

**CHARACTERISTICS OF PATIENTS WITH POST CAESAREAN
SECTION BURST ABDOMEN AND ITS TREATMENT OUTCOME
AT MUHIMBILI NATIONAL HOSPITAL**

Andreas Mgaya, MD

**MMed (Obstetrics and Gynaecology) Dissertation
Muhimbili University of Health and Allied Sciences
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**Muhimbili University of Health and Allied Sciences
Department of Obstetrics and Gynaecology**



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By

Andreas Mgaya

**A Dissertation Submitted in (Partial) Fulfillment of the Requirements for the
Degree of Masters of Medicine (Obstetrics and Gynaecology) of**

**Muhimbili University of Health and Allied Sciences
October, 2017**

CERTIFICATION

The undersigned certifies that he has read and hereby recommends for acceptance by Muhimbili University of Health and Allied Sciences a dissertation titled: ***“Characteristics of Patients With Post Caesarean section burst Abdomen and its Treatment Outcome at Muhimbili National Hospital.”*** in (partial) fulfillment of the requirements for the degree of Masters of Medicine (Obstetrics and Gynaecology) of Muhimbili University of Health and Allied Sciences.

Dr. Peter Wangwe MD, MMed,

(Supervisor)

Date

DECLARATION AND COPYRIGHT

I, **Dr Andreas Mgaya**, declare that this **dissertation** is my own original work and that it has not been presented and will not be presented to any other University for a similar or any other degree award.

Signature..... **Date**.....

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Lastly but not least, to all women who participated in this study, without them I would not be able to make this work. I say thank you all.

DEDICATION

I dedicate this dissertation to my late parents **MR. Batista Mgaya and Luciana Ndendya** who nurtured and provided me with a good education foundation that brought me to where I am today. May their souls rest in eternal peace.

ABSTRACT

Background: Burst abdomen is a distressing complication and remains a major cause of morbidity following any abdominal surgery whether elective or emergency. There are many factors responsible for burst abdomen. Anaemia is among others that play a significant role in causing burst abdomen. Owing to high rates of cesarean section, different post surgical complications including burst abdomen are encountered in post CS patients at MNH.

Objective: The objective of this study was to describe the characteristics of patients with burst abdomen and its treatment outcome among patients who underwent CS at MNH.

Methodology: This was a case series study conducted from 22nd July 2016 to 22nd January 2017 among patients who underwent CS at MNH and developed burst abdomen. Patients were recruited in obstetric wards after they had met the inclusion criteria and had consented. They were then followed up until the first follow up visit (two weeks) after being discharged home. Data on socio-demographic characteristics, patient's medical history, physical examination, laboratory investigations, and surgical procedure were obtained from patients and their files using a structured questionnaire and a checklist. Data was analyzed using SPSS version 20 software and results presented as means and proportions.

Results

A total of 12 patients who underwent CS at MNH and developed burst abdomen were studied. During the study period, a total of 2768 CS were done at MNH (an average of 461 CS per month) of which 12 developed burst abdomen. This is an average of 2 cases every month with a frequency of about 4.3 per 1000 patients who had undergone CS at MNH. The mean age of the studied patients was 26.7 years. On average burst abdomen was reported on the 5th day post CS. Most patients were operated as emergency (10 patients) while 2 were elective cases. SUMI was the most used abdominal incision (10 patients) while Pfannenstiel incision was used in 2 patients. The duration of hospital stay ranged from 7-35 days with a mean duration of 23.1 days. There was no death among the studied patients.

Conclusion

Burst abdomen is said to have occurred when there is disruption of the layers of an abdominal wound including the rectus sheath or herniation of peritoneal contents through a gap in the rectus sheath, evisceration of peritoneal contents and serosanguinous discharge. The frequency of burst abdomen is about 4.3 per 1000 patients who had undergone CS at MNH.

Results of this study suggest that patients who develop burst abdomen may have clinical comorbidities such as anaemia, pre-eclampsia and eclampsia, PROM and obstructed labour. Surgery related characteristics such as experience of the surgeon, type of incision, use of pre and post operative antibiotics have a role to play for a good outcome of a post CS wound. Some patients with post CS burst abdomen may have STAH done even before completion of their families. It is a fact that patients with post CS burst abdomen have a prolonged hospital stay.

Recommendation

A large study of a different design is needed in order to find out the statistical association between different causative factors for burst abdomen.

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LIST OF ABBREVIATION

ARM	Artificial Rupture of Membranes
APH	Ante Partum Haemorrhage
C	Caesarean Section
DTS	Deep Tension Suture
HIV	Human Immunodeficiency Virus
MNH	Muhimbili National Hospital
MUHAS	Muhimbili University of Health and Allied Science
PROM	Premature Rupture of Membranes.
SRM	Spontaneous Rupture of Membranes
SUMI	Sub Umbilical Midline Incision
WHO	World Health Organization
STAH	Subtotal Abdominal Hysterectomy

OPERATIONAL DEFINITION

Burst abdomen; refers to disruption of the layers of an abdominal wound post surgery including the rectus sheath. The skin may remain intact with disruption of the rest of layers.

BACKGROUND

Burst abdomen occurs when there is disruption of the abdominal wound due to tear of sutures apposing the different layers and may be accompanied with evisceration of intestine and/or omentum. It occurs mostly between the sixth and eight day after operation (1). Burst abdomen is one of the most distressing complications following surgery including CS. The incidence of burst abdomen varies from one center to another worldwide. In most centers it is recorded to be 1-3 % and some centers have recorded incidences of burst abdomen as high as 10-30% with mortality rate as high as 45%(2,3). The incidence of burst abdomen at MNH is not documented.

