: Out of the total 59 respondents, 2% do not know the purpose of PPE, 23.7% do not know how to don and doff PPEs, 13.6% do not use PPE even when indicated and 10% are not using an appropriate PPE. The main barriers relates to poor fitting and weak domestic gloves, few of aprons, frequent stock out and inadequate PPE as well as lack of training in PPE.

Conclusion: This study provides a baseline for measuring the effectiveness of interventions to improve compliance.

Introduction

Worldwide, three million Health Care Workers (HCWs) experience per-cutaneous exposure to blood-borne viruses such as hepatitis B, hepatitis C and HIV per year¹. To mitigate this danger, CDC developed the universal precautions (Ups) in 1987 and later updated it in 1996². Compliance with UPS protects health worker as well as reduces their risk of infections³,⁴. Related to Universal precaution practices, proper donning and doffing of Personal Protective...
Equipment (PPE) has been identified as key in reducing muco-cutaneous injuries and contact with Blood Body fluid splash. The use of PPE is essential in Infection Control (IC) and protects HCWs from acquiring dangerous infection and diseases of epidemic proportion. However, compliance with universal precautions amongst HCWs is poor even in the face of high-risk clinical situations.

Lack of comfort/fit, and fogging of eyewear and the need to scratch as well as young age and lack of safety training has been reported as the main impedance to use of PPE. Furthermore, amongst HCWs a large proportion (76%) feel the barrier to PPE use relates to inadequate training in the use of PPE. Being too busy to wear PPE and, not using PPE because colleagues also do not use or feeling that PPE may offend patients, and discomfort in PPE use was reported to be a significant barrier to PPE use amongst the nurses compared to doctors ($P < 0.004$) by Kotwal and Taneja.

In Uganda, very few studies, with varying focus and differing research setting, have been conducted in this field. Thus, the present study was conducted to assess the knowledge, practices and barriers to compliance to PPE among HCWs in St. Mary’s Hospital Lacor to help target any appropriate intervention programs. St. Mary’s Hospital Lacor is a large private not for profit health facility located in Northern Uganda, has 482 beds and is a teaching hospital for Gulu University faculty of Medicine. The main objective of this study was to identify and describe the factors that influence a HCWs’ decision to wear Personal Protective Equipment (PPE) and the barriers that exist in preventing their use.

**Subjects and Methods**

A cross-sectional survey was carried out in the St. Mary’s Hospital Lacor in March 2017 all the wards were included. The survey was done during the morning duty shift, the respondents consisted of, Nurses, nursing aids, cleaners and doctors on morning duty. Morning duty is often characterized by ward hygiene, cleaning, Bed making, collection of samples, ward round, wound dressing, drug administration and injection. Those working in the outpatient unit, labour room, and Operation Theater were excluded because they form a different PPE user category.

Data was collected qualitatively and quantitatively. Qualitative data collection comprised of observation as well as interview of ward staff by a trained research assistant while quantitative data was collected by filling a self-administered World Health Organisation (WHO) PPE standardized questionnaire by respondents. Data was collected by trained research assistants who were also available for consultation. Respondents offered verbal consent prior to administration of the questionnaire. Data was entered and analysed using SPSS version 15. Chi square test was used for comparing proportions and statistical significance was taken as $P \text{ value } \leq 0.05$.

**Results**

Approximately 65 respondents fill a self-administered questionnaire, but 6 were invalid hence only 59 cases were analyzed. Table 1 show that all categories of health workers
participated in the study. However, the biggest proportion was formed by enrolled nurses 22%, followed by Registered nurses (15.3%) nursing aids (13.6%), cleaners (8.5%) and doctors (5.1%). There was a group who preferred not to state their employment carder and this were particularly from Obstetric ward. Perhaps they feared being personally identified during analysis.

Distribution of the Wards
From Table 2, all the wards in St. Mary’s Hospital Lacor participated in the study. Obstetric ward represented the biggest proportion (17%) followed by the Children ward and the septic surgical ward - surgery 1 (11.9%) where all surgical patients with septic lesion like necrotizing fasciitis, osteomyelitis, abscesses, urosepsis etc are admitted. Casualty, burns unit and Gyn ward accounted for 10.2% each while surgery 2 (the clean surgical unit), Isolation unit, and Medicine ward accounted for 8.5% each.

Factors and Barrier affecting PPE Usage
According to Table 3, approximately 30.5% of the hospital employees have had NO training on PPE use. Most of the respondents stated that they only learnt about PPE on their job, this lack of training could affect compliance to PPE use. Furthermore, 23.7% of the HCWs in our hospital do not know how to don and doff PPEs. Only 86.4% of staffs don PPE when carrying a procedure that necessitates use of PPE and 13.6% do not use PPE even when indicated. Even when all the respondents know and agree that PPEs are important in their day to day job, availability and access to PPE is still a problem, with 57.6% of respondents stating that PPEs are inadequate in the ward where they work. On any one day, 10% of the HCWs in the hospital are not using an appropriate PPE and 56% aver that there are problem that affect use of PPE and indeed 2% of staffs do not know the purpose of PPE in their Jobs. Approximately 10% of the respondent reported that use of PPEs is not promoted and enforced in their respective wards, a function incumbent on the ward in-charge.

However by comparison, Doctors and RNs were more likely to use PPEs compared to Enrolled nurses and cleaners (P-value 0.009) and some Wards (Burns unit, Surgery 1, Children ward, and Medicine) were more likely to have adequate PPEs available for the day to day ward work than Surgery 2, Obstetrics, Gynecology,, TBW, ISO) P-value 0.001. It appears therefore that some ward in-charges do not enforce availability, access and use of PPEs.

Problems affecting PPE Use
Qualitative analysis revealed that there was a problem with the domestic gloves, either were too large and fell off from the hand or were weak and easily tore. It was cumbersome to use such gloves for cleanliness. Nurses were observed to be wearing examinations gloves during ward cleaning. They said “The Black domestic gloves are too large and easily falls off from our hands, the yellow one is weak & perforates easily”
Table 1. Carder of Employees

<table>
<thead>
<tr>
<th>Qualification</th>
<th>Frequency</th>
<th>Percent (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cleaner</td>
<td>5</td>
<td>8.5</td>
</tr>
<tr>
<td>Nurse aid</td>
<td>8</td>
<td>13.6</td>
</tr>
<tr>
<td>Enrolled nurse</td>
<td>13</td>
<td>22</td>
</tr>
<tr>
<td>Registered nurse</td>
<td>9</td>
<td>15.3</td>
</tr>
<tr>
<td>Doctors</td>
<td>3</td>
<td>5.1</td>
</tr>
<tr>
<td>Not stated</td>
<td>19</td>
<td>32.2</td>
</tr>
<tr>
<td>Mid wife</td>
<td>2</td>
<td>3.4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>59</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

Table 2. Distribution of the Wards

<table>
<thead>
<tr>
<th>Ward</th>
<th>Frequency</th>
<th>Percent (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surgery 1(Septic)</td>
<td>7</td>
<td>11.9</td>
</tr>
<tr>
<td>Surgery 2 (Clean)</td>
<td>5</td>
<td>8.5</td>
</tr>
<tr>
<td>Obstetric ward</td>
<td>10</td>
<td>16.9</td>
</tr>
<tr>
<td>Gyn ward</td>
<td>6</td>
<td>10.2</td>
</tr>
<tr>
<td>Children Ward</td>
<td>7</td>
<td>11.9</td>
</tr>
<tr>
<td>Medicine</td>
<td>5</td>
<td>8.5</td>
</tr>
<tr>
<td>Isolation</td>
<td>5</td>
<td>8.5</td>
</tr>
<tr>
<td>TB ward</td>
<td>2</td>
<td>3.4</td>
</tr>
<tr>
<td>Casualty</td>
<td>6</td>
<td>10.2</td>
</tr>
<tr>
<td>Burns unit</td>
<td>6</td>
<td>10.2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>59</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

Table 3. Appraisal of PPE Usage Aspects

<table>
<thead>
<tr>
<th>PPE Appraisal Item</th>
<th>Affirmative (Frequency)</th>
<th>NO (Frequency)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do you know purpose of PPE in job</td>
<td>58 (98%)</td>
<td>1 (2%)</td>
</tr>
<tr>
<td>Have you had any training in PPE use</td>
<td>41 (69.5%)</td>
<td>18 (30.5%)</td>
</tr>
<tr>
<td>Do you know how to wear and remove a PPE</td>
<td>45 (76.3%)</td>
<td>14 (23.7%)</td>
</tr>
<tr>
<td>Is the Use of PPE promoted on your ward</td>
<td>53 (90%)</td>
<td>6 (10%)</td>
</tr>
<tr>
<td>Do you use PPE all the time when indicated</td>
<td>51 (86.4%)</td>
<td>8 (13.6%)</td>
</tr>
<tr>
<td>Is the PPE in use adequate for you day to day work</td>
<td>25 (42.4%)</td>
<td>34 (57.6%)</td>
</tr>
<tr>
<td>Have you used PPE in the last 24hours</td>
<td>53 (90%)</td>
<td>6 (10%)</td>
</tr>
<tr>
<td>Do have you problems in using PPE</td>
<td>33 (56%)</td>
<td>26 (44%)</td>
</tr>
<tr>
<td>Do you think PPE is important in your day to day work</td>
<td>59 (100%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>59</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>
Aprons were few on the wards, and in some wards they were only selectively used and reserved for procedures and some carders. Some wards lacked even a single apron. There was lack of storage room for PPEs, they kept them in the toilet.

“Aprons in our ward is used during evacuation only”…said one staff of Gynae ward. “In isolation ward we have no aprons”….said staffs of Isolation ward.

**Problem Affecting PPE Use**

From Figure 1, the main problems affecting PPE availability, access and use included inadequate quantity, PPE being too large and easily falls of, particularly the domestic gloves that is used for cleaning. Frequent stock out of PPE as well as lack of training are amongst the problem facing PPE use. However a big proportion did not specifically state their main impediment to PPEs.

![Bar chart showing the main problems affecting PPE availability, access and use. The chart indicates that the main problems are inadequate quantity, PPE being too large, stock out, and lack of training.](image)

**Figure 1. Problem of PPE Usage**

**Discussion**

Proper use and compliance to PPE protocol is particularly important when carrying out invasive surgical procedures. It (PPE) provides health care workers with a barrier to prevent human contact with viruses like Ebola and potential transmission of the disease. In a meta-analysis, Verbee, Ijaz, Mischke, Ruotsalainen, Mäkelä *et al*, (2016)\(^9\) found that gowns protected better than aprons, while double gloving led to less contamination compared to single gloving (Relative Risk (RR) 0.36; 95% CI 0.16 to 0.78) and training at least reduced non-compliance with doffing procedures (OR 0.45; 95% CI 0.21 to 0.98). Much as training is important in ensuring compliance to PPE use, 30.5% of our staffs report having no training in PPE. It is therefore important to address this concern as soon as possible.
In this study, poor fitting and uncomfortable PPE was reported highly on domestic gloves used for cleaning. This type of PPE is commonly used by cleaners, nursing aid, and nurses during ward hygiene. Kotwal and Taneja (2010) reported similar factor as a barrier to PPE use predominantly amongst the nurses. This study found that cleaners and enrolled nurses are less likely to use PPE compared to Registered nurses and doctors. This could be related to training and awareness of the importance of PPE. On a day by day basis, 10% of the hospital staff carry out procedures without using PPE even when indicated. Similar result was found by MacFarlane, Chapman, Benke, et al. (2008) where they found, up to 10–40% of farmers routinely do not use PPE at all. Besides discomfort, PPE introduces additional physiological burden to the user in terms of increase in heat stress, heart rate and core temperature significantly. This could affect compliance to the recommended PPEs unless there is system for cooling the room. Some barrier to PPE use however are personality and behavior related, or example in one study setting, attending surgeons were least likely to use PPE compared to surgery residents and 84% paramedics, believe Eye protection, and wearing masks interfere with some medical procedures.

Inadequacy, poor access and unavailability of the PPE itself were report by 57.6% of the hospital staff. They reported frequent stock outs of PPE, inadequate number of PPE such that there is total lack of aprons in some wards and in some wards only certain procedures are allowed to use PPE while others are not. According to our findings 10% of the wards do not promote the use of PPE and some are more significantly like to have PPE than others. According to Rahel, Jack, Jennifer et al. (2008), lack of access to safety devices is major barrier to their use hence increased availability, training, and improvement of safety equipment are needed to better PPE compliance. Work-to-rest ratio that avoids dehydration and reducing heat stress are addition measures that improves PPE compliance. It is therefore important to make PPEs available, train HCWs in their use as well as make the PPE and its user ergonomically friendly in order to address PPE barrier.

**Conclusion**

Compliance with universal precautions is poor amongst HCWs and this study provide a baseline for measuring the effectiveness of interventions to improve compliance.

**Acknowledgment**

To members of the Infection control committee and ward in-charges of St Mary’s Hospital Lacor.

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Pattern and Management of Priapism in a Tertiary Hospital of North- Western Nigeria

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https://dx.doi.org/10.4314/ecajs.v22i1.9

Background: Priapism is a persistent penile erection that continues for more than four hours beyond sexual stimulation and orgasm or unrelated to sexual stimulation¹. The objective is to document the pattern and management of priapism in our hospital.

Methods: This is a retrospective study of patients managed for Priapism by Urology Unit of our hospital, from January 2009 to December 2015.

Results: Thirty patients were managed for managed for priapism within the study period. The mean age at presentation was 23.9 ± 12.2 years with a range of 8–55 years. Fifteen patients (57.7 %) presented beyond 72 hours of the onset of priapism. All the patients had ischaemic priapism. Half of the patients had sickle cell disease, two (7.7 %) had chronic myeloid leukaemia, five (19.2%) used aphrodisiacs and cause was not established in six (23.1%). The most effective forms of treatments were corporal aspiration and glanulocavernosal shunt. Hydroxyurea was used for the patients with leukaemia. Thirteen (50.0%) of the patient's were loss to follow-up after their first visits. Three patients (11.5%) developed erectile dysfunction.

Conclusion: Sickle cell disease is the commonest cause of ischaemic priapism in our practice. Late presentation is common and is usually associated with the development of erectile dysfunction.

Keywords: priapism, sickle cell disease, aphrodisiacs, erectile dysfunction, treatments of ischaemic priapism

Introduction

Priapism is a persistent penile erection that continues for more than four hours beyond sexual stimulation and orgasm or unrelated to sexual stimulation ¹. There is dysfunction of mechanisms regulating penile tumescence, rigidity and flaccidity ²,³. Priapism can be ischaemic (low flow), non-ischaemic (high flow) or stuttering ⁴. Stuttering priapism is characterized by pattern of recurrence and historically described as unwanted painful erections in men with sickle cell anaemia ⁵. Ischaemic priapism is a urologic emergency which requires prompt diagnosis and urgent intervention to prevent erectile dysfunction. Interventions done beyond 48 hours may only relieve the priapic state and pain but may do
Ischaemic priapism is painful, with little or no arterial blood flow resulting in time–dependent alteration in the corporal metabolic environment leading to progressive hypoxia, hypercapnia and acidosis. In Western world, ischaemic priapism is usually idiopathic or due to use of aphrodisiacs more especially intracavernosal injections for erectile dysfunction while haematological disorders, more especially sickle cell disease, are the commonest cause in our environment. Aghaji et al. reported use of aphrodisiacs to be the commonest cause in Nigerian adults but more recent studies by Badmus et al., Ajape et al., Omisanjo et al. and Ekeke et al. showed sickle cell disease to be the commonest aetiologic factor in Nigeria. We carried out this study to document the pattern and management of priapism in our institution.

