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# Contents of the Volume


i. Copyright Notice
ii. Editorial Board Members
iii. Chief Author and Dean
iv. Table of Contents
v. From the Chief Editor's Desk
vi. Research and Review Papers

1. Abdominal Wall Closure in Emergency Laparotomy: Management and Outcome in Omdurman Teaching Hospital. *1-4*
2. Infantile Hypertrophic Pyloric Stenosis: Presentation and Outcome in Khartoum Teaching Hospital. *5-8*
3. Postcholecystectomy Iatrogenic Biliary Injury Presentation, Diagnosis and Management at The National Centre of Gastroeneterology and Liver Disease - Sudan. *9-14*
4. A Comparison Between Urine Analysis, Ultrasound and Cystoscopy in Detecting Urinary Schistosomiasis and its Manifestations. *15-18*
5. Stapler Haemorrhoidopexy for the Management of Haemorrhoids. *19-24*
6. Children Blunt Abdominal Trauma At Khartoum Teaching Hospital. *25-30*
7. Hand Machinery Injuries Presentation and Management (Omdurman Teaching Hospital). *31-36*
8. Non-Sentinel Lymph Nodes Status in Patients With Breast Cancer Operated at OmdurmanTeaching Hospital. *37-41*

vii. Auxiliary Memberships
viii. Process of Submission of Research Paper
ix. Preferred Author Guidelines
x. Index

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# Abdominal Wall Closure in Emergency Laparotomy: Management and Outcome in Omdurman Teaching Hospital

By Lodu S Kuju, Aamir A Hamza & Mohayad A Elhaj

*Medical Specialization Board, Sudan*

*Abstract-* *Background :* The incisions those applied in approaching those operations, were vertical anterior abdominal incisions (midline or paramedian), and the way these incisions were closed, it was either mass or layered abdominal wall closure and types of suture materials used in the closure, non-absorbable/absorbable, monofilament (Nylon)/ polyfilament (Vicryl).

*Objectives :* To study a series of patients those who underwent vertical incisions, either midline or paramedian and how they were closed, mass or layered closure and suture materials used inclosing the abdomen and the outcome.

*Keywords:* *laparotomy incision closure, suture material, closure technique.*

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# Abdominal Wall Closure in Emergency Laparotomy: Management and Outcome in Omdurman Teaching Hospital

Lodu S Kuju[α], Aamir A Hamza[σ] & Mohayad A Elhaj [ρ]

*Abstract-* ***Background:*** The incisions those applied in approaching those operations , were vertical anterior abdominal incisions (midline or paramedian), and the way these incisions were closed, it was either mass or layered abdominal wall closure and types of suture materials used in the closure, non-absorbable/absorbable, monofilament (Nylon)/ polyfilament (Vicryl). Patients and methods:

*Objectives:* To study a series of patients those who underwent vertical incisions, either midline or paramedian and how they were closed, mass or layered closure and suture materials used inclosing the abdomen and the outcome.

*Patients and methods:* This study is an observational prospective analytical hospital based study. Conducted at Omdurman Teaching Hospital, Sudan, over one year duration from 2012 Sep to 2013 Sep. Included were patients who underwent vertical anterior abdominal incisions (midline or paramedian) for emergency laparotomy, Non probability sampling including patients consecutively. Questionnaires were used and the variables were; demographical patient data, indications for laparotomy, suture materials used in these closures, technique of closing the fascial layer and skin and the outcome. Patient consent and ethical clearance were obtained in advance. Data was analyzed using SPSS version 20 and the P value was considered significant if ≤0.05.

*Results:* 114(91.9%) patients underwent midline incisions and 10(8.1%) patients were paramedian incision. Mass closure were111 (89.5%) and layered were13(10.5%) patients, types of suture materials used in the closure technique were non-absorbable polyamide (Nylon) 103(83.1%). Delayed absorbable polygactin 910 (Vicryl) 21 (19.9%). Sutures size used 2# (106) Nylon 90 (87.4%) Vicryl 16 (76.2%), 1# (17) Nylon 12 (11.7%)-vicryl 5(23.8%) and only one 0# (0.8%). Length of hospital stay 5days and less 55(44.4%) patients, >5-10 days 52(41.9%) patients and >10 days were 16(13.7%) patients. Outcome; 97(78.2%) patients were uneventful, complications 12 (9.7%) patients and 15 (12.1%) deaths. Complications; surgical-site wound infections were 7(5.6%) patients, woud dehiscence 4 (3.2%) patients and incisional hernia only one (0.8%) patient. Most of the closure was conducted by surgical registrars 118(95.2%) patients, surgeons' only two (1.6%) patients and the house officers did 4 (3.2%) patients.

*Conclusion:* Mass abdominal wall closure technique is the preferable technique by the surgeons than layered closure technique, for it is less time consuming and it has got a disadvantage of forming an incisional hernia, when it got dispted by any assault to area of suture line.

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*Keywords: laparotomy incision closure, suture material, closure technique.*

## I. Introduction

Closure of the abdominal wall is a common denominator of all abdominal surgery. The methods of closure are often based on local traditions and preference of the teacher and the surgeon is often reluctant to change these methods later on in his or her career. Abdominal closure is performed in multitude of fashions and an abundance of differently tailored studies on this matter. The goal to wound closure is to restore function of abdominal after a surgical procedure. The optimal method should be so technically simple that its results are as good for the hands of the trainee as they are for the experienced surgeon. It should leave the patient with a reasonably aesthetic scar and most importantly, it should minimize the frequency of wound rupture, incisional hernia (IH) wound infection and sinus formation. Mass closure involves a single layer closure of all musculofascial layers and may or may not include the peritoneum. Numerous clinical trials have compared layered to mass abdominal closure. Some studies have shown an increased incidence of burst abdomen and incisional hernia with layered closure and some studies show no difference in these complications, but no studies demonstrate advantage of layered over mass closure[(1)]. Closure of the midline abdominal incision have varied over time with better understanding of the physiology and engineering of closure of the abdominal wall and improvement in the materials of surgical sutures[(2)].

When this surgical procedure is conducted in an emergency setting and depending on the type of surgery (clean and/or contaminated), the incidence of complications may be particularly high, especially when acute dehiscence of the wall occurs. Furthermore, the rate of herniation related to midline laparotomy is still high approximately 16% of cases. Despite efforts to evaluate different suture techniques, suture threads (reabsorbable or non-absorbable) and general factors that may interfere with the repair process, the incidence of complications associated with this approach has been reduced [(3)].

Access to the abdominal cavity must be performed in such a way that surgical treatment



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procedures can be performed safely. For skin incision, scalpel and electrocautery are equivalent. Subcutaneous tissues and fascias must be divided by electrocautery to minimize blood loss. The best way to close abdominal cavity is by an all layer, slowly absorbable, running suture with suture: wound length ratio 4:1. Closing the peritoneal layer is not necessary. Subcutaneous suture and drains do not reduce the risk of wound complications. Staples should be used for skin [4- 9].

A similar technique is used for closure of the paramedian incision (PMI). The anterior and the posterior rectus sheaths are packed up in one bite. A transrectus incision will incorporate the medial sliver of the rectus muscle into the suture loops. Mass closure of the lateral (PMI) is not possible. For this incision, the anterior and posterior rectus sheaths are closed separately [1].

Mass closure techniques (MCT) with the one loop suture technique allow give of suture with coughing, respiration and movement. It basically holds the wound together and allows the properties of wound healing, the strongest of the all wound healing techniques, to take place without necrosis and closure by second intention [2].

The choice of suture material is more complex. They prefer to use absorbable sutures with delayed degradation, such as polydioxanone (PDS). Among nonabsorbable sutures, monofilament suture is recommended. Whether the incision is vertical or transverse, the steps for closure are more or less the same [1, 10-21].

## II. Patients and Methods

This is an observational prospective analytical study hospital based study, conducted at Omdurman Teaching Hospital. The study population was composed of male and female patients who underwent vertical abdominal wall closure during the period Nov.2012 Oct.2013. A total number of 124patients were the use of predesigned and pretested structured questionnaire.

Non probability sampling including all patients operated in the emergency theatre during the allocated period of study. Data analysis by using SPSS version 20.The percentage was calculated and chi-square test was used for the analysis. Test of significance was analytically accepted and P value0.000. Ethical clearance and approval for conducting this study was obtained from the ethical committee of Omdurman Teaching Hospital. Informed verbal consent was obtained from the patients participating in this study after full explanation of the study objectives.

## III. Results

A total of 124 patients were included in the study of emergency laparotomy. The surgical access in all these laparotomies was through vertical incisions, either midline or paramedian. The mean age range was 37.5 (SD_+19.4) years, ranged from 13to 90 years. Seventy seven (62.1%) were forty or younger and only one patient above 80 years **(Table1)**. Male patients constituted 104(83.9%) and female 20 (16.1%) ratio of male: female was 5.2: 1.

*Table 1 :* Age of the patients underwent emergency vertical abdominal incision.

| Age | Frequency | Percentage |
|---|---|---|
| 00-20 | 27 | 21.8% |
| 21-40 | 50 | 40.3% |
| 41-60 | 29 | 23.4% |
| 61-80 | 17 | 13.7% |
| 81-100 | 01 | 0.8% |
| Total | 124 | 100% |

Of the emergency wall closure, 92(74.2%) were acute abdomen, 28 (22.4%) abdominal trauma and 4 (3.2%) other abdominal conditions. Gunshot account 22 (84.6%) of abdominal trauma and stab wounds 6 (21.4%) **(Table2)**.

*Table 2 :* cause of laparotomy and vertical approach in the study

| Causes | Midline | Para median | Total% |
|---|---|---|---|
| Acute abdomen | 83 | 9 | 92(74.2%) |
| Stab wound | 21 | 1 | 22(17.7%) |
| Gunshot | 6 | 0 | 6(4.8%) |
| Others | 4 | 0 | 4(3.2%) |
| Total | 114 | 10 | 124(100.0%) |

Midline was 114 (91.9%) and paramedian incision was10 (8.1%) of vertical in the study. Out of114 patients operated through midline incision 83 (72.8%) were cases of acute abdomen, 27 (23.8%) were abdominal trauma and 4 (3.5%) patients other abdominal emergencies. Whereas those of paramedian incision nine were acute abdomen and one patient of stab wound **(Table3)**.



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*Table 3 :* type of closure in patients underwent emergency vertical abdominal incision

| Closure type | Midline Incision | Paramedian incision | Total |
|---|---|---|---|
| Mass | 111(97.4%) | 00 (0.00%) | 111(89.5%) |
| Layered | 03 (2.6%) | 10 (100%) | 013(10.5%) |
| Total | 114 (100%) | 10 (100%) | 124(100%) |

P value 0.000

Mass closure technique was used in 111(89.5%) while layered closure in 13 (10.5%). The later technique was used in all cases of paramedian incision and only three cases of midline incision. 97.4% of midline was closed in mass closure, which was found to be statistically significant P value 0.000(Table3). The continuous mode of closure was adopted in all cases (100%). This was used in mass closure of midline and layered closure of paramedian incisions. Interrupted fasial closure was not practiced in this study.

Vicryl was applied in 21 (16.9%). The most commonly used size of suture material was size 2# in106 (85.5%), size 1# 17 (13.7%) and 0# is only one suture. Of Nylon type of suture size 2# was commonly used 90 (87.4%) of Vicryl variety, size2# was 16 (76.2%) of patients (Table 4). In all ten patients of paramedian incisions and three midline incision, layered closure was applied. Vicryl was used in closing both fascial layers. The first layer was of peritoneum and posterior rectus sheath and second layer of the anterior rectus sheath) P value 0.000.

*Table 4 :* Type of suture material and its size used in closing the fascial layer

| Suture type | Suture 2# | Suture1# | Suture0# | Total% |
|---|---|---|---|---|
| Nylon | 90 (87.4%) | 12 (11.7%) | 01 (0.9%) | 103(100%) |
| Vicryl | 16 (76.2) | 05 (23.8%) | 00 (0.00%) | 21(100%) |
| Total | 106(185.5%) | 17 (13.7%) | 01 (0.8%) | 124(100% |

Closure of the abdominal incisions took between 5-10minutes 76 (61.3%) of patients, however, those who took >10mkinutes 48 (38.7%) of patients. Regarding type of incision incisions, out of 114 midline incisions 68 (59.6%) < 10 minutes. In the paramedian incision the great majority 10 (80%) took less than10 minutes though this was statistically not significant P value 0.205.

In all cases, conventional interrupted skin closure was practice. Suture size 0# was used in 66 (53.2%), 2/0 # in 48 (38.7%) and size 1# or2 # were used in 5 (4%) each. Regarding type, the majority 120 (96.8%) Nylon was used and 4 (3.2%) other types were employed (Silk in one and Vicryl in three patients. Most of abdominal wall closure 118 (95.2%) wre by done by the registrars; remaining six patients (4.8%) were completed by either surgeons' two patients or house officers' four patients.

Length of hospital stay varies 55 (44.4%) were discharge in less than five days, 52 (41.0%) discharged between5-10 days and 16 (13.7%) discharged in more than 10 days. Ninety seven of patients (78.2%) discharged home without any complications. The morbidity 12 (9.7%) and mortality was seen in 15 (12.1%). The morbidity and mortality were seen in 10.9% and14.1% respectively in patients with acute abdomen, where as in 3.7% and7.4% of patients with abdominal trauma.

Wound infection 7 (5.6%), burst abdomen 4 (3.2%) and (IH) 1(0.8%) were complications encountered. All seven cases of wound infection and single case that developed (IH) in the study had mass closure of their anterior abdominal wall. Out of four patients who developed burst abdomen, three followed mass closure. Out of 15 mortality 14 (93.3%) followed mass closure whereas one patient (6.7%) from layered closure.

## IV. Discussion

Midline incision is still the most frequently used to access the abdominal cavity in emergency surgery. In our study midline incisions are the most which constitutes about 97.4% and this comply the previous international studies [5, 6, 7].

Mass closure where all layers of the abdominal wall were closed as one structure (except skin), 89.5% whereas layered closure was less utilized 10.5% [5].

Most suture materials used Nylon 103 (83%) and Vicryl 21(17%). The most commonly used size of suture materials was 2# and1# Nylon and Vicryl 2#.

Surgical-site infection remains the important early postoperative complications as within the first 30 days postoperatively 5.6%, burst abdomen 3.2% and incisional hernia 11.2% [18].

## V. Conclusion

Mass closure technique is most preferred by the surgeons than the layered closure for it is less time consuming, it has got disadvantage of forming incisional hernia when it gets disrupted by any assault to the area of suture line.



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# Infantile Hypertrophic Pyloric Stenosis: Presentation and Outcome in Khartoum Teaching Hospital

By Gamar Elanbia E A Elnour, Amir A Mahamadain, & Aamir A. Hamza

*Medical Specialization Board(MSB), Sudan*

*Abstract-* *Background/Aims :* Infantile hypertrophic pyloric stenosis (IHPS) is a common cause of gastric outlet obstruction in infants, and presents as one of the most common surgical conditions of infancy. Although there were many published studies about IHPS worldwide; there was very few published study in our local literature. So we conduct this study to investigate IHPS in form of, presentation, management and overall outcome.

*Methodology :* In this prospective cross - sectional, hospital based study; 42 patients with IHPS, were admitted in Khartoum Teaching hospital department of Pediatric Surgery in the period between Aug. 2011 and May. 2013. Patients were referred from all parts of Sudan.

*Keywords :* *pediatric surgery,infantile hypertrophic pyloric stenosis (IHPS), ramsted's pyloromyotomy.*

*GJMR-I Classification :* *NLMC Code: WI 387*

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# Infantile Hypertrophic Pyloric Stenosis: Presentation and Outcome in Khartoum Teaching Hospital

Gamar Elanbia E A Elnour [α], Amir A Mahamadain [σ] & Aamir A. Hamza [ρ]

*Abstract-* *Background/Aims:* Infantile hypertrophic pyloric stenosis (IHPS) is a common cause of gastric outlet obstruction in infants, and presents as one of the most common surgical conditions of infancy. Although there were many published studies about IHPS worldwide; there was very few published study in our local literature. So we conduct this study to investigate IHPS in form of, presentation, management and overall outcome.

*Methodology:* In this prospective cross - sectional, hospital based study; 42 patients with IHPS, were admitted in Khartoum Teaching hospital department of Pediatric Surgery in the period between Aug. 2011 and May. 2013. Patients were referred from all parts of Sudan. Study variables included were age, gender, and residence, presenting symptoms, clinical sign and postoperative outcomes. Data was collected using a structured, pretested questionnaire and analyzed using a computer program-Statistical Package for Social Sciences (SPSS) version 20. Results were presented in tables and graphs.

*Results:* Forty two patients with IHPS were studied, 78.6% of them were males, 61.9% of the patients were of 3-6 week age group and 50% of them were a first born child.

All patients presented projectile vomiting with severe dehydration observed in 88.1% of them. While 90.5% had palpable epigastric olive like mass 69.0% of them had visible peristaltic wave.

Abdominal U/S was done for all patients, and confirmed the diagnosis in 97.6% of them.

For all patients; open surgical Ramsted's pyloromyotomy was done successfully, with 4.8% complications and 2.4% mortality.

*Conclusion:* We observed that dehydration and abnormal laboratory values are the most common findings in IHPS. Surgical operation associated with good outcome.Ultrasound has emerged as the modality of choice for diagnosing IHPS as it is easily, available and sensitive.

*Keywords: pediatric surgery, infantile hypertrophic pyloric stenosis (IHPS), ramsted's pyloromyotomy.*

## I. Introduction

Infantile hypertrophic pyloric stenosis (IHPS) is a common cause of gastric outlet obstruction in infants, and presents as one of the most common surgical conditions of infancy. The lesion is characterized by gastric outlet obstruction and multiple anatomic abnormalities of pyloric antrum.

The etiology of (IHPS) is obscure but probably is a multifactorial, involving genetic predisposition and environmental factors. Typically; infants with IHPS are clinically normal at birth, but during the first few weeks of postnatal life; they develops non bilious forceful vomiting described as "projectile" [(1)].

Gastric outlet obstruction leads to emaciation and, if left untreated, may result in death.

The clinical diagnosis hinges on the palpation of the thickened pylorus or "olive " Abdominal examination is accurate but not always successful, depending on factors such as the experience of the examiner ,the presence of gastric distention and , a calm infant.[(2)]

Surgical treatment is curative. The classical operation is a Ramsted's Pyloromyotomy; which may also be performed laparoscopically Current imaging techniques, particularly sonography, are noninvasive and accurate for identification of (IHPS)[(3)].

There was very few published study in our local literature. So we conduct this study to investigate IHPS in form of, presentation, management and overall outcome.