A retrospective study done in Kenya revealed burst abdomen rate of 4.3% among patients who underwent abdominal surgery including CS(4). The frequency as described in the international data ranges from 0.4% to 3.5% and it is associated with a mortality rate as high as 45% and incisional hernia formation in 4-70% of survivors(5,6,4). There are many factors that influence the occurrence of burst abdomen. For example, surgical site infection among others plays a significant role in causing burst abdomen. According to the Centre for Disease Control, surgical site infection (SSI) is defined as an infection occurring within 30 days of performing a surgical procedure. It can either involve superficial tissues, deep tissues, tissue spaces or organs deeper to the incision site. This definition also takes into consideration the clinical symptoms/signs like pain or even swelling, laboratory evidence which suggests infection from the culture of microorganisms of samples taken from the infected surgical site and a clinical diagnosis by the attending surgeon (7).

Owing to the fact that many surgeons would not want to have their failures published, literature on burst abdomen in the past is limited. However, literature on how to prevent burst abdomen is readily available.

The genesis of pre-operative preparation for surgical rooms, patients and the surgeons dates back to 1865. Lord Joseph Lister (1827 - 1912) - regarded as father of modern surgery said, "Skin is the best dressing". In 1865 he decreased wound sepsis and burst abdomen rates in

Glasgow Infirmary surgical unit by spraying operating rooms with diluted phenol(8). Consequently a variety of antiseptics and disinfectant evolved. To date, the use of antiseptics is no longer a question. May be the question is how long should a surgeon scrub or patient be scrubbed to prevent infection.

Burst abdomen and incision hernias have been associated with midline abdominal incisions in any age group (9). This has led to formulation and popularization of other abdominal approaches by various surgeons. Some of these incisions are therefore known by the names of these surgeons. One surgical researcher, Sloan; found that tension across a vertical incision is 30 times more than across a transverse incision(10). To minimize the risk of burst abdomen and hernia formation transverse incisions are preferred. However where speed is of the essence in an emergency or when access to a lesion is critical then the most applicable incision is midline(3).

The role of antibiotics to prevent infection and burst abdomen has been well stipulated in most literatures. In 1939, use of sulphanilamide powder on surgical wounds was almost universal. It was sprinkled in peritoneal cavity for peritonitis because it appeared to decrease morbidity. Today intravenous antibiotics have played their role well in reduction of wound sepsis and burst abdomen. Antibiotic prophylaxis administration significantly reduces the incidence of surgical site infection up to four-fold(11).

Wound closure techniques have evolved with evolution of closure materials. A wide variety of suture materials are in use. Disruption of abdominal wound was a particular problem with mortality exceeding 50% in early last century. This was addressed in a special symposium where it was recommend that retention sutures of silk or preferably silver wire to be used while another study recommended the use of Nylon suture, which evoked less tissue reaction than catgut or silk(8). This began the current era of synthetic sutures with different properties. Recent studies suggest that, bacterial adherence of suture materials should be taken into account by all practitioners when closing wounds or debriding infected wounds. Absorbable braided suture should not be used in closure of contaminated wounds or wounds at risk for developing infection(12).

Burst abdomen therefore occurs in varying rates and causes are multifactorial. At MNH, burst abdomen is one of the encountered post CS complications, be it in emergency or elective cases and is more observed when new residents are introduced to surgical procedures. A good understanding of the characteristics of patients with the problem will help to put in place effective preventive measures. The frequency of burst abdomen at MNH is not documented. The aim of this study was to describe the characteristics of patients with post CS burst abdomen and its treatment outcome among patients undergoing CS at MNH.

LITERATURE REVIEW

Caesarean section is one of the common surgical interventions to save lives of the mothers and/or the newborns. The World Health Organization (WHO) and Pan American Health Organization suggest the ideal CS rate for a country to be 5% - 15%(13). The average frequency of CS in Africa is 9%(13). In Sub Saharan Africa the cesarean section rate is 6.2% (14). The rate of cesarean section at MNH increased from 15.8% in 1999 to 31.8% in 2004(15). Another study noted a rise from 19% to 49% between the year 2000 and 2011(16). This increase in the rate of CS is associated with different complications including burst abdomen.

Various previous reports have discussed factors affecting wound healing in abdominal wall and those leading to complication but no clear consensus were made. For example, while in most studies increase in patient age was associated with burst abdomen, one prospective study done in India from July 2006 to September 2008 found higher incidence of wound complications in the age group between 21-40 years. Similarly neither diabetes mellitus or obesity have been identified as risk factors for burst abdomen in most of the studies contrary to the common belief(3). Patients related factors like age, pre-operative medical conditions like anemia, diabetes, obesity, malnutrition, jaundice, renal failure are the frequently encountered risk factors for wound complication(4,17). Surgical site infection has been implicated in most previous studies as the most important postoperative risk factor for burst abdomen. Others are such as nausea and vomiting, abdominal distension, increased intra-abdominal pressure, increased coughing, pneumonia; and wound hematoma. Presence of bacteria in wounds causes activation and influx of neutrophils and increased levels of degradative matrix metallo proteinases. The endotoxin released by these bacteria leads to collagenase production and degradation of collagen fiber. Thus, collagen synthesis is exceeded by collagen degradation, affecting tissue breaking strength and causing sutures to tear through fascial edges (3). In one study surgical site infection was the third cause of burst abdomen preceded by malnutrition and anemia (5). Many studies have not investigated the relationship between HIV infection and burst abdomen. A retrospective study done in Kenya in 2003 could

not establish an association between HIV infection and development of wound dehiscence because majority of the participants in the study were not tested for HIV, only 18 out of 86 patients were tested for HIV and only 4 were positive. However, a prospective study done in India in 2015 found that HIV contributed up to 7.4% of burst abdomen. On the other hand emergency surgery has been identified by vast majority of authors as a risk factor for burst abdomen(3,2,17,18). For example, Kenig found a statistically significant number of people with burst abdomen among those who were admitted on emergency bases as compared to those admitted as elective patients(18).

