ST. PAUL'S HOSPITAL MILLENNIUM MEDICAL COLLEGE

Abdominal Wound Dehiscence: Retrospective review on pattern, associated factors and management outcome of patients operated at St. Paul's Hospital Millennium Medical College, Addis Ababa, Ethiopia

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II. CONTENTS

III. LIST OF TABLES

IV. LIST OF GRAPHS

V. Abbreviations and acronyms

- **AWD:**Abdominal Wound Dehiscence
- **HIV:**Human Immunodeficiency Virus
- **IRB:**Institutional Review Board
- **LBO:**Large Bowel Obstruction
- **MO:** Management Outcome
- **OR:** Operation Room
- **PAT:**Penetrating Abdominal Trauma
- **POST OP :**Postoperative
- **PUD:**Perforated Peptic Ulcer Disease
- **SBO:**Small Bowel Obstruction
- **SPHMMC:** Saint Paul's Hospital Millennium Medical College
- **SPSS:** Statistical Package for Social Sciences Software

VI. Abstract

Background: Abdominal wound dehiscence (AWD) is separation of different layers of an abdominal wound before complete healing has taken place. The magnitude of wound dehiscence

varies from hospital to hospital worldwide while it is recorded to be 1-3% in most hospitals with an impact of mortality rate as high as 45%.

Objectives: The aim of this study is to assess the prevalence of abdominal wound dehiscence, associated factors and management outcome of patients operated at St. Paul's Hospital Millennium Medical College, Addis Ababa, Ethiopia

Methods: A hospital based retrospective review of chart was done by using the data covering the past three years (September 2014 – September 2017)and data was collected from hospital medical records of sampled patients like OR log books, and individual patient medical records. The collected data were checked for any inconsistency, coded and entered into SPSS version 20 for data processing and analysis. The bivariate and multivariate analysis was done to see the significance association between abdominal wound dehiscence and the independent variables at p-value<0.05.

Results a total of 41(0.99%) patients developed abdominal wound dehiscence from September 2014 to September 2017 among 4137 patients who underwent abdominal laprotmy at SPHMMC department of Surgery. Among the patients, the majority 51.2% were in age range of 41 and above years with mean age 2.98 (SD=1.21) and 70.7% were male. Also, abdominal wound dehiscence was more common in emergency patients and vertical incision was the most common types of incision and 58.5% of the Wound Dehiscence was developed within 6-10 days of postoperative course95.2%of them underwent re-laparatomy for the management of the wound dehiscence and 48.8% of them were treated with Tension suture during the 2nd operation of abdominal closure.

Conclusion: The current study revealed that the overall magnitude of Abdominal Wound Dehiscence at study area was 0.99% and among this, 4.9% and 95.1% were partial wound dehiscence and complete wound dehiscence respectively. During the multivariate analysis there was no any factor which has significant association with abdominal wound dehiscence. However, regarding the management outcome, 9.8% of patients died within the institution after the second operation which is high mortality rate. Abdominal Wound Dehiscence was relatively higher among those patients operated for emergency case (90%) than elective ones during the 1stsurgery.

Key Words: wound dehiscence, postoperative, evisceration, Emergency operation, Midline incision

1. INTRODUCTION

1.1 Background

Abdominal wound dehiscence (AWD) is a terminology which is commonly used to explain separation of different layers of an abdominal wound before complete healing has taken place. Other terms used are acute laparotomy wound failure and burst abdomen (1). It is usually occurs when a wound fails to achieve required strength to withstand stresses placed upon it (2, 3). It can be occult or overt, partial or complete. Overt wound failure follows early removal of sutures leading to evisceration but the other type which means occult dehiscence occurs with disruption of musculoaponeurotic layer beneath intact skin sutures (4, 5).

Abdominal wound dehisence is one of the most dreaded life threatened complications owing to the associated rapid onset of often irreversible pathological sequel. It is a major cause of postoperative morbidity and mortality in sub- Saharan Africa including Ethiopia (6). Unlike the encouraging outcome is recorded in more developed countries, associated mortality is very high in many developing countries due to infective complications and a lack of adequate facilities (1, 7).