## II. Methodology

In this prospective cross - sectional, hospital based study; 42 patients with IHPS, were admitted in Khartoum Teaching hospital department of Pediatric Surgery in the period between Aug. 2011 and May. 2013. Patients were referred from all parts of Sudan. Study variables included were age, gender, and residence, presenting symptoms, clinical sign and postoperative outcomes. Data was collected using a structured, pretested questionnaire and analyzed using a computer program-Statistical Package for Social Sciences (SPSS) version 20. Results were presented in tables and graphs.

## III. Results

Forty two patients were admitted in Khartoum Teaching hospital, department of Pediatric Surgery, from Aug 2011 to May2013; with IHPS.

Thirty three (78.6%) of the patients were males and 9(20.4%) were females. with a male to female ratio

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of 3.7:1. Twenty six (61.9%) of our patients lie in the range between 3-6 week of age group, and 21 (50%) of them were a first born child.

Clinically 42(100%) of the patients presented projectile vomiting; which found to be non bilious in 41(97.6%) patients. 34(81.0%) of the patients had marked weight loss while 24(57.1) of them present with constipation.

Regarding clinical examination 37(88.1%) of the patients were dehydrated, 38(90.5%) had palpable epigastric olive like mass while just 29(69.0%) of them had visible peristaltic wave. With 24(57.1) of the patient had abdominal distension.

Thirty (71.4%) patients had normal Hb level, 24(57.1%) showed low serum $K^+$ level compared to 18(42.9) with low serum $Na^+$. 8(19%) of the patient had high blood urea level, while just one (2.4%) had elevated serum creatinine.

Abdominal U/S done for all patient; which confirm the diagnosis in 41(97.6%) of the patients, while contrast study was needed to confirm the diagnosis just in one (2.4%) patient.

All the 42 patients received open surgical intervention, and Ramsted's pyloromyotomy was done successfully to all patients; with only 4.8% complication, and 2.4% mortality

Twenty five (59.5%) of our patients had an average postoperative stay of 48 hours.

## IV. Discussion

Although there were many published studies about IHPS worldwide; there was very few published study in our local literature. So we conduct this study to investigate IHPS in form of, presentation, management and overall outcome.

In our study we reviewed 42 patients; admitted in Khartoum Teaching hospital department of Pediatric Surgery with IHPS; from Aug. 2011 to May. 2013.

Comparison of our study with the AC Paul, etal [6], Frieda Hulka, etal [8], Jlidi S, etal [9], Taylor, etal [4], and İsmet Faruk ÖZGÜNER, etal [7] revealed several similar results and many important differences.

Most of our patients (61.9%) were between 3-6 weeks of age group. That's goes with the results of in comparison studies [4, 6, 7, 8, 9].

In our study there is a male gender dominance (78.6%), with a male to female ratio of (3.7:1); and that's goes with all the above mentioned studies [4, 6, 7, 8,9], with a male to femal ratio ranging from (3.8:1) in Jlidi S, etal [9] to (10:1) in AC Paul, etal [6] study.

With regards AC Paul, et al [6] study, he found among 70 male, 49(70%) were a first born male child, and that's goes with our results as (50%) of our patients were a first born male.

Regarding the clinical presentation, 42 (100%) of the patients presented with projectile vomiting; which found to be non bilious in 41 (97.6%) patients. (81.0%) of the patients had marked weight loss while (88.1%) of the patients were dehydrated, (90.5%) had palpable epigastric olive like mass and (69.0%) of them had visible peristaltic wave. That's comparable to most of the previously mentioned studies; (83.6%) of the patients had the typical history of projectile vomiting and the typical findings of visible peristalsis after a "test meal" and a palpable pyloric tumor in İsmet Faruk ÖZGÜNER, etal [7] study, and palpable olive like epigastric mass was found in up to (92%) of patents in Sapkota. S [5] study,while olive' was palpated on examination in 48%, and visible peristalsis seen in 25% in Taylor, etal [4] study. And that variation is most probably due to patients built; as these sign more obvious in thin wasted patients, beside that the state of gastric fullness also affect the examination finding; as full stomach make a peristaltic wave visible, while an empty stomach facilitate palpation of an olive like epigastric mass.

Thirty (71.4%) patients had normal Hb level, 24(57.1%) showed low serum $K^+$ level compared to 18(42.9) with low serum $Na^+$. Eight (19%) of the patient had high blood urea level, while just one (2.4%) had elevated serum creatinine. (Table4).

Abdominal U/S done for all patient; which confirm the diagnosis in 41(97.6%) of the patients, while contrast study was needed to confirm the diagnosis just in one (2.4%) patient.

All patients received open surgical intervention, and Ramsted's pyloromyotomy was done successfully to all patients; with only 4.8% complication; in form of inadvertent simple mucosal perforation; repaired with 4/0 vicryl, and wound dehiscence for 1 (2.4%). We had a 1 (2.4%) mortality. Over all outcome of our study is comparable to the international results, for example; AC Paul, etal[6] had Inadvertent mucosal perforation occurred in 1 case during procedure and Superficial wound infection found in 3 cases (03.89%),

Twenty five (59.5) had average postoperative stay of 48 hours, AC Paul, etal[5] had 65 (84.41%) patients were discharged on 3rd to 4th postoperative day.



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*Table 1 :* Age & Gender distribution of patients with IHPS

| Age | Male | Female | Total |
|---|---|---|---|
| Less than 3 Weeks | 1 | 0 | 1 |
| 3-6 Weeks | 20 | 6 | 26 |
| More than 6 Weeks | 12 | 3 | 15 |
| Total | **33** | **9** | **42** |

*Table 2 :* Symptoms of patients with IHPS

| *Symptoms* | *Frequency* | *Percent (%)* |
|---|---|---|
| *Vomiting* | 42 | 100 |
| *Non Bilious vomiting in character* | 41 | 97.6 |
| *Projectile vomiting in character* | 42 | 100.0 |
| *Loss of wt* | 34 | 81.0 |
| *Constipation* | 24 | 57.1 |

*Table 3 :* Clinical signs in patients with IHPS

| *Signs* | *Frequency* | *Percent (%)* |
|---|---|---|
| *Abdominal distension* | 24 | 57.1 |
| *Dehydration* | 37 | 88.1 |
| *Emaciated* | 17 | 40.5 |
| *Visible peristaltic wave* | 29 | 69.0 |
| *Palpable abdominal olive mass* | 38 | 90.5 |

*Table 4 :* Laboratory investigations of patients with IHPS

| Investigation | Normal | Abnormal (low) |
|---|---|---|
| Hemoglobin % | 30 (71.4%) | 12 (28.6%) |
| Serum potassium | 19 (45.2%) | 23 (54.8%) |
| Serum sodium | 24 (57.1%) | 18 (42.9%) |
| Blood urea | 34 (81.0%) | 08 (19.0%) high |
| Serum createnine | 41 (97.6%) | 1 (2.4%) high |

P value 0.049

*Table 5 :* Outcome of surgery in patients with IHPS

| Outcome | No | Percent (%) |
|---|---|---|
| *Uneventfully* | 39 | 92.8 |
| *Developed complications* | 2 | 4.8 |
| *Death* | 1 | 2.4 |
| *Total* | 42 | 100.0 |

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# Postcholecystectomy Iatrogenic Biliary Injury Presentation, Diagnosis and Management at The National Centre of Gastroeneterology and Liver Disease - Sudan

By Alaa Musa El Sayed Mohammed & Abdelmajid Mohammed Masaad

*Medical Specialization Board, Sudan*

*Abstract-* *Background:* Iatrogenic biliary duct injury is a rare but potentially devastating condition associated with significant morbidity and mortality. Related data are limited in developing countries. This study aimed to analyse the clinical presentation, diagnosing and type of biliary injuries, and management proposed and in a population treated at a tertiary care centre.

*Method :* Retrospective and prospective analysis of patients who sustained IBDI, and presented to the Gastroeneterology surgical department at the National Centre Of Gastroenterolgy and Liver Disease Sudan , between the period of October 2010 to September 2013 (three years period).

*Keywords:* *open cholecystectomy, biliary injury, strasberg classification.*

*GJMR-I Classification :* *NLMC Code: WI 900, WI 700*

POSTCHOLECYSTECTOMYIATROGENICBILIARYINJURYPRESENTATIONDIAGNOSISANDMANAGEMENTATTHENATIONALCENTREOFGASTROENETEROLOGYANDLIVERDISEASE–SUDAN

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# Postcholecystectomy Iatrogenic Biliary Injury Presentation, Diagnosis and Management at The National Centre of Gastroeneterology and Liver Disease - Sudan

Alaa Musa El Sayed Mohammed [α] & Abdelmajid Mohammed Masaad [σ]

*Abstract-* ***Background:*** Iatrogenic biliary duct injury is a rare but potentially devastating condition associated with significant morbidity and mortality. Related data are limited in developing countries. This study aimed to analyse the clinical presentation, diagnosing and type of biliary injuries, and management proposed and in a population treated at a tertiary care centre.

***Method:*** Retrospective and prospective analysis of patients who sustained IBDI, and presented to the Gastroeneterology surgical department at the National Centre Of Gastroenterolgy and Liver Disease Sudan , between the period of October 2010 to September 2013 (three years period).

***Results:*** Total of 40 patients diagnosed as IBDI, 36 were females and 4 were males. Their mean age was 41 years (range 23-72) years. IBDI were due to 90% (n=36) post OC and due to10% (n= 4 ) post LC. 65%presented with obstructive jaundice, 20% presented with biliary peritonitis, 15% presented with biliary cutaneous fistula (bile leak). The identification rate of intra-operative injury was 10% and 90% in the post-operative group. Time of presentation ranged between 2 days and 3 years the median was12 days .According to Strasberg type E I, II, III and type D injuries, 20%, 37.5%,35%,7.5% were seen in patients, respectively. 87.5% of patients (n=35) underwent Roux en Y HJ. 5% of patients (n=2) underwent ERCP stenting, 2.5% underwent end to end anastamosis , 2.5% underwent primary repair T tube insertion.. Fifteen patients (40.5%) had complications during their hospital stay. Total hospitalization days, ranged between 14 days and 1months the median was 18 days. Mortality was 12.5% (n=5).

***Conclusion:*** Open cholecystectomy is the main cause of IBDI in our study. In most of the cases surgical reconstruction with hepaticojejunostomy was required as the definitive treatment. ERCP should only be attempted when there is biliary continuity Intrabdominal abscess is the most common cause of death. Early referral to a tertiary centre with experienced hepatobiliary surgeons is necessary to assure optimal results.

*Keywords: open cholecystectomy, biliary injury, strasberg classification.*

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## I. Introduction

Cholecystectomy is one of the most performed surgical procedures in general surgery. Iatrogenic biliary duct injury is a rare but potentially devastating condition associated with significant morbidity and mortality. The vast majority of these injuries occur as rare complication of both open and laproscopic cholecystectomies [1].

Iatrogenic injury may also occur during gastrectomy, pancreatectomy or ERCP, Trauma and duodenal ulcer are less common causes.A multidisciplinary approach including surgery, endoscopy and interventional radiology specialists is required to properly manage this complex disease[1].

Management depends on the timing of recognition of injury, the extent of bile duct injury, the patient's condition and the availability of experienced hepatobiliary surgeons. Immediate detection and repair are associated with an improved outcome, and the minimum standard of care after recognition of a bile duct injury is immediate referral to a surgeon experienced in bile duct injury repair.

The goal of surgical repair of the injured biliary tract is the restoration of a durable bile conduit, and the prevention of short- and long-term complications such as biliary fistula, intra-abdominal abscess, biliary stricture, recurrent cholangitis and secondary biliary cirrhosis [2].

The success rate of biliary reconstruction for iatrogenic bile duct injuries depended on complete eradication of abdominal infection, complete cholangiography, use of correct surgical technique, and repair by an experienced biliary surgeon. If these objectives were achieved, the repair could be performed at any point with the expectation of an excellent outcome [3].

In general data about IBDI in Sudan is lacking, there are no records of IBDI incidence per year. Although there is a recognized rise in IBDI cases presenting to tertiatry centres.Records are not just deficient in Sudan but also in other developing countries especially African countries.Developing countries are in



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need of encouragement of local audits of surgical performance and quality assurance.

## II. Objectives

*a) General objective*

- To reflect the problem of post-cholecystectomy biliary injuries, through analyzing the cases of postcholecystectomy biliary injury presenting to the NCGLD.

*b) Specific objectives*

- To study the clinical presentation, diagnosing and type of postcholecystectomy biliary injuries.
- To study the management and short term outcome of these patients.

## III. Patients and Methods

*a) Study Design*

It is a Retrospective prospective descriptive analytical study.

*b) Study area*

This study was done at National Gastroenterology& Liver Disease Centre (NGLDC).

*c) Study duration:*

September 2012 to October 2013.

*d) Study population*

Cases diagnosed as postcholecystectomy biliary injuries admitted from the period of October 2010 to September 2013 (three years period).

*e) Sample size*

Total of 40 patients presenting to the Gastroeneterology surgical department at the NCGLD, diagnosed as postcholecystectomy biliary injury.

*f) Inclusion criteria*

Patients who had injury iatrogenic biliary injury during cholecystecomy done by either laproscopic or open method.

*g) Exclusion criteria*

Patient who sustained their biliary injuries either through trauma or during some other procedure.

*h) Sampling*

Non probability sample.

*i) Research & technique*

This study was conducted in the surgical department at the National Center of Gastroenterology and Liver Disease (NCGLD) - Sudan.

Analysis was done retrospectively and prospectively from the records of patients files , patients charts and operation notes ,demographic info, history of presenting illness , date of cholecystectomy surgery, symptoms and signs after surgery, imaging , drainage procedures ,course of the illness, type of injury according to(Strasburg classification), management proposed and postoperative complications .Patient were also contacted through the telephone contact .

*j) Data Collection Tools*

A well-constructed predesigned questionnaire including demographic info, history, and clinical examination, investigation ,mode of management, patient will be followed up in the refer, through their admission ,and through telephone contact.

*k) Data Variables*

Questionnaire including, age, sex, gender, BMI, Operation (laproscopic or open cholecystectomy), signs and symptoms of biliary injury presentation(early and late),decompression procedure(open or US), investigations laboratory and radiological MRCP, type of injury according to Strasburg classification, definitive managements endoscopic and surgical, postoperative complications and postoperative mortality, days of admission in the hospital.

*l) Data analysis*

All the data was analyzed using computer program SPSS 19. Significance will be used with probability of P value will be considered significant if $\leq 0.05$.

*m) Consent*

Verbal consent to be taken from all patients after explanation of the study, its nature, the confidential keeping of data & to quit at any time during the study.

Ethical clearance:

Will be obtained from Sudan National Summit Board, Ethical Clearance committee.

## IV. Results

*a) Sample number*

Forty patients sustained postcholecystectomy IBDI, were admitted in the Gastroeneterology surgical department, at the NCGLD from October 2010 to September2013.

*b) Age and gender*

The mean age of patients is 41 years old (S.D. ± 11.8).Sixty five percent of patients' ages were between 30 and 50 years. The age range is (23-72years old).

Thirty six patients were females (90%) and four males (10%), with a female to male ratio of 9:1.

*c) Previous Operation*

Thirty six patients (90%) underwent open cholecystectomy, while only four patients (10%) underwent laparoscopic cholecystectomy.

Intraoperative detected injuries were in four patients (10%), two of them in our centre, none of them were LC biliary injury. Postoperative detected injuries in 36 patients (90%); they were referred from other hospitals, two patients detected postoperatively in our centre.



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*d) Clinical Presentations*

There is a realized increase in patients with IBDI presenting to the centre, nearly half of the patients (n=19) presented in the last year.

Twenty six patients (65%) presented with obstructive jaundice, eight patients (20%) presented with biliary peritonitis (fever, vomiting, generalized abdominal tenderness), six patients (15%) presented with biliary cutaneous fistula (bile leak).

Of the 26 patients presenting with obstructive jaundice, 15 patients (37.5%) presented with complete clipping or ligation of the CHD or CBD, and 11 patients (27.5%) presented with strictures, many month after the surgery.

*e) Time of presentation since operation (Referral Delay)*

Between 2 days and 3 years the mean 45 weeks(SD+242.8) the median is 12 days, 2 patients refused reconstructive surgery but appeared after 3 years .

Although two patients presented to our centre, diagnosed as intraoperative detected major bile injury by their surgeons they were referred after 8 days.

Only 2 patients diagnosed as postcholecystectomy injury after 2 days of injury, they sustained their injury at our centre, and underwent reconstructive Roux n y surgery after one day (immediate reconstruction).

Decompression was done for 10 patients, for all of the patients with biliary peritonitis 8 patients (20%), and in 2 patients (5%) with biliary cutaneous fistula due to a significant bilioma on MRCP.

Initially decompression was done either by open decompression (60%) or U.S guided decompression (40 %).All of patients who underwent U.S guided drainage got blocked within a few days and so open decompression was done in all the patients.

Regarding diagnosis all of the patients with IBDI injuries, were diagnosed by MRCP, the distal and proximal biliary tree was clearly identifiable, and amount of bilioma was detectable, MRCP was not done for the patients who sustained intraoperative injury at our centre.

*f) Classification of injury*

According to MRCP results patients injuries were classified by Strasberg classification, eight patients diagnosed as E I (20%), fifteen patients diagnosed as E2 (37.5%), fourteen patients diagnosed as E3 (35%) , three patients diagnosed as type D (7.5%).

Patients with drains and biliary cutaneous fistula, in total were 14 patients (35%) ,have intra-abdominal infections, definitive surgery was deferred until inflammation subsided ,added to that decrease of biliary cutanoeus fistula till reaching dryness or semidryness, and proximal stump fibrosis and dilatation of biliary system with appearance of jaundice, differed from patient to patient,70% of patients reached dryness and appearance of jaundice within 3months . The mean duration for fistula dryness was 2.6 month(SD+-1.60), median was 3 month.

*g) Definitive management*

Out of 40 patients, thirty five patients (87.5%) patients underwent Roux.en.Y HJ(Rodney Smith rechnique). Two patients (5%) underwent ERCP stenting, one patient (2.5%) underwent end to end anastamosis of CHD were injury detected intraoperatively, one patient (2.5%) with type D underwent primary repair T tube insertion were injury detected intraoperatively, one patient (2.5%) didn't come back for surgery.

The method of biliary drainage and stenting was either external transhepatic stenting for 31 patients(88.6%) or external T drainage which was done in 4 patients (11.4%) according to surgeon preference.
Eight patients (22.8%) of the 35 patients with transected or ligated CHD, had previous attempts of ERCP stenting but failed. Seven patients (63.6%) of the 11 patients diagnosed as strictures managed initially by ERCP stenting and dilatation more than 3 times, but failed to dilate the stricture, six patients (54.5%) had an episode of cholangitis during their stent management at least for once.