Very few studies have pointed out the issue of experience of the surgeon as a factor for good outcome of the wound. Similarly few authors have looked at time which an operation took place, where at night for majority of emergency operations the surgeon was exhausted leading to suboptimal closure of the abdominal wall layers(19,20). A retrospective study done in Cracow, from January 2008 to December 2011 found no statistically significant relationship between experience of the surgeon, time of operation and outcome of the wound. The above author was among the few who performed logistic regression analysis(18).

Different authors have investigated whether the type of incision is a risk factor for burst abdomen. Theoretically, healing of median incisions is considered to be more challenging than, transverse incisions due to the anatomy of the abdominal wall. The transverse muscle fibers are oriented perpendicularly to median incisions and activation of these muscles results in increased tension at the site of the sutured tissue. Retraction of the abdominal muscles and fascia is a frequently observed phenomenon in open abdomen treatment, which eventually hinders tension free closure of the abdominal wall. Also, the vascular supply of the fibrous line alba is assumed to be poor compared to abdominal muscles. Midline incisions have been associated with burst abdomen and incisional hernias(4,9). Few studies however have found no association between type of incision and burst abdomen. For example, Hendrix et al found no significant difference in occurrence of acute wound dehiscence between patients with lower midline incisions and Pfannenstiel incisions for gynecological surgery in a retrospective case-control study(21).

The type of suture materials and suture method are equally important in wound healing. Different types of suture material with different properties are available. Wissing et al in a randomized multicenter trial compared four techniques for closure of the fascia after midline laparotomy: continuous closure with polydioxanone-s, interrupted closure with polyglactin and continuous closure with nylon. The incidence of burst abdomen in this trial was 2.3% without statistically significant differences between the four groups. There was significant difference one year later in the incidence of incisional hernia between nylon and continuous polyglactin; 10.3% and 20.6% respectively (22). A meta-analysis by Van 't Riet, (2002) showed that closure of the abdominal wall with quickly absorbable suture material in a continuous fashion had poorer results compared to non-absorbable and slowly absorbable suture material (23). Layered closure of the abdominal wall was frequently performed in the past. The technique has been replaced by mass closure in which several layers are sutured at once. The latter has been assumed to result into better wound healing than the former (3).

Most studies on burst abdomen have not looked into its management and outcome. In one study, repair of burst abdomen using deep tension sutures (DTS) was found to be simple and effective way of management and was associated with less morbidity and mortality. When repair with DTS was compared with the use of UROSAC bags, the mean length of stay was significantly higher in UROSAC bag group than DTS group. Similarly, later development of incisional hernia was also a problem which was seen in UROSAC bag group which increased the frequency of re-explorations and further surgeries on patients. Other methods of closure of burst abdomen like X-stitch, Bogota bags and vacuum technique were not employed due to lack of technical expertise and high cost. (2).

Despite the occurrence of burst abdomen at MNH, no studies that have been done on the problem. Furthermore; little is known on the different methods of burst abdomen repair and their outcome.

PROBLEM STATEMENT

Burst abdomen is one of the encountered complications among patients undergoing CS at MNH. It poses significant impact on quality of life of the patient, health care cost for the patients, their families and hospital by requiring re-operations, need for antibiotics and prolonging hospital stay. In addition, it is a fact that there is psychological and social drawback where both the patient and relatives tend to be discontent of the health care provided and ignore the achievements of the initial surgery. Few reports have included results of burst abdomen in obstetric patients. Therefore, the cost burden, psychological trauma and social implications call for reduction or elimination of the problem coupled with a good understanding of the characteristics of patients who develop burst abdomen, its management and expected outcome of the management. This study described the characteristics of patients with post CS burst abdomen and its treatment outcome among patients undergoing CS at MNH.

RATIONALE

A good surgical outcome following caesarean section due to any indication depends largely on a number of factors that lie within the scope of the surgeon's competency and the patient's general condition. Sound knowledge regarding different predisposing factors that may lead to burst abdomen help in preventing its occurrence. Burst abdomen is one of the complications encountered in patients following cesarean section at MNH. A patient with burst abdomen spends on average of 15 days in the ward. This is definitely costly both for the patient and the hospital. In addition, such patients occupy beds for so long that would otherwise be used by other patient. This study describes the characteristics of patients with post CS burst abdomen and its treatment outcome at MNH. Results from this study will be important in strengthening surgical services and guiding recourse allocation to address the problem.

RESEARCH QUESTION

What are the characteristics of patients with post CS burst abdomen and its treatment outcome at MNH?

OBJECTIVES**Broad objective**

To describe characteristics of patients with post CS burst abdomen and its treatment outcome at MNH from 22nd July 2016 to 22nd January 2017.

Specific objectives

1. To describe patient related characteristics among patients with post CS burst abdomen at MNH from 22nd July 2016 to 22nd January 2017.
2. To describe surgery related characteristics among patients with post CS burst abdomen at MNH from 22nd July 2016 to 22nd January 2017.
3. To describe the treatment outcome following burst abdomen repair among patients with post CS burst abdomen at MNH from 22nd July 2016 to 22nd January 2017.

METHODOLOGY

Study design

This was a hospital based case series. 12 patients who were diagnosed to have developed burst abdomen having undergone CS at MNH from 22nd July 2016 to 22nd January 2017 were studied. Description was done on patients' characteristics before and after surgery, surgery related characteristics and treatment outcome.