The post-operative complications are always of concern to surgeons which may have a significance impact as some of them lead to prolonged disability and death. Even if, review of the experiences of large series of operative procedures provides a useful index of the frequency with which the various types of complications occur, their recognition and management are surgeon's responsibility (8).

1.2 Statement of the Problem

The magnitude of wound dehiscence varies from hospital to hospital worldwide. It is recorded to be 1-3% in most hospitals with an impact of mortality rate as high as 45% (9, 10, 1). Factors like the presence of co-morbid illness of diabetes, malnutrition, anemia and COPD may play significant role in delaying wound healing that predisposes for the development of wound dehiscence (11).

Risk factors in wound dehiscence can be divided into general and local. General factors include malnourishment, diabetes, obesity, renal failure, jaundice, sepsis, cancer, patients on steroids (11, 12). Local factors include inadequate or poor closure of wound; poor local wound healing because of infection, hematoma or seroma, increased intra-abdominal pressure in post-operative patients suffering from chronic obstructive airway disease, during excessive coughing, vomiting, and distension (13).So, early identification of imminent predictors of burst abdomen and doing simple routine laboratory investigations may help in reducing the occurrence of wound dehiscence (11, 12,14).

Postoperative complications like abdominal wound dehiscence are a serious concern around the world (15) which is a frequent disorder that are associated with poor clinical outcomes with increased remaining hospitalized and hospital mortality (16). Data from 56 countries showed that in 2004 the annual volume of major surgery was an estimated 187–281 million operations, or approximately one operation annually for every 25 human beings (17). However, a 3% perioperative adverse event rate and a 0.5% mortality rate have been happening globally, and almost seven million surgical patients suffered with significant complications each year (18). In industrialized countries the rate has been documented to occur in 3–22% of inpatient surgical procedures with a death rate 0.4–0.8% (19) and 5–10% in developing countries (20,21).

Post-operative complications like abdominal wound dehiscence is much higher in females than males, that 50% of them are expected to develop complication and also patients undergoing emergency surgery are more at risk to develop abdominal wound dehiscence as compared to patient of elective surgery (22).

Even if vertical midline incision, surgeries for peritonitis are the common causes of post laparotomy wound dehiscence, respiratory infections, anemia and hypoprotenemia are contributing factors and Improper hemostasis during surgery and poor surgical technique are the predisposing factors (23).Nearly half the adverse events following postoperative complications are considered as to be preventable (24) by doing appropriate surgical technique and wound care with sterile techniques (25) and also by improving the nutritional status of the patient, strict aseptic precautions and improving patients respiratory pathology to avoid postoperative cough (26).

However, as to the review of different literatures, there is no published data regarding the magnitude and factors associated with Abdominal Wound Dehiscence and Management outcome among patients who underwent abdominal surgery at the study area and as well as at national level. For that matter, the current study is aimed to assess the magnitude and factors associated with Abdominal Wound Dehiscence and Management outcome in study area. This will help the department to plan an appropriate policy or protocols to handle patients who are going to have an abdominal surgery to prevent its complication and this has its own contribution in the case of reducing morbidity and mortality related to post abdominal surgery. Also, it will have a benefit in the reviewing of the management approach for a patient who developed abdominal wound dehiscence at the institution as well as at a country level.

1.3 Significance of the Study

Frequent reports of wound dehiscence have been reporting in monthly department reports and reviews, though there are no published papers about the magnitude of the problem in our hospital. So this paper tries to identify the magnitude of the problem and associated factors with it. Therefore the findings of the research will help in identifying the magnitude and associated factors that might contribute in reducing morbidities and mortalities. From observation in SPHMMC, this problem does occur in some patients undergoing abdominal or pelvic surgical procedures.