*h) Injury-intervention time gap*

The time between the injury and definitive management, the mean is 5 months and median 2 months (SD± 10.9) .

*i) Early postoperative complications*

Regarding the postoperative period, out of the 37 patients who underwent definitive surgical management, 20 had a normal postoperative period during their hospital stay, with no complications. Fifteen patients (40.5%) had sustained complications during their hospital stay.

Wound infection. Four patients (10.8%) developed wound infection in the postoperative period.
Fistula, five patients (13.5%) developed fistula, 2 patients from them developed intra abdominal abscess.
AnastamoticDehiscense, one patient (2.7%), the only patient who underwent primary end to end anastamosis.
Liver failure, three patients (8.1%) developed liver failure.
Pulmonary embolism. One patient (2.7%) developed pulmonary embolism.

Acute renal failure. One patient (2.7%) developed acute renal failure.

*j) Mortality*

Five patients (12.5%) unfortunately died, all in the postoperative period.

Three patients (7.5%) died due to sepsis condition started as fistula formation, followed by intra-abdominal abscess collection.



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One patient (2.5%) died due to massive pulmonary embolism. One patient (2.5%) died to hepatic failure, deterioration in liver functions and hepatic encephalopathy.

*k) Total Hospitalization Days*

Hospitalization ranged between 14 days and 1months the median was 18 days.

## V. Discussion

Iatrogenic biliary duct injuries are a major concern to general surgeons everywhere, since it's an iatrogenic inflicted injury.

In general data about IBDI in Sudan is lacking, there is no records of IBDI incidence per year , although there are few centers which are specialized in gastroenterology and liver surgery and these centers receive all of the IBDI in Sudan .

Information about IBDI incidence is not just deficient in Sudan but also in other developing countries especially African countries. One of the causes maybe due to sensitivity of the surgeons' community to the condition, which leads to less reporting, the exact reason is not clear.

NCGLD have been receiving IBDI for a long time. There is an increase in the referred patients in comparison with the pervious study done in the late 90's(MAM Ibnouf et al)4, the referred patents have doubled and even tripled in the last year 2013 .According to IbnOuf et al 5, IMBDI is a stable phenomenon because increasing experience of surgeons did not affect the overall incidence of bile duct injury.

Speculation of the exact reason is not possible, the rise of IBDI is probably due to many factors, possibly one of them is the amount of cholecystectomies which has definitely increased in the last years.

Of the admitted patients female percentage is higher than males similar to the result in (MAM Ibnouf et al)4 and (JayasundaraJAet al)6. Mean age and age range is also similar to results in 4 and 6 and but less in comparison to results of SicklickJK et al7.

Injuries due to open cholecystectomy were 90%, while laproscopic cholecystectomy were just 10%. Similar to the results ofIbnouf et al4 which results showed post OC were 95% and LC 5%, this shows that there is no advancement in introducing laproscopic surgery to our hospitals in the last 12 years .Although worldwide the routine cholecystectomy surgery done is LC, still in Sudan the common practice is the open cholecystecomy. OC injuries are still reported reaching approximately half of the patients according to Seeliger H et al8, and 40.3% according to Jayasundara JA6 but they are less than LC.

There is delay in the referral time median is 12 days,and mean is 45 weeks. this finding is very similar between MAM Ibnouf et al4 and our results and it show less delay in comparison to Sicklick et al7 results, median is 21 days,and results of Seeliger H816 days but comparing the mean of delayed referral results of Sicklick et al7 results shows 29.1 week and our study shows 45 weeks, due to 2 patients in our study who refused surgery for years and eventually came back. Delayed referral is a major problem most of the patients are referred at the maximum time of inflammation making surgery impossible, and so patients definitive surgery is deferred till inflammation subsides.

Presentations of patients in our study, similar to the presentations MAM Ibnouf et al4 and comparable to Sicklick et al7, but in contrast to results of M.shamimi et al9and SlaterK et al10were patients presenting were biliary peritonitis and bile leak (57%) and (70%) respectively.

All of the patients were diagnosed by MRCP, except for the intraoperative detected injuries in our centre ,MRCP is considered a new technology and proved to be of high sensitivity and specificity in detecting abnormalities of the biliary system according Bujanda L et al 11and Yeh TS et al12.Before the invention of MRCP diagnosis was made by ERCP and PTC ,ERCP detect low injuries and PTC detect high injuries ,PTC have disadvantage of possibility of failure when the biliary system is not dilated according to results of MAM IbnOuf et al4, Bujanda L et al 11and Yeh TS et al12.

MRCP have completely replaced ERCP and PTC in the diagnosis of biliary injury, ERCP should not be considered as tool of diagnosis, unless MRCP is not available.

Regarding classification of IBDI injury,In our study EII and EIII, together were 72.5% and E1 were 20%, similar to results of IbnOuf et al4 were portahepatis injuries were 62.5% and injuries at the level of the cystic duct E1 26.3% , In comparison to Jayasundara JAet al6 results which showed both EII and EIII 57% significantly less than our injuries and a higher rate of E 1 were 27% which is more than our E I injury,and also showed EIV injuries in 16% of patients ,there was no EIV injuries in our study .This is probably because of difference between mode of injury in OC and LC according to Ibnouf et al 4. Open cholecystectomy injuries is associated with high ductal injuries specially just below the confluence and portahepatis collectively EII and EIII, while laproscopic cholecystectomy is associated with diathermy heat transfer, late tissue necrosis affecting unpredictable length of biliay system can reach to the right and left hepatic ducts i.e EIV injuries . However in both LC and OC overtraction may lead to inappropriate placing of clips or ligatures. There are overall commonalities of injuries when comparing them to Seeliger H et al 8and Woods MS et al13, although specific type E classification was not reported.

Patients who underwent definitive managements were 39 patients ,our results were similar



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to results of Sicklick et al7which showed 86% underwent Roux en Y HJ reconstruction,(11%) underwent stenting for partial injuries,(1.5%) underwent end to end anastamosis. Also there is commonalities between our results and Seeliger H et al 8results showing 76% underwentRoux en Y HJ including CHD transection and strictures and 22% underwent stenting for Type A and Type D and cystic duct leaks. In comparison to Woods MSet al13, 18% underwent endoscopic stenting including all of type A and type D .Sixty five% underwent Roux en Y HJ (including 93% of complete transections and 60% of strictures), while 21% underwent end to end anastamosis (including 40%of strictures and 7% of transections), 36% of patients who underwent end to end anastamosis due to stricture required additional treatment and 52% of patients who underwent end to end anastamosis due to transections required further surgical intervention. In comparison to results of Karvonen Jet al14 69% of patients were treated surgically byRoux en Y HJ. Ninety eight percent of them were major injuries, including tangential lesions of common bile duct and total transections, were treated operatively.4% treated primary repair over T tube.. All the cystic duct leaks (8%) of injuries were treated endoscopically with a 90% success rate. 19 % of patients had strictures of bile duct 88% of them were treated successfully with ERCP stenting and dilataion. According to preference and availability of radiological expertise there are specialized centers which advocates stenting for strictures and resort to surgery when it fails, while other centers advocates surgical therapy for strictures, since ERCP stenting and dilatation has significant failure rates.

In Ibnouf et al4 only 50% underwent Roux n y HJ, and 50% of patients were stented , that's because ERCP was needed for diagnosis at that time and MRCP wasn't available and attempt for stenting was done even if injury is complete injury, stent was inserted even in completely transected CBD or CHD.

In our study seven patients (63.6%) of the 11 patients diagnosed as strictures managed initially by ERCP stenting and dilatation more than 3 times, but failed to dilate the stricture, six patients(54.5%) had an episode of cholangitis during the management at least for once.In many studies of radiological management of IBDI complete transections were referred for direct surgery as in Mohammed Salih et al15 Ahmed Abdel-Raouf et al16.. ERCP stenting should only be done in patients with biliary continuity and better to refer patients with complete transections to surgical unit for surgical reconstructions.

In our study fifteen patients (40.1%) developed complication, similar to Sicklick et al7, were (42.9%) sustained at least 1 postoperative complication. In comparison to Sicklick et al7our results showed higher wound infection, but similar intra abdominal suppuration, and higher fistula formation. In comparison to Mihăileanu et al17 our results showed lower intraabdominal suppuration, wound infection, and cardio-renal-pulmonary complications, while fistula formation in our result was higher.

Wound infection was treated with frequent dressings cultures and antibiotics Three of our patients who developed biliary cutaneous fistula, their biliary fistula closed within 2 months, their transhepatic drain was left for 2 months in these patients rather than 6 weeks.

Patient who underwent primary end to end anastamosis of CHD, developed anastamotic dehiscence after 3 days of surgery ,she developed massive biliary peritonitis with 7 days, patient was then explored, ischemia and retraction of ends of CHD, T tube was still connecting the two ends. Peritoneal wash and two drains were put in the right hypochondrium, patients condition stabilized within four days.

Mortality rate is 12.5% in our study. In comparison to Siclicket et al 7(1.7%) and Mihăileanu et al17(6%) and (1.6%) Slater K et al 10andKarvonen J et al (3%)14, our mortality is higher.

Three patients (7.5%) died due to sepsis condition started as fistula formation, followed by intra abdominal abscess collection.One of these patients sustained the biliary injury two years back but refused definitive surgery she had liver cirrhosis and intraoperative hepatolithiasis was detected during the reconstructive surgery. The other 2 patients sustained their injury 1 and a half month prior to their surgery.

One patient (2.5%) died due to massive pulmonary embolism 4 hours after surgery. One patient (2.5%) died postoperatively due to hepatic failure: deterioration in liver functions and hepatic encephalopathy. Patient presented 1 months after injury with cholangitis and liver multiple abcess, and large amount of pus in the biliary tree reconstructive surgery was done for her after 4 months most of liver was found cirrhosed, patient developed deterioration of liver function and hepatic encephalopathy, after surgery she developed deteriotaion in liver function ,impaired conscious level patient died after 11 days of operation.
Total hospitalization days ranged between 14 days and 1months, the median was 18 days comparable to Seeliger H et al 8 13 days, SicklickJK et al 79.5 days,IbnOuf et al4 16 days.

## VI. Conclusion

- Bile duct injury is a rare complication of cholecystectomy. The early and proper treatment of IBDI is very important, because it can prevent serious complications and improve quality of life in patients.
- Pain or jaundice after open or laparoscopic cholecystectomy should raise suspicion, mandating



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prompt evaluation of liver function followed by imaging.

- Early referral to a tertiary care center with experienced hepatobiliary surgeons and skilled interventional radiologists is necessary to assure optimal results.
- ERCP should only be attempted when there is biliary continuity evident on MRCP.
- Roux en Y HJ reconstruction using the Rodney Smith technique is the most used modality of management.

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# A Comparison between Urine Analysis, Ultrasound and Cystoscopy in Detecting Urinary Schistosomiasis and its Manifestations

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*Abstract-* Urinary schistosomiasis affects 200 million people worldwide it is a major source of morbidity and mortality in developing countries.

*Objectives:* To compare the effectiveness of three diagnostic methods (urinalysis, ultrasound and cystoscopy) in evaluating the presence of S. haematobium infection.

*Material and Methods:* This is a prospective cross-sectional hospital based study conducted in three specialized urology centres in Khartoum, Sudan, in the period between Oct 2012-Sep 2012. It included all patients presenting to the outpatient clinics with different urinary tract symptoms and diagnosed as urinary schistosomiasis.

*Keywords: urinary schistosomiasis, haematuria, cystoscopy.*

*GJMR-I Classification : NLMC Code: WN 1*

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# A Comparison between Urine Analysis, Ultrasound And Cystoscopy in Detecting Urinary Schistosomiasis and its Manifestations

Nyagan H.K. Sakit [α] & Abdelraouf Sharfi [σ]

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*Results:* Dipstick tests showed haematuria (61.8%), while microscopy showed ova in only (3.1%) of patients. The majority of patients had no pathology on U/S exam (68%), minor pathology in (1%) and severe pathology in (31%) of patients.The most common ultrasound finding was increased bladder wall thickness (27.5%) followed by bladder masses (14.5%). Cystoscopy diagnosed the disease in all presenting patients; the most common cystoscopic findings were sandy patches (89.3%), followed by granuloma (23.7%).

*Conclusion:* In this study cystoscopy was the most reliable investigation for diagnosing urinary schistosomiasis. Dipstick tests came second followed by ultrasonography, while urine for schistosomal ova was the least diagnostic test.

*Keywords: urinary schistosomiasis, haematuria, cystoscopy.*

## I. Introduction

It is thought that urinary schistosomiasis affected the people of Sudan for many centuries, but the map of endemic areas of the disease is changing with movement of individuals from rural areas to the cities.The region of WadiHalfa, the Nile basin, and various areas in the provinces of Kordofan (Nubian mountains) and Darfour were noted to be endemic.[1]In Sudan the risk for S. haematobium is widespread in the different regions [2-4] and school age children are at a much higher risk of developing S. haematobium infection than the other age groups.[3] The spread of the disease is associated with the establishment of irrigation schemes, and movement of population from endemic area to the cities.The prevalence range of the disease is 57–79%. [5, 6, 7]

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The disease is caused by the blood fluke *Schistosoma haematobium*and is transmitted by its vector the snail Bulinustruncatus. The microscopic worms penetrate the skin and make their way to the bladder where they grow and lay eggs. The cycle is completed when ova pass to the environment in urine. Chronic infection causes bladder lesions which when left untreated may lead to irreversible bladder pathology which might progress to squamous cell carcinoma in the 3rd and 4th decades. In endemic areas infection is usually acquired as a child, the intensity and prevalence of infection rises with age and peaks usually between ages 15 and 20 years. In older adults, no significant change is found in the prevalence of disease, but the parasite burden or intensity decreases.[8]

Clinical manifestations start from penetration of the skin by larva causing Katayama fever, eosinophilia, urticaria, and other manifestations of serum sickness. [9,10]Subacute manifestations are dominated by inflammatory lesions of the bladder, granulomatous lesions coalesce to form tubules, nodules or masses often ulcerate resulting in a surrounding hyperaemic mucosa.[11]The characteristic clinical presentation is terminal haematuria and dysuria.Chronic manifestations may include fibrotic lesions, glomerulonephritis, amyloidosis and malignancy.[12]

*Diagnosis*

Urinalysis is donelooking for haematuria, proteinuria.An egg count is done to determine severity of infection. [13]

Evaluation of consequences of urogenital tract lesions is by cystoscopy, the findings are very characteristic, in early stages there are defined haemorrhagic alteration; later on in the disease nodules with ova and ulcers are seen and finally sandypatches may be seen around the bladder neck and ureteric orifices. Manifestations of late stages of the disease include hypertrophy of the bladder wall, calcification, and stones. Squamous cell carcinoma of the bladder may develop up to 10-20 years after the initial infection.[14,15]

Other diagnostic tests: Ultrasonographyis useful in detecting ureteral obstruction and hydronephrosis.
Other tests: Urography, computerized tomography and retrograde cystography.



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*Treatment:*

Praziquantel,an antischistosomal it is the drug of choice today. It is effective against all species of human pathogenic schistosomes with a cure rate of 80%.[16]

## II. Objectives

*General:* To compare the effectiveness of three diagnostic methods in evaluating the presence of haematobium infection and its other manifestations in the general population.

*Specific objectives:* To evaluate the most effective method of diagnosing the disease; and to evaluatethe most common symptoms and complications of the disease.

## III. Materials and Methods

The study is a hospital based descriptive cross sectional study, conducted in three specialized urology centres in Khartoum, Sudan; in the period between Oct 2012- Sep 2013.

Inclusion criteria were all patients presenting to the outpatient clinic with different urinary symptoms diagnosed as schistosomiasis.

Exclusion criteria were patients who did not perform all three modalities of investigation required in the study.

*Investigations:*

1. All patients had a base line urea and creatinine.
2. Urine analysis: dipstick test, urine for schistosomal ova.
3. Abdominal ultrasound.
4. Cystoscopy.

*Follow up:* All patients requiring biopsy or a surgical procedure were followed up and the results of the tissue biopsy and type of surgical management were recorded and included in the results.

*Data analysis:* A questionnaire was designed in a way that facilitates for computer based analysis of data. The data was entered into the computer and analysed using the SPSS program.

## IV. Results

Most patients were males (85.5%), the most common age group was between 21-30 years old (43.5%), with patients from Khartoum state having the highest distribution (65%), followed by west Sudan (18%) and El Gezira state (11%). Haematuria (70.2%) and dysuria (79.4%) were the most common symptoms. Dipstick tests showed haematuria in (61.8%) of patients, while microscopy showed ova in only (3.1%). (Figure. 1)

The majority of patients had no pathology on ultrasoundscan (68%), minor pathology in (1%) and sever pathology in (31%). (Figure.2) The most common ultrasound finding was increased bladder wall thickness (27.5%) followed by bladder masses (14.5%). All presenting patients had positive findings on cystoscopy; the most common findings were sandy patches (89.3%), followed by granuloma in (23.7%) patients and inflammatory polyps in (15.3%) patients. Management of the patients was medical in (75.6%) of patients, surgical in (2.3%) and (22.1%) of patients received both medical and surgical treatment. Surgical treatment for established bladder pathology was in form of bladder mass biopsy in (12.2%) of patients, ureteric dilatation in (5.3%), DJ fixation in (3.1%) of patients and bilateral ureteric re-implantation of the ureters in (1.5%) of patients.