**Patients and Methods**

Records of patients managed for priapism at Urology Unit, Department of Surgery, of our hospital, from January 2009 to December 2015 were retrospectively retrieved. The following information was extracted; socio-demographic features, presentation, duration of symptoms before presentation, type of priapism, aetiology of priapism, clinical examination findings, results of laboratory investigations, treatment offered, and duration of admission and complications. The laboratory investigations include haemoglobin genotype, peripheral blood film, full blood count and electrolyte urea and creatinine. Data was entered into a structured proforma and analysed using SPSS version 20.0 for windows.

**Results**

Thirty patients were managed for priapism within the study period, but full records of only 26 patients were retrieved. The mean age of the patients was 23.9 ± 12.2 years (8-55 years). Only eight patients (30.8%) presented within 24 hours of the onset of priapism. Of the 18 patients (69.2%) that presented beyond 24 hours, six (23.1%) presented after a week (Table 1). The mean duration of priapism was 110.6 ± 91.9 hours. Twenty four patients (92.3%) had hard woody penis with dark tarry blood aspirated from the corpora. Two patients (7.7%) had stuttering priapism and the penis was flaccid at presentation.

**Table 1. Duration of Priapism before Presentation**

<table>
<thead>
<tr>
<th>Duration of symptoms</th>
<th>Number of patients</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>24 hours</td>
<td>8</td>
<td>30.8</td>
</tr>
<tr>
<td>24-48 hours</td>
<td>3</td>
<td>11.5</td>
</tr>
<tr>
<td>72 hours</td>
<td>5</td>
<td>19.2</td>
</tr>
<tr>
<td>&gt; 72 hours- 1 week</td>
<td>4</td>
<td>15.4</td>
</tr>
<tr>
<td>&gt;1-2 weeks</td>
<td>6</td>
<td>23.1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>26</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>
Table 2. Aetiology of Priapism in our environment

<table>
<thead>
<tr>
<th>Aetiology</th>
<th>Number of patients</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sickle Cell Disease</td>
<td>13</td>
<td>50.0</td>
</tr>
<tr>
<td>Chronic Myeloid Leukaemia</td>
<td>2</td>
<td>7.7</td>
</tr>
<tr>
<td>Idiopathic</td>
<td>6</td>
<td>23.1</td>
</tr>
<tr>
<td>Aphrodisiacs</td>
<td>5</td>
<td>19.2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>26</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

All the 26 patients had ischaemic or low flow priapism. The commonest aetiologic factor was haematologic disorders which were found in 13 patients (57.7%). Of the five patients (19.2%) that used aphrodisiacs, two used overdose of sildinafil citrate and three used herbs to enhance their sexual performances. Other details of the aetiologic factors were shown in Table 2.

All the patients were counseled about the disease, possible outcomes and that even though intervention may relieve pain and priapic state, it does little in preservation of potency. Erectile dysfunction may occur later more especially in those that presented after 48 hours. Corporal aspiration with or without irrigation, percutaneous shunts, caveroglandular shunt were performed for thirteen (50%), three (11.5%) and ten patients (38.5%) (Table 3). Twenty two patients (84.6%) had immediate detumescence following surgical intervention. Four patients (15.4%) with minimal or no detumescence after the intervention had penile fibrosis and oedema. In the 2 patients (7.7%) with CML, initial corporal aspiration and irrigation was not effective, but they had detumescence after cytoreduction with hydroxyuria. Two patients (7.7%) refused caveroglandular shunt and left against medical advice after corporal aspiration and irrigation with partial detumescence. Other details of surgical interventions are shown below (Table 3)

Table 3. Surgical Interventions for Priapism

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>corporal aspiration</td>
<td>5</td>
<td>19.2</td>
</tr>
<tr>
<td>Corporal aspiration + irrigation</td>
<td>8</td>
<td>30.8</td>
</tr>
<tr>
<td>Winters shunt (percutaneous)</td>
<td>2</td>
<td>7.7</td>
</tr>
<tr>
<td>Caveroglandular shunt (AL-ghorab)</td>
<td>10</td>
<td>38.5</td>
</tr>
<tr>
<td>Ebbehoj shunt (percutaneous)</td>
<td>1</td>
<td>3.8</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>26</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>
Erectile dysfunction and high flow priapism occurred in 3 patients (11.5%) and 1 patient (3.8%) respectively. The mean duration of admission was (7 days ± 1.5 days). Nine patients (34.6%) did not return for follow-up after discharge, and 13 patients (50.0%) were loss to follow-up after the first visit. The longest follow-up was five years in a patient with erectile dysfunction.

**Discussion**

Ischaemic priapism is a urologic emergency and a form of compartment syndrome that requires immediate corporal decompression to prevent corporal ischaemia, acidosis, fibrosis and subsequent erectile dysfunction. It affects young age group in our environment with significant negative impact on their quality of life. The mean age of our patients was 23.9 years which was comparable to 25.4 years and 20.4 years reported by Omisanjo et al.\(^9\) and Badmus et al.\(^9\) in the South-Western part of Nigeria. Ekeke et al.\(^10\) who studied adult population in Port-Harcourt reported median age of 30 years. All our patients were male and had ischaemic priapism as reported by the previous studies.\(^9\)-\(^13\) Clitoral priapism is rare,\(^3\),\(^10\) and we did not record it in our series. Some researchers suggested high incidence of female genital mutilation to be a factor in a rarity of clitoral priapism.\(^10\)

The risk factors for it, such as use of specific classes of medications (alpha adrenergic blockers, antidepressants), diseases that alter clitoral blood flow and clitoral vascular anomalies leading to clitoral engorgement such as Persistent Genital Arousal Disorder (PGAD) are rare in our environment.\(^3,14,15\) The mean time of presentation in this study (110 hours) was longer than what was reported by Omisanjo et al.\(^13\) (74.4 hours) but shorter than other studies by Badmos et al.\(^9\) (192 hours) and Ekeke et al.\(^10\) (144 hours). Generally, patients in our environment present after 48 hours unlike what happened in the Western World where patients usually present within 24 hours.\(^10\) Even though our intervention relieved the acute pain, it did little in preserving the potency. Therefore, the patients in the long run are predisposed to the development of erectile dysfunction which was recorded in only three of the patients probably due to poor follow-up. These patients had evidence of penile fibrosis on presentation. The patients could not present early despite painful erection due to cultural inhibition about sexual matters, ignorance and poverty. A good number of them presented initially to general practitioners, chemists, herbalists and peripheral hospital before referral to our facility. In Pohl’s series,\(^16\) delay of five days between the onset and intervention did not affect the prognosis much. He reported that 65% and 40% regained potency when intervention was instituted between five and ten days of the onset of priapism.

Some of our patients were newly married young men that took herbs and overdose of sildenafil citrate to enhance sexual performance. It is a tradition in this environment to use all kinds of herbs and concoctions by newly married individuals male and females to enhance sexual performance. This preserves self esteem and continuity of marriage as the first coitus reflects the man’s potency.

The commonest aetiologic factor in our series was haematologic disorder (57.7%) with sickle cell disease alone accounting for 50% of the cases. This was similar to the findings by...
Badmus et al, Omisanjo et al, Ekeke et al where sickle cell disease accounted for 87.6%, 63% and 55.6% of their cases respectively. In Ekeke series haematological disorders accounted for 66.7% of the ischaemic priapism, where as in our study they accounted for 57.7% of our patients. These comprise sickle cell disease and CML in the two studies. Idiopathic causes and use of aphrodisiacs predominates in Southern Nigeria and Europe, accounted for 19% and 23% of our patients respectively.

Corporal aspiration was less affective (42.3%) in our series compared to the one reported by Omisanjo et al (78.3%). This difference can be accounted for by the late presentation in our patients and thus presence of corporal injury and oedema. Lawani et al reported cavernotomies to be effective. Al-ghorab shunt was effective in all the ten patients that had the procedure in our series. This is a procedure of choice when aspiration and percutaneous shunt failed which is common in late presentation. The average duration of admission of our patients was seven days which was longer than 5.8 days reported by Omisanjo et al. Some of the patients need longer admission to allow for resolution penile oedema and turgidity following intervention. The patients with CML stayed up to two weeks on hospital admission due the time required to achieve effective cyto-reduction and to establish appropriate maintenance dose for hydroxyuria by the haematologist.

Only 13 patients (50.0%) reported for follow up at the first visit while the rest were loss to follow-up. This is similar to what we observed in the follow up of other urologic diseases. Most of the patients are poor, ignorant and cover long distance before they reach our facility. Our patients come regularly for follow-up when they have complaints. Erectile dysfunction was seen only in three patients (11.5%) which might be accounted by erratic follow-up. Most of these patients are young, not yet sexually active which makes the complaints of erectile dysfunction less worrisome. They may later represent to other physicians with erectile dysfunction after getting married or when sexually active. Bertolotto et al reported a case of high flow priapism following Winter shunt due to injury to dorsal artery. This rare complication was observed in one patient in our series which was managed conservatively. He had initial corporal aspiration which we thought had failed and he subsequently had Al-ghorab shunt. The patient was one of those patients that did not report for any follow-up visit.

Conclusion

Haematologic disorders are the commonest cause of priapism in our environment. The most effective forms of treatments were corporal aspiration and distal shunt. The mean time of presentation of our patients was late with attendant susceptibility to erectile dysfunction. This complication is likely to have been under reported in our series due to erratic follow-up by the patients.

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Management of Undescended Testes: A Retrospective Study from a Tertiary Hospital in Ethiopia

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Background: Undescended testis is one of the commonest congenital malformations seen in boys. The aim of this study is to evaluate the pattern of presentation, approach to diagnosis, treatment and follow up in Tikur Anbesa Specialized Hospital, a tertiary teaching hospital in Ethiopia.

Methods- This is a retrospective cross sectional study of all boys with undescended testis operated in Tikur Anbesa Specialized Hospital between September 2012 and August 2014.

Results: Of 82 boys operated within the study period, 66 boys with 78 undescended testes are studied. Twenty-six percent (17/66) came before the age of 2 years, while the majority of the study group, 50% (33/66), presented beyond 5 years of age. Of the 17 boys brought to the hospital before 2 years, only 41% (7/17) of them were treated before the age of two years. The majority 89% (59/66) of the boys were treated after 2 years of age. Seventy-one testes of 78 [91%] were in the inguinal canal, 5 were intra-abdominal and 2 were absent. 46% (36/78) were on the left side, 29% (23/78) on the right side and the rest were bilateral. Among the 54 boys who had ultrasound examination, the ultrasound report is consistent with operative findings in 33 [61%]. Associated congenital malformations were found in 31.8% (21/66) of the boys. Hypospadia was the predominant malformation comprising 38% (8/21) of the total congenital malformations. Orchidopexy was done for 82% (64/78) of the total testes, orchietomy was done for 9% (7/78) and biopsy was taken in 1 case. Among the total operated boys only 62% (41/66) were followed in our clinic; of those who had follow up 10% (4/41) testes atrophied and 1 [2%] testis retracted.

Conclusion: Boys with undescended testes present and are treated late in Tikur Anbesa Hospital. As opposed to the literatures most of the undescended testes were found on the left side. Ultrasound examination cannot be the only mode of examination for undescended testes as it misses more than one third of the cases. Hypospadia is the commonest associated congenital malformation. Post operative follow up is very poor after treatment for undescended testes

Introduction

Undescended testes (UDT) is a common congenital malformation in boys. The prevalence of undescended testes in term infants, according to European literature, is 1 to 3%. A study out of Nigeria estimates the prevalence in Africa to be 0.8 to 2% among term infants. The
prevalence is higher in premature boys 15 to 30%, and drops to 1% at one year of age. Unless treated, descent after this time is not expected.

Undescended testes develop progressive histological changes during the first few years of life, such as defective transformation of gametocyte and loss of germ cell. These changes are apparent from two years of age onwards. Loss of seminiferous tissue may cause atrophy of the testes. The histological changes observed in cryptorchidism are most likely due to temperature-related damage and low fertility. The testis may undergo torsion or sustain trauma, and the risk of malignancy in undescended testis is relatively high.

As in any clinical evaluation of all other patients, boys with undescended testes deserve proper history taking and physical examination. History and physical examination is indispensable in early detection and management of this problem. The current diagnostic standard is laparoscopy; it is also valuable for treatment of undescended testis.

Successful scrotal repositioning of the testis may reduce, but does not prevent, the potential long-term issues of infertility and testicular cancer, and appropriate counseling and follow-up of the patient are essential. According to a study of 51 formerly cryptorchid subjects who had undergone surgery in the first 2 years of life, sperm count and motility were normal in more than 95% at 18-26 years of age, with even better fertility prognosis if Orchidopexy was performed during the first year of life (96.3% for both normal sperm count and sperm motility).

Patients and Methods.

This is a retrospective cross sectional study conducted in Tikur Anbesa Specialized Hospital (TASH). The study included all boys with undescended testes operated between September 2012 and August 2014. Operation log book was used as the initial source of patient information. Registration numbers of operated boys were collected from the operation log book, and then corresponding charts were collected from the chart room. The history, physical examination, ultrasound findings, operation note and the follow up notes were documented from individual files.

Results

During the study period, 82 boys underwent operations for undescended testes. Of these cases, 66 charts were retrieved. These 66 boys with a total of 78 undescended testes were included in the study. The median age at presentation was 60 months [range: 2 months to 156 months]. Seventeen boys (25.8%) presented from birth to 23 months of age, 24.2% (16/66) presented between 24 months to 59 months of age, 28.8%(19/66) presented between 60 months to 119 months and 21.2% (14/66) presented at 120 months and above. (Table 1).

Of the 66 boys brought for medical attention, 17 (26%) came before the age of two years, 7 (10.6%) were treated before age 2. Ten (15%) who came before the age of two years didn’t get the surgical treatment in time. Nineteen boys (28.8%) were treated between the age of
24 to 59 months, 24 [36.4%] underwent operations between the ages of 60 and 119 months, and 16 [24.2%] were treated after the age of 120 months (Table 2). Eighty-two percent (54/66) cases were unilateral while 18% (12/66) were bilateral. Left sided undescended testes was found in 55% (36/66), while 27% (12/66) were on right side and 12 18% (12/66) were bilateral (Table 3).