Study setting

The study was conducted at Muhimbili National hospital (MNH) in maternity block from 22nd July 2016 to 22nd January 2017. This study period was chosen because previous records have shown large number of burst abdomen at MNH occurred during such a period. MNH is geographically located in Dar es Salaam region and is the largest referral and teaching hospital for Muhimbili University of Health and Allied Sciences (MUHAS). The department of Obstetrics and Gynecology is one among the six departments in the Directorate of Surgical Services. It takes care of both the outpatients and inpatients.

Health care providers in the maternity unit include consultants, specialists, residents, registrars, intern doctors and midwives.

Pre-operatively; patients at MNH are given intravenous antibiotics (ceftriaxone and metronidazole) at least one hour before the operation, intravenous fluids (ringers lactate or normal saline), they are catheterized, blood grouping and cross matching is done and the patient signs an informed consent form. However; the time from giving the antibiotics to commencement of the CS varies from patient to patient depending on the number of patients in the waiting list. Surgical techniques vary from one surgeon to another and availability of different standard suture materials vary from time to time. Post operatively, patients are given intravenous antibiotics for three days and are discharged home with oral antibiotics for 5 days. Stitches used to close the skin include silk or nylon which are all non absorbable and are removed on the 7th day at any other nearby health facility. However, It has been observed at MNH that post operative patients are incidentally found with burst abdomen while still in the

ward or during follow up visits. Some patients are re-admitted with such complications 7 days after the operation for repair.

Study population

This included all patients who underwent CS at MNH and developed post CS burst abdomen from 22nd July 2016 and 22nd January 2017. Burst abdomen was diagnosed based on presence of disrupted layers of an abdominal wound post surgery including the rectus sheath or evisceration, herniation of peritoneal content through an opening in the rectus sheath and the presence of serosanguinous discharge.

Sampling technique

It was a convenient sampling where all patients who underwent CS at MNH and developed post CS burst abdomen were enrolled into the study. Whenever a patient was admitted due to burst abdomen or one was diagnosed by the attending physician to have developed burst abdomen while still in the ward, the admitting residents and doctors in a given ward would communicate to the principal investigator. In addition, the principal investigator would pass in all the wards on daily basis to inquire for the presence of such patient(s).

Inclusion criteria

Patients who presented with burst abdomen after undergoing CS at MNH.

Exclusion criteria

Patients with burst abdomen who underwent CS in other hospitals and referred to MNH. Such patients were excluded because majority had data.

Data Collection

Using a check-list and a questionnaire, the patients' demographic data, medical history, physical examination findings, laboratory investigation results, surgical procedures, and outcome of the repaired burst abdomen were collected. Data on demographic characteristics such as age was obtained from the patient's file and entered into a check-list. Co-morbidities such as anemia (the most recent before CS), Diabetes Mellitus and HIV status (most recent results - usually checked twice during ANC) were obtained from the ante-natal card and

patients' files and entered into a check-list. HIV test is a routine test to all pregnant mothers at MNH. In case of patients who were in labor prior to CS, data on duration of labor and number of vaginal examination done was obtained from the patients using a questionnaire. Information on prophylactic antibiotics was collected from the preoperative checklist from the wards where such antibiotics are given before patients go to theatre. If prophylaxis was given in theatre then the information was obtained from the anesthetic medication chart or nursing intervention chart. Information on the CS such as type of incision, state of membranes/liquor, outcome of the baby, type of suture materials and duration of the operation was obtained from the operation notes. Symptoms experienced by the patient prior to the burst such as fever, cough, vomiting, abdominal distention and serosanguinous discharge from the wound were obtained from the patient. Physical findings following burst abdomen were obtained from the patient's file. Such information included tachycardia, fever, abdominal distention, serosanguinous discharge from the wound, and evisceration of abdominal contents and protrusion of omentum. Such symptoms would precipitate occurrence of burst abdomen or suggest presence of burst abdomen.

Intra operative findings and what was done during repair of the burst such as, pus collection, necrosis of the wound edges and subtotal hysterectomy was obtained from the operation notes. After the repair, patients were reviewed two weeks after discharge-during their follow-up visit. The outcome of the repair was recorded as healed, re-burst or death. All the collected information was entered into the checklist.

Data Analysis

Data collected was entered into a computer and analyzed using SPSS Version 20 computer software. The dependent variable was burst abdomen post CS, while patient and surgery related factors leading to post CS burst abdomen such as anemia, type of incision or sepsis were the independent variables. Data were presented as proportions for categorical variables. Univariate analysis was used for characteristics of research participants which were expressed as categorical and continuous variables, inclusive of their age. The means was used to summarize continuous variables while categorical data were expressed as frequencies.

Ethical Considerations and clearance

Ethical clearance was sought from Muhimbili University of Health and Allied Sciences ethical review board. All Patients with burst abdomen who met the inclusion criteria were explained what the study was about and were requested to sign an informed consent form to participate. Patients in the study were given standard of care available to all other patients by health care providers in a given ward where such patients were admitted. The principal investigator was involved in giving care to patients that were admitted in the ward where he was working. The principal investigator was involved in the repair of one patient.

Permission to do the study

The permission to do the study was sought from The Director of Muhimbili National Hospital and the head of the department of obstetrics and gynecology.

RESULTS

A total of 19 patients who underwent CS and had burst abdomen were identified, among these 7 were excluded from analysis as they were operated elsewhere and not at MNH. During the study period, a total of 2768 CS were done at MNH (an average of 461 CS per month) of which 12 developed burst abdomen. This is an average of 2 cases every month with a frequency of about 4.3 per 1000 patients who had undergone CS at MNH. The mean age of the studied patients was 26.7 years. On average burst abdomen was reported on the 5th day post CS.