However, literature review concerning data regarding to the above context, there couldn't be found a published data in the study area as well as in Ethiopia. Therefore the findings of this study will add information about the magnitude and associated factors for abdominal wound dehiscence among patients who underwent abdominal surgery in the study area and as well as at national level. This may serve as a clinical reference to surgeon's to use the findings of this study to offer comprehensive care to their postoperative patients by early identifying and handling possible associated factors with post operative abdominal wound dehiscence.

Furthermore this study will provide baseline data for the foundation of future surgical research in the area and might also help in influencing the development of appropriate protocols in the area of prevention of post operative abdominal wound dehiscence, management approach and intervention programs for the management of postoperative abdominal wound dehiscence in surgical services.

1.4. LITERATURE REVIEW

1.4.1 Magnitude of Abdominal Wound Dehiscence and associated factors

Abdominal wound dehiscence/burst abdomen is among the most dreaded complications faced by surgeons and of greatest concern because of risk of evisceration, the need for immediate intervention, and the possibility of repeat dehiscence, surgical wound infection (3, 27).

A prospective study was conducted with thirty three patients who developed wound dehiscence following various types of laparotomies in Osmania general hospital by having the aim to find out and record the etiological factors for Burst abdomen and its howed that the incidence is common during the 3rd to 6th decade and among 78.7% of males, 72.72% of patients with emergency laparotomies, 51.51%of patients with peritonitis and 48.48%of patients who underwent surgery more than 2.5 hours. Also, factors like having anemia (63.63%), hypoprotenemia (63.63%), post operative wound infection (72.72%) and respiratory infections (51.51%) were mentioned as major risk factors for abdominal wound dehiscence (23).

The clinical study of post operative abdominal wound dehiscence was conducted in Department of General Surgery at Sri Venkateswara Ramnarain Ruia Government General Hospital, Tirupatiamong 36 patients to determine the incidence and identify the risk factors involved in wound dehiscence in elective and emergency operations and itindicated that its incidence was more common in male patients around the age group of 45 year, patients with peritonitis due to duodenal and appendicular perforation, patients with contaminated and dirty wound, operated in emergency, and on those having anemia (Hb% < 10g%) and BMI more than 22 (26).

Cross-sectional study was conducted to find an association and prevalence of risk factors of wound dehiscence at surgical unit IV DHQ hospital among 430 patients who underwent exploratory laparotomy through vertical abdominal incisions with one or more risk factors showed that out of 430 patients, 35 patients had acute wound failure, 32 patients had the catastrophe happening in emergency laparotomies where as only 3 cases were noted in elective laparotomies ($P<0.001$). In addition, emergency laparotomies incidence was highest in cases of frank peritonitis ($P<0.001$) and among patients with dehisced cases, 29 patients undergoing emergency laparotomy had intra-abdominal sepsis as compared to only one patient of the sepsis in elective laparotomy group ($P < 0.001$). Also, patients with diabetes, steroid use, and advancing age were found as statistically significant risk factors only in cases of peritonitis and intra-abdominal sepsis (27).

The prospective cross sectional study was conducted in Bangalore Medical College and Research Institute, Karnataka, India to assess the prevalence of abdominal wound dehiscence with different risk factors and to identify the effective management of abdominal wound dehiscence among 60 patients presented with wound dehiscence after surgery by using elaborate clinical history concluded that male (76.67%) patients have a higher incidence of laparotomy wound dehiscence and in 5th decade (33.33%), also patients presenting with peritonitis secondary to hollow viscus perforation are more prone to abdominal wound dehiscence and most of the

patients can be managed with secondary suturing without the need of re exploration and repeated surgery (28).

1.4.2 Factors Associated With Abdominal Wound Dehiscence and Management out Come

Prospective observational study was done to highlight the risk factors for wound dehiscence and remedial measures among 930 patients who have developed abdomen wound dehiscence in MB Govt Hospital, RNT Medical College, Udaipur, India, showed that the overall incidence of abdominal wound dehiscence