**Table 1. Age at Presentation in Months**

<table>
<thead>
<tr>
<th>Age in month</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;24</td>
<td>17</td>
<td>25.8</td>
</tr>
<tr>
<td>24 to59</td>
<td>16</td>
<td>24.2</td>
</tr>
<tr>
<td>60 to 119</td>
<td>19</td>
<td>28.8</td>
</tr>
<tr>
<td>&gt;120</td>
<td>14</td>
<td>21.2</td>
</tr>
<tr>
<td>Total</td>
<td>66</td>
<td>100</td>
</tr>
</tbody>
</table>

**Table 2. Age at Presentation and Age at Treatment Categorized**

<table>
<thead>
<tr>
<th>Age in Months at presentation</th>
<th>Age in Months at treatment categorized</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>&lt;24</td>
<td>24-59</td>
</tr>
<tr>
<td>&lt; 24</td>
<td>7</td>
<td>3</td>
</tr>
<tr>
<td>24-59</td>
<td>0</td>
<td>13</td>
</tr>
<tr>
<td>60-119</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>120+</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>7</td>
<td>19</td>
</tr>
</tbody>
</table>

**Table 3. Affected side**

<table>
<thead>
<tr>
<th>Unilateral/Bilateral</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bilateral</td>
<td>12</td>
<td>18</td>
</tr>
<tr>
<td>Unilateral</td>
<td>54</td>
<td>82</td>
</tr>
<tr>
<td>Total</td>
<td>66</td>
<td>100</td>
</tr>
</tbody>
</table>
Ninety-one percent (71/78) testes were found in the inguinal canal, 6% (5/78) were found intra-abdominal, 3% (2/78) were not found after exploration of inguinal canal and abdominal cavity [absent testis]. See table 4

Fifty-four boys of the 66 underwent ultrasound. The operative finding and ultrasound report were consistent in 33 [61%] of boys, and the report was different from operative findings in 21 [39%]. Twelve cases have no ultrasound report. No proper description of physical finding of the scrotal status or the status of the testes is mentioned in any of the cases.

Associated congenital malformations were found in 32% (21/66) of the boys. Hypospadias was found in 9 (43%), Hirschsprung’s disease (HSD) accounted for 10% (2/21) of congenital abnormalities, renal abnormalities [ectopic kidney, hydronephrosis] were in 2 [10%] and others (Table 5).

Table 4. Site of Testes

<table>
<thead>
<tr>
<th>Site</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>In the inguinal canal</td>
<td>71</td>
</tr>
<tr>
<td>Intra abdominal</td>
<td>5</td>
</tr>
<tr>
<td>Not found [Absent testes]</td>
<td>2</td>
</tr>
</tbody>
</table>

Table 5: Associated Anomalies

<table>
<thead>
<tr>
<th>Congenital malformation</th>
<th>Number of boys</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypospadias</td>
<td>9</td>
</tr>
<tr>
<td>HSD</td>
<td>2</td>
</tr>
<tr>
<td>CNS</td>
<td>2</td>
</tr>
<tr>
<td>Cerebral palsy</td>
<td>1</td>
</tr>
<tr>
<td>Seizure disorder</td>
<td>2</td>
</tr>
<tr>
<td>Kidney</td>
<td>1</td>
</tr>
<tr>
<td>Ectopic</td>
<td>1</td>
</tr>
<tr>
<td>Hydronephrosis</td>
<td>1</td>
</tr>
<tr>
<td>Hydrocele</td>
<td>2</td>
</tr>
<tr>
<td>Umbilical hernia</td>
<td>2</td>
</tr>
<tr>
<td>ARM</td>
<td>1</td>
</tr>
<tr>
<td>Micropenis</td>
<td>2</td>
</tr>
<tr>
<td>Cataract [bilateral]</td>
<td>1</td>
</tr>
</tbody>
</table>
**Table 6**: Management Outcome

<table>
<thead>
<tr>
<th>Management Outcome</th>
<th>Number</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not known [disappeared from follow up]</td>
<td>25</td>
<td>38%</td>
</tr>
<tr>
<td>Normal</td>
<td>36</td>
<td>88%</td>
</tr>
<tr>
<td>Atrophied</td>
<td>4</td>
<td>10%</td>
</tr>
<tr>
<td>Recurrent Undescended testis</td>
<td>1</td>
<td>2%</td>
</tr>
</tbody>
</table>

Orchidopexy was performed for 82% (64/78) of undescended testes; 9% (7/78) underwent orchiectomy, 4 testes [5%] are fixed somewhere in the inguinal canal and a biopsy of 1 testes [1%] was taken. Two testes were not found on exploration. Post-operative follow up was conducted for a minimum of 3 months. Twenty-five boys [38%] were lost to follow up, 41 boys [62%] had follow-up for more than 3 months. Among boys who had post operative follow up, four [10%] boys had atrophied testes and one [1%] had recurrent undescended testis (Table 6).

**Discussion**

In accordance with the recommendation of diagnosis and treatment of UDT only 17 boys [26%] presented for medical attention before the age of 2 years. Of these only 10.6 % got treatment before the age of 2. The vast majority of children, 49 of 66 boys 74% presented after 2 years of age. Fourteen boys 21% were older than 10 years at the time of presentation. This could be an indicator for lack of awareness of the parents either about the presence of the pathology or lack of knowledge of the treatability of the problem, lack of access to health facility, poverty or a combination of reasons. Birth attendants, who are conducting the delivery, might not have awareness of the need to examine the gross abnormality such as undescended testis to detect the problem at an earlier age, so that further follow up can be made.

A Similar study conducted in Nigeria, Lagos shows 25% of the boys were treated before the age of 2 years ¹; another study conducted in Nnwi [South East Nigeria] on 71 boys with 86 UDT revealed 33.3% of boys with undescended testes were treated before the age of 2 years ². At the University of Benin [Benin City], 43.7% boys were treated at the age of 5 years and below ³. At Medical College Hospital, Alappuzha, Kerala, India, and n Zaria, Nigeria, the percentage of patients who underwent Orchidopexy before the age of 2 years is 19.4% and 11% respectively ⁴ ⁵. That 10.6 % of our patients presented after 2 years of age shows a similar trend to other low resource setting. Of those 17 (26%) boys brought to our hospital, only 7(10.6%) boys got treatment before the age of 2 years. This is also an indicator of significant delay of treatment even after the children were seen in our hospital. Therefore, the problem of early management is seen at all levels.
Ultrasound study was performed for preoperative evaluation of 54 boys. For 12 cases preoperative evaluation of ultrasound was performed. Of the 54 ultrasounds conducted, the preoperative finding is consistent with the intra-operative finding in 33 cases (61%). The sensitivity in this study is 61%. A study out of the University of California, San Francisco showed a sensitivity and specificity of 45% and 78%, respectively. In a study out of the Benin University teaching Hospital in 2008, ultrasound was used to localize only 10 [11.6%] of the testis. In Zaria, Nigeria, Ultrasonography was performed for three non-palpable testes but was not helpful (9). Our data adds to this literature which suggests that ultrasound may not be a reliable investigative tool for non-palpable testes as it is unable to efficiently rule-out intra-abdominal testes.

Previous work suggests that laparoscopic Orchidopexy presents excellent results in terms of diagnosis and therapy of the impalpable testis, our department should strive to use of laparoscopy for the management of impalpable testis. In our study, of the 66 boys with undescended testes 12 [18%] were bilateral, 18 [27%] were on the Rt. Side and 36 [55%] were on the Lt. Side. The usual teaching that UDT is common on the right side is not seen in this study. But this finding is in line with the study conducted in University of Benin which showed 47.9% left side, 31.0% on the right side and 21.1% bilateral. The reason for the predominance on the left side seen in this study and others needs further investigation. The occurrence of bilateral undescended testis is apparently less common when compared with the other studies.

Congenital malformation was found in 32% of the study population [21 of the 66 boys]. Hypospadia is the most common associated congenital malformation. It accounts for 38% of congenital malformations and it is found in 14% of the study group. Renal, central nervous system and intestine are the common organs where malformations are detected in this study. From this study it is realized that boys presented with undescended testes should be investigated for associated congenital malformations. A study done in Lagos University teaching Hospital where 56 boys with undescended testes were examined revealed 6 [10.7%] of congenital malformation of which 5 [83.3% of the congenital abnormalities] were hypospadias. The combination of Hypospadia and undescended testicle sometimes indicates a disorder of sexual differentiation, and additional investigation like karyotyping and hormonal assays are recommended to investigate the malformations. Therefore, while we are planning to manage undescended tastes, we need to investigate for any associated congenital anomaly.

Of the 78 UDT 91% testes were detected in the respective inguinal canal, 6% were intra-abdominal, 3% was not found on exploration, 9% testes were atrophied on first evaluation. Orchidopexy was done for 64 testes, orchiectomy was done for seven testes; four of the UDT were fixed somewhere in the inguinal canal. A study from Tanzania revealed 70% of UDT were inguinal and 30% cases are abdominal and 26.7% were atrophied.

It is difficult to draw conclusions about the management outcome from this study as many of our patients were lost to follow up. Twenty-five (38%) of the study group was lost to follow up. In our setting, there are many reasons for high levels of loss to follow up. Parents
may not be given enough information about the need for proper follow up, problem of distance [accessibility], and others. From the 41 boys on follow up 4 [10%] testes were atrophied, and there was one case of recurrence. The 4 atrophied testes were in those boys treated beyond the age of 5 years and one child with recurrence was treated before the age of 5 years. Similar study conducted in Dar-es-Salaam reported that 29.8% of post operative patients had atrophied testicles 13. At the University of Benin, 10 boys [14.1%] were found to have atretic testicles and all were detected in boys treated above the age of 5 years. It was found out that 11.1% of total testes were atrophic/vanished in the review from Kerala 8. Our atrophy rate is also similar with the reports from centers in other developing countries.

Limitations

The major limitation in this study was lack of proper patient record keeping. In this study, it is seen that number of patients operated within the study period was 82, but only 66 cards were found. The other 12 [15%] cards are missing, which and not only affects research activities, but also patient management. This indicates that the recoding keeping needs improvement.

Conclusions

Patients with undescended testes often present late, which is detrimental to good outcomes. As it is seen in this study, ultrasound is not a reliable diagnostic instrument, when used in isolation, as it misses more than one third of patients. Evaluation of associated congenital malformation is important. Hypospadias is one of the most common malformations seen. More than one third of the operated boys did not appear for follow up. In this case it is difficult to evaluate the management out come and to set the plan of action.

Recommendations

- The vast majority of boys present for treatment after histological change has occurred. In fact, this is an alarming finding to make us start to educate and create awareness of both parents, midwifes and other birth attendants so that early detection and referral should be made
- In addition to awareness creation of the parents and the birth attendants improving the health service delivery capacity of the existing hospitals and to start this service in the others hospitals should be done.
- It is time to start electronic patient record keeping like the other part of the the world. And this will not only solve all the complaints related to patients file and management but also facilitate and makes simple research activities.

Acknowledgement

We are grateful to Dr Assefa Sime from the School of Public health for his invaluable contribution.
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Post Operative Pain Control in Inguinal Hernia Repair: Comparison of Tramadol Versus Bupivacaine in Local Wound Infiltration: A Randomized Controlled Trial

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Background: Post-operative pain control is a key factor in surgery. It greatly increases patient satisfaction, and influences the hospital stay period. Local wound infiltration has often been used to control postoperative pain following hernia surgery, with the use of the conventional local anesthetics like Lidocaine or Bupivacaine. The use of Tramadol for local wound infiltration is new and not yet practised in Rwanda. The aim of this study was to compare the postoperative pain control effects and cost effectiveness of Tramadol versus Bupivacaine in wound infiltration following inguinal hernia repair.

Methods: This was a randomized controlled trial conducted between September 2015 and February 2016. Randomization was done using a sealed envelope containing the name of drug to be used for local wound infiltrations following inguinal hernia repair.

Results: A total of 52 patients were enrolled equally in the two study groups. Only one female patient enrolled in the study. Tramadol was found to be superior to Bupivacaine in providing postoperative pain control. (P=0.000). Pain free period was 4.7±1.3 hours in Bupivacaine group while it was more than 12 hours in Tramadol group. Additional analgesia request in both groups was significantly different, in favor of Tramadol. (P=0.000). No complications reported in both groups. Bupivacaine was found to be 5 times more expensive than Tramadol.

Conclusion: Wound infiltration with Tramadol after open inguinal hernia repair offers a superior and prolonged pain control compared to Bupivacaine. The need of additional analgesics is very low after Tramadol wound infiltration compared to Bupivacaine used in the same conditions. In addition, Tramadol is cheaper making its use cost affordable.

Key words: Postoperative pain, Wound infiltration, Tramadol, Bupivacaine/ macaine.

Introduction

Maximizing Postoperative pain control in inguinal hernia repair is essential, in order to facilitate earlier patient discharge from hospital. Inadequate analgesia during the
Postoperative period may have short or long term consequences. Benefits from local infiltration in the wound before closing the skin post hernia repair with Bupivacaine have been proved to be efficient in order to decrease opioids demands subcutaneously, intramuscularly or via intravenously.

The local anesthetic effects of opioids have been demonstrated both in clinical and animal models. Even if Tramadol is a weak opioid, it has proved to be effective in pain control if used as local infiltration in the surgical wound before closing the skin. It has a selective anesthetic effect on N receptors of peripheric nerves. Studies have shown that it has a longer postoperative pain control effect and less side effects compared to Bupivacaine when used as local wound infiltration.

Hernia repairs are among the commonest operations carried out by in general surgeons in Rwanda. Currently, the patients are hospitalized for 2-3 days postoperatively; it is believed that inadequate pain control is a contributing factor for the prolonged hospital stay. By maximizing postoperative pain control, inguinal hernia repair can be done as a day case.

**Patients and Methods**

This randomized controlled trial was conducted between September 2015 and February 2016. All patients who met the inclusion criteria (adult patients on appointment for elective inguinal hernia repair) and accepted to participate in the study were enrolled. Randomization was done using sealed envelopes containing the name of drug was to be used for infiltration (Tramadol or Bupivacaine). Both the patient and the researcher were blinded. Only the anesthesiologist knew the drug given as he/she was the one to prepare it and to hand it to the surgeon, ready for infiltration.

The study was conducted in two Rwandan referral hospitals. The University teaching hospital of Butare (CHUB) in Southern province, a public referral hospital with 4 running theaters used for both elective and emergency surgeries in general surgery, orthopedics, ENT and gynecology. It has 509 beds, the surgical department occupying 26% of them. The second hospital was Rwanda military Hospital (RMH), a referral hospital located in Kigali city; it has 4 theater rooms, used for orthopedics, general surgery, gynecology, plastic surgery, urology and ENT. It currently treats 80% civilian and 20% military patients. It offers secondary and tertiary level health care services but its new strategic direction focuses on referral and teaching activities. Adult patients confirmed to have inguinal hernia that needed elective surgery (herniorrhaphy or hernioplasty) and accepted to consent for the study, were enrolled.