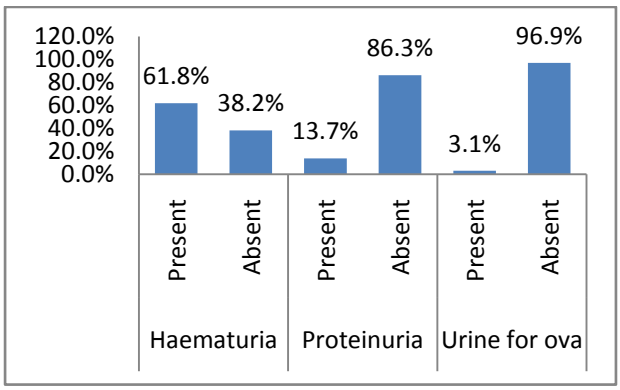


*Figure 1 :* The findings of urinalysis in patients with schistosomiasis

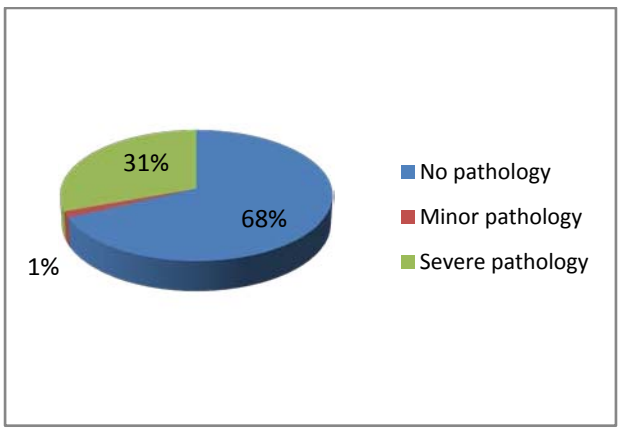


*Figure 2 :* Severity of bladder pathology on ultrasound scanamong patients presenting with urinary schistosomiasis

*Table 9 :* Cystoscopic findings in patients presenting with urinary schistosomiasis

| Cystoscopic finding | No | % |
|---|---|---|
| Sandy patches | 117 | 89.3% |
| Granuloma | 31 | 23.7% |
| Inflammatory polyps and erythematous lesions | 20 | 15.3% |
| Ureteric orifice stenosis | 14 | 10.8% |
| Bladder mass | 7 | 6.9% |
| Vesical stones | 1 | 0.8% |



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## V. Discussion

In this study the majority of patients were males (85.5%), the commonest age distribution among males was between 21-30 years, younger males 11-20 years were the second largest age group (16.1%). This was in contrast to recent data which suggest that school children are at higher risk of infection due to high rates of water activities and variation in blood supply of genitourinary structure and immunological factors. [2, 17, 18, 19]

In a Kenyan study of spatial patterns of urinary schistosomiasis in the highly endemic lake area the difference for prevalence between sexes was only significant for those more than 21 years old indicating younger age groups frequent the lakes more. The intensity of infection was not significantly different between males and females of any age groups.[20]

Khartoum state had the highest distribution of patients (65%) followed by west Sudan (18%), the least number of patients presented from the North. Since all the three hospitals are referral hospitals that receive patients from all areas of Sudan, these findings correlate with the new data that shows Khartoum state as a new endemic area for Schistosomiasis, although Elgezira is known to be the highest endemic area, it was third in distribution (11 %). Various areas in the provinces of Kordofan and Darfur are known to be endemic, a recent study in 2011 indicated S. haematobium to be endemic in Elsafia and Abu Selala in S.Darfur, and this combined with lack of specialized urology centres in those areas leads to the patient's referral to Khartoum and explains their appearance as a high risk group in the study. [1,4]

The characteristic clinical presentation of urinary schistosomiasis is terminal haematuria associated with increased frequency of micturition and dysuria [21], in a large cross sectional study on an untreated African population infected with S. haematobium micro-haematuria was reported in (41-100%) and gross haematuria in (0-97%), [22] this correlates with this study's findings, terminal haematuria was found in (79%) of patients and dysuria in (70%) which represent the characteristic clinical presentation of the disease. Haematuria and dysuria are the main symptoms of early disease, the disease can present as a chronic infection which is more common than acute infection, the severity of the disease depends on the intensity of infection, most of the patients with a few worms, especially in adults remain asymptomatic, although (80%) of the infected children show early symptoms and signs of the disease. [10]The very low rate of detecting bilharzial ova in the urine maybe due to the timing and method of collection of the urine sample , the number of samples taken or it could result from the substantial day-to-day variation of egg output. [18] Signs of disease can be present in the true absence of egg excretion.

Urinary schistosomiasis has typical sonographic features; however, it may also occur without. In a study of ultrasound findings in an endemic area for S. haematobium infection, (17%) of patients with vesicalschistosomiasis had hydronephrosis these lesions were seen in (10%) of infected children even in areas of low endemicity.[23]

In this study ultrasound abnormalities were found in only 32% of patients, the lower number of positive findings ultrasound on maybe explained by lower intensity of infection,this was proven by the cystoscopic findings of sandy patches rather than hyperaemia which is a sign of early and active infection. The ultrasound studies were performed by different radiologist with different interpretations of the bladder pathology and no specific diagnostic criteria or guidelines were used to reach diagnosis or classify the disease making ultrasound scana less reliable operator dependant diagnostic tool.

An Egyptian study correlating cystoscopic findings to the intensity of infection in childrenfound hyperaemia to be present in all cases and greater in heavily infected children. [24]Sandy patches were in 60% of heavily infected cases and 33% of all cases. Tubercles in (18%) of all cases and (33%) of heavily infected patients and mostly over the posterior wall. A higher frequency (100 %) was reported from post-mortem study of cases older than 10 years, sandy patches was regarded as a record of schistosomal activity rather than a sign of activity, they represent old calcified eggs buried under the a thin covering, while tubercles have a high diagnostic value in dubious cases and are an indication of active infection. Hyperaemia is an important cystoscopic sign of early and active infection, tubercles are related to active infection and ulcers and polyps may be related to heavy load of eggs deposition at the site of the lesion.[24]

In this study cystoscopic findings of the disease were detected in all patients, sandy patches were the main bladder pathology seen in schistosomal infection, they were found in (89.3%) of patients, granuloma were in (23.7%) and inflammatory polyps were found in (15.3%). This indicates the chronicity of the disease in this study group; bladder hyperaemia and inflammatory polyps the signs of acute active infection were found in only (15%) of patients.

## VI. Conclusion

In this study cystoscopy was found to be the most reliable investigation for diagnosing urinary schistosomiasis, in comparison to urine analysis and ultrasonography. Dipstick tests came second followed by ultrasonography, while urine for schistosomal ova was the least diagnostic test.



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# Stapled Haemorrhoidopexy for the Management of Haemorrhoids in Sudan

By Rania Hassan Saad Ahmed, Aamir Abdullahi Hamza & Huzaifa Elamin Elkhalifa

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*Abstract-* *Background :* Haemorrhoidectomy is a commonist anal surgical procedure which is usually associated with post operative pain , Stapled Haemorrhoidopexy (SH) is a new alternative to conventional haemorrhoidectomy (CH). It was first described by Dr. Antonio Longo, in 1998 and since then it has been widely adopted, and can be used in the management of 2nd , 3rd and 4th degree hemorrhoids.

*Objective :* To audit (SH)in Sudan and to show its effectiveness in the treatment of haemorrhoids.

*Keywords:* *stapled haemorrhoidopexy, haemorrhoids, haemorrhoidectomy.*

*GJMR-I Classification :* *NLMC Code: QZ 268, WO 141*

*Strictly as per the compliance and regulations of:*

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# Stapled Haemorrhoidopexy for the Management of Haemorrhoids in Sudan

Rania Hassan Saad Ahmed [α], Aamir Abdullahi Hamza [σ], Huzaifa Elamin Elkhalifa [ρ]

*Abstract- Background :* Haemorrhoidectomy is a commonest anal surgical procedure which is usually associated with post operative pain, Stapled Haemorrhoidopexy (SH) is a new alternative to conventional haemorrhoidectomy (CH). It was first described by Dr. Antonio Longo, in 1998 and since then it has been widely adopted, and can be used in the management of 2nd, 3rd and 4th degree hemorrhoids.

*Objective :* To study (SH) in Sudan and to evaluate its effectiveness in the treatment of haemorrhoids.

*Patients and Methods :* It is a retro-prospective descriptive study. Conducted at multicentres (7 hospitals) in the period from 2009 January to 2013 August. It included all Cases of 2nd, 3rd and 4th degree haemorrhoids underwent (SH) procedure. Data regarding the clinical presentation, duration of the surgery, postoperative complications, duration of hospital stay and period of retaining to normality were reviewed and analyzed using (SPSS) .The mean follow up duration was 28 months.

*Results :* The study included 100 patients, 80 men and 20 women (23 – 85) years with mean age (42.2years ± SD 14.2). Male to female ratio was 4:1.This male gender preponderance was found to be statistically significant (P value 0.007)

The most frequent symptoms either alone or in combination with other symptoms were pain 83%, swelling/prolapse 57% or bleeding 64%. Third degree haemorrhoid represents 56% of the patients, 4th degree haemorrhoid in 34% and 10% had second degree who were not respond to conservative management. The mean duration of surgery was (35.6 minutes ± SD 19.4) and ranged between (15 -120) min. The immediate post-operative pain was experience by 68 patients 68% and assessed by Visual Analogue Scale, mild to moderate pain in 53% of the patients and the pain fade by day three post-operative in 89%. Minor post-operative complications were seen in 66 patients. In more than half of them it was pain with or without defecation 45%, bleeding in 8%, urine retention in 6%. During the follow up which extend from one month to fifty five months 27% of the patients developed late complications, as recurrence, stenosis, incontinence or others in 16%, 4%, 3% and 4% respectively. The mean hospital stay was (39 hours ± SD 29.5), 61% of the patients were discharged within 24 hours. There was 51% of the patient return to their normality in the first post operative week. Half the patients return to their work in less than three weeks. In general 85% of the patients show a full satisfaction to the procedure.

*Conclusion :* (SH) can be safely performed with low recurrence and complication rates while offering a minimal postoperative pain and hospital stay, and early return to normality.

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*Keywords: stapled haemorrhoidopexy, haemorrhoids, haemorrhoidectomy.*

## I. Introduction

Haemorrhoids are inflammation or prolapse of the vascular tissues of the anal canal. They are the most common anal disorder and affect people of any age and gender.

Ironically the word haemorrhoids indicates the normal tissues that located around the anal canal as a cushion which facilitate defecation and prevent fluid leak, as well as it was given when some pathological changes associated with it and lead to disrupt it's function.

Before 1975 surgeons delt with haemorrhoids as varicosity of the haemorrhoidal veins, but in 1975 an anatomical and clinical study aimed at uncovering factors likely to be helpful in understanding the true nature of haemorrhoids was described. The main finding was of specialized "cushions" of submucosal tissue lining the anal canal, it was argued that piles are merely the result of their displacement. Conventional haemorrhoidectomy(CH) removes the haemorrhoidal tissue leaving the cushions of submucosal tissue lining the anal canal which tends to elongate again leading to recurrence [(1)].

(CH) provides symptomatic relief for most patients, and effectively treats the external component of the haemorrhoids. However, the wounds created by the surgery are usually associated with considerable post-operative pain which sometimes necessitates prolonged recovery period. This can put stress on general practitioner's resources, may alienate the patient and delays the patient's return to a full, normal lifestyle. Because of this, surgeons will generally reserve formal excision for the most severe cases of prolapse, or for patients who have failed to respond to conventional otreatments [(2)].

With the advent of modern surgical stapling techniques, the introduction of circular stapled haemorrhoidectomy (or stapled haemorrhoidopexy)(SH) has come to the forefront as a possible solution to this problem.

Stapled Haemorrhoidopexy (SH) is a new alternative to (CH). This procedure was first described by an Italian surgeon – Dr. Antonio Longo, Department of Surgery, University of Palermo – in 1998 and since then has been widely adopted through Europe[(3,4)].



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(SH) is a minimal invasive procedure performed through the anus, requires no external incisions, and leaves no visible scars; it also has the advantage of reducing postoperative pain and hospital stay [5].

## II. Objectives

*a. General objective*

To study the local experience of stapled haemorroidopexy in Sudan as a new modality of management of 2nd, 3rd and 4th degree Haemorrhoids, and to determine its advantages and disadvantages.

*b. Specific objectives*

To find out :

- Theatre operating time.
- Post operative pain.
- Period of return to normal activity.
- Hospital stay.
- Complications rates.

## III. Patients and Methods

This is a multicenter, retro-prospective descriptive study, conducted mainly at Fedail hospital. The prospective part over a period of one year from 2012 September to 2013 August. While the retrospective part from 2009 January to 2012 August.

All new and old cases of haemorrhoids underwent SH procedure were included. Patient refused to participate in the study or not reachable were excluded. Patients underwent SH were contacted through their telephone numbers to fill the questionnaire. Consecutive non probability sampling was used.

Data was collected using a well-constructed pretested questionnaire. The variables included: demographic data, diagnosis , past surgery for haemorrhoids, duration of surgery, postoperative complications, duration of hospital stay, disappearance of symptoms after and retaining to normality. Data was analyzed using computer program statistical package of social sciences (SPSS) version 20. Descriptive, frequency and Chi-square test were used when appropriate and P value was considered significant if ≤0.05.

Patient consent, ethical clearance and hospital administration approval were obtained in advance.

## IV. Results

*a. Demographics*

This study includes 100 patients from 7 hospitals. The mean age was (42.2 years ± SD14.2), ranging from 23 – 85 years. Seventy one percent were ≤50 years of age, and the highest prevalence in the fourth decade of life 35%, with only five percent above 70 years **(Figure 1)**. Males constituted 80% of our patients and the male to female ratio was 4:1.

This male gender preponderance was found to be statistically significant (P value 0.007).

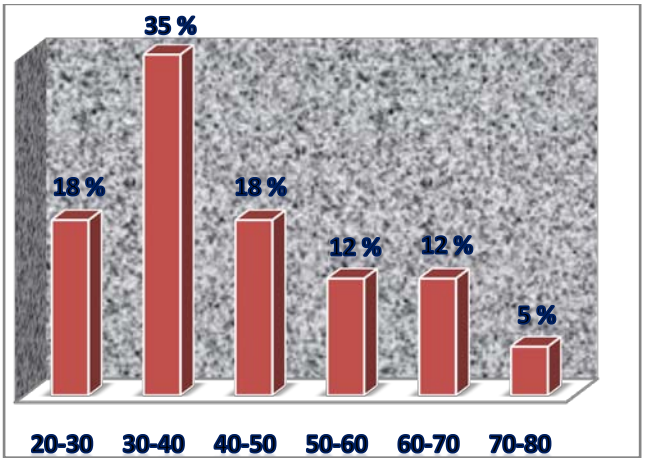


*Figure 1 :* Age distribution of the patient underwent (SH)

*b. Presenting symptoms*

Single symptom was seen in 28% as (bleeding, swelling /prolapse, pain or constipation) two symptoms in 23% and different combination of three or more symptoms in the majority of patients 49%

The most frequent symptoms either alone or in combination were; pain 83%, swelling/prolapse 57% or bleeding 64%.

The pain severity ranged from mild, moderate to severe in 28%, 17% and 40% respectively. Two third of the patients did not have a symptoms suggestive of IBS.

*c. Past history of anal procedure*

Fourteen percent (n=14) of the patients had past history of haemorrhoidectomy (in one of them it was stapled haemorrhoidopexy) where 4%, 2% and1% had fissurectomy, fistulectomy and abscess drainage respectively.

*d. Diagnosis*

All patients were subjected to digital rectal examination and proctoscopy. It revealed third degree haemorrhoid in 56% ,fourth degree haemorrhoid in 34% and 10% had second degree who were not respond to conservative management. Thirty percent had associated anal fissure, fistula in ano was seen in three patients. No perianal abscess or anorectal cancer was detected.

*e. Stapled haemorrhoidopexy*

All patients in the study underwent stapled haemorrhoidopexy after medical assessment and fitness for the procedure, following the standard steps and precautions of the Longo technique, most of operations were done by single consultant surgeon. The stapling was done under spinal anaethesia for all patients and in lithotomy position.



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*f. Duration of haemorrhoidopexy*

The mean duration of surgery was (35.6 minutes ± SD 19.4). It ranged from 15 to 120 minutes. In the majority 63% the operations were completed in ≤30 minutes. But few took longer, as four patients 4% in more than one hour **(Table 1)**.

*Table 1:* Operative time in the study

| Time take (min.) | Frequency | Percentage |
|---|---|---|
| ≤30 min | 63 | 63% |
| 31- 60 min | 33 | 33% |
| 61- 120 min | 04 | 04% |
| **Total** | **100** | **100%** |

*g. Post-operative pain*

The immediate post-operative pain after convalescence from spinal anaesthesia was experienced by 68 patients 68%. Visual analogue scale from (0- 10) was used to describe the severity of pain. Mild to moderate pain was seen in 53% of the patients while sever in 15% and one third of the patients experienced no pain **(Table 2)**.

*Table 2 :* Severity of immediate post-operative pain in patients underwent stapled haemorrhoidopexy

| Severity of pain | VAS* | Frequency | Percentage |
|---|---|---|---|
| Mild | 1- 4 | 29 | 29 % |
| Moderate | 5- 7 | 24 | 24 % |
| Severe | 8- 10 | 15 | 15 % |
| No Pain | 00 | 32 | 32 % |
| Total | | 100 | 100% |

*VAS: Visual analogue score

*h. Duration of post-operative pain*

The duration of post-operative pain varied between patients, but in the great majority (63 patients 92.5%) of those who experience pain it continues for one week only. Two, three and four weeks were seen in 4.5%, 1.5% and 1.5% of the patients respectively. In 63 patients, the pain takes only one week, it fade by day three post-operative in 88.9% of them **(Table 4)**.

*Table 4 :* Duration of the Post-operative pain in the first week

| | Number of patients | Percentage |
|---|---|---|
| One day | 32 | 50.8% |
| Two days | 14 | 22.2% |
| Three days | 10 | 15.9% |
| Four days | 01 | 01.6% |
| Five days | 01 | 01.6% |
| Seven days | 05 | 07.9% |
| **Total** | **63** | **100%** |

*i. Post-operative analgesia*

Post-operative analgesia in the form of Diclofenac sodium was given to 63 patients. Half of them started as oral analgesia and the other half as injectable. In the latter group 18 patients were discharged on oral analgesia. Eighty six percent (55 out of 63 patients) continued analgesia for one week (86%), 5% for two weeks, 7% for three weeks and only a single patient 2% for one month. When considering those who received it for one week, the majority (60%) had it for the first three days only.

*j. Relation of post-operative pain and other parameters*

The duration of surgery and the form of analgesia used , significantly influenced the severity and duration of post-operative pain experienced by the patients. None of the following parameters was found to have statistical role in the severity and duration of post-operative pain: age, gender of the patients, preoperative pain, and degree of haemorrhoid, associated anal conditions or previous history of anal surgery including haemorrhoidectomy **(Table 4)**.

*Table 5 :* Relation of post-operative pain to other patient parameters

| Parameters | P value |
|---|---|
| Age | 0.558 |
| Gender | 0.416 |
| Preoperative pain | 0.280 |
| Degree of haemorrhoids | 0.890 |
| Associated anal condition | 0.282 |
| Previous haemorrhoidectomy | 0.791 |
| Past history of anal surgery | 0.740 |
| Duration of surgery | 0.029 |
| Type of analgesia | 0.054 |
| Hospital stay | 0.458 |

*k. Post-operative complications*

*Immediate post-op complications :* Minor post-operative complications were seen in 66 patients. In more than half of them it was pain with or without defecation 45%, bleeding in 8%, urine retention in 6% and others in 7% (swelling, discharge, constipation or diarrhea/fecal urgency).