Table 1: Distribution of patient related characteristics for post C/S burst abdomen.

Characteristics	Number of cases (n=12)
Age	
<20	1
20-35	9
>35	2
clinical co morbidities*	
Anemia(last hemoglobin <11g/dl)	7
1. Moderate (7 -9g/dl)	4
2. Mild (9.1-10.9g/dl)	3
Severe pre-eclampsia	2
Eclampsia	1
Ascitis	2
HIV	1
No co morbidity	3
Duration of labor	
Not in labor	6
<12hours	5
>12hours	1
Number of vaginal examinations	
0	3
1-4	8
>4	1
Urgency of C/S	
Elective	2
Emergency	10
Indication for C/S	
Previous scar not in labor	2
Previous scar in labor	3
Abruption placenta	1
Fetal distress	2
Obstructed labor	2
Severe pre-eclampsia with unfavorable cervix	1
Big baby in breech presentation	1

The age range was 18-40 years with a mean age of 26.7years.

Anemia was the frequent preoperative co-morbidity and was observed in 7 patients.

Previous scar was the common indication for CS (5 patients) followed by obstructed labor and fetal distress.

Six (6) patients were in labor before CS and vaginal examination was done more than 4 times in one patient.

Most patients were operated as emergency case (10) while 2 were elective cases.

Table 2: Distribution of surgery related characteristics for post C/S burst abdomen.

Characteristics	Number of patients (n=12)
Pre op antibiotics	
Given	11
Not given	1
Time of giving antibiotic before C/S	
Within 30 minutes	3
31-60mins	2
>1hour	5
Time not documented	2
Professional level of the surgeon	
Registrar	3
Resident	8
Specialist	1
Type of abdominal incision	
SUMI	10
Pfannenstiel	2
Time at which C/S was done	
0800-18:59hours	7
19:00-07:59hours	5
Duration of surgery	
<45mins	4
45-90mins	5
>90mins	3

Use of antibiotics after discharge

Used	8
Still in the ward	4

Symptoms prior to burst abdomen

Fever	1
Cough	1
Abdominal distention	4
Abdominal pain	1
Serosanguinous discharge	6
No symptoms	1

Duration from C/S to burst

0-2 days	2
3-7 days	7
>7 days	3

Clinical findings prior to repair

Abdominal distention	6
Omentum protrusion through the incision	3
Pus discharge	2
Serosanguinous discharge	7
Tenderness at incision site	4

Intra op findings during burst repair

Type of suture used for rectus	
Vicryl	1
Not recorded	11
State of the suture	
Loose suture	9
Broken suture	1
Suture teared through tissues	2
State of fascia	
Necrotic	2
Intact	10
State of uterine incision	
Intact	8
Necrotic	1
Dehiscent	1
Not recorded	2
Presence of peritonitis	
Present	2
No peritonitis	10

Pre operative antibiotics were given to 11 patients and only 2 patients received pre-operative antibiotics within 30 minutes prior to cutting time.

SUMI was the most used abdominal incision.

The most common symptoms prior to burst abdomen were serosanguinous discharge from the incision site (6 patients) and abdominal distention (4 patients). Clinical evaluation revealed Serosanguinous discharge and abdominal distension as the most frequent findings in 7 and 6 patients respectively.

On average burst abdomen was reported on the 5th day.

Table 3: Distribution of outcome characteristics post burst abdomen repair.

Characteristics	Number of patients (n=12)
Hysterectomy (STAH)	
Done	1
Not done	11
Duration of hospital stay	
7-20days	5
21-35 days	7
State of the wound (two weeks after discharge)	
Healed	12
Maternal death in hospital	
Yes	0
No	12

STAH was done in 1 patient during burst abdomen repair.

The duration of hospital stay ranged from 7-35days with a mean duration of 23.1 days

DISCUSSION

This study describes the characteristics of patients with post CS burst abdomen and their treatment outcome among patients who underwent CS at MNH in a period of six months from 22nd July 2016 to 22nd January 2017. During the study period there were 12 patients who were diagnosed to have burst abdomen. This number is higher than that observed in some other studies. In a five years retrospective study done in Kenya reported 50 cases of burst abdomen, an average of 10 cases per year while in one case series study done in India there were 23 patients with burst abdomen in a period of 22 months(2,6). In a four years randomized control study there were 3 patients with burst abdomen out of 140 patients who had undergone surgery (17). In another 20 years retrospective study there were 363 cases of burst abdomen out of 429,907 operated patients(3).

The mean age was 26.7 years with a range of 18 to 40 years. Majority of patients were within the age group of 20-35 years, which can be explained by the fact that most women of reproductive age are within that age group. This is in keeping with findings in one study, where the highest number (42) of patients with burst abdomen were within the 21-30 age group and most of them had undergone CS(4).

Anemia in pregnancy was found to be present in 7 patients. This is consistent with previous studies which have shown anemia to be one of the common clinical co-morbidity for burst abdomen. Low hemoglobin means poor oxygen supply to tissues and therefore poor tissue healing and inability to resist infection. One cross-section study showed anemia to be the second common co-morbidity by 12% preceded by malnutrition(5).

In retrospective study done in Kenya, 40% of patient with burst abdomen were anemic pre-operatively(4). Severe pre-eclampsia was the second common clinical co-morbidity in this study. This may be due to hypoproteinemia which contributes to prolonged inflammatory phase and impairs collagen synthesis, neo-angiogenesis and wound remodeling.

In this study burst abdomen was common among patients who underwent emergency CS (10 patients) as compared to 2 who were elective patients. This may be attributed to poor patient preparation and presence of conditions such as PROM, multiple vaginal examinations and prolonged labor in emergency cases. Similar observation has been made by other authors. For example, in a two years case series study, 44 cases of burst abdomen were those operated on emergency bases while 6 were elective cases(2). Similarly, in a four years case control study, there were 3 cases of burst abdomen out of 76 emergency operations and no burst abdomen among those operated as elective cases(17).