In the previous almost similar study, the proportion of those who had not experienced pain necessitating analgesia in group A which had received Tramadol local wound infiltration post herniorrhaphy was 4/30 while in the group B which received Bupivacaine as local wound infiltration were 0/30. In this study, the sample size was calculated to be 50. But it was further increased by 5% to account for anticipated contingencies such as non-response or recording error; so it included 52 participants with 26 in each group. Randomization was...
done using a sealed envelope containing the kind of drug, prepared by the researcher then
given to the surgeon.

Data analysis
Analyzed variables included age, ASA classification, types of inguinal hernia, pain free
period, pain severity, drug cost, and complications. The data were entered and analyzed
using SPSS 16.0. Numerical variables were presented as means plus standard deviations and
student “t” test was used to compare the means between two groups. All the data were
calculated on 95% confidence interval. A P value <0.05 was considered as statistically
significant level for all comparisons.

Results
The study was carried out from September 2015 till February 2016. It included 51 males and
one female. Their ages were ranging between 16 years and 85 years. The mean age was
43.5±20.5 years in the group received Bupivacaine (group B); and 41±18 years in group
which received Tramadol (group T). Both groups were comparable with respect to age. The
study patients were mainly male (51/52), despite cumulative enrollment. This was probably
due to the fact that inguinal hernias are more common in men. The inguinal hernias in this
study were indirect (43 or 82%), while 9 or 18% were direct. Most of the patients in this
study were in the ASA1 category (88%), while the rest were in ASA2 category. Generally, no
drug side effects were observed in during this study.

We didn’t calculate the mean of starting requesting adjuvant analgesia in the group with
Tramadol as there was single patient who received adjuvant analgesia in that group in the
study period.

Table 2. Pain severity in 2 groups at every Visit (V)

<table>
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<th></th>
<th>V0</th>
<th>V1</th>
<th>V2</th>
<th>V3</th>
<th>V4</th>
<th>V5</th>
<th>V6</th>
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<tr>
<td>No pain</td>
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<tr>
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<td>14</td>
<td>10</td>
<td>3</td>
<td>0</td>
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</tr>
<tr>
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<td>3</td>
<td>6</td>
<td>3</td>
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<tr>
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<td>6</td>
<td>1</td>
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<td></td>
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<tr>
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<td>1</td>
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<tr>
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<tr>
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</tbody>
</table>
Figure 1. Adjuvant analgesia demand in both Groups

Figure 2 shows how the pain was fluctuating in both groups. In the group which received Bupivacaine the pain was significantly increasing with time while in the group which received Tramadol the pain was not significant and was decreasing with time.

The sig (2-tailed) value is 0.000. This value is less than 0.05. Because of this, we concluded that there is a statistically significant difference between the mean of patients who received Tramadol and the mean of patients who received Bupivacaine in rescuing adjuvant analgesia. Since our group Statistics box revealed that the mean of tolerable pain in group received Tramadol was greater than the mean for tolerable pain the group which received Bupivacaine.
### Table 3. Comparison of Means of Time to Rescue the First Analgesia

<table>
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<tr>
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<th>t-test for Equality of Means</th>
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<td>Sig.</td>
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<tr>
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<td>Equal variances not assumed</td>
<td>16.2</td>
</tr>
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</table>

### Cost of the Drugs
In the hospital pharmacy, we found that the cost of Tramadol 100mg was 400 Rwanda francs (0.52USD) whereas the cost of Bupivacaine 0.5% 20ml was 4300 Rwandan francs (5.6USD), Diclofenac IM vial of 75mg was 100 Rwandan Francs (0.13 USD) whereas the price of Paracetamol tablets of 500mg was 100 Rwandan francs (0.13USD), 10 tablets.

This means that the patients in the group received Tramadol with local wound infiltration paid 400 Rwandan francs (0.52USD) in 12 hours for pain medications, for each patient, whereas the patients in the group received Bupivacaine the one who received Bupivacaine and Diclofenac IM paid 4400 Rwandan francs (5.73USD), the same as the one who received Paracetamol tablets.

### Discussion
Given an increasing trend of day case surgery and early hospital discharge, role of pain relief via local wound infiltration is increasingly becoming common\(^1, 2, 11\). In this study, local wound infiltration with Tramadol before closing the skin after inguinal hernia repair, provided a significant postoperative pain relief when compared to Bupivacaine (onset of postoperative pain requiring adjuvant analgesics was more than 12 hours vs 4.7 ±1.23 hours for Tramadol and Bupivacaine respectively) (P=0.000). Afaq Iqbal Malik et al found that when Tramadol used locally post inguinal hernia repair, at 2mg/kg body weight the mean time for requiring adjuvant analgesic was 11.6 hours, while when Bupivacaine used as local wound infiltration at 0.25% 10cc the mean time for requiring adjuvant analgesics was 8.2 hours \(^6\).
Furthermore, the study done by Abdullah M Kaki et al from the Department of Anaesthesia, Faculty of Medicine, King Abdulaziz University Hospital, Jeddah, Saudi Arabia in 2008, found that Tramadol used locally at 1mg/kg total body weight diluted in normal saline post inguinal hernia repair, the first adjuvant analgesia requirement was 6.6± 0.99 hours, while in the group which received Marcaine 0.25% 10cc the mean time to rescue the first adjuvant analgesia was 3.7± 0.74 hours. Demiraran et al. also made a study comparing post hernia local wound infiltration with Tramadol and Bupivacaine and showed that the pain score was high in the group received Bupivacaine than in the group received Tramadol (P< 0.005), Average time to first analgesic requirement was significantly longer in group T (6.72±4.09 h after herniotomy than both group I (4.49+/-3.9 h) and group B (6.04±3.7 h) (P<0.05) 

Hernia repair with either tension free (Lichtenstein procedure) or herniorrhaphy (using modified Bassini technique) were used equally. The choice of the technique was based on surgeon’s preference but also on the availability of prolene mesh. It may be thought that the variety of surgical techniques could have caused bias and influence regarding postoperative pain. However, the analysis did not shown any difference. Operators were either consultant general surgeons or senior residents in general surgery. This constitutes one of our study limitations as multiple operators with different level of expertise have been involved.

The severity of self reported pain was high in the group which received Bupivacaine compared to the group which received Tramadol (P= 0.000) (Figure 2). In the study done by Abdllah M. Kaki et al there was a significant difference between the two groups in the recorded visual analog pain scale rating high in group with Bupivacaine (P< 0.05). In the study done by Bahanur C. et al revealed that the severity of pain was high in the group which received L Bupivacaine compared to the group which received Tramadol.

Side effects also have been evaluated in our study; we evaluated nausea, vomiting, bradycardia and hypotension, no single side effect recorded in the 2 groups. Bahnur C et al, in their study comparing Tramadol and Bupivacaine used as local wound infiltration they were monitoring side effects of each drug( nausea, vomiting, cardiovascular), no side effect found in their study.

In the study done by M.E. Ausems et al, evaluating side effects of Bupivacaine used locally there were no side effect related to the local wound infiltration with Bupivacaine. In this study the cost of all products the patients consumed along our study period has been evaluated, we found that the group received Tramadol paid 10 times low for analgesia as one vial of Tramadol was 0.52USD, whereas the group received Bupivacaine one vial 20ml was 5.6 USD plus additional analgesics received to control pain better.

**Conclusion**

Wound infiltration with Tramadol after open inguinal hernia repair offers a superior and prolonged pain control compared to Bupivacaine. The need of additional analgesics is very
low after Tramadol wound infiltration compared to Bupivacaine used in the same conditions. In addition, Tramadol is cheaper making its use cost affordable

References

A Cross Section Study to Correlate Fine Needle Aspiration Cytology and Histopathology in the Diagnosis of Parotid Tumours at Four Major Hospitals in Zambia

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2Pathologist at University Teaching Hospital, MMED Pathology (UNZA)
3Consultant General Surgeon at University Teaching Hospital, MRCS, MMED General Surgery (UNZA), FCS (ECSA) General Surgery
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https://dx.doi.org/10.4314/ecajs.v22i1.12

Background: Needle Aspiration Cytology (FNAC) is cheap, simple, quick, minimally invasive procedure that is widely used for preoperative diagnosis of Parotid tumours.

Methods: Twenty five patients were prospectively studied over a two year period at four major hospitals in Zambia. FNAC was done using a 10cc syringe and 20-22G needles for sample collection and specimen staining was done with papanicolaou stain. Histopathology was assessed with Haematoxylin and Eosin (H&E) stained sections.

Results: FNAC correlated with histopathology with a sensitivity of 100% and specificity of 66.7%; positive and negative predictive values of 95.7% and 100% respectively and a likelihood ratio of 3. All Parotid tumours were neoplastic with 76% benign and 24% malignant tumours on histopathology. FNAC accurately diagnosed 68% benign and 20% malignant tumours.

Conclusion: This study found that FNAC correlates well with histopathology in the diagnosis of parotid tumours. FNAC is useful in the preoperative assessment of Parotid tumours as it provides a preoperative diagnosis that influences management by either avoiding surgery (inflammatory lesion) and limiting the extent of surgery for benign and malignant Parotid tumours.

Introduction

George Papanicolaou (1883-1962) is generally accredited for use of cytopathological examination of cells for diagnosis of tumours. FNAC involves subjecting appropriately stained aspirated cells to cytopathological examination where the cells are evaluated for morphological changes based on the appearance of individual cells or cell clusters. Theoretically this procedure is supposed to diagnose most tumours with acceptable sensitivity and specificity.
Salivary gland tumours make up 10% of all head and neck tumours (parotid gland tumours contribute 2-6.5%) and 3% of all tumours of the body\textsuperscript{4, 9, 10, 11}. There are two types of Salivary glands, major (parotid, submandibular and lingual) and minor salivary glands\textsuperscript{1}. The parotid gland tumours are 10 times more common than submandibular tumours and 100 times more common than lingual tumours. 80% of parotid tumours are benign\textsuperscript{1}.

The incidence of parotid gland tumours is 1-2/100,000 \textsuperscript{1}. There is equal incidence between the sexes\textsuperscript{1}. Risk factors for development of parotid gland tumours include nutritional deficiencies, exposure to radiation, ultra-violet exposure, genetic predisposition and infection with Epstein-Barr virus\textsuperscript{1}.

Generally, it has been accepted among Head and Neck Surgeons that tumours of the parotid gland, present management problems for various reasons\textsuperscript{4, 11}. In the first instance, most surgeons believe that the presence of a parotid gland tumour is an indication for removal\textsuperscript{4, 9, 11}. Clinical diagnosis has been used to preoperatively diagnose and influence surgical management of a patient with a parotid gland tumour. But it is difficult to distinguish clinically between inflammatory and non-inflammatory lesions or between benign and malignant lesions\textsuperscript{1}. This is because inflammatory lesions are not subjected to surgery but conservative management\textsuperscript{1, 4, 9}. Clinical diagnosis has resulted in over treatment of patients with inflammatory parotid tumours which have been subjected to surgery and under treatment of patients with malignant parotid lesions that have been treated by parotid conserving surgery\textsuperscript{4, 9, 11}. Clinical diagnosis cannot decide the fate of the facial nerve, whether to excise or not, excision of facial nerve with its consequence of facial nerve paralysis has resulted in increased morbidity\textsuperscript{1, 4, 9, 11}.

It remains a challenge to obtain a preoperative tissue diagnosis of the parotid gland tumour because salivary gland tumours are not subject to conventional tissue diagnosis by core needle biopsy or incisional biopsy as these complicate into formation of salivary fistulae and implantation of malignant tumours\textsuperscript{1, 4, 9, 10, 11, 12}. Secondly, a preoperative diagnosis ensures planning of the surgical procedure to be done (whether conservative or total parotidectomy and whether to do neck dissection or not in the case of malignant tumours)\textsuperscript{1, 4, 9, 10, 11, 12}. However, lack of a preoperative diagnosis poses a challenge to appropriately counsel patients about the preoperative diagnosis and prognosis and what procedure is to be done and whether or not the facial nerve will be preserved\textsuperscript{4}.

Thirdly, an intraoperative diagnosis at the time of surgery by assessment of frozen sections is not readily available even in developed centres and they are not available in resource limited centres especially in the developing world like Zambia\textsuperscript{4, 9, 12}.

In view of the above, FNAC has gained popularity among Head and Neck surgeons who have used this procedure to preoperatively diagnose Head and Neck Tumours\textsuperscript{4, 9}. The application of FNAC for diagnosis of Parotid gland tumors has been an area that has been widely debated\textsuperscript{4, 5, 9, 10, 11}. The management problems of patients with parotid gland tumours has led to more research being done about the application of FNAC in obtaining a preoperative tissue diagnosis\textsuperscript{4}. As a result, FNAC has established its role in the diagnosis of parotid gland
Those who support FNAC use in the preoperative diagnosis argue that FNAC can distinguish neoplastic from non-neoplastic lesions, and benign from malignant tumours; and incidence of complications with FNAC is rare. Those who argue against the use of FNAC in the diagnosis of parotid gland tumours feel that FNAC has low sensitivity in the diagnosis of parotid gland malignant tumours, and that it only changes the management of lymphomas of the parotid gland. They argue that FNAC obscures diagnosis, there is increased incidence of inadequate sampling therefore, it requires multiple sampling, prolongs the period of waiting for operative management and therefore increases the cost of hospital stay. The Value of FNAC in the investigation of salivary gland disease has also been widely discussed by both Clinicians and Cytopathologists. Most Clinicians argue that FNAC is not accurate enough to diagnose parotid gland tumours and therefore influence decision making in terms of whether to operate or not to operate.

An audit of the parotid gland surgeries was performed at University Teaching Hospital (UTH) between August 2013 and September 2014. A total of 14 parotid gland surgeries were done for parotid gland tumours. 79% were superficial Parotidectomies and 21% were total Parotidectomies. None of the patients had a preoperative tissue diagnosis to objectively ascertain the extent of the surgery in order to avoid over or under treatment. Only 14% had a post-operative diagnosis the rest had missing excised parotid samples, either they were taken to other laboratories or the samples were lost. It cannot be objectively stated whether we are treating our patients optimally or not from the above statistics. In this era of patients being aware about their rights, this is a recipe for litigation because the consequences of not optimally treating patients are grave. This is the more reason why we need to conduct our own studies on how we can achieve a preoperative diagnosis of the parotid gland tumours and determine whether surgical intervention is required or not and if it is required then to what extent should it be done. In short we need to practice evidence based medicine.

This study was aimed at evaluating the diagnostic accuracy of FNAC of parotid gland tumours by correlating it with Histopathological diagnosis. At the time of operation and with obtained informed consent, an FNAC sample of the parotid gland tumour planned for excision was obtained while the patient was under anesthesia. The excised parotid gland tissue was also kept after surgery. Cytopathological and Histopathological examinations were performed by different pathologists to avoid bias. The diagnoses of the two in the same specimen was evaluated for accuracy. In this case histopathology was considered the gold standard and therefore became the control.