*Spinal anaesthesia complications :* As all patients were operated under spinal anaesthesia, 29 patients (29%) developed related complications, back pain in 13 patients, headache in 8 patients and similar number developed both. Most of these complications 75% resolved within the first week and 14% took more than four weeks.



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*Late complications :* During the follow up which extend from one month to fifty five month, 27 patients 27% developed some late complications, as recurrence, stenosis, incontinence or others in 16%, 4%, 3% and 4% respectively. And 15% had persistence of their symptoms.

*l. Hospital stay*

The mean hospital stay was (39 hours ± SD 29.5), ranging from 24-240 hours. Sixty one percent of the patients were discharged within 24 hours and 9% after more than three days.

*m. Disappearance of the symptoms*

The outcome of the procedure was assessed by complete resolution of the presenting symptoms. Symptoms disappeared within the first week in 56 patients (56%), and within the second week in 16 patients (16%) and few patients took longer. Of the latter group 8 patients (8%) complained that they were not relieved even after three months **(Figure 2)**.

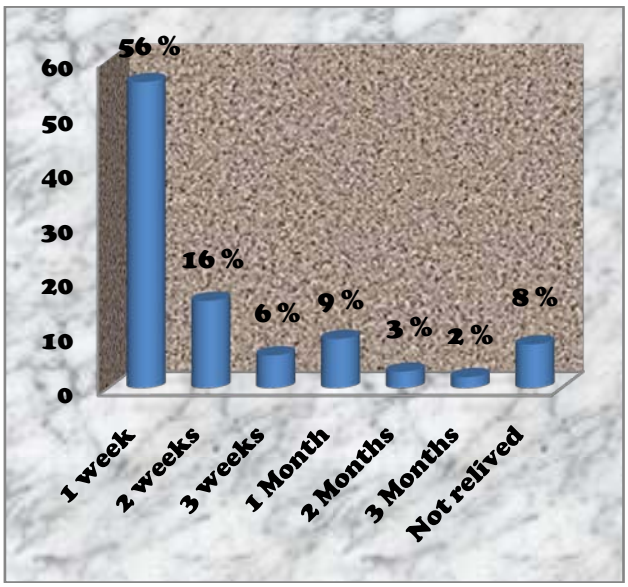


*Figure 2 :* Disappearance of symptoms after (SH)

*n. Return to work*

Half the patients returned to their work in less than three weeks, one quarter in four weeks and similar percentage took more than four weeks.

In general 85% of the patients show a full satisfaction to the procedure and 15% did not.

## V. Discussion

This study included 100 patients operated at seven hospitals and it had been conducted in the period from 2009 Jan to Aug 2013, the mean follow up period was 28 months (1-55) months, this period lies within the range of the follow up period that the most of the international studies had been held on it e.g.in Greece (6-72) months [6], in Dubai study18 months [7], in Brazil study 20 months (14-60) months [8]. The number of the patients was increased through the last two years, this indicate the awareness about stapler heamorroidopoxy.

The mean age is (42.2 years ± SD 14.2), the most age group is between (30 – 40) years 35%, the range is (23-85), 71% were≤ 50 years and 5%≥ 70 years .This result is similar to that held in Greece[6] and near to study done in Dubai. Male to Female ration is 4:1, this is near to Dubai which is 3:1 and the reverse was in Iran where number of female was larger than male[7,9].

Generally the presenting symptoms is similar to that reported in the literature and in our study the most presenting symptom was pain (83%) either alone or combined with other symptoms, while in Malaysia the study by Mr Abdulwahab the pain represent 42.5%[10]. The presentation of bleeding and prolapsed symptoms were (42%) and(51%) respectively and in Carlos Walter,et al study it was significantly high (96.1%)and (96.7%) , while the bleeding in our study is typical to that of the study held in Malaysia ( 42.6%) and prolapse presentation was 100% which is double to our study[(8)].

The majority of patients diagnosed to have 3rd haemorrhoid (n=56) 56% , (n=34) 34% had 4th and (n=10) 10% had 2nd who were not respond to conservative management, the same result was noticed in the study done by Grigoropoulos P,et al and revealed that most of the patients who underwent stapled haemorrhoidectomy diagnosed to have grade III haemorrhoids 67% and grade IV is 27.6% and the least was grade II 4.8%. This giving an attention to that stapled heamorroidopexy is performed mostly in those with grade III [6].

In our study we found 30% of the patients had associated anal fissure which were treated at the same session and also 3% of patients had low anal fistula and it had been treated at the same session although it is contraindicated, luckily they had an uneventful recovery, in comparison to other studies no associated anal pathology was found.

In our study we found that Fourteen percent (n=14) of the operations were done for the patients who had a recurrence from a previous conventional haemorr-hoidectomy and one had stapled haemorrhoidopexy. it was a re do for a very large haemorrhoids in the first presentation [11].

The mean duration of the surgery was 23minuts, 30minuts and 36.2 minutes in Brazil, Dubai and Sudan respectively the range in our study (15 – 120 minutes) whereas the range is (16-48 minutes) in Brazil study [8,7]. The duration in our study is more than others due to presence of two patients surgerys lasting for 120 minutes, because of developing hypotension during the procedure.

Sixty eight patients (68%) suffered from post-operative pain, it was assessed by (VAS), the pain was mild in (29%) , moderate in (24%) and severe in (15%) most of them their pain disappeared within the first



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post operative week 92.5% and in 17% represent ≤ 2 in VAS and in 50% the pain last for 1 day just. In our study 32% of patient never experienced pain post-operatively. This is near to the results reported by Arroyo A, et al.70% of patients developed≤ 2in VAS on the first post-operative day and reported a very closed result to our study in the first post-operative week (95%)[11]. The pain was minimal or even nonexistent in the study done by Grigoropoulos P ,et al.[6] and mild to moderate pain represented 79.6% in Aziz R,et al study [9] which was greater than our study .

Among these patients 63 (93%) needed analgesia , 51% respond to NSAID tablets, 21% needed injectable form of NSAID and 2 patients received pethedine the rest was given injection in the hospital and continued on by tablets, similar to the Iran experience where the pain was relieved by NSAID or acetaminophen while in Brazil they used oral dipyron and celecoxib and that controlled the pain in 85% of patients and 5 patients needed opiates[9,8].

Sixty six percent reported immediate anal complication. Pain without motion in 27%, bleeding in 8%, which was more than reported by Angelone G,et al and reported by Faris Dawood(3.9%,1%) respectively, but less than that reported by Carlos Walter,et al (10.3%)[12,7,8].

Urine retention reported in 6% of patients, one patient treated by temporary catheterization and the others resolved spontaneously , this percentage is larger than that of Greece study which was 2.4% and it was temporary retention and the use of catheter was not needed and 8% in Dubai study [8,7]. Seven percent had other symptoms like swelling , discharge , constipation , and fecal urgency and that was reported in Dubai where fecal urgency was 25% , in Italy 14 % and in Greece 6.5% but fortunately in our study we have just 1% [7,12,6] .

Unfortunately in our study there is significant post operative anesthetic complication like neck pain, back pain and headache however these complications resolved quickly and had been minimized after the patients advocated postoperatively to take plenty of oral fluids particularly caffeinated drinks.

The mean hospital stay was (39hours SD ± 29.5), the minimum 24 hours in 61% and the maximum 240 hours in one diabetic patient, the prolong stay was advice by the physician because the patient had poorly controlled diabetes. Otherwise our hospital stay is more or less comparable to other studies.

Fifty six patients (56%) reported complete resolution of the presenting symptoms within the first week while only 8 patients showed their dis satisfaction.

Fortunately there were 51% of the patients returned to their normality in the first post operative week in term of returning to their regular dietary habits, normal defecation and sitting. 9% took more than 4weeks. One of them developed wound infection and admitted again for regular dressing. While Iran study showed 99% of the patient returned to their normal activity within 48 hours [9].

When we look at return back to their work, we found 50% of the patients returned to work in the first & second post operative week and 16 % delayed because of (pain, difficulty in sitting for a long period, anaesthetic complication, recurrence and that patient who developed wound infection).

During follow up period (1month-55months) we found that 15% had persistent symptoms, recurrence 16% compared to Italy (2.2%), Brazil (1.3%), and no recurrence at all in Greece. [12,8,6] where in Germany study Kim JS et al reported 18% recurrence rate[13]. So our recurrence rate is higher than that reported in the most of international review. Also we found that during the first couple of years of using the stapler which was available in Sudan is a low volume staple and later on there was introduction of the high volume stapler and more or less replaced the use of low volume stapler, this partially may explain the increased recurrence rate in the first few years of the procedure.

On the other hand when the patients developed complications, they hardly reviewed the doctor who treated them, I wish if public health educationalist can address this problem. In our study we had one patient who came back complained of recurrence which was expected at the time of the operation because he had an extremely very large haemorrhoid, and had been informed that he might have another session and so operated on him again. in Spain 14 patients had recurrence 4 of them treated by (MM), 2 treated by SH and 6 required treatment by rubber band ligation[11].

Stenosis is one of the late complications in our study 4% of the patients claimed that they had stenosis which is not verified clinically and most likely they had muscular spasm, as the procedure performed in the rectal mucosa high above the dentate line and there was no interference with the whole rectal wall, as post excision of the specimen had been examined clinically and showed it only contained mucosa and submucosa. Our result is higher than what had been reported in Dubai study(2%) and in Brazil study where there was no stenosis [7,8].

Regarding the incontinence we reported it in ( 3%) of the patients in terms of passing loose motion with urgency and we could not find a causal association with the procedure , in Brazil study there is no incontinence[8].

Others complication like swelling, burning sensation, prolapsed is very minimal. 1% developed itching, while high percentage of itching 21% reported in Dubai study [7].

We did not experienced serious complications like rectovaginal fistula like what was reported by Angelone G,et al to young lady , and rectal obstruction by Buyukasik O,et al to 27 years old[12,14].



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In general 85% of the patients were fully satisfied to the extent that they are willing to recommend the procedure to others. While 12% of the patients did not have a satisfying outcome and 3% concerned about the cost of the procedure. This is much better than Iran study where 73.5% were fully satisfied with the operation results where as in fact most of the studies reported a full satisfaction from the patients[9].

A major drawback of the procedure is the cost of the stapler added to that it is disposable. But if we compare the benefit of low postoperative pain, reduced amount of analgesia, reduced rate of complication, reduced hospital stay and early return to normality and work can over weigh the disadvantage of the cost. However more studies should carried to produce cheaper stapler.

## VI. Conclusion

- Stapler Haemorrhoidopexy is a new trend of treating 2nd , 3rd and 4th degree haemorrhoids and a new alternative to conventional haemorrhoidectomy.
- Stapler Haemorrhoidopexy is a minimal invasive procedure requires no external incision, leaves no visible scars and takes short operative time.
- Since the introduction of stapler haemorrhoidopexy ; the awareness and number of patients were increasing .
- Stapler Haemorrhoidopexy offer to the patients minimal postoperative complications, minimal hospital stay and early return to normality.
- Although Stapler Haemorrhoidopexy is still under researched, the complications reported are mostly minor complications and most of it resolves in short period postoperatively.
- Sticking to the guidelines of the procedure and proper placement of purse-string provides excellent results.
- The outcome of the operation is highly dependent on the training and experience of the surgeon.

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# Children Blunt Abdominal Trauma At Khartoum Teaching Hospital

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*Objectives:* To study mechanisms of injury, presentation, management and outcome of paediatrcis blunt abdominal trauma in KTH.

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*Keywords:* *abdominal trauma, abdominal injury, children, paediatrics, blunt.*

*GJMR-I Classification :* *NLMC Code: WO 925*

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*Results:* There were 50 patients. The mean age was 7 years. Male to female ratio was 2:1. There was a wide spectrum of causative trauma. The most frequent cause was RTA 40% .Solid organ injuries were (70%), intestinal injuries (12%), diaphragmatic hernia (2%), abdominal wall haematoma (2%), NOM for solid organs injuries was successful in 94%. There were 3 deaths (6%). Two of them associated with head injuries and one was delayed intestinal perforation.

*Conclusion:* The majority of children with blunt abdominal solid organs injuries can be treated successfully without surgery, associated head injuries and delayed intestinal perforation were main causes of mortality.

*Keywords: abdominal trauma, abdominal injury, children, paediatrics, blunt.*

## I. Introduction

Despite increased awareness and prevention efforts, trauma remains number one cause of childhood death and disability in the developed countries [1]. In under developed countries it is beginning to assume importance as infections and malnutrition are controlled [2]. Childhood trauma will be number one disease globally in 2020 as expected by the World Health Organization (WHO), who published their third World Report on Child Injury Prevention in December 2008 [3]The abdomen is the third most commonly injured anatomic region in children following head and extremities [4]. But it is the most common site of initially unrecognized fatal injury in traumatized children

Despite its importance being the most common cause of traumatic abdominal injury, paediatrics blunt abdominal trauma in Sudan is not studied before and this motivate me to address this issue in Khartoum teaching hospital which is the main referral hospital for paediatrics surgical emergencies.

## II. Objectives

a) *The General objective*

To study mode of trauma, presentation, management and its outcome in paedaitrics patients with blunt abdominal trauma presented to Khartoum teaching hospital.

b) *Specific objectives:*

- To specify mechanism of injury in paediatrics blunt abdominal trauma.
- To determine types of intra-abdominal injuries in paediatrics blunt abdominal trauma in KTH.
- To determine incidence of solid organ injury in paediatrics blunt abdominal trauma in KTH.
- To identify modalities of treatment of intra abdominal injuries.
- To determine outcome of paediatrics blunt abdominal trauma in KTH.

## III. Patients and Methods

*Study design :* This is a prospective observational descriptive study.

*Study area :* Department of paediatrics surgery Khartoum teaching hospital.

*Study duration* : The study was conducted in the period from March 2012 to August 2013.

*Patient selection:*

*Inclusion criteria* : All children with blunt abdominal trauma aged less than 15 years regardless of the mechanism of injury.

*Exclusion criteria:* Children with blunt abdominal trauma with associated penetrating injury.

*Sample size:* Number of paediatrics patients with blunt abdominal trauma admitted to KHT during the above mentioned period.

*Data collection tool:* Structured pre-designed questionnaire including demographic data, date and mode of trauma, presenting complains, examination on presentation, resuscitation done, investigations requested, management and outcome.

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presentation, resuscitation done, investigations requested, management and outcome.

*Data analysis:* Data was analyzed using SPSS version 20 and a P value was considered significant if it is ≤ 0, 05.

*Consent and ethical clearance:* all patients were informed and consented about their inclusion in this study and no one was forced or included against his /her or their family interest.

## IV. Results

*a) Demography*

A total number of 50 patients with paedaitrics blunt abdominal trauma were included in the study. Mean age was 7 (SD± 3.5), it ranged from 2 to 13. Boys were 34 (68%) and girls 16 (32%), with a male to female ratio of 2:1.

*b) Mode of trauma*

There was a wide spectrum of causative trauma. The most frequent causes were RTA representing 40%, falling from height 26%, animal related accidents 18% and other causes with varying prevalence (Figure1).

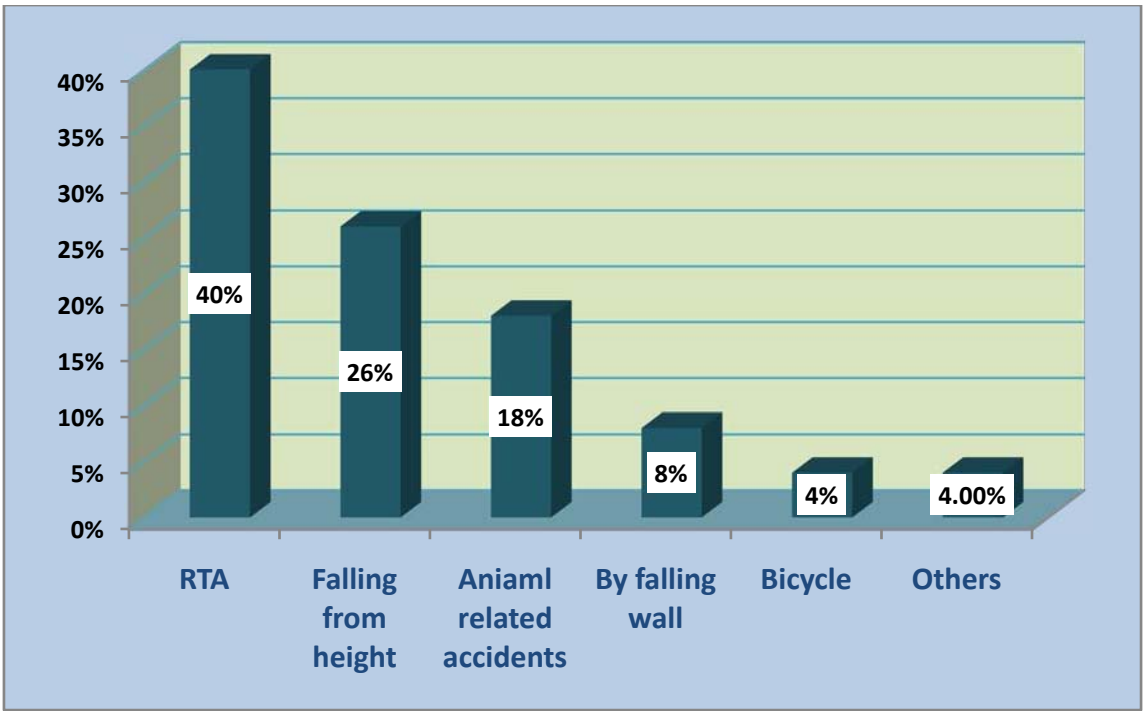


*Figure1 :* Mode of trauma in paediatric blunt abdominal trauma.

*c) Clinical presentation*

The main symptom on presentation was abdominal pain; it was the only symptom in 60%, abdominal pain associated with vomiting was noticed in 22%, abdominal pain with associated vomiting and distension in 16%.Vomiting was the only presenting symptom in 2%.

Abdominal tenderness was found in 48 patients (96%). Only two cases were negative for abdomen tenderness (one has splenic injury and the other with liver injury), however there were six patients with abdominal tenderness but no evidence of intra abdominal injury. Abdominal rigidity was detected in 22 patients (44%) and negative in 28 patients (56%). Most patients have normal GCS (15), three patients (6%) with GCS of 13 one of them with associated pelvic fracture, two patients (4%) with GCS of 10 both have associated head injury.