The use of prophylactic intravenous antibiotics play a vital role in reducing wound sepsis and burst abdomen. Antibiotics are more effective when given within a short period prior to the cutting time. In this study, 11 patients were given pre operative antibiotics, among these only 2 were given the antibiotics within 30 minutes before commencement of the CS which is the recommend time. In 5 patients, CS commenced after more than an hour after antibiotics were given. Use of post operative antibiotics also play similar role of preventing surgical site infection hence facilitating wound healing. In this study, all patients used post operative antibiotics.

Most patients who developed burst abdomen were operated by registrars and residents. Only 1 patient was operated by a specialist. This may be explained by the fact that these two groups of doctors operate the majority of emergency cases. In one study, the seniority of the operating surgeon could not be considered as a significant variable due to the regular practice where the assisting surgeon closes the incision(4).

In our study, SUMI was the most used abdominal incision (10 patients) while Pfannenstiel incision was used in 2 patients. In theory healing of median incisions is considered to be more challenging than transverse incisions due to the anatomy of the abdominal wall. The transverse muscle fibers are oriented perpendicularly to median incisions and activation of these muscles results in increased tension at the site of the sutured tissue. Retraction of the abdominal

muscles and fascia is a frequently observed phenomenon in open abdomen surgery, which eventually hinders tension free closure of the abdominal wall. Also, the vascular supply of the fibrous linea alba is assumed to be poor compared to abdominal muscles(3). The observation made in our study is consistent with many other studies. For example, Adwok found that all patients with burst abdomen post CS except one had midline incisions. A retrospective study and a case control study respectively also found high incidence of burst abdomen among patients with midline incisions(9,24).

Burst abdomen was reported between the 3rd and 7th day post CS in 7 patients with a mean duration of 5.5 days. This finding is consistent with those of other studies where burst abdomen occurred between the 6th and 8th day post surgery(2,18,19,25). In our study, 2 patients had developed burst abdomen by the 2nd day after CS, this could be due to suboptimal closure of the rectus sheath.

The most common symptoms experienced by the patients before a diagnosis of burst abdomen was made were abdominal distention and serosanguinous discharge from the incision site. Discharge of serosanguinous fluid indicates presence of a gap in the fascia which may have resulted from faulty closure of the fascia or tearing of the sutures through necrotic fascia following infection. Fever is an indication of infection and 1 patient had this symptom. Bacterial presence in wounds causes activation and influx of neutrophils and levels of degradative matrix metallo proteinases are increased. Bacterial endotoxin released leads to collagenase production and collagen fiber degradation. It has been observed in patients with burst abdomen that collagen synthesis is exceeded by collagen degradation(3). This negatively affects tissue breaking strength, causing sutures to tear through fascial edges. The other symptom was cough, this increases intra-abdominal pressure which may predispose the patient to burst abdomen and more so when the wound is already weakened by infection and poor fascia closure technique. Clinical evaluation of these patients confirmed the complaints. In our study, there was poor documentation of procedure notes. For example; the type of suture used to close the rectus was not documented in most procedures. This is in keeping with the

observation made by Adwok et al where out of the 92 studied patients, 6 had incomplete data including post operative notes.

Few studies have included findings during repair of the burst abdomen- this may be due to the fact that many were retrospective studies.

One patient underwent STAH during burst abdomen repair; this was because of septic uterus and necrotic uterine incision. This is definitely a distressing event especially for patients who may have not completed their reproductive carrier.

The duration of hospital stay ranged from 7 to 35 days with a mean duration of 23 days. This is in keeping with findings from other studies where the mean duration of hospital stay ranged from 22 to 38 days(4,2,17).

All patients had their wounds healed when examined two weeks after discharge. Contrary to the documented mortality of up 24%(5), there was no death that was reported among the studied patients while still in hospital. This was due to vigorous management of the co morbidities such as severe anemia with blood transfusion and timely repair of the burst is abdomen.

CONCLUSION

Burst abdomen is said to have occurred when there is disruption of the layers of an abdominal wound including the rectus sheath or herniation of peritoneal contents through a gap in the rectus sheath, evisceration of peritoneal contents and serosanguinous discharge. The frequency of burst abdomen is about 4.3 per 1000 patients who had undergone CS at MNH. Results of this study suggest that patients who develop burst abdomen may have clinical comorbidities such as anaemia, pre-eclampsia and eclampsia, PROM and obstructed labour. Surgery related characteristics such as experience of the surgeon, type of incision, use of pre and post operative antibiotics have a role to play for a good outcome of a post CS wound. Some patients with post CS burst abdomen may have STAH done even before completion of their families. It is a fact that patients with post CS burst abdomen have a prolonged hospital stay.

RECOMMENDATION

A large study of a different design (such as case control or cohort study) is needed in order to find out the association between different factors and burst abdomen.

STRENGTH OF THE STUDY

Findings of this study can be used to generate hypotheses that can be tested using other study designs.

STUDY LIMITATIONS AND MITIGATION

Being a case series, the study could not establish a statistical association between burst abdomen and the possible risk factors.

Some patients had their hemoglobin checked at gestation age remote from term. Thus, it was difficult to ascertain whether anemia was corrected or not. Furthermore, it was difficult to ascertain the method used to check for hemoglobin level.