If the correlation between FNAC and Histopathology was significant then a cytopathological preoperative diagnosis can start the initial treatment of patients with parotid gland tumours and it can influence the management of patients with parotid gland tumours to avoid excess morbidity associated with over treatment of parotid gland tumours. The general objective of this study was to determine the correlation of FNAC and histopathology in the diagnosis of parotid tumors at University Teaching Hospital in Lusaka, Chipata Central Hospital in
Chipata, Livingstone Central Hospital in Livingstone and Ndola Teaching Hospital in Ndola, Zambia. The specific objectives were to determine the specificity and sensitivity of FNAC; and calculate the positive and negative predictive values, and likelihood ratio of FNAC in the diagnosis of Parotid Tumours; and to determine the usefulness of FNAC in the management of Parotid tumours.

Patients and Methods

This was a prospective study done in the Departments of Surgery at the University Teaching Hospital (Lusaka), Ndola Teaching Hospital (Ndola), Chipata Central Hospital (Chipata) and Livingstone Central Hospital (Livingstone); from April 2014 to October 2016. A total of 25 patients with parotid tumours were recruited in this study and all were later operated. All the 25 patients were subjected to thorough history and physical examination with appropriate imaging. A preoperative FNAC was done either in the clinic, on the ward or just before operation under General anesthesia in theatre depending on patients’ preferences. The postoperative excision samples were submitted for histopathological diagnosis.

FNAC was done using a 10cc syringe and a 20-22G needle in a patient who had given an informed consent. The smears were done on 6 glass slides, 3 were fixed in alcohol and 3 were air dried, then stained with papanicolaou stains, subsequently reported. The postoperative excision samples were fixed in 10% formalin and then gross and microscopic examinations performed after staining with H&E stains. The FNAC and Histopathology reports were then retrospectively reviewed, compared and analyzed. A comparison of preoperative FNAC and post-operative histopathology diagnosis was done and the data analysis was performed by calculating the sensitivity and specificity, likelihood ratio and positive and negative predictive values of FNAC in the diagnosis of Parotid tumours.

Results

The study population was comprised of 25 patients who had had preoperative samples collected for FNAC and had a final Histological post-operative diagnosis. Eleven were males and 14 were females giving a male to female sex ratio of 1:1.3. Their ages ranged from 19 to 74 years with a mean of 40.6 years and a median age of 34 years.

Figure 1 shows the age distribution of patients in the study. Figure 2 shows the diagnoses made on histopathology. Commonest tumour was pleomorphic adenoma at 52%.

FNAC did not correlate with 3 specimens which were diagnosed as 1 chronic sialadenitis (wrong diagnosis, histopathology showed invasive squamous cell carcinoma); and 2 samples which were acellular. Based on this data the following calculations were done based on Table 3.
Table 1. The FNAC and Histological diagnoses of the patients involved in the study.

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<td>M</td>
<td>69</td>
<td>Chronic Sialadenitis</td>
<td>metastatic carcinoma</td>
<td></td>
<td>FN</td>
</tr>
</tbody>
</table>

Key: TP = True Positive. FP = False Positive. FN = False Negative
Table 2. Analysis of non-neoplastic and neoplastic tumours in the study.

<table>
<thead>
<tr>
<th>Histology and Cytological diagnosis analysis</th>
<th>Histological Diagnosis</th>
<th>Cytological Diagnosis</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Benign Lesions</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pleomorphic adenoma</td>
<td>13</td>
<td>13</td>
</tr>
<tr>
<td>lymphoepithelial Cyst</td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(2 samples where acellular)</td>
</tr>
<tr>
<td></td>
<td>0.76</td>
<td>0.68</td>
</tr>
<tr>
<td><strong>Malignant lesions</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carcinoma</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>0.24</td>
<td>0.2</td>
</tr>
<tr>
<td><strong>Non-Neoplastic</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>chronic sialadenitis</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(wrong diagnosis)</td>
</tr>
<tr>
<td></td>
<td>0.04</td>
<td></td>
</tr>
</tbody>
</table>

Figure 1. Age Distribution

Figure 2. Histological Diagnosis
Table 3.

<table>
<thead>
<tr>
<th></th>
<th>TRUE</th>
<th>FALSE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive</td>
<td>22 (a)</td>
<td>1 (b)</td>
</tr>
<tr>
<td>Negative</td>
<td>0 ©</td>
<td>2 (d)</td>
</tr>
</tbody>
</table>

Calculations

**Sensitivity** = \( \frac{a}{a+c} \)
\[ \frac{22}{22+0} \]
\[ \frac{22}{22} \]
\[ 1.00 \text{ (100\%)} \]

**Specificity** = \( \frac{d}{b+d} \)
\[ \frac{2}{1+2} \]
\[ \frac{2}{3} \]
\[ 0.6667 \text{ (66.7\%)} \]

**Positive predictive value** = \( \frac{a}{a+b} \)
\[ \frac{22}{22+1} \]
\[ \frac{22}{23} \]
\[ 0.9565 \text{ (95.7\%)} \]

**Negative Predictive value** = \( \frac{d}{c+d} \)
\[ \frac{2}{0+2} \]
\[ \frac{2}{2} \]
\[ 1.0 \text{ (100\%)} \]

**Likelihood ratio** = \( \frac{\text{sensitivity}}{1-\text{specificity}} \)
\[ \frac{1.00}{1-0.667} \]
\[ \frac{1.00}{0.3333} \]
\[ 3.003 \]
\[ 3 \]

The study showed that FNAC has a sensitivity of 100% and specificity of 66.7%. The Positive Predictive value was 95.7% and the Negative Predictive value was 100%. The Likelihood ratio was 3.

**Discussion**

FNAC is a safe, cheap and cost effective preoperative diagnostic procedure for assessment of Parotid tumours that offers a cytological diagnosis important in influencing management of Parotid tumours\(^4\,^6\). The management of parotid tumours involves an assessment of whether the Parotid tumour is inflammatory or neoplastic, and if neoplastic then whether benign or malignant. Inflammatory lesions are management conservatively while neoplastic tumours are subjected to surgery.\(^4\)

Benign tumours of the Parotid gland in the superficial lobe are treated with superficial parotidectomy while those in the deep lobe are treated with total parotidectomy with facial
nerve excision, while in some centres facial nerve sparing surgery is performed. Malignant tumours are treated with total parotidectomy with facial nerve excision. Some centres perform superficial parotidectomy for malignant tumours in the superficial lobe with facial nerve sparing. All FNACs in the study were collected preoperatively few minutes or hours before the scheduled operations based on clinical assessment. All patients in the study had superficial parotidectomy with facial nerve sparing.

In this study, 88% of the samples from parotid tumours where diagnosed as neoplastic parotid tumours and 12% where unsatisfactory/acellular (2 out of 25) and wrong diagnosis (1 out of 25) on FNAC; while histology diagnosed 100% as neoplastic parotid tumours. FNAC diagnosed 68% as benign parotid tumours and 20% as malignant parotid tumours. Histopathology diagnosed 76% as benign parotid tumours and 24% as malignant parotid tumours. This finding is comparable with what other authors have found and reported benign tumours at 40%, 61% and 69%; while malignant tumours have been reported at 6%, 13% and 37%. The commonest benign parotid tumour was pleomorphic adenoma at 52% on FNAC and Histopathology. FNAC was unable to characterize the malignant tumours and therefore reported as carcinoma but Histopathology showed Invasive squamous cell carcinoma as commonest malignant tumor of the parotid.

The age range was from 15 to 84 years. This shows that parotid tumours affects all age groups. Parotid tumours were seen more commonly in females than in males with a female to male ration of 1.2:1. Other studies have reported a ratio of 1.8:1 (F:M) ratio. Pleomorphic adenoma was more common in females than in males at 69.2% of all pleomorphic adenomas. Carcinomas were more common in males than in females at 66.7% of all carcinomas in the study.

Two samples were acellular/unsatisfactory because of the cystic nature of the parotid tumours and therefore difficult to harvest any cells on aspiration. This phenomenon has been described by some authors and therefore a known weakness of FNAC. Sometimes technique becomes important in ensuring proper sample collection otherwise the results maybe unsatisfactory necessitating repeating the procedure or the result maybe wrong altogether as was seen in one of the samples that showed chronic sialadenitis on FNAC but histopathology showed metastatic carcinoma. Sample collection on FNAC harvested necrotic tissue and inflammatory cells hence missing the diagnosis. This raises concern that FNAC requires proper technique of sample collection to ensure proper specimen that is representative of the tumour is collected. In this study, the sensitivity of FNAC was 100% while specificity was 66.7%. Other authors have reported 57-98% sensitivity and specificity of 86-100%. The findings in this study are therefore comparable. The positive and negative predictive values were 95.7% and 100% respectively. This is very significant. The likelihood ratio was 3.03 which is very significant for the application of FNAC as a diagnostic test at the four centres were the study was conducted. The likelihood ratio of 3 increases the pretest probability that the positive result of FNAC will more likely indicate a correct pathology in the parotid gland of the patient and can therefore be adopted as an evaluation tool for preoperative assessment of parotid tumours at the four Hospitals in Zambia.
This study has shown that FNAC correlates with histopathology and therefore can be provide a preoperative cytological diagnosis which can influence management of patients parotid tumours in terms of whether to operate or not, and if a patient should be operated then what would be the extent of surgery and would the facial nerve be spared or not. Some patients in this study will have recurrences and therefore increased morbidity of reoperations for malignant tumours. This practice could be avoided in future by adopting preoperative cytological diagnosis of parotid tumours with FNAC. This shows that clinical assessment alone is not sufficient to evaluate parotid tumours and decide the extent of surgery. This study has shown the usefulness of FNAC and its potential to influence management of parotid tumours. The preoperative cytological diagnosis can guide the extent of surgery to be done and whether the facial nerve should be excised or spared. However, it has been shown that FNAC cannot give definitive diagnoses of some Parotid tumours compared to histopathology but can determine whether the tumour is neoplastic or inflammatory and if neoplastic whether benign or malignant. 

Conclusion

This study has demonstrated that FNAC correlates with histopathology in the diagnosis of parotid tumours. FNAC is highly sensitive (100%) and specific (66.7%) and its usefulness as a cheap, cost effective, safe procedure in the evaluation of Parotid tumours has been demonstrated and that it can be relied upon to influence management of Parotid tumours. FNAC is therefore more reliable than clinical examination in distinguishing between malignant and benign parotid tumours.

Recommendations

FNAC should be adopted as a preoperative assessment procedure of evaluating Parotid tumours at the four major hospitals in Zambia.

Acknowledgement

We wish to recognize the following people for the support offered during the study: The Senior Medical Superintendents of University Teaching Hospital, Ndola Central Hospital, Livingstone Central Hospital and Chipata Central Hospital. Miss Cooley for assistance in organizing patients for collection of samples from in theatre. Mr. Chipaila for staining of all the FNAC specimen. Dr. Maswabu and Dr. Shibemba and other pathologists at University Teaching Hospital for reading the Histology specimens.

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A One-year Retrospective Study on the Pattern of Death Found at Autopsy at Forensic Pathology Department, Menelik II Hospital in Addis Ababa, Ethiopia.

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Background: The main objectives of this study were to determine the magnitude, manner and modalities of natural and unnatural deaths among deaths brought to the Forensic Pathology Department. Menelik II Hospital, for post mortem examination and secondary to find the remedial measures that may have influence on the incidence of preventable deaths.

Methods: This retrospective study was conducted in the Department of Forensic Pathology at Menelik II Hospital, Addis Ababa, Ethiopia. From January 1st, 2014 to December 31st, 2014.

The Study material was collected from Forensic Pathology Department of Menelik II Hospital, postmortem reports. A total of 4206 cases of deaths were done postmortem examination during the one-year study period. All these cases were grouped according to age, gender, manners and modalities of natural and unnatural deaths. The data collected was analyzed.

Results: Out of total 4206 cases, the male to female ratio 3:1. The age group most commonly involved was 16-30 years (41.5%) followed by 31-55 years (38.3%). Only 7.8% were in the under 15 years age group. The commonest mode of death in all age groups put together was accident in 1615 (38.4%) followed by natural death in 1156 (27.5%), homicidal deaths accounted for 698 (16.6%) followed by suicide in 508 (12%). In 229 (5.4%) of the cases the manner of death remained undetermined. Among 698 homicidal deaths, blunt weapon injury accounted for 61.4% and bullet injury were in 15.4%. Among the accidental deaths, road traffic injuries were 1092 (67.6%), followed by fall accident in 170 (10.5%). Hanging was the preferred modality of suicide (88.4%), followed by poisoning 51 (10%). Natural death accounted for 1190 (27.5%) and cardiac disease was the most predominant 453 (38%), followed by respiratory disease 240 (20.2%).

Conclusion: Our study concludes that unnatural deaths exceeded enormously the natural deaths. Accident was the most dominant manner of death among the unnatural deaths. Road Traffic Accident was the commonest modality among accidental deaths. Fatalities caused by blunt weapon injuries were the commonest mode of homicide; whereas hanging was the preferred modality of suicide. Cardiovascular diseases were the leading...
causes of natural deaths. Most deaths are preventable, so concerned bodies are expected to take action of prevention and increase the public awareness of the real situation and the causes of both natural and unnatural deaths and subsequently make an impact in the decrement of death rate in our societies.

Introduction

Death is a tragedy in whatever form, at whatever time and in whatever way it comes. Death is natural when it is due to any pathology (disease) or ageing, and is unnatural when caused prematurely against order of the nature by injury, poison or other means of violence. Unnatural deaths may be accidental, suicidal, homicidal or undetermined. The data of unnatural deaths may reflect the law and order situation in a particular area of jurisdiction. If Death is premature, unexpected and resulting from violence causes harassment / depression not only among the relatives of deceased but also have certain impacts all over the society.

Every Human being is blessed with the gift of life for the purpose of being happy and to bring peace for all but the purpose is ignored when human pursuit of wealth and power, satisfaction of physical appetites, and passions terrorize their fellow human beings. The crime and violence exist in the society since long over the centuries but in this modern era there is an extreme aggravation of these problems. Drawing public attention and awareness towards casualties is important to prevent unnatural deaths; this possibly could reduce the incidence of such cases.

This study was not only aimed at finding out the magnitude of natural and unnatural deaths but also to provide information of the demographic profile, manners and modalities involved in deaths, presented to the Department of Forensic pathology of Menelik II Hospital, for post mortem examination. The finding of this study will create awareness among the people about deaths related to violence, which is the important public health concern in the society. It will also be helpful for law enforcement agencies to make the strategies for prevention of such incidences.

Emperor Menelik II was fascinated by modernity, and like Emperor Tewodros II before him had a keen ambition to introduce Western technological and administrative advances into Ethiopia. The Russian support for Ethiopia led to the advent of a Russian Red Cross mission. The Russian mission was a military mission conceived as medical support for the Ethiopian troops. It arrived in Addis Ababa some three months after the historic Menelik's Adwa victory 1st of March 1896 (26) and then the first hospital, (Menelik II) was created in Ethiopia.

Menelik II Hospital is currently the only hospital where forensic pathology service is provided, this being the reason for the large amount of deaths received in the center in a period of one year. There are two Legal Medicine specialists working in the department on a full time basis. Both professionals are among the authors of this study. To our knowledge this is the first study of its kind from the department and the country and we hope this will
give insight on the magnitude of the reality and would serve as a basis for other studies to come.