*d) Investigations*

Mean haemoglobin was 9.38 (SD± 2.01), it was low (less than 10 gram/dl) in 52%, Urinalysis was normal in 84%; it showed gross haematuria in four patients (8%) and microscopic haematuria in a similar number. Renal injuries were proved in three out of the four patients with gross haematuria, but only in one patient of those with microscopic haematuria. Two patients were found to have renal injury and normal urinalysis.

Renal function test was normal in 43 patients (86%), and abnormal in seven patients (14%). Liver function test was done for 22 patients (44%) and was abnormal in 8 patients (16%).

Abdominal ultrasound (US) was made for 47 patients out 50 (94%), it showed 32 solid organ injuries in 26 patients (52%); splenic 18, liver 9, renal 4 and one pancreatic injury. It showed haemoperitneum with no solid or hollow organ injuries in 17 patients (34%) of



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whom four patients were later diagnosed as intestinal injuries, and was normal in four patients 8%.

Abdominal computed tomography scan (CT scan) was done for 29 patients (58%); it showed 30 solid organ injuries of these 17 were splenic injuries, seven liver injuries, five renal injuries, one pancreatic injury and two haemoperitoneum. It detected eight solid organ injuries that were not seen in abdominal sonography.

*e) Intra-abdominal injuries*

There were 43 solid organ injuries found in 35 patients (70%), The most frequently injured solid organ was spleen 22 patients (44%) followed by the liver 14 patients (28%).There were six small bowel injuries ,the most commonly injured small bowel was jejunum four patients (8%), followed by duodenum one patient (2%) and ileum one patient (2%) (Table1).

*Table1 :* Intra- abdominal injuries in children with blunt abdominal trauma

| Type of injury | Number of patients | Frequency |
|---|---|---|
| Solid organ injury | 35 | 70% |
| Hollow viscus injury | 6 | 12% |
| Haemoperitoneum only | 6 | 12% |
| Diaphragmatic hernia | 1 | 2% |
| Abdominal wall haematoma | 1 | 2% |

*f) Associated extra-abdominal injuries*

Associated injuries were seen in 11 patients (22%), head injuries in five patients (10%) followed by chest injuries in four patients (8%). There was one patient with pelvic fracture and one with lower limb fracture- dislocation.

*g) Management of paediatric blunt abdominal trauma*

On presentation 36 patients (72%) were haemodynamicaly stable and 14 patients (18%) were unstable of these 11 patients responded to resuscitation. Three patients did not respond to crystalloid and blood transfusions and were taken to the theatre. Conservative treatment was done for 32 patients out of 35 patients with solid organ injuries it was successful in 30 patients (94%) and failed in two patients 6%. one patient developed liver abscess after successful conservative treatment and was drained operatively.

Nine patients (18%) required operative treatment; six small bowel injuries and three solid organ injuries. One patient was presented three months after the operation with adhesive intestinal obstruction for which he was re-operated.

There were three mortalities (6%); one died post-operatively and two patients were died during conservative management (Table 2).

*Table 2 :* Mortalities in paedaitrics blunt abdominal trauma.

| No. | Age | Sex | Mode of trauma | Intra-abdominal injury | Associated injury | Treatment |
|---|---|---|---|---|---|---|
| 1- | 11years | Male | RTA | Splenic injury | Head injury | Conservative |
| 2- | 4 years | Male | By falling wall | Haemoperitoneum | Head injury | Conservative |
| 3- | 6 years | Male | Kicked by donkey | Jejunal injury | No | Operative |

*h) Hospital stays*

Mean hospital stay was 7.9 days (SD± 4.64), ranging from 1-21 days. The majority of patients (80%) were discharged after 12 days.

## V. Discussion

Abdominal trauma accounts for 8-10% of all trauma admissions to paediatric hospitals. Penetrating injuries are less common in children and account for 8-12% of paediatric abdominal trauma admissions. Abdominal trauma can be associated with significant morbidity and may have a mortality rate as high as 8.5%. [1]

In this study mean age is 7 years (SD ±3.26) ranging from 2 -13 years. Boys were 34 (68%) and girls were 16 (32%), male to female ratio was 2:1. Most literatures cited mean age around seven years and male predominance [2, 5, 6].

The majority of our patients sustained their injuries as RTA (40%) or falls (26%) which is similar to other studies [2,7,8] .Several studies showed that abdomen to handle collision are associated with high risk of small bowel injury [9]; in our study the most common cause of small bowel injuries was domestic animal related accident (66%).

In current study abdominal tenderness was found in the vast majority of patients vies 48 patients (96%). Only two cases were negative for abdomen tenderness. However, there were six patients (12%) with abdominal tenderness but no evidence of intra abdominal injury.



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Liver enzymes; alanine aminotransferase (ALT) and aspartate aminotransferase (AST) are markers for liver or other solid organ injury. Liver function test was done for 22 patients (44%) ALT and AST were high in eight patients (16%).

Abdominal CT scan is the investigation of choice in haemodynamicaly stable patients [4], in our study it was made for 29 patients (58%) and was indicated by positive findings in abdominal US. It detected eight solid organ injuries that were missed by abdominal US. CT scan should not affect the decision to operate or conserve as this is a clinical judge. However, some study reported negative laparotomy rate of 51% for paediatrics blunt abdominal trauma and they explain it by lack of advanced imaging modalities [5].

There is controversy in literature regarding the most commonly injured intra- abdominal organ, classically spleen was the most commonly injured organ, and however, recent studies cited that the liver is the most commonly injured intra-abdominal organ followed by spleen [1, 7, 10]. In our study spleen is the most commonly injured organ 22 patients (44%) followed by liver 14 patients (28%); and this is the same in regional studies in Egypt and Nigeria [2,5].

Non-operative management has become the standard of care for managing solid organ injuries, and is successful in more than 95% in appropriately selected patients [11].The failure rate of non-operative management is 5%. In our study conservative treatment which include; proper resuscitation, serial abdominal examination, imaging facility and close monitoring of the haemodynamic status was successful in 30 patients (94%) out of 32 patients with solid organ injuries treated conservatively and was failed in two patients (6%).

Regarding splenic injuries it is estimated that 15 % of children with blunt abdominal trauma still undergo splenectomy[12]. Non –operative management in our study was successful in 86.3% out of the total patients with splenic injuries, it failed in two splenic injuries (9%), operative management was carried for three patients (13%) of splenic injuries. two were ended with splenectomy and one was underwent splenorraphy, our splenectomy rate was 9% of the total splenic injuries Although liver injuries account for 15-20% of abdominal injuries they are responsible for more than 50% of death resulting from blunt abdominal trauma [8]

In our study liver injuries were found in 14 patients (28%), thirteen patients were successfully treated conservatively one of them developed liver abscess and was drained operatively. One unstable patient was treated operatively, and was presented three months after the operation with adhesive intestinal obstruction for which he was re-operated.

Renal injury occurs in 10% of paediatric blunt abdominal trauma [13]. In the current study we had six patients (12%) of renal injuries, sixty six percent of renal injures we had were associated with haematuria. Over the last twenty years, the management of paediatric renal trauma has shifted towards a primarily non-operative approach that is now well established for children up to 18 years old. In the current study we have six patients (12%) of renal injuries all of them were treated conservatively.

Blunt trauma to pancreas is rare and clinical features are often non-specific and unreliable leading to possible delays in diagnosis and therefore increased morbidity [14].In our study there was only one pancreatic injury (2%), he developed pancreatic pseudocyst and was resolved on conservative treatment.

Traumatic diaphragmatic hernia is uncommon, it should be suspected in all blunt abdominal traumas; because delayed diagnosis is usually associated with high morbidity [15].We have one patient(2%) of diaphragmatic hernia and was associated with chest and jejunal injuries. The diagnosis was clinical supported by chest x-ray and the patient was operated on immediately without further investigation.

Hollow viscus injuries are uncommon and occur in approximately 3% of abdominal injury, small bowel was the most frequently involved hollow viscus [16]. In this study hollow viscus injuries were found in six patients (12%) all were treated operatively by simple repair. One patient was died postoperatively and was due to delayed presentation (after three days).

We had three deaths (6%) all were males and two of them were associated with head injuries. It was found that fatal paediatric trauma occurs most frequently in boys, and associated with severe head injuries [17]. In western countries mortality of paediatric blunt abdominal trauma is up 8.5%,regionaly in Egypt and Nigeria mortality rate of 17% and 13% was reported respectively[2,5]. for blunt spleen/liver injury in children the American Paediatric Surgical Association recommends a number of bed rest days equal to the grade of injury+1[4].In the current study mean hospital stay was 7.9 days (SD 4.64), ranging from 1-21 days. The majority of patients (80%) were discharged after 12 days.

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# Hand Machinery Injuries Presentation and Management (Omdurman Teaching Hospital)

By Haitham Yousif Elhaj Mohammed & Osama Murtada Ahmed

*University of Khartoum, Sudan*

*Abstract-* Aim to evaluate the amplitude of MHI received by OTH.

This prospective descriptive cross sectional hospital base study carried out in a single plastic surgery unit at OTH in the period from sep 2012- sep2013.

A total of 106 MH injured patients were enrolled in this study; Evaluation is purely clinical and radiological. Initial management included general assessment of the patient status, wash of the wound with antiseptic, careful limited initial debridement, elevation of the hand, antibiotic and anti tetanus prophylaxis. Beside exploration of the wound with proper surgical management according to the injury ranging from minimal stitching, V.Y flap, skin graft, vessel, nerve, tendon repair to bone fixation .with severely crushed hand a limited stitching and waiting for 48 h before a second look.

*Keywords:* *grinder, finger, amputation, crush, palm.*

*GJMR-I Classification :* *NLMC Code: WO 700*

HANDMACHINERYINJURIESPRESENTATIONANDMANAGEMENTOMDURMANTEACHINGHOSPITAL

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The study revealed that the right hand dominance was prevalent in 97.2% and was the most affected (64.1%). The mean age of the study group 25 years with male to female ratio of 4:1. Among named machines, Grinder injury is the commonest represent about (36.8%); followed by plastic machine 8.7%. The most involve part of the hand is the middle finger 14.2% , index 10.4% and thumb 8.5% .Highest percentage of fractures found in the middle finger 15.1% . Skin loss was seen mainly in index finger 4.7%.

Concerning the management at tertiary hospital, minimal stitching constitutes 55.7% followed by V.Y flap 7.5%. Amputation in MHI is of great significance of P- value < 0.03, at initial discharge from ER; thumb represent (2.8%), and index (4.7)%

*Conclusion:* Severe hand injury in form of finger amputation, skin loss, nerve and arterial injuries are more common in age below 25 years.

Grinder and plastic machines are the commonest cause of MHI among named machines.

*Keywords: grinder, finger, amputation, crush, palm.*

## I. Introduction

Design and function of the hand is an amazing work of anatomic engineering for the effective functions of the hand. Therefore any injury to the underlying structures of the hand carries a potential risk of serious handicap. To reduce this risk, even the smallest hand injuries require proper medical evaluation. The goal with injuries to hand is rapid and accurate entail evaluation and treatment, in other words, once an injury occurs, the Doctor strives to begin medical treatment quickly. So short and long term effects on the hand can be minimized.

## II. Result

A total number of 106 patients present with MHI were studied. The common age group is below age of 25 years see Fig. (1).

Affection of the hand regarding job shows the following, the most affected categories are labors by35.8%and free workers by17% while engineers shows the minimal 1.9% and the remaining jobs affected by(28.2%) see Fig. (2).

The right hand is the dominant hand by 97.2% while the left represent only 2,8% see table (1).

There are four types of machines were studied while the remaining put under the name of (others) represent 37.7% each of them represent less than 3%. Grinder injury affect 36.8% while (plastic, saw, car machine) affection in about 25.5% table (2).

The right hand involved in 64.1% while the Lt hand account for 34% ,both hand equal to 1,9% see Fig. (3).

More disappointing to see loss of all fingers but fortunately enough seen in about (0.9%) see Fig (41).
No patient discharge with hand amputation.

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*Tables and figures*

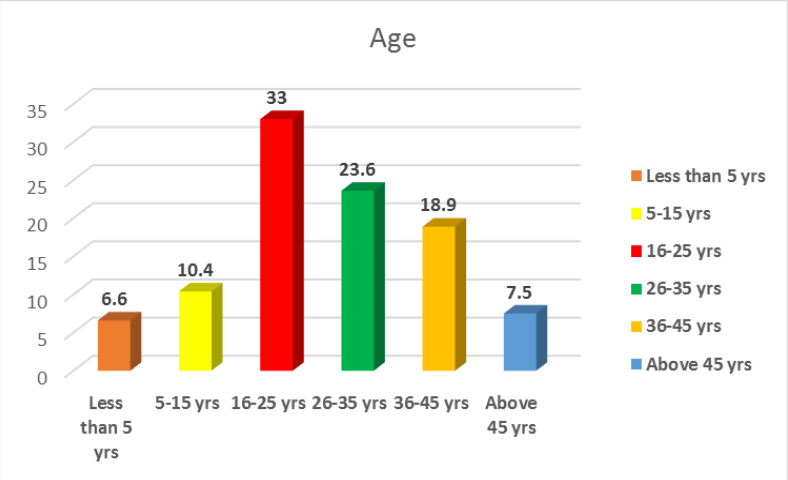


*Figure 1 :* Age

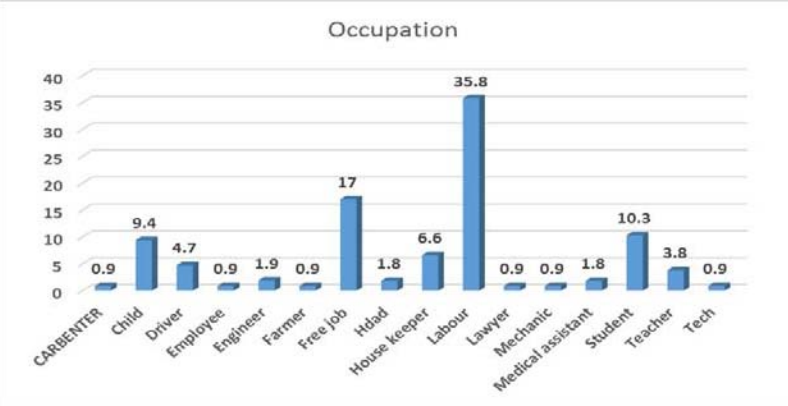


*Figure 2 :* Occupation

*Table 1:* Hand Dominance

| | Frequency | Percent |
|---|---|---|
| Rt | 103 | 97.2 |
| Lt | 3 | 2.8 |
| Total | 106 | 100.0 |

*Table 2 :* Type of Machine

| | Frequency | Percent |
|---|---|---|
| Saw | 9 | 8.5 |
| Plastic machine | 9 | 8.5 |
| Car machine | 9 | 8.5 |
| Grinder | 39 | 36.8 |
| Others | 40 | 37.7 |
| Total | 106 | 100 |

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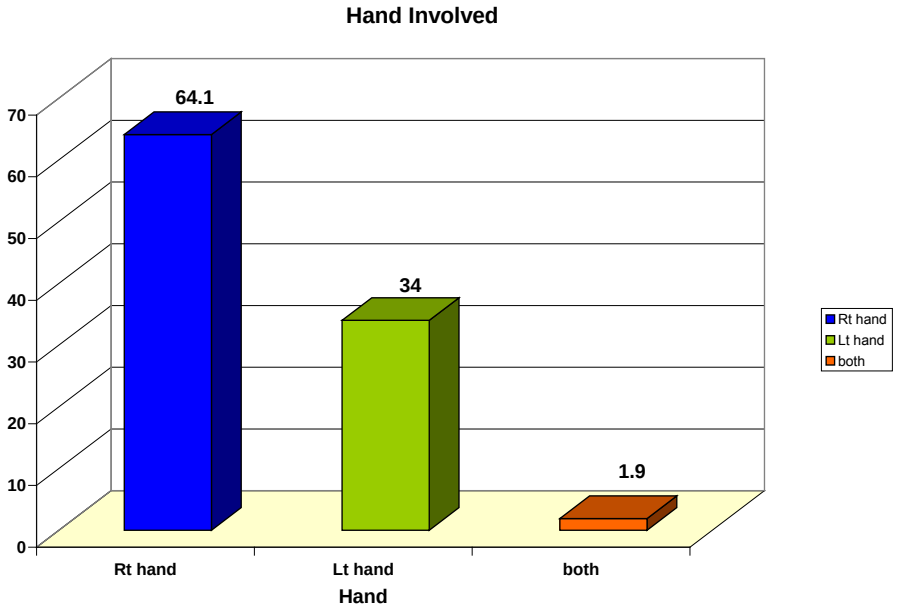


*Figure 3 :* Hand Involved

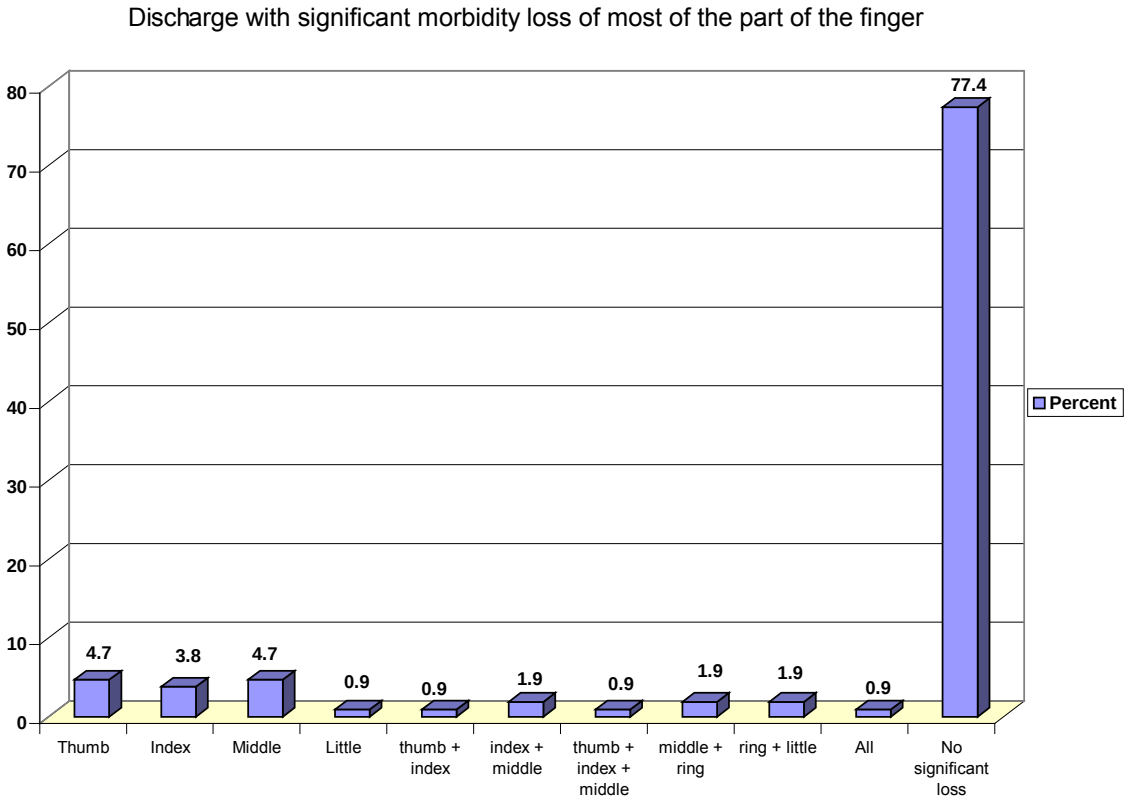


*Figure 4 :* Amputation



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## III. Discussion

The hand is a very intricate and important tool used for daily living activities. In the developing world, it establishes the individual in society, allowing them to meet social and economic responsibilities. It is therefore important to understand the causes of injury to this part of the body to minimize the occurrence of injury and to forestall poor treatment outcomes that may result in dramatic reduction in quality of life. In this study, young adults were most commonly affected. This finding is consistent with other series in which the average age was less than 25 years.[24,26,29,30]However, studies in areas with considerable post productive populations show a slightly higher average age group of 40 years. Most studies show a male predominance, with a male-to-female ratio of 4:1.[24,30,32] In our series, we had a higher incidence of injury among men, so male to female ratio is 4:1.