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APPENDICES

Appendix I: Checklist

A six months case-series study on **Characteristics of patients with post caesarean section burst abdomen and its treatment outcome at Muhimbili National Hospital (22nd July 2016 –22nd January 2017)**

- 1. Date.....
- 2. Registration no.....
- 3. Patient Code number
- 4. Patient’s characteristics.
 - 1. Age.....
 - 2. Date of admission.....
 - 3. Admission status.
 - 1. Referral ()
 - 2. Non-referral ()
- 5. Clinical Co-morbidities:
 - 1. Anemia (last hemoglobin) ()
 - 2. Diabetes Mellitus ()
 - 3. HIV positive ()
 - 4. Others (specify).....
- 6. Duration of labour (hours).....
- 7. Number of vaginal examinations.....

8. State of membranes before CS

- (1) Intact
- (2) SRM
- (3) PROM
- (4) ARM ()
- (5) PPRM

9. Urgency of the CS.

- (1) Elective
- (2) Emergency ()

10. Pre operative antibiotics

- (1) Given
- (2) Not given ()

11. Time of giving the antibiotics. Mention.....

12. Type of antibiotics given. Mention.....

13. Post operative antibiotics

- (1) Given
- (2) Not given ()

14. Indication for the CS. Mention.....

15. Professional level of the surgeon.

(1) Registrar

(2) Junior resident (year I and 2)

(3) Senior resident (year 3)

(4) Specialist

(5) Consultant ()

16. Type of skin incision.

(1) SUMI

(2) Phannenstiel ()

17. Status of liquor on CS.

(1) Clear

(2) Chorioamnionitis ()

(3) Not documented

18. Outcome of the baby.

(1) Live

(2) Fresh still birth

(3) Macerated still birth ()

19. Type of suture material used to close the;

(1) Uterus.....

(2) Abdomen.....

(3) Skin.....

(4) Not documented

20. Time at which operation was done.....

21. Duration of the operation.....

22. Findings prior to burst abdomen repair

(1) Temperature (febrile) ()

(2) Tachycardia (Pulse rate) ()

(3) Abdominal distention ()

(4) Tenderness at the incision ()

(5) Purulent discharge ()

(6) Serosanguinous discharge ()

23. Intra operative findings during burst abdomen repair.

(1) Suture material used to close the rectus sheath.

1. Vicryl

2. Prolene ()

3. Catgut

4. Silk

5. Not recorded

(2) Broken suture.

1. Yes ()

2. No

3. Not recorded

(3) Loose suture.

1. Yes

2. No ()

3. Not recorded

(4) Suture teared from the abdominal wall tissue.

1. Yes

2. No ()

3. Not recorded

(5) Necrotic fascia.

1. Yes

2. No ()

3. Not recorded.

(6) Presence of Infection (peritonitis)

1. Yes

2. No

3. Not Recorded

(7) State of the uterine incision

- 1. Necrotic
- 2. Dehiscent
- 3. Intact
- 4. Not recorded ()

24. Maternal outcome.

(1) Hysterectomy done.

- 1. Yes
- 2. No ()
- 3. No uterus (post STAH)

(2) Duration of hospital stay (days).....

(3) State of the wound after repair (up to first follow up visit after being discharged)

- 1. Healed
- 2. Re- burst ()

(4) Did the patient die in the hospital?

- 1. Yes
- 2. No ()

Appendix II: Questionnaire

A six months case-series study on **Characteristics of patients with post caesarean section burst abdomen and its treatment outcome at Muhimbili National Hospital**(22nd July 2016 –22nd January 2017)

1. Date.....

2. Registration no.....

3. Patient Code number

4. Did the patient experience any of the following symptoms prior to burst abdomen?

- 1. Fever ()
- 2. Vomiting ()
- 3. Cough ()
- 4. Constipation ()
- 5. Abdominal distention ()

5. How many times was vaginal examination done?

1. Mention.....

2. Can't remember. ()

6. Did you continue taking the prescribed antibiotics after being discharged home?

- 1. Yes
- 2. No ()

7. For how long were you in labor?

8. Were the membranes ruptured before c/s?

- 1. Yes
- 2. No
- 3. I was not in labor.

Appendix III: Questionnaire Swahili version

DODOSO

Utafiti kuhusiana na sababu za vidonda kuachia/kufumuka baada ya kufanyiwa upausuji wa kumtoa mtoto/watoto tumboni na matokeo ya matibabu ya vidonda hivyo kwa wagonjwa waliolazwa Hospitali ya Taifa Muhimbili.

1. Tarehe.....
2. Namba ya faili.....
3. Namba ya utambulisho.....
4. Je kabla ya kidonda kuachia, ulipata dalili zifuatazo?
 - (1) Homa
 - (2) Kukohoa
 - (3) Kutapika
 - (4) Kupata choo kubwa kwa shida.
 - (5) Tumbo kujaa.
5. Ukiwa kwenye uchungu ulipimwa njia mara ngapi?
 1. Taja.....
 2. Sikumbuki
6. Baada ya kuruhusiwa, uliendelea kutumia dawa?(antibiotiki)
 1. Ndiyo
 2. Hapana
7. Kabla ya kufanyiwa upasuaji, ulikuwa kwenye uchungu kwa muda gani?
8. Kabla ya kufanyiwa upasuaji, chupa ilishavunjika?
 1. Ndiyo
 2. Hapana
 3. Sikuwa na uchungu

Appendix IV: Consent Form English Version

Introduction

I am Dr. Andreas Mgaya, a postgraduate student from Muhimbili University of Health and Allied Sciences (MUHAS) from the department of obstetrics and gynaecology. I am conducting a study titled; **‘Characteristics of patients with post caesarean section burst abdomen and its treatment outcome at Muhimbili National Hospital.’** I aim conducting this study as a prerequisite for the completion of my studies, but also the results of this study will generate deeper understanding of the problem and ultimately lead into more improved surgical services. Your participation in this study will include the following; getting information about your general condition prior to the cesarean section, before burst abdomen, during and after burst abdomen repair for the entire period of your stay in the ward until the first follow up visit. The information will be obtained from you, your medical file and antenatal card.