Materials and Methods

This study was undertaken on on 4206 death subjects brought to Department of Forensic pathology of Menelik II Hospital between 1st January and 31st December 2014. The data was collected from the hospital notes / treatment history and Medico-legal certificates hospital notes included age, gender and treatment history. The information about circumstances of death was sought from the police inquest reports. The data was entered on a Proforma, statistically analyzed and the results were summarized in charts.

Ethical Considerations: Permission was obtained from Head of the Department of Forensic pathology, Menelik II Hospital, for examining the relevant data required for this study.

Results

Out of the total 4206 deaths, 698 (16.6%) cases were due to homicides and 1615 (38.4%) of accidents while 508 cases (12%) were involved in suicidal deaths. In 1156 (27.7%) cases, the manner of death was natural, whereas manner of death in 229 (5.4%) cases was undetermined (Figure 1).

![Figure 1. Mode of Death Distribution.](image)

In 1746 (41.5%), death was in the 16-30 years age group closely followed by 1610 (38.3%), in the age group of 31-55 years, 520 (12.4%) and 330 (7.8%) cases involving age groups of >56 years and <15 years respectively. Both extremes of age were the least presented. Gender wise male predominated with 74.2% and females 25.8%, with the male female ratio of
The distribution of age is shown in Figure 2 shows the age distribution.

**Figure 2.** Age-wise Distribution.

Among the 698 deaths due to homicide, blunt weapon injuries accounted for 429 (61.4%) cases, followed by bullet injury 108 (15.4%), 101 (14.4%) deaths by stab injury, strangulation 50 (7.5%), suffocation 6 (0.8%) and others 4 (0.5%) (Figure 3).

**Figure 3.** Distribution of Methods of Homicide

Among 1615 accidents, road traffic accident has been the most commonest type accounting for 1092 (67.6%), followed by fall accident 170 (10.5%), drowning 133 (8.5%), electric accident 108 (6.7%), suffocation 43 (2.6%), intoxication 28 (1.7%), burn 14 (0.8%) and others 27 (1.6%) (Figure 4). From 508 suicide cases hanging was the most common modality accounting for 449 (88.4%), followed by poisoning 51 (10%), bullet 4 (0.7%) and others 4 (0.7%) (Figure 5).
Figure 4. Distribution of Mode of Accidents.

Figure 5. Method of suicide-wise Distribution.

Natural deaths accounted for 1190, from this cardiac disease predominated by 453 (38%), followed by respiratory disease 240 (20.2%), liver and pancreatic disease each accounted for 71 (6%), still birth 27 (2.3%), others 320 (27%) (Figure 6).
Discussion.

Out of the total 4206 deaths, 698 (16.6%) were homicides and 1615 (38.4%) accidents, while 508 (12%) were involved in suicidal death. In 1156 (27.7%) cases, the manner of death was natural, whereas 229 (5.4%) cases were undetermined (Figure 1). Accidental deaths outnumbered homicidal and suicidal deaths. This finding of present study is in agreement with studies conducted by Rahim and Ghulam, Akang, Srivastava. In a study done in Nigeria the manner of death are, homicide, natural, accidental and suicide accounting for 40.0%, 30.5%, 23.8% and 1.9% of cases respectively while in 3.81% of cases the manner of death could not be ascertained. This shows that natural death is the second most common mode of death in both studies, while homicidal death being the leading mode in the Nigerian study and the accidental death being the most prevalent in our study. Kachare et al's study observed that burn (29.41%) was the commonest cause of death followed by poisoning (24.09) and trauma (21.85%). In their study 69.40% cases were of accidental in nature. Other studies Memon, Humayun, Alfaz which showed homicidal deaths predominance in all unnatural deaths. Pathak et al's observed burns (n= 216, 45.0%) as commonest cause of unnatural death in females followed by poisoning. The commonest manner of death in female was accidental (n=271, 56.46%) followed by suicidal in 141 (29.37%) cases with higher incidence of female unnatural death in the age group of 20-29 years [168(35.0%)].

In our study road traffic accidents has predominated among the accidental deaths (67.6%). Other authors have reported similar results, Kumar reported unnatural death in 88.13% of total autopsy in relation to population of Varanasi (3676841 according to census 2011) were 0.24% the unnatural death pattern of road traffic injury 3963 (44.11%) contribute most common cause followed by burn 1911(21.27%), Poisoning 896 (9.97%) etc. In our study burn injury has been the least type of accidental injury compared to other studies. In a study conducted in cases of deaths due to road traffic accidents, Govekar et al observed comparable findings. They observed that road traffic accident deaths are more common. The search for acceleration and speed has lead to the development of high velocity
motorized vehicles which have become integral part of new system of our modern life\textsuperscript{10}.

The most vulnerable age group in our study was 16-30 years in 41.5\% fatalities, followed by 38.3\% deaths in the 31-55 years age group. Both extremes of age were the least presented. Pradipkumar Singh et al observed that the age group 21–30 years was the most vulnerable group (24.89\%). Menon et al\textsuperscript{12} reported that the least affected group were those above 70 years (2\% and 1\% respectively), which is consistent with the finding in this study. This is due to the fact that persons belonging to the young age group are active, mobile and energetic\textsuperscript{9}. The young individuals are short tempered and easily become emotional which result in violence (9) and in addition to this in countries like Ethiopia, the population is relatively young so this could be the reason for this data conclusion.

The male to female ratio of 3:1 in this study is similar to the findings of other authors from other centers\textsuperscript{5}. Some other studies have even shown a wider difference between the two genders, like Ghulam et al\textsuperscript{6} who found a 85.4\% male (85.4\%) predominance among the victim of unnatural deaths as compared to 14.6\% for females. This could be due to the fact that males are more aggressive and are engaged more in the outdoor activities.

Our study had 698 deaths due to homicide; blunt weapon was the predominant manner, which accounted for 61.4\%, followed by bullet injury (15.4\%). Bhuipinder\textsuperscript{16} had similar result to ours and reported that the majority of homicidal deaths were caused by blunt weapon (46\%), followed by sharp weapon (25\%) and asphyxiation (12\%). Despite the decreased rate when compared to our figure, this study is in agreement with our study. In contrast to our study Avnesh\textsuperscript{17} and Hugar\textsuperscript{18} reported sharp weapon injuries as the commonest manner of homicide. Another study done in Chicago from 394 victims 49.5\% were gunshot injury, 27.9\% were sharp weapon injury, 14.7\% were with blunt weapon, and 7.9\% were slain by other means, such as by fire or by being thrown from a building. Shooting was most frequently the means of inflicting death\textsuperscript{19}. This difference between studies among countries could be due to influence of the nature of individuals and weapon possession legislation and cultural differences from country to country.

In our study, 12\% of all unnatural deaths were suicides. Hanging was the most common modality accounting for 449 (88.4\%), followed by poisoning 51(10\%). Studies done by Baruah\textsuperscript{20} and Meera\textsuperscript{21} showed that hanging and self-immolation were the most common methods employed for suicide. Whereas Santhosh reported that the most common method employed to die were poisoning, hanging, burns and drowning in the decreasing order, which is similar to the study by Behera and colleagues \textsuperscript{22}. In a study conducted in Kenya Ingestion of organophosphate poison, hanging and carbon monoxide poisoning were the methods used to commit suicide in order of frequency. There were a total of 195 deaths by organophosphate poisoning, 17 by ligature hanging and only one from carbon monoxide poisoning \textsuperscript{24}. Our neighbor country has less rate of suicide by hanging than in our study even if it is the second preferred mode of suicide.In the Nigerian study the suicide rate was as low as 1.9%\textsuperscript{25}.

The leading cause of natural death in our study was cardiovascular disease (38\%) followed
by respiratory disease (20.2%). Similar findings have been echoed in studies by Nayak and colleague\(^2\). Uchendu\(^2^5\) reported cardiovascular disease as the predominant cause of natural death, but followed by obstetric and cerebrovascular deaths in contrast to our study. The fact that cardiovascular diseases are becoming the leading cause of death could probably be the western type of life style that our African societies are acquiring.

**Conclusion**

Our study concludes that unnatural deaths exceeded enormously the natural deaths. Accident was the most dominant manner of death among the unnatural deaths. Road Traffic Accident was the commonest modality among accidental deaths. Fatalities caused by blunt weapon injuries were the commonest mode of homicide; whereas hanging was the preferred modality of suicide. Cardiovascular diseases were the leading causes of natural deaths. Most deaths are preventable, so concerned bodies are expected to take action of prevention and increase the public awareness of the real situation and the causes of both natural and unnatural deaths and subsequently make an impact in the decrement of death rate in our societies.

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25. The Russian Red Cross Mission.
A Rare Case of Primary Mucocutaneous Histoplasmosis Presenting as a Non-Healing and Disfiguring Upper Lip Ulcer.

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BA 27-year-old female patient presented with a non-healing disfiguring upper lip ulcer for 10 months. At the time of presentation 50% of her lip had been eroded. She had had several consultations and had been on several antibiotic courses without improvement. Histopathological evaluation of an incisional biopsy specimen revealed that she had histoplasmosis. This prompted an HIV test, as this disease is common in immunocompromised patients. Once the diagnosis was clinched she was commenced on Itraconazole with complete resolution of the ulcer. Antiretroviral therapy was also initiated.

Key words: HIV, Histoplasmosis, Histoplasma Capsulatum, mucocutaneous, ulcer, immunocompromised, Itraconazole

Introduction:

Non-healing ulcers can be disfiguring especially when they are located on the face. Besides the distress of disfigurement the patient has additional stress of worrying about malignancy especially squamous cell carcinoma. Infectious aetiological agents need to be excluded in chronic ulcers. Histoplasmosis is a granulomatous infectious mycosis caused generally, but not exclusively by Histoplasma Capsulatum. Samuel Darling first described the disease in 1905. Commonly it has pulmonary manifestations but can affect reticuloendothelial organs¹. Oral lesions manifesting primarily are rare². They tend to occur in conjunction with disseminated histoplasmosis especially in HIV-infected patients³. A histological examination of an incisional biopsy secures the diagnosis of histoplasmosis and should prompt an HIV test. Medical treatment is all that is needed in these chronic ulcers due to Histoplasma Capsulatum. There is prompt response to Itraconazole. We present a case of primary oral histoplasmosis in a patient who as a result of the diagnosis was subsequently found to be HIV positive. Response to Itraconazole was dramatic, much to the relief of the patient.

Case Report

A 27-year-old female patient was referred to our outpatient surgical clinic with a 10-month history of a non-healing ulcer on the upper lip. She had been on several antibiotic courses
some based on pus swab microscopy, sensitivity and culture with no improvement. She had no co-morbid conditions and her HIV status was unknown at the time of presentation.

On physical examination she was a young female patient who was distressed about the ulcer. Her blood pressure, pulse and temperature were normal. She had mobile cervical and axillary lymphadenopathy. Her Cardiovascular and Respiratory examination were normal, as were the rest of the systems. There was an irregularly-shaped ulcer involving more than 50% of her upper lip. The edges were punched out with no attempt at healing. Necrotic tissue was evident on the most superior part of the ulcer. The pre-treatment image of the ulcer is shown in Figure 1.

![Fig 1: Pre-treatment image of the ulcer](image1)

A diagnosis of a chronic mucocutaneous ulcer of the upper lip was made. Hematological investigations showed a low white cell count of 3.36 x 10^9/l and low hemoglobin of 11.20g/dl. Her biochemistry results were normal. An incisional biopsy was done in theatre. Microscopic examination showed some poorly formed granulomas with multinucleated giant cells ingesting fungal spores. Appearances were consistent with Histoplasmosis and there was no evidence of malignancy. The patient was commenced on high dose itraconazole for 6 weeks. The results were dramatic. There was complete healing of the ulcer with no need for plastic reconstructive surgery. Post treatment images of the upper lip are shown in Figure 2. After appropriate counseling an HIV test was done. Her HIV test was positive with a CD4 cell count of 250 cells/ml. She was commenced on anti-retroviral therapy.

**Discussion**

Histoplasmosis is a fungal disease caused by *Histoplasma Capsulatum*. Samuel Darling first described the disease in 1905. *Histoplasma Capsulatum* is a dimorphic fungus found in warm humid environment that contains bird and bat excreta. Sources of infection are birds, bats and soil contaminated with their droppings. Spores are infective to humans and small animals. The disease is transmitted by the inhalation of airborne conidia. Introduction of the spores through the skin and mucous membrane will result in infection in most cases.
**Histoplasma Capsulatum** causes acute and/or chronic pulmonary disease but can affect other reticuloendothelial organs. Oral lesions manifesting primarily are rare. They tend to occur in conjunction with disseminated histoplasmosis especially in HIV-infected patients. Recently primary mucocutaneous ulcers have been reported with greater frequency in HIV-positive patients. This was the case with our patient who was later found to be HIV positive. Differential diagnoses include lichen planus, squamous cell carcinoma and tuberculous ulcer.

Diagnosis is established by identifying the small intracellular yeast cells (2-5mm) of *Histoplasma* in smears of mucocutaneous lesions, sputum, peripheral blood, and bone marrow or biopsy specimens. Our patient had diagnosis established from a biopsy specimen because squamous cell carcinoma was one of the differential diagnoses. Histopathological identification of *Histoplasma Capsulatum* in the sections provides conclusive evidence of the disease.

In immunocompetent patients the disease is self-limiting. Pulmonary histoplasmosis in HIV patients is managed with Amphotericin B at a dose of 2gms intravenous for 10 weeks. Mucocutaneous or oral lesions are best treated with Itraconazole at a dose of 200mg twice a day for 4 weeks. Itraconazole has a rapid action and prevents relapses. Our patient had a rapid recovery.

**Conclusion**

In conclusion patients presenting with oral ulcers should be meticulously examined and laboratory investigations should be done to exclude histoplasmosis. Biopsies of chronic ulcers must always be done early to avoid ineffective treatment, which contributes to the delay of the diagnosis, as was the case with our patient and also in averting unnecessary surgery, which may cause further disfigurement. Histoplasmosis being an opportunistic infection may be the first and only indication of HIV infection ever with CD4 cell counts below 400, as was the case in this patient. This case highlights the importance of tissue diagnosis in the management of non-healing ulcers and in heralding possible HIV positive cases.

**References:**

In many parts of the East African region malaria is endemic, while in other parts it is hyper-endemic. While all the four species of the plasmodium parasite (vivax, ovale, malaria & falciparum), are prevalent in E Africa, it is the Plasmodium falciparum that is most aggressive and rampant. In this region malaria is still by far among the top three disease burdens accounting for high morbidity and mortality rates across all age groups. Whereas there are many complications associated with severe malaria, peripheral gangrene leading to amputation of limbs is so rare and unbelievable. The following is a summarized report of two cases with bilateral peripheral gangrene seen at Butare University Teaching Hospital, following severe malaria between August and October 2015.

In both cases several investigations were carried out to rule out other possible causes of limb ischemia and gangrene.