The report of hand injuries by Beaton and colleagues [27] showed results similar to ours, where right-hand are dominant by 97.2% with sustained injuries more common than left-hand injuries. Similar to other studies, 64.1% of our patients sustained an injury to their dominant hand. These studies reported more than 50% of injuries to the dominant hand.[24,26] However, Mink and colleagues[33] observed dominant-hand injuries in about 37% of their sample. In our study, about 1.9% sustained injury to both hands. A 2% rate of injury to both hands has previously been reported. [24]

In this study, 95.3% who had a hand injury have no co morbid disease and some of them have DM and HTN equally (1.9%) this because most of the patients are of younger age group.[34]

Management in form of nerves, vessels, bones fixation and muscles repair of low percentage and this may be due to severity of injury and tissue destruction due to grinder and named machines.

Mechanism of injury in our study mainly by crush injury(39.7%) followed by laceration(33%) this goes with study conducted in Nigeria by keki and his colleagues [8].In our study the surgical management resemble that which done by Keki in form of minimal stitches ,V.Y flaps and SSG.

Trybus and colleagues [24] performed a study in an industrial city in Poland in which about 50% of workers with a hand injury were manual workers. However, in our study, unskilled workers such as labors (35.8%) and free workers (17%) constituted more than half of all patients with hand injuries. This underscores the important fact that more than 50% of people who sustain hand injuries in our environment are in the work force. It is pertinent to observe that in many studies undertaken in industrialized nations, machine injury is the most common cause of hand injury. [24,30] In our environment, grinder was the most common cause of hand injury among named machines(36.8%) followed by plastic machine injury(8.5%)while others unnamed machines were put under the name of others represent(37.7%)each unnamed machine may represent less than 3%. This may be because of the fact that this study was carried out in an environment with fewer industries and using machines without safety and irresponsible measures like in our environment where they put grinder in front of their shops.

We also observed that the engineers and technicians (1.9%) had low rate of injuries sustained from machine accidents. The labors and free workers had most of their injuries from grinder; this is probably explained by the fact that these professionals are well trained in dealing with safety.

An appreciable number of our patients (45.3%) sustained their injuries from grinder and plastic machine. This was not the finding of other investigators, who rarely reported grinder injuries to the hand.[24,28,30] . All injuries sustained by labors, free worker and children were due to grinder. This is most probably the result of careless placing and operating resulting in sad injuries to one's self. We also observed that all of the grinder injuries occurred outside home and involved most of the part of the hand.

In our series, most injuries occurred outside home (the workplace) (67.1%) while inside home equal to (32.9%); other studies reported more workplace injuries. [28,30,33] Trybus and colleagues[24]reported that 45% of injuries in their study occurred in the home, followed by 20% in the workplace. These results are similar to those from a study conducted in Finland.[34] Some earlier reports showed that home injuries are commonly due to home machines.[24,29,35]This is consistent with our findings. This is probably because most home injuries are minor and are treated at a nearby medical clinic.

Consideration was given to the injury distribution within the zones of the hand. We observed that zone 3 had the highest risk of being injured (38.7%). This is because it is the palmar surface of the hand and is the widest zone, thereby making it the most at risk of injury. Finger injuries accounted for almost 83% of cases and mainly seen in middle index and thumb and these are the common used fingers during grinding .[36] However, 61.6% of cases involved injury to more than one zone. As in other series, the skeleton and integument were the tissue components most commonly injured.[28,30] High-energy injuries from grinder and others named machines have a higher risk of involving all the tissue components and increasing the potential of digit amputation which seen in our study in 42.5%.[28,30,37]

In conclusion, we have shown that hand injuries constitute a major proportion of trauma emergencies in a developing country and that grinder and plastic machine among mentioned machines are the major

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cause of hand trauma in this environment, unlike in other locations where industrial machine injury is the major cause. It is imperative that education for labors and free workers will reduce the incidence of hand injury. Although a large percentage of machine injuries are minor, more than half of the people with this type of injury are from the working class and are the driving force of the country's economy. A substantial number of these workers face the risk of losing their employment and having their social status irreparably altered. This, in turn, leads to major economic loss. We also observed that workers who sustained machine injuries usually had severe to major forms of injury, which included amputation of digits. It is therefore recommended that employers and government focus more effort toward worker education, particularly with regards to occupational health and safety. The provision of a safe and work-friendly environment includes training in equipment operation and maintenance and the provision of appropriate protective clothing and safeguarding of machinery. Furthermore, it is essential that policy measures be put in place for insurance and adequate compensation of the hand injury-related disability.

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# Non-Sentinel Lymph Nodes Status in Patients With Breast Cancer Operated at Omdurman Teaching Hospital

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*Abstract-* *Background :* Sentinel lymph node (SLN) biopsy has been emerged as safe and accurate procedure for axillary staging in breast cancer and to direct the need for further axillary treatment in patients with early breast cancer.

*Objectives :* To assess the status of axillaries lymph nodes in patients of breast cancer to determine further management of the axilla and to assess status of non sentinel lymph nodes cases of negative SLN.

*Patients and methods:* It is prospective interventional study done in Omdurman Teaching Hospital, department of General Surgery from 27/6/2012 to 30/8/2013 in 39 patients under went modified radical mastectomy plus level I and II axillaries clearance by injecting methylene blue dye and identifying sentinel lymph node in patients diagnosis by breast cancer.

*Keywords:* *breast cancer, sentinel lymph node, sentinel lymph node biopsy, non-sentinel lymph node biopsy.*

*GJMR-I Classification :* *NLMC Code: WP 840*

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# Non-Sentinel Lymph Nodes Status in Patients With Breast Cancer Operated at Omdurman Teaching Hospital

Osman H M Hassan [α], Omer M Ismail [σ] & Aamir A Hamza [ρ]

*Abstract-* ***Background:*** Sentinel lymph node (SLN) biopsy has been emerged as safe and accurate procedure for axillary staging in breast cancer and to direct the need for further axillary treatment in patients with early breast cancer.

Objectives: To assess the status of axillaries lymph nodes in patients of breast cancer to determine further management of the axilla and to assess status of non sentinel lymph nodes cases of negative SLN.

***Patients and methods:*** It is prospective interventional study done in Omdurman Teaching Hospital, department of General Surgery from 27/6/2012 to 30/8/2013 in patients underwent modified radical mastectomy plus level I and II axillaries clearance by injecting methylene blue dye and identifying sentinel lymph node in patients diagnosed with breast cancer.

***Results:*** Total number of 39 female patients under went modified radical mastectomy and level 1 and II axillaries clearances, In 22 patients 56.4% the retrieved sentinel axillary lymph node proved histopathologically to contain malignant cells. In eight patients 20.5% the sentinel lymph node were negative for malignancy and in 09 (23.1%) the SLN was either not found or reactive, Non-sentinel lymph node (NSLN) was found to be positive for malignancy in 11 (28.2%) of the cases. In 23 (59.0%) it was negative and in 05 (12.8%) it was not found. Out of 22 patients with positive SLN, half of them 11 patients were concomitantly had a positive NSLNs and the other half had a negative NSLN. In the eight patients with negative SLN for malignancy, all of them 08 (100%) had their NSLNs as well were negative for malignancy. These relations were found statistically to be highly significant (P value 0.000) none of the patients in study diagnosis as positive NSLN in negative SLN base.

***Conclusion:*** Highly occurrence of positive NSLN in patient diagnosis by T3 and T4 in the study, a number of patients diagnosis by positive NSLN in positive SLN was 32, 4 %, none of the patients in study diagnosis by positive NSLN in negative SLN base.

*Keywords: breast cancer, sentinel lymph node, sentinel lymph node biopsy, non-sentinel lymph node biopsy.*

## I. Introduction and Background

Sentinel lymph node biopsy has been emerged as a safe and accurate procedure for axillary staging in breast cancer and directs the need for further axillary and systemic treatment in patients with early breast cancer (1). The hypothesis that one or a few lymph nodes receive the first drainage from a tumor site and that a regional node dissection and its morbidity might be avoided if the SLNs prove negative, is logical and intuitive. First suggested by Cabanas in the context of penile cancer and conceived in its modern form in 1992 report by Morton et al. SLN biopsy is rapidly emerging as a new standard of care in melanoma and breast cancer (2). This technique has been studied as a means to improving the quality of life in patients with primary breast cancer it has been proved to be a valuable and accurate tool for the staging of early breast cancers (3). Also has largely replaced level I and level II axillary lymph node dissection (ALND), and identification should be possible in more than 95% of patients (4). The SLN is defined .as the first node or group of node receiving lymph from a tumor area, is usually an axillary node, and is most often in the central group of level I. However it may be an internal mammary node, a supraclavicles node, or even a contralateral axillary node. The status of the SLN has been shown to reflect the presence of metastases in the axillary lymph nodes [non sentinel lymph nodes] (5, 6).

### *a) Techniques used in sentinel lymph node*

Currently there are two techniques Used for SLNB: radio colloid Tc 99m sulfur colloid and methylene blue dye (isosulfan blue). Most institutions recommend both, some experienced surgeons use one or the other. Methylene blue is as good for SLN mapping agent as Isosulfan blue and is much cheaper. Addition of radio-colloid mapping to blue dye does not achieve a sufficiently higher identification rate to justify the cost. Methylene blue is therefore the agent of choice for SLN mapping in developing countries (7).

### *b) Objectives*

To assess the status of axillary lymph nodes in breast cancer to determine further management of the axilla and to assess status of non-sentinel lymph nodes cases of negative SLN patients.

## II. Patients and Methods

It is prospective interventional study, done in Omdurman Teaching Hospital, department of General Surgery from 27/6/2012 to 30/8/2013 in patients who underwent modified radical mastectomy plus level I and II axillary clearance by injecting methylene blue dye and identifying sentinel lymph node.

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## II. Results

*a) Patients' demographics*

This study included 39 female patients. The mean age was 51.3 (SD± 11.4) years, (range 34-75 years). Eight patients (20.5%) were young below forty and similar number of cases was elder above 60 years of age. The majority 23 (59.0%) were in the age group 41-60 years (Table 1).

Most of our patients were housewives 23 (59.0%), the rest were laborers, employee or teachers representing, 20.5%, 12.8% and 7.7% respectively. Thirty seven patients (94.9%) were married. Patients seen were coming from different state of the country but 17 (43.6%) from Khartoum state, followed by Kordofan 6 (15.4%), River Nile 5 (12.8%) and Darfour state 4 (10.3%) of the patients.

b) *Clinical presentation*

Breast lump was the common presenting symptom, being the chief complaint in 38 (97.4%) of the patients. followed by breast pain 24 (61.5%) then bloody nipple discharge 09 (23.1%) and no single patient presented with symptoms suggestive of metastases.

*c) Investigations*

Images of the breast was done as U/S in 04 (10.3%) and were below 35 years of age, or breast mammography 08 (20.5%), was suspicious in all. Cyto-pathological diagnosis was conducted to the majority, true cut needle biopsy to 31 (79.5%), fine needle aspiration cytology 19 (48.7%), or excisional biopsy which was the least done in 02 (05.1%) of the patients.

*d) Tumor characteristic*

These tumor characteristics were based on clinical assessment. T2 (tumor size 2-5 cm) was the most prevalent accounting for 17 (43.6%) and T4 for only two cases (5.1%). No axillary lymph node was detected on clinical examination on 22 (56.4%) of the patients whereas N1 (single mobile ipsilateral axillary lymph node) was detected in 12 (30.8%). No evidence of distal metastasis was seen in 38 (97.4%) of the cases (Table2).

*e) TNM classification and staging*

Most of our patients 19 (48.8%) were stage II, 10 (25.6%) Stage III, 9 (23.1%) stage I and only a single patient (02.6%) of stage IV. Of stage II (A 12 (30.8%, B 07 (18%)) and stage III (A 08 (20.5%), B 02 (05.1%) (Table3).

*f) Surgical management:*

All our patients underwent modified radical mastectomy i.e. mastectomy and axillary clearance. None had breast conserving surgery neither axillary sampling.

*g) Sentinel lymph node status:*

In 22 patients 56.4% the retrieved sentinel axillary lymph node proved histopathologically to contain malignant cells. In eight patients 20.5% the sentinel lymph node were negative for malignancy and in 09 (23.1%) the SLN was either not found or reactive.

h) *Non-sentinel lymph node status:*

Non-sentinel lymph node (NSLN) was found to be positive for malignancy in 11 (28.2%) of the cases. In 23 (59.0%) it was negative and in 05 (12.8%) it was not found.

*i) Relation of sentinel and non-sentinel lymph node:*

Out of 22 patients with positive SLN, half of them 11 patients were concomitantly had a positive NSLNs and the other half had a negative NSLN. In the eight patients with negative SLN for malignancy, all of them 08 (100%) had their NSLNs as well were negative for malignancy. These relations were found statistically to be highly significant (P value 0.000) as shown in (Table 4) and (Table5).

*j) Outcome:*

The outcome was uneventful in 30 (76.9%), complications were seen in 09 (23.1%) and no mortality was reported in this study. Most of the morbidity were surgical site infection in five (12.8%), seroma 03 (7.7%) or hematoma 02 (5.1%) of the patients respectively.

*k) Hospital stay:*

The mean length of hospital stay was 5.7 (SD± 1.6) days, (ranged 4-10 days). Two third of our patients (66.7%) were discharged home on day five post-operative.

*Table 1 :* Age group distribution for breast cancer patients

| Age (years) | Frequency | Percent |
|---|---|---|
| ≤ 40yrs | 08 | 20.5 |
| 41-50yrs | 12 | 30.8 |
| 51-60yrs | 11 | 28.2 |
| >61+ yrs | 08 | 20.5 |
| Total | 39 | 100.0 |



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*Table 2 :* Tumor size, lymph node and metastasis (TNM) in patient of breast cancer included in the study

| | *Frequency* | *Percent* |
|---|---|---|
| *Tumor size* | | |
| • T1 | 09 | 23.1 |
| • T2 | 17 | 43.6 |
| • T3 | 11 | 28.2 |
| • T4 | 02 | 5.1 |
| *Lymph nodes* | | |
| • N0 | 22 | 56.4 |
| • N1 | 12 | 30.8 |
| • N2 | 05 | 12.8 |
| *Metastasis* | | |
| • M0 | 38 | 97.4 |
| • M1 | 01 | 2.6 |

*Table 3 :* TNM and staging system in patient of breast cancer included in the study

| *Stage* | *TNM* | *Frequency* | *Percent* |
|---|---|---|---|
| Stage I | T1.N0.M0 | 09 | 23.1 |
| Stage II A | T2.N0.M0 | 12 | 30.8 |
| Stage II B | T3.N0.M0 | 03 | 07.7 |
| | T2.N1.M0 | 04 | 10.3 |
| Stage III A | T3.N1.M0 | 05 | 12.8 |
| | T3.N2.M0 | 03 | 07.7 |
| Stage III B | T4.N2.M0 | 02 | 05.1 |
| Stage IV | T2.N0.M1 | 01 | 02.6 |
| *Total* | | 39 | 100% |

*Table 4 :* Relation of sentinel and non-sentinel lymph node

| Sentinel LN | | NSLN | | | Total |
|---|---|---|---|---|---|
| | | NS LN positive for malignancy | NSLN negative for malignancy | NSLN not found | |
| SLN contain malignancy | Count | 11 | 11 | 00 | 22 |
| | % within Sentinel LN | 50.0% | 50.0% | 0.0% | 100.0% |
| | % within NSLN | 100.0% | 47.8% | 0.0% | 56.4% |
| SLN does not contain malignancy | Count | 00 | 08 | 00 | 08 |
| | % within Sentinel LN | 0.0% | 100.0% | 0.0% | 100.0% |
| | % within NSLN | 0.0% | 34.8% | 0.0% | 20.5% |
| SLN not found or reactive | Count | 00 | 04 | 05 | 09 |
| | % within Sentinel LN | 0.0% | 44.4% | 55.6% | 100.0% |
| | % within NSLN | 0.0% | 17.4% | 100.0% | 23.1% |
| Total | Count | 11 | 23 | 05 | 39 |
| | % within Sentinel LN | 28.2% | 59.0% | 12.8% | 100.0% |
| | % within NSLN | 100.0% | 100.0% | 100.0% | 100.0% |

P value 0.000



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*Table 5 :* Relation between SLN and NSLN patient of breast cancer included in the study

| Parameter | P value | |
|---|---|---|
| | SLN | NSLN |
| Age group | 0.423 | |
| Occupation | 0.007 | 0.025 |
| Marital status | 0.443 | |
| clinical presentation | NS | |
| TNM state | 0.324 | |
| NSLN | 0.000 | 0.000 |
| T | 0.274 | |
| N | 0.278 | |
| M | 0.181 | 0.031 |

## III. Discussion

This study included 39 female patients. The mean age was 51.3 (SD± 11.4) years, (range 34-75 years) and this rang of age most of the patients of breast cancer come to hospital to see doctors. Eight patients (20.5%) were young below forty and similar number of cases was elder above 60 years of age. The majority 23 (59.0%) were in the age group 41-60 years, This is similar to reported findings (8), and lower than 40-50 years in another study. This may indicate that slightly late incidence of carcinoma of breast in Sudan.