Participation in the study

You are kindly requested to participate in this study. If you accept to participate in this study your particulars/information will be taken and used for the purpose of the study and this will certainly not bother you or cause any discomfort to you. Your participation in this study will involve the following: Getting some information from you, taking your records from clinical notes, being directly observed after burst abdomen repair. Also you will be clinically examined during the post operative ward stay and on your first follow up visit.

Confidentiality

You are strongly assured of the confidentiality of the information obtained that will only be used for the purpose of this study and anonymity will highly be observed when collecting data and compiling report. To assure you, even your name will not be required to appear in the questionnaire.

Risk to participant

No anticipated risk or harm that may result from participating in this study. Your participation is absolutely voluntary and there is no penalty for not participating. You will receive the standard of care given to all other such patients. You are free to ask any question and you may stop to participate in this study any time.

Contact Person

In case of any queries about this study contact the principal investigator, Dr. Andreas Mgya +255687359324 or Dr. P. wangwe of Muhimbili University of health and Social Sciences who is my supervisor. If you have any questions/concerns about your rights as a participant you may contact Professor Mainen Mushi, the chairman of the university senate research and publications, MUHAS P.O.BOX 65001, Dar es salaam.

Signing of the consent

If you agree to participate in this study please sign in this consent form.

I (initials)..... have read and understood the contents of this form and I have been given satisfactory explanation with all my questions answered. I therefore consent to participate in this study.

Signature of intervieweeDate.....

Signature of interviewerDate

Appendix V: Consent form Kiswahili version

FOMU YA RIDHAA KUSHIRIKI KATIKA UTAFITI.

Utangulizi;

Naitwa Dkt. Andreas M gaya, ni mwanafunzi wa uzamili katika Chuo Kikuu cha Sayansi za Afya Muhimbili, idara ya magonjwa ya akina mama na uzazi. Ninafanya utafiti kuhusiana na ‘sababu za vidonda kuachia/kufumuka baada ya kufanyiwa upasuaji wa kumtoa mototo/watoto tumboni na matokeo ya matibabu ya vidonda hivyo kwa wagonjwa waliofanyiwa upasuaji katika Hospitali ya Taifa Muhimbili.’Ninafanya utafiti huu kama hitaji la lazima ili niweze kumaliza masomo yangu.Pia matokeo ya utafiti huu yatasaidia kufahamu kwa undani zaidi kuhusu tatizo hili na matokeo ya kekuboresha zaidi huduma za upasuaji. Ushiriki wako katika utafiti huu utahusisha yafuatayo; kupata taarifa kutoka kwako, kwenye faili lako, na kadi yako ya kliniki kuhusu hali yako kabla ya kufanyiwa upasuaji wa kumtoa mtoto tumboni,kabla ya kidonda kuachia/kufumuka na hali ya kidonda wakati wa kukishona kwa mara ya pili na baada ya hapo kwa wakati wote uwapo wodini na utakaporudi kuonwa tena kliniki baada ya kuruhusiwa.

Kushiriki katika utafiti huu

Tafadhali unaombwa kushiriki katika utafiti huu, na mara tu utakaporidhia,unahakikishiwa kuwa habari zako na maelezo utakayotoa yatumika kwa makusudio na malengo ya utafiti huu tunakuwahidi haitakuletea usumbufu wowote.

Usiri wa taarifa za mshiriki

Unahakikishiwa tena kuwa taarifa zozote zitakazopatikana kutoka kwako wakati wa utafiti huu zitapewa usiri mkubwa sana na hazitatumika kwa malengo mengine yeyote tofauti na utafiti husika. Kuhakikisha hilo dodoso litakalohusika halitakuwa na jina lako wakati wote wa utafiti na hata baada ya utafiti.

Athari za utafiti huu kwa mshiriki

Hakuna athari au madhara yeyote yatakayokupata kutokana na kushiriki katika utafiti huu. Ushiriki wako katika utafiti huu ni wa hiari kabisa. Unayo haki ya kushiriki au kutoshiriki bila kulazimshwa. Pia unayo haki ya kukataa kuendelea kushiriki/kuacha kujibu maswali wakati wowote utakapojisikia kufanya hivyo na hakutakuwa na hatua yeyote itakayochukuliwa dhidi yako au kulaumiwa kwa kufanya hivyo.

Taarifa/Mawasiliano

Kuna kamati ya kusimamia udhibiti wa utafiti huu.

Endapo unahitaji kupata maelezo kuhusu haki zako au taarifa, wasiliana nami Dr. Andreas Mgaya, +255687359524 au Dr. P. Wangwe +2557844450340 wa chuo kikuu cha Afya na Tiba Muhimbili ambaye ndiye msimamizi wangu. Kama unaswa lilolote kuhusu haki yako kama mshiriki wasiliana na Profesa Mainen J. Moshi, ambaye ni mkurugenzi wa bodi ya utafiti chuo kikuu cha Afya na Tiba Muhimbili, kwa S.L.P 65001 Dar es Salaam.

Kukubali kushiriki

Ukikubali kushiriki tafadhali thibitisha kwa kujaza na kusaini sehemu ya fomu hii hapa chini.

Mimi.....nimesomewa na kuelewa yaliyomo kwenye form hii na maswali yangu yote yamejibiwa vizuri. Hivyo ninakubali mwenyewe kwa hiari yangu bila kushurutishwa au kushawishiwa kushiriki katika utafiti huu.

Sahihiyamhojiwa..... Tarehe.....

Sahihi ya mhoji.Tarehe