Key words: Peripheral gangrene; Plasmodium falciparum parasitaemia; Amputation

Case 1

N.S was a 30 year old male who was first admitted at a District hospital with a febrile illness, two weeks prior to transfer to Butare University Teaching Hospital. The reason for transfer was the development of gangrene of both feet. The referral notes indicate that he was admitted at the district hospital with a high fever, with temperatures between 38 -40 degrees Celsius. The blood film showed Plasmodium falciparum malaria (+++) scizont forms. While still on treatment with coartem, his hemoglobin fell to 5mg/dl and was given blood transfusion. A few days later he developed pain and numbness of the feet. These latter symptoms became progressive even when fever subsided. He was referred on the tenth day from the District hospital when his feet had developed a dark discoloration.

At Butare U.T.H, the main complaint was darkening, drying, and numbness of his feet. Prior to this febrile illness, he had been in good health, with no history suggestive of diabetes mellitus, cardiovascular disease, or any claudication. He had never smoked cigarettes, and there was no history of trauma. He was not febrile but had dry gangrene of both feet. The popliteal and femoral pulses were of good volume. The following investigations were done:
Doppler ultrasound, blood sugar, lipid profile, ECG and ECHO-cardiography, clotting profile, full blood count. All the results were normal, except the Doppler ultrasound, which reported as follows:

A increased resistance to blood flow in the lower 1/3 of the right and left anterior tibial arteries, and almost complete obstruction to flow in the distal 1/3 of the posterior tibial arteries. The middle and proximal parts of the arteries showed normal flow.

After waiting for demarcation of the gangrene, bilateral below knee amputation was done. He was discharged later in a wheel chair.

Fig 1: 30 year old N.S had below knee amputation following severe malaria with a high parasitaemia of Plasmodium falciparum.

Case 2

MJP 8 years old male, was referred from a district hospital for further management of bilateral gangrene of all his toes, and the tip of the left small finger. This followed a severe febrile illness characterized by high grade fever, seizures, and coma. With a blood film demonstrating Plasmodium falciparum +++ (gametocytes and ring forms), he was treated for cerebral malaria for six days prior to the gangrene. He was treated with intravenous Quinine. There was no history suggestive of cardiovascular disease, or diabetes. We carried out several investigations including ECG/ECHO, blood sugar, full blood count, and Doppler ultrasound.

All results were normal except the Doppler Ultrasound report which suggested that there was greatly reduced flow in the middle and distal 1/3 of the right and left t posterior tibial arteries; and much reduced flow in both the right and left distal 1/3 of the anterior tibial arteries. Both dorsalis pedis arteries demonstrated disappearing signals. Haematologically, he had a hemoglobin of 7gm/dl, and there was evidence of recent disseminated intravascular coagulopathy (DIC). While waiting for demarcation, the gangrene spread, involving the mid 1/3 of his feet. He later underwent chopart’s (mediotarsal) amputation.
Figure 2. MJP 8 years old, first underwent chopart amputation for bilateral peripheral gangrene of his feet following cerebral malaria with high parasitaemia of Plasmodium falciparum. Later, the left limb developed osteomyelitis of the stump, resulting into further debridement.

Literature Review:

There is evidence that patients with Plasmodium falciparum malaria may present with peripheral gangrene as a rare complication. Two adult Sudanese patients with high grade fever due to P. falciparum malaria developed bilateral feet gangrene (Saif Eldin Mohammed Ali, Khartoum, 2011)

A 30 year old Ethiopian female developed spontaneous gangrene of the distal phalanges of the index and middle fingers, plus the great and middle toes of the right foot, following cerebral malaria. (Yegerem Kabede, Addis Ababa, 1998)

Discussion:

These two patients presented with bilateral peripheral gangrene following severe febrile illnesses during which high parasitaemias of Plasmodium Falciparum were hematologically demonstrated. Several investigations were carried out in both cases to exclude other possible causes of gangrene such as diabetes, vascular diseases, cardiac diseases, and localized sepsis.

The pathogenesis of the gangrene in these cases is explained by the fact that high parasitaemia, often a characteristic of plasmodium falciparum, is associated with vascular occlusion, facilitated by a big number of infected RBCs that get adherent to the vascular endothelium, and as the blood vessels become smaller towards the periphery, the risk of vascular occlusion increases. The high parasitaemia is also thought to cause activation of
complement, leading to thrombosis. In severe malaria, inflammatory cytokines such as TNF and interleukin 6 increase tissue factor interaction with molecular cells, leading to thrombosis. The other possible explanations in these cases may have been the increased viscosity of blood that may be partly due to the rosetting of the infected and non-infected erythrocytes, and DIC.

Gangrene as a complication of malaria has been so rare that it is almost unbelievable in the East African region, despite the high prevalence of malaria. The fact that two cases occurring in the same province were seen in a period of two months, may possibly suggest two things; an up-surge of malaria prevalence, and the changing dynamics of the complication pattern of the disease. But generally, there were several delays in the case management of these patients that could have contributed to the complications. The patients should have been referred for severe malaria, long before they developed gangrene.

The lessons to learn from this include the need for increase in prevention measures, early and vigorous case-management of malaria, with the involvement of community based health workers; and early referral when there are complications.

References

An Exceptional Case of Spontaneous Fistulization of an Intrahepatic Biliary Cyst in to the Colon, Operated Tikur Anbessa Specialized Hospital, Ethiopia - A Case Report

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Biliary cysts are congenital cystic dilations of the extrahepatic and/or intrahepatic biliary tree. Intrahepatic cysts constitute less than 1% of the biliary cysts. Complications of these cysts include cholangitis, livercirrhosis, liver abscess andcholangiocarcinoma. In intrahepatic cysts the complications can also be related to compression of adjacent viscera, infection of the cyst's contents or perforation of the cyst. Spontaneous fistulization of a biliary cyst into hollow abdominal organs is a rare complication. We report an exceptional case in whom an intrahepatic biliary cyst spontaneously fistulized into hepatic flexure of the colon. Patient presented to our hospital with 02 months history of abdominal pain, weight loss, and 02 weeks of jaundice. The communication with colon was diagnosed by CT scan before surgery. But, surgical intervention was required for the complete diagnosis. Postoperatively, patientrecovery was uneventful.

Keywords: Biliary cyst. Colon. Spontaneous Fistula. Caroli’s disease. Intrahepatic

Introduction

Caroli’s disease refers to Todani V biliary cysts which are rare congenital cystic dilations that involve only the intra hepatic bile ducts1-4. They are caused by an anomalous rearrangement of the embryonic ductal plate.[5,6] If the defective remodeling involves the larger intrahepatic ducts Caroli’s disease develops. But, when the entire intrahepatic biliary tree is involved the condition is designated Caroli’s syndrome; in which there is an associated congenital hepatic fibrosis5-7. Unlike other types of biliary cysts, Caroli’s disease rarely present in childhood and the diagnosis is usually made at an advanced age8-10. Biliary cysts are associated with significant complications such as stone formation, cholangitis, secondary biliary cirrhosis and rupture2,11. Spontaneous biliary colonic fistulas are rare. Whenever they occur, usually, are associated with diseases of extrahepatic biliary tree12-14. Spontaneous fistulization of a solitary intrahepatic biliary cyst into transverse colon is extremely rare and has not been previously reported to the best of our knowledge.

We hereby, describe a case of a solitary intrahepatic biliary cyst with spontaneous fistulization into hepatic flexure of the colon. Diagnosis posed a challenge. Written informed
Case Presentation

A 53 years old male was admitted to our hospital with 02 months history of gradually developed mild, right sided, dull aching, upper abdominal, pain which is not related to ingestion of any form of meal. He has also history of associated low grade intermittent fever, fatigue, jaundice which lasted for two weeks, and infrequent loose stool. The jaundice had no obstructive features. Before presentation to us, he was treated with unspecified oral medications by a GP, at a general hospital. But, he showed no improvement. Otherwise he has no history of trauma, previous surgery or other known medical illness, no history sheep rearing. Physical examination revealed the patient was pale and emaciated. On abdominal examination, he had mild right upper quadrant tenderness; otherwise normal. There were no signs of peritonitis. Per rectal digital examination stained the finger with brownish faecal matter. He had no signs of anaphylaxis.

His Laboratory investigation results are as follows: Hemoglobin =8.4gm/dl, Hematocrit=24.9%, WBC and platelet count are within the normal range. Liver function test: SGPT =557, Albumin =2.8, otherwise normal. Electrolytes were within normal limits. ERCP and MRCPwere not available. The preliminary ultrasound examination (figure 1) showeda thin-walled heterogeneous complex cystic lesion in the right hepatic lobe with maximum diameter of 12 cm. Liver appeared normal, with no other parenchymal lesion. Gall bladder had normal size and wall thickness. Based on the above findings, CT scan of the abdomen was performed and revealed 13 x 11 cm measuring right hepatic cyst with air fluid level, which extends into the right subphrenic spaceresulting in elevation of the diaphragm. (Figure 2) There was also adjacent right hepatic flexure colonic thickening and abnormal contrast enhancement (Figures 3b & 3c). But, no clear evidence of bile duct dilatation. (Figures 3a-c) Gall bladder was contracted with wall enhancement. The kidneys appeared normal.

Figure 1 (Left): Abdominal US shows thin walled, heterogeneous complex cyst in the right hepatic lobe.

Figure 2 (Right): Scout film shows right subphrenic collection with air fluid level (found later
to be an extension from the intrahepatic cyst)

*Figure 3. CT scan:* Shows posteriorly located, huge peripheral hepatic cyst with air fluid level (Fig.3a), the colo-cystic fistula with significant colonic thickening and surrounding inflammation is demonstrated. (Figures 3b and 3c)

*Figure 4(right):* Intraoperative picture: cyst drained and resection was undergoing

The patient was taken to the operation theater for exploratory laparotomy, which revealed attachment of right extreme end of the colon to segment six of the liver. There was an opening in the colon which communicates with a bile containing cavity, in the liver. Extrahepatic bile ducts were normal. Colon disconnected, bile aspirated, and segment of the colon resected. There were no features of malignancy. End to end anastomosis of the colon and omentoplasty of the cystic cavity in the liver was done. Sub hepatic drain was left.
Biopsy was taken and its’ result shows localized organizing fibrino-purulent serositis of the hepatic colonic flexure with suggestion to look for hepatic or biliary lesion. Unfortunately, we were not able to retrieve cyst wall biopsy. The sub hepatic drain had minimal output of serosanguinous fluid, which later stopped and removed on the third day. Postoperatively patient had good recovery and discharged uneventfully.

Discussion

Biliary cysts, aka Choledochal cysts, are rare congenital cystic dilatations of the extrahepatic and/or intrahepatic biliary tree that affect females (three to eight times) more often than males\(^1,2\). Although frequently diagnosed in infancy or childhood, significant number of patients have reached adulthood when diagnosed\(^1,2\). Less than one half of patients clinically present with the classic clinical triad of right upper quadrant abdominal pain, jaundice, and a mass\(^1\). In adults, this triad is unusual, and abdominal pain with tenderness is usually the only initial feature\(^2,15\); as it is in our patient. The cause is not clearly known.

Different authors proposed variable classification systems for biliary cysts\(^16, 17, 3, 4\). Among which, despite its drawback, the modified Todani classification is the widely used one\(^3,4\). According to Todani, type I to type IV biliary cysts all involve the extrahepatic biliary tree (type IVa: multiple intra-and extrahepatic bile ducts). Type V cysts represent single or multiple intrahepatic bile duct cysts, without extrahepatic involvement. This condition (presence of type V biliary cyst) is called Caroli’s disease and when associated with congenital hepatic fibrosis it is termed Caroli’s Syndrome\(^18,19\). In our case, the presence of a single bile containing intrahepatic cyst in the absence of extrahepatic biliary tree involvement and in the absence features of hepatic fibrosis (even though not biopsy proven) suggests simple Caroli’s disease. Although present from birth, Caroli’s disease usually remains asymptomatic during the first 20 years, and may also remain so throughout life\(^18\). Unlike other biliary cysts, it rarely present in childhood and the diagnosis is usually made at an advanced age\(^19-22\). Our patient was 53 years old when diagnosed and he had single lobe involvement. Feteriche and colleagues\(^23\) reported 16 cases of Caroli’s disease, which showed findings similar to our patient’s, in age distribution and lobe involvement. The mean age was 55 years and the distribution of biliary lesions was monolobar in 13 patients. In patients like ours, the isolated monolobar form of disease, the absence of hepatic fibrosis and its complications, as well as the absence of cholelithiasis and absence of previous episodes of cholangitis could be possible explanations for the late presentation. Cholangitis, pancreatitis, hepatic fibrosis, and malignancy have all been reported at the time of presentation\(^2, 5,8-11\).

The presence of anemia and cachexia in our patient may suggest possible malignancy. The jaundice probably resulted as consequence of cholangitis. Other complications of the disease include intra- and extra hepatic lithiasis. Even though unusual, acute rupture of the cyst resulting in biliary peritonitis can also occur\(^2\). Though not common, spontaneous fistulization into an adjacent hollow viscous organ (like duodenum, colon, stomach etc.) is also a known complication of biliary cysts\(^13,24\). It comprises only <1% of all biliary disorders\(^12\).
Extrahepatic biliary cysts are usually responsible for such fistula, the commonest type being cholecysto-enteric fistula (75-85%)\textsuperscript{12,25}.

Spontaneous biliary colonic fistulas are rare. Whenever they occur, usually, are associated with diseases of extrahepatic biliary tree\textsuperscript{12-14,26}. Biliary calculus disease is responsible for such fistulas in up to 90% of cases\textsuperscript{13}. Patients can present with variable nonspecific signs and symptoms, posing a challenge to early diagnosis\textsuperscript{27}. Despite presence of biliary-colonic fistula, patients can also be asymptomatic\textsuperscript{28}. Fistulization of an intrahepatic biliary cyst into a transverse colon is extremely rare and has not been previously reported to the best of our knowledge.

In the present case, imaging and operative findings combined revealed a bile containing, single, intrahepatic (biliary) cyst with normal extrahepatic bile ducts, gallbladder and liver parenchyma; These suggest an intrahepatic biliary cyst (Carolí’s disease). There were no typical features of hydatid disease, which is one of the known causes of intrahepatic cysts in endemic areas, such as ours (East Africa)\textsuperscript{29}. Magnetic resonance or Endoscopic retrograde cholangiopancreatography could have been the choice of modality to define the details of the biliary-colonic fistula, if the facility would have been there. In our case, the CT scan showing presence of air under the diaphragm and inside the cyst cavity along with colonic wall thickening confirmed the communication between the cyst cavity and colon, even before surgical intervention. [Figure 2,3a-c] Initially, it was difficult to safely define the origin of the cyst, due to presence of deceiving features like extension into subdiaphragmatic space and absence of obvious intrahepatic bile duct dilatation. The complete diagnosis was undoubtedly made after surgery.