The majority of our patients were house wife's about 59% and this may be due to large number of a woman in my country that do not go to work in outside, This is similar to other study (The majority of the patients (76.0%) were house women, while teachers, employee, Farmers, Police women, Sellers, students and mid wives constituted 4.7%, 7.3%, 6.7%, 2.7%, 1.3%, 0.7% and 0.7% respectively) (9).

Low incidence is found in nulliparous patients about 5% of the cases and this does not go with literature which showed high incidence of breast cancer in nulliparous woman (breast cancer is commoner in nulliparous women) (10). This may be due to a little number of woman is nulliparous in Sudan at this age.

Most of our patients have tissues diagnosis by histopathology obtained using true cut needle biopsy. Invasive ductal carcinoma is most common (79. 5%) type of breast malignancy seen in our patients. This is in agreement with the reported 82% -85% in other studies (8, 9,11).

In 5/39 (12.8%) the sentinel lymph node was not found after injecting the dye. This is higher than a rate of 3%-10% reported by other workers (12).

In 22 patients 56.4% the retrieved sentinel axillary lymph node proved histopathologically to contain malignant cells. This is similar to other findings of 50 to 65% (13)however our detection rate is higher than 30 to 40% (14) These differences may be due to different stages of breast cancer at presentation or use of combine Methylene blue dye and radio isotope.

Non-sentinel lymph node was found to be positive for malignancy in 11 (28.2%) of the cases. This rate is lower than (35%) in SLN positive patients (4).

In 23 (59.0%) of our patient negative NSLN was found which is comparable to 50%- 70% in other studies. This will enhance the use of sentinel lymph node practice in breast surgery instead of axillaries clearance (3) to avoid a lot of complications found after axillaries surgery ALND is associated with substantial morbidity affecting up to 39% of patients, with a nearly three-fold increased risk of lymph edema or regional sensory loss (9). The rate of false negative results varies from 9.8 % -10.8% (4) to 5% in other study, yet in in other report, it was 1% - 2% (14). Some study reported positive NSLN with negative SLN base. If no SLN metastases are identified, the likelihood of additional NSLN involvement is 9.8%, this is comparable to that reported in NSABP-32 and recently by both Lyman and Veronese ranging 9.7%, 8.4%, and 8.8% respectively (4).

## IV. Conclusion

High prevalence of breast carcinoma in Khartoum state. Most of the patients presented with breast lump. Highly occurrence of positive NSLN in patient with T3 and T4 in the study. The rate of positive NSLN in positive SLN was 32.4 % .None of the patient in study had positive NSLN in negative SLN base.

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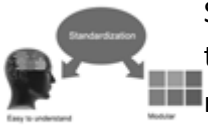


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**Note :**

"

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1. General,

2. Ethical Guidelines,

3. Submission of Manuscripts,

4. Manuscript's Category,

5. Structure and Format of Manuscript,

6. After Acceptance.

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(h) Brief Acknowledgements.

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**8. Use the Internet for help:** An excellent start for your paper can be by using the Google. It is an excellent search engine, where you can have your doubts resolved. You may also read some answers for the frequent question how to write my research paper or find model research paper. From the internet library you can download books. If you have all required books make important reading selecting and analyzing the specified information. Then put together research paper sketch out.

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**10. Bookmarks are useful:** When you read any book or magazine, you generally use bookmarks, right! It is a good habit, which helps to not to lose your continuity. You should always use bookmarks while searching on Internet also, which will make your search easier.

**11. Revise what you wrote:** When you write anything, always read it, summarize it and then finalize it.

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**13. Have backups:** When you are going to do any important thing like making research paper, you should always have backup copies of it either in your computer or in paper. This will help you to not to lose any of your important.

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**15. Use of direct quotes:** When you do research relevant to literature, history or current affairs then use of quotes become essential but if study is relevant to science then use of quotes is not preferable.

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**17. Never use online paper:** If you are getting any paper on Internet, then never use it as your research paper because it might be possible that evaluator has already seen it or maybe it is outdated version.

**18. Pick a good study spot:** To do your research studies always try to pick a spot, which is quiet. Every spot is not for studies. Spot that suits you choose it and proceed further.

**19. Know what you know:** Always try to know, what you know by making objectives. Else, you will be confused and cannot achieve your target.

**20. Use good quality grammar:** Always use a good quality grammar and use words that will throw positive impact on evaluator. Use of good quality grammar does not mean to use tough words, that for each word the evaluator has to go through dictionary. Do not start sentence with a conjunction. Do not fragment sentences. Eliminate one-word sentences. Ignore passive voice. Do not ever use a big word when a diminutive one would suffice. Verbs have to be in agreement with their subjects. Prepositions are not expressions to finish sentences with. It is incorrect to ever divide an infinitive. Avoid clichés like the disease. Also, always shun irritating alliteration. Use language that is simple and straight forward. put together a neat summary.

**21. Arrangement of information:** Each section of the main body should start with an opening sentence and there should be a changeover at the end of the section. Give only valid and powerful arguments to your topic. You may also maintain your arguments with records.

**22. Never start in last minute:** Always start at right time and give enough time to research work. Leaving everything to the last minute will degrade your paper and spoil your work.

**23. Multitasking in research is not good:** Doing several things at the same time proves bad habit in case of research activity. Research is an area, where everything has a particular time slot. Divide your research work in parts and do particular part in particular time slot.

**24. Never copy others' work:** Never copy others' work and give it your name because if evaluator has seen it anywhere you will be in trouble.

**25. Take proper rest and food:** No matter how many hours you spend for your research activity, if you are not taking care of your health then all your efforts will be in vain. For a quality research, study is must, and this can be done by taking proper rest and food.

**26. Go for seminars:** Attend seminars if the topic is relevant to your research area. Utilize all your resources.

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**27. Refresh your mind after intervals:** Try to give rest to your mind by listening to soft music or by sleeping in intervals. This will also improve your memory.

**28. Make colleagues:** Always try to make colleagues. No matter how sharper or intelligent you are, if you make colleagues you can have several ideas, which will be helpful for your research.

**29. Think technically:** Always think technically. If anything happens, then search its reasons, its benefits, and demerits.

**30. Think and then print:** When you will go to print your paper, notice that tables are not be split, headings are not detached from their descriptions, and page sequence is maintained.

**31. Adding unnecessary information:** Do not add unnecessary information, like, I have used MS Excel to draw graph. Do not add irrelevant and inappropriate material. These all will create superfluous. Foreign terminology and phrases are not apropos. One should NEVER take a broad view. Analogy in script is like feathers on a snake. Not at all use a large word when a very small one would be sufficient. Use words properly, regardless of how others use them. Remove quotations. Puns are for kids, not grunt readers. Amplification is a billion times of inferior quality than sarcasm.

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**33. Report concluded results:** Use concluded results. From raw data, filter the results and then conclude your studies based on measurements and observations taken. Significant figures and appropriate number of decimal places should be used. Parenthetical remarks are prohibitive. Proofread carefully at final stage. In the end give outline to your arguments. Spot out perspectives of further study of this subject. Justify your conclusion by at the bottom of them with sufficient justifications and examples.

**34. After conclusion:** Once you have concluded your research, the next most important step is to present your findings. Presentation is extremely important as it is the definite medium though which your research is going to be in print to the rest of the crowd. Care should be taken to categorize your thoughts well and present them in a logical and neat manner. A good quality research paper format is essential because it serves to highlight your research paper and bring to light all necessary aspects in your research.

## Informal Guidelines of Research Paper Writing

**Key points to remember:**

- Submit all work in its final form.
- Write your paper in the form, which is presented in the guidelines using the template.
- Please note the criterion for grading the final paper by peer-reviewers.

**Final Points:**

A purpose of organizing a research paper is to let people to interpret your effort selectively. The journal requires the following sections, submitted in the order listed, each section to start on a new page.

The introduction will be compiled from reference matter and will reflect the design processes or outline of basis that direct you to make study. As you will carry out the process of study, the method and process section will be constructed as like that. The result segment will show related statistics in nearly sequential order and will direct the reviewers next to the similar intellectual paths throughout the data that you took to carry out your study. The discussion section will provide understanding of the data and projections as to the implication of the results. The use of good quality references all through the paper will give the effort trustworthiness by representing an alertness of prior workings.

Writing a research paper is not an easy job no matter how trouble-free the actual research or concept. Practice, excellent preparation, and controlled record keeping are the only means to make straightforward the progression.

**General style:**

Specific editorial column necessities for compliance of a manuscript will always take over from directions in these general guidelines.

To make a paper clear

· Adhere to recommended page limits

Mistakes to evade

- Insertion a title at the foot of a page with the subsequent text on the next page
- Separating a table/chart or figure - impound each figure/table to a single page
- Submitting a manuscript with pages out of sequence

In every sections of your document

· Use standard writing style including articles ("a", "the," etc.)

· Keep on paying attention on the research topic of the paper

· Use paragraphs to split each significant point (excluding for the abstract)

· Align the primary line of each section

· Present your points in sound order

· Use present tense to report well accepted

· Use past tense to describe specific results

· Shun familiar wording, don't address the reviewer directly, and don't use slang, slang language, or superlatives

· Shun use of extra pictures - include only those figures essential to presenting results

**Title Page:**

Choose a revealing title. It should be short. It should not have non-standard acronyms or abbreviations. It should not exceed two printed lines. It should include the name(s) and address (es) of all authors.

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The summary should be two hundred words or less. It should briefly and clearly explain the key findings reported in the manuscript--must have precise statistics. It should not have abnormal acronyms or abbreviations. It should be logical in itself. Shun citing references at this point.

An abstract is a brief distinct paragraph summary of finished work or work in development. In a minute or less a reviewer can be taught the foundation behind the study, common approach to the problem, relevant results, and significant conclusions or new questions.

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- Reason of the study - theory, overall issue, purpose
- Fundamental goal
- To the point depiction of the research
- Consequences, including definite statistics - if the consequences are quantitative in nature, account quantitative data; results of any numerical analysis should be reported
- Significant conclusions or questions that track from the research(es)

Approach:

- Single section, and succinct
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- A conceptual should situate on its own, and not submit to any other part of the paper such as a form or table
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- What you account in an conceptual must be regular with what you reported in the manuscript
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The **Introduction** should "introduce" the manuscript. The reviewer should be presented with sufficient background information to be capable to comprehend and calculate the purpose of your study without having to submit to other works. The basis for the study should be offered. Give most important references but shun difficult to make a comprehensive appraisal of the topic. In the introduction, describe the problem visibly. If the problem is not acknowledged in a logical, reasonable way, the reviewer will have no attention in your result. Speak in common terms about techniques used to explain the problem, if needed, but do not present any particulars about the protocols here. Following approach can create a valuable beginning:

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- Shield the model - why did you employ this particular system or method? What is its compensation? You strength remark on its appropriateness from a abstract point of vision as well as point out sensible reasons for using it.
- Present a justification. Status your particular theory (es) or aim(s), and describe the logic that led you to choose them.
- Very for a short time explain the tentative propose and how it skilled the declared objectives.

Approach:

- Use past tense except for when referring to recognized facts. After all, the manuscript will be submitted after the entire job is done.
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- Present surroundings information only as desirable in order hold up a situation. The reviewer does not desire to read the whole thing you know about a topic.
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This part is supposed to be the easiest to carve if you have good skills. A sound written Procedures segment allows a capable scientist to replacement your results. Present precise information about your supplies. The suppliers and clarity of reagents can be helpful bits of information. Present methods in sequential order but linked methodologies can be grouped as a segment. Be concise when relating the protocols. Attempt for the least amount of information that would permit another capable scientist to spare your outcome but be cautious that vital information is integrated. The use of subheadings is suggested and ought to be synchronized with the results section. When a technique is used that has been well described in another object, mention the specific item describing a way but draw the basic principle while stating the situation. The purpose is to text all particular resources and broad procedures, so that another person may use some or all of the methods in one more study or referee the scientific value of your work. It is not to be a step by step report of the whole thing you did, nor is a methods section a set of orders.

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- Embrace particular materials, and any tools or provisions that are not frequently found in laboratories.
- Do not take in frequently found.
- If use of a definite type of tools.
- Materials may be reported in a part section or else they may be recognized along with your measures.

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- Report the method (not particulars of each process that engaged the same methodology)
- Describe the method entirely
- To be succinct, present methods under headings dedicated to specific dealings or groups of measures
- Simplify - details how procedures were completed not how they were exclusively performed on a particular day.
- If well known procedures were used, account the procedure by name, possibly with reference, and that's all.

Approach:

- It is embarrassed or not possible to use vigorous voice when documenting methods with no using first person, which would focus the reviewer's interest on the researcher rather than the job. As a result when script up the methods most authors use third person passive voice.
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What to keep away from

- Resources and methods are not a set of information.
- Skip all descriptive information and surroundings - save it for the argument.
- Leave out information that is immaterial to a third party.

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The principle of a results segment is to present and demonstrate your conclusion. Create this part a entirely objective details of the outcome, and save all understanding for the discussion.

The page length of this segment is set by the sum and types of data to be reported. Carry on to be to the point, by means of statistics and tables, if suitable, to present consequences most efficiently.You must obviously differentiate material that would usually be incorporated in a study editorial from any unprocessed data or additional appendix matter that would not be available. In fact, such matter should not be submitted at all except requested by the instructor.

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Content

- Sum up your conclusion in text and demonstrate them, if suitable, with figures and tables.
- In manuscript, explain each of your consequences, point the reader to remarks that are most appropriate.
- Present a background, such as by describing the question that was addressed by creation an exacting study.
- Explain results of control experiments and comprise remarks that are not accessible in a prescribed figure or table, if appropriate.
- Examine your data, then prepare the analyzed (transformed) data in the form of a figure (graph), table, or in manuscript form.

What to stay away from

- Do not discuss or infer your outcome, report surroundings information, or try to explain anything.
- Not at all, take in raw data or intermediate calculations in a research manuscript.
- Do not present the similar data more than once.
- Manuscript should complement any figures or tables, not duplicate the identical information.
- Never confuse figures with tables - there is a difference.

Approach

- As forever, use past tense when you submit to your results, and put the whole thing in a reasonable order.
- Put figures and tables, appropriately numbered, in order at the end of the report
- If you desire, you may place your figures and tables properly within the text of your results part.

Figures and tables

- If you put figures and tables at the end of the details, make certain that they are visibly distinguished from any attach appendix materials, such as raw facts
- Despite of position, each figure must be numbered one after the other and complete with subtitle
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- Give details all of your remarks as much as possible, focus on mechanisms.
- Make a decision if the tentative design sufficiently addressed the theory, and whether or not it was correctly restricted.
- Try to present substitute explanations if sensible alternatives be present.
- One research will not counter an overall question, so maintain the large picture in mind, where do you go next? The best studies unlock new avenues of study. What questions remain?
- Recommendations for detailed papers will offer supplementary suggestions.

Approach:

- When you refer to information, differentiate data generated by your own studies from available information
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- Submit to generally acknowledged facts and main beliefs in present tense.

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| ***Methods and Procedures*** | Clear and to the point with well arranged paragraph, precision and accuracy of facts and figures, well organized subheads | Difficult to comprehend with embarrassed text, too much explanation but completed | Incorrect and unorganized structure with hazy meaning |
| ***Result*** | Well organized, Clear and specific, Correct units with precision, correct data, well structuring of paragraph, no grammar and spelling mistake | Complete and embarrassed text, difficult to comprehend | Irregular format with wrong facts and figures |
| ***Discussion*** | Well organized, meaningful specification, sound conclusion, logical and concise explanation, highly structured paragraph reference cited | Wordy, unclear conclusion, spurious | Conclusion is not cited, unorganized, difficult to comprehend |
| ***References*** | Complete and correct format, well organized | Beside the point, Incomplete | Wrong format and structuring |

# INDEX


## A

Abdomen · 2, 3, 4, 5, 6, 48, 50, 51
Amputation · 57, 61, 62, 63
Analgesia · 41, 44, 46
Anastamosis · 17, 22, 25
Anorectal · 40

## B

Bilharzial · 34
Biopsy · 31, 64, 66, 69, 70, 71

## C

Caffeinated · 44
Cholangitis · 18, 22, 25
Cholecystectomy · 17, 19, 20, 23, 24, 26, 27, 28
Cirrhosis · 18, 25
Concomitantly · 64, 66
Cutaneous · 17, 21, 25

## D

Dehiscence · 2, 3, 13, 25
Deterioration · 23, 25
Diabetic · 44
Diathermy · 24
Dilated · 24
Dipyron · 44
Dysuria · 29, 31, 33

## E

Electrocautery · 4
Encephalopathy · 23, 25
Eosinophilia · 29
Epigastric · 10, 12, 13

## F

Fissurectomy · 40
Fistula · 17, 18, 21, 22, 25, 40, 42, 45
Fistulectomy · 40

## G

Genitourinary · 33
Glomerulonephritis · 29
Granuloma · 29, 31, 34, 35
Grigoropoulos · 42, 44, 47

## H

Haematobium · 29, 31, 33, 35, 36
Haemorrhoidopexy · 1, 37, 38, 39, 41, 42, 44, 46, 47
Hepaticojejunostomy · 17
Hepatobiliary · 17, 18, 27
Hyperaemia · 33, 34

## I

Iatrogenic · 1, 17, 18, 19, 21, 23, 25, 27
Inflammation · 21, 24, 37

## J

Jaundice · 17, 21, 22, 26

## L

Laparoscopically · 10
Laparotomy · 2, 3, 4, 8, 9, 53
Laproscopic · 18, 19, 20, 23, 24
Lymph · 64, 65, 66, 68, 69, 70, 71

## M

Malignant · 36, 64, 66, 69
Mastectomy · 64, 65, 66
Musculofascial · 3

## N

Necrosis · 4, 24

## *P*

Pancreatectomy · 18
Paramedian · 2, 4, 5, 6
Pathirana · 27
Peritonitis · 17, 21, 24, 25
Pethedine · 44
Polydioxanone · 4, 8, 9
Portahepatis · 24
Praziquantel · 31, 36
Preponderance · 37, 40
Pyloromyotomy · 10, 12, 13, 14

## *R*

Rectus · 4, 6
Referral · 17, 18, 23, 24, 27, 33, 48
Resuscitation · 49, 50, 51, 53

## *S*

Schistosomiasis · 29, 31, 32, 33, 34, 35, 36
Subcutaneous · 4
Suppuration · 25
Sutures · 2

## *T*

Transhepatic · 22, 25
Transrectus · 4

## *V*

Vesicalschistosomiasis · 33

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