The perforation of the cyst into the transverse colon can occur due to primary pathology of the colon or secondary to infection of the cyst with inflammation and swelling of its wall giving rise to adhesion formation between the cyst and the surrounding organs. Continuous mechanical friction in a cyst with thick or calcified wall can result in colo-cystic fistula by progressively eroding the hollow viscous wall, as it is seen in conditions like hydatid cyst. But, since there is no significant cyst wall thickening or calcification (shown on abdominal ultrasound [Figure 1]) and colonic biopsy report came negative (with suggestion of hepatic or biliary cause), infection of the cyst resulting in surrounding inflammation [3b &3c] could be the most probable cause in the presented case. The presence of fever could be the manifestation of infection. The content of the cyst did not drain into the large bowel because the fistula was very narrow and allowed only gas from the colon to pass into the cyst.

Other differential diagnosis like non-parasitic hepatic cysts (NPHC) and simple hepatic cysts could have been considered in the differential diagnosis but the complex, heterogeneous and bilious content of the cyst makes them less likely.

**Conclusion**

Biliary-colonic fistulas are rare but known complications of biliary cysts, usually occurring in extra hepatic biliary ducts/cysts. However, our patient represents an exceptionally rare case
of biliary cyst fistulization as he presented with spontaneous communication between intrahepatic biliary cyst and hepatic flexure of the colon. On top of that the usual biliary duct dilatation was not seen; rather it was an isolated biliary cyst. The fistula also occurred without associated biliary calculus. Although, the fistula was initially revealed by CT scan, surgery was required to reach in to a complete diagnosis. The outcome of surgical intervention was satisfactory.

References


Prostatic Cyst with Bladder Outlet Obstruction Symptoms. Case Report

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The prostatic cysts are uncommon lesions usually detected incidentally. The incidence is reported as less than 1% most often occurs as small & asymptomatic lesions located medially in the gland, when they get a big size causes different lower urinary tract symptoms. Only 5% are symptomatic. The symptoms depend on the size & location of the lesion. Minimal access surgery (endoscopic) is recommended for its treatment. We present a case with the diagnosis of Prostatic cyst at the bladder neck treated with transurethral resection of the lesion. Histopathological investigation revealed benign prostatic cyst. At six months of follow up the patient remains free of symptoms.

Key words: Prostatic Cyst, Bladder outlet obstruction, transrectal ultrasound (TRUS), Transurethral Resection of the Prostate (TURP).

Introduction

The prostatic cysts are extremely rare, frequently diagnosed incidentally with an incidence of less than 1%. The uses of imaging studies have made cyst incidences increased. Usually they are small and asymptomatic located in the middle of the gland. When they have a big size causes different lower urinary tract symptoms. Only 5% are symptomatic. 1 Dik P, et al.

reported a series of transrectal ultrasound on 704 patients with symptoms of bladder outlet obstruction or lower urinary tract symptoms and prostatic cyst was found in 34 (5%). These might include painful ejaculation, hemospermia, infertility, urinary tract infections, chronic pelvic pain and prostatitis-like syndrome symptoms, but can rarely result in obstructive and irritative urinary tract symptoms if located close to the bladder neck or posterior urethra. 1, 3

Prostatic cysts are diagnosed incidentally during un ultrasound examination for any other indication and are classified based on cyst location, shape, and embryogenic origin, interconnection with prostatic urethra or seminal vesicle, and sperm presence in the cyst. 1, 3 The increasing use of transrectal ultrasound (TRUS) has resulted in the discovery of incidental prostatic cysts. Galosi et al. classified 6 distinct cyst types based on TRUS and pathological features, including midline cyst, cyst of the ejaculatory ducts, cyst of the parenchyma, multiple cysts, complicated cyst, cystic tumor, and cyst secondary to other diseases. 4 Kilinc, Tambo, Nghlem,classified the prostatic cysts lessons in congenital (mullerian duct and utricle) or acquired (ejaculatory duct cysts). 1, 3, 5 The Mullerian duct cysts and Prostatic utricle cysts are considered two separate clinical entities. The first arise from
remnants of the mullerian duct and the second as their name implies, are due to dilatation of the prostatic utricle. These two conditions can be very difficult or impossible to distinguish from clinically, and sonographically. Mullerian duct cysts usually occur in the 3rd and 4th decades of life. Utricle cysts are most often detected earlier in life. 5

The mullerians cysts are considered a remnant of the duct of Müller. Commonly are presented with irritative urinary symptoms, hematuria, suprapubic or rectal pain and palpable suprapubic mass, and sonographically they extend cephalic and lateral to the midline of the prostate gland.1, 3, 5

It has been reported the association of urogenital anomalies like the unilateral renal agenesis, undescended testis and hypospadias with the presence of cysts of the utricle that tend to be smaller in size and rarely spread outside the prostate to be considered a dilation of the utricle, it gives some symptoms, on post voiding ultrasound the cystic image is seen in the middle part of the gland and the distinctive clinical feature is post micturation dribbling of urine. Mullerian duct cysts have no such associations. This difference is the reason for the belief that utricle cysts have a different embryologic origin than mullerian duct cysts. Endoscopic contrasted study of the cyst confirms the diagnosis of the cyst. 1, 3, 5, 6, 7

The ejaculatory cysts are even rarer, raises the theory that are caused by a congenital obstruction of the duct or by secondary inflammation. It is asymptomatic and is diagnosed accidentally during investigation for some other pathology.

When the cysts are large in size are accompanied of perineal pain, dysuria, hemospermia and pain during ejaculation. When it has a big size the ultrasound shows as cystic lesion at the ejaculatory duct, the small cysts are generally seen as cystic lesions in the central and lateral areaof the base of the gland at the level of verumontanum. It is associated with the presence of stones to that level. The aspiration of the cyst may report the presence of sperm if testicular function is normal. After endoscopic contrast injection of the prostatic cyst can be appreciated dilated seminal vesicle on the same side.5, 6

The cystic degeneration of benign prostate enlargement often occurs with relative frequency and commonly located in the area of transition. These cysts are small and rarely give symptoms; The result of cyst puncture is frequently starch bodies, hemorrhagic fluid, infarction or necrosis of the hyperplasic nodule5

The prostate abscesses are usually complications of prostate infections (bacterial prostatitis) being the E. coli the more frequent causal germ. It has a high incidence in patients in the 5th and 6th decade of life, although its incidence has increased at young ages related to individual sexual behaviors. The patients present with the typical signs and symptoms of prostatitis; the ultrasound finding is focally enlarged prostate, hypoechoic or anechoic lesion, with irregular walls, internal echoes or partitions. These lesions are generally observed toward the midline of the gland.5, 6, 7 The clinical presentation improvement and the response to the antibiotic treatment confirms the diagnosis.
Other entities are reported even it is rare are parasitic prostate cysts (eg, Echinococcus cyst, bilharzial cyst) and cystic carcinoma. 1, 3, 6, 7. In the literature, recommended many treatments of prostatic cysts include TRUSG guided drainage or esclerotherapy, endoscopic transurethral resection or transurethral incision with endoscopic urethrotomy, Holmium: YAG laser for the marsupialization of the cyst wall, and in some cases even open surgery. 1, 2, 3, 4, 6

We present a case with a diagnosis of prostatic cyst. We will present: the symptoms, investigations performed, treatment, follow-up and a literature review.

Case Report

A 54-year-old male patient was admitted to our hospital with a history of chronic suprapubic pain of more than 6 months, and nocturia. Genital examination, external meatus, and digital rectal examination of the patient revealed normal findings. PSA 0.44ng/ml. Abdominal ultrasonography revealed normal prostate size (3.6 cm x 3.4 cm), volume 22 ml with midline prostatic cysts (2.4 cm x 1.9 cm) and high post voiding residual (156 ml) (Figure 1). His International Prostate Symptom Score (IPSS) was 20, and his quality of life (QoL) score was 4. The cyst was homogeneous on Pelvic CT, but in MRI wasn’t visualized. Under spinal anesthesia, Cystoscopic examination performed and found normal prostate size and a cystic mass at the 6 o’clock position on the bladder neck, which appeared to be obstructing the bladder outlet. (Figure 2) The mass was unroofed using the transurethral resection loop. Subsequently, a 16 Fr Foley catheter was inserted at the end of the intervention. On the 1st postoperative day, the urethral catheter was removed. The histopathological examination revealed a benign prostatic cyst. During the 6-month follow-up period, no complications were observed and symptoms disappeared. The anterograde ejaculation was preserved.

Figure 1. Abdominal ultrasonography findings: midline prostatic cysts (2.4 cm x 1.9 cm).

Figure 2. Cystoscopic finding: cystic mass at the 6 o’ clock position on the bladder neck.
Discussion.

The increasing use of the imaging studies as an abdominal ultrasound and transrectal ultrasound (TRUS) have increased of incidental finding of prostatic cysts. The reports of prostatic cysts has increased every time in the literatures.1, 2, 3, 4

Galosi et al. reported that midline cysts are observed by TRUS in 9.8% of cases located posteriorly,4 similar as our case of a prostatic cyst located at 6’clock position on the bladder neck. Kilinc et al, reported a 26-year-old male patient with a history of chronic suprapubic pain for more than 2 years, and painful ejaculation. Transrectal ultrasound (TRUSG) revealed a midline prostatic cyst with approximately 10 × 12mm diameter. The pelvic MRI verified the same and midline prostatic cyst. Minimally invasive endoscopic intervention using holmium was done: YAG laser was considered to treat long term lower urinary tract symptoms in order to minimize potential harm inflicted on the urogenital tract and future sexuality of the young patient. During 3- and 6-month follow-up periods, no complications were observed. Suprapubic pain and painful ejaculation disappeared.1

Tambo, et al, reported two cases of symptomatic prostatic cysts arising around the bladder neck causing bladder obstruction for long time (5 - 10 years) and the quality of life was affected. The patients were investigated with Uroflowmetry (obstructive patron) and abdominal ultrasonography (high post voiding residual). The abdominal ultrasonography revealed prostatic cysts arising around the bladder neck. The cyst was homogeneous on pelvic CT and MRI. With flexible cystoscope showed a smooth bulge anteriorly at the proximal prostatic urethra. The cysts were at the 11 o’ clock positions on the bladder neck, appeared to be obstructing the bladder outlet, did not show prostatic hypertrophy. The mass were unroofed using the trans urethral resection loop. The histopathological examination revealed benign prostatic cysts. The anterograde ejaculations were preserved and postoperatively the symptoms were resolved.3 The highest number of patients with symptomatic prostatic cysts have been reported by Tambo, et al with 34 patients. The symptoms included obstructive urinary tract symptoms (40%), urinary retention (33%), urodynia (9%), and infertility (6%). Symptomatic prostatic cysts were seen in relatively young patients and usually measures 3.6 cm.3

Joo-Yong et al. reported the first case of a prostatic cyst in Korea in a 41-year-old man presented with LUTS. The prostatic cyst was located anteriorly and acted like a checking valve during urination. His International Prostate Symptom Score (IPSS) was 20, and his quality of life (QoL) score was 4. Uroflowmetry showed that the peak flow rate was 9 ml/s (136 ml voided volume) and the volume of residual urine was more than 200 ml; a digital rectal examination revealed a normal prostate. Urine cytology did not suggest malignancy, and his serum PSA level was 3.12 ng/ml. The patient was treated with transurethral resection of the cyst, and the obstructive symptoms successfully improved.8

Tambo and Joo-Yong reported cases of prostatic cysts arising around the bladder neck similar to our case,1 8 but the localization of the cyst of our case was posterior. The
retention cysts of the prostate are resulting from the obstruction of the glandular acinis causing its dilation. Usually appear between the 5th and 6th decade of life. Usually cause no symptoms but when they are located at the level of the bladder neck can cause obstructive symptoms by the closure of the same. Mostly they are located toward the transitional zone and measure between 1-2 cm in diameter or less. May be one way indistinguishable from cystic changes of the BPH. Taketoshi et al reported a 54-year-old man with dysuria. Transabdominal ultrasonography revealed a multilocular cyst at the neck of the bladder, and a cystoscopy revealed bladder neck obstruction. The initial treatment was tamsulosin and abdominal magnetic resonance imaging (MRI) and the cyst disappeared. After 2 years the patient came again with difficulty of urination and transurethral resection of the cyst was performed. Histopathological examination reported a retention cyst. Hiroshi et al reported a 34-year-old man presented a prostatic retention cyst around the bladder neck causing prostatitis-like symptoms. The investigations (TRUS, MRI and Cystoscopy) revealed a projecting prostatic cyst which occupied the bladder outlet and seemed to cause the symptoms. Transurethral resection of the cyst was performed and the symptoms were markedly improved. Histopathologically, the cyst was retention cyst of the prostate.

Dell reported a 28 year old young man with obstructive and irritative voiding disorders caused by a prostatic cyst, located in the anterior and left lateral lobe of the prostate gland. The prostatic cyst was incised and marsupialized by transurethral resection. At post-operative follow up observed an increase in Qmax with no residual urine and negative urine culture. The patient showed no retrograde ejaculation or erectile dysfunction. on the other handDik P, et al. did in their series ultrasound guided transurethral marsupialization of the cyst through prostatic floor incision in 18 patients without complication.

The recommended treatment for intraurethral prostatic cyst is transurethral resection. This treatment can resolve obstructive urinary tract symptoms and preserve ejaculation in the absence of the prostatic hypertrophy. The complications are rare. Young patients need special care to preserve antegrade ejaculation and future fertility. In order to minimize the risk of complications is recommended the use of lower-Fr endoscopic instrument with minimal trauma to the bladder neck and urethra.

The malignancy natures of the prostatic cysts are less frequent. The lower male genitourinary tract is an extremely rare location for adenoid cystic carcinoma. Frankel and Craig in 1974 reported the first case with a diagnosis of adenoid cystic carcinoma of the prostate as an extremely rare variety of prostate adenocarcinoma. The tumor is histologically identical to adenoid cystic carcinoma of the salivary gland and breast. In these sites has favorable prognosis. The patient was treated with transurethral resection of the tumor with negative long-term follow-up.

Since 1974 for more than a decade only four well-documented adenoid cystic carcinomas has been reported in detail in the literatures where In 1988 two new cases were reported for Young, et al. in men of 60 and 68 years of age with urinary tract obstruction of long duration. The patients were treated with transurethral resection. When diagnoses were
confirmed one patient had a pelvic lymph node dissection recovered 26 nodes, all of which were negative for tumor, and a radical prostatectomy was then performed. The patient is well six years after operation. The other patient was treated with transurethral resection and radiation and is well eight months after operation.

Adenoid cystic carcinoma is considered for many authors as a subtype of prostatic adenocarcinoma. This can be a justification of the therapeutic treatment follow up in these cases because evidence suggests that the adenoid cystic-like tumor has an excellent prognosis on the basis of the limited experience to date.

Conclusion

Minimal Access surgical techniques (endoscopic) continue to be preferable treatment option for prostatic cysts with excellent results and minimal risk of complications.

References

The College of Surgeons of East, Central and Southern Africa (COSECSA/ASEA) and the Associação Moçambicana de Cirurgia (AMC) invite you to the 18th AGM and Scientific Conference to be held at Maputo from the 4th to the 8th of December, 2017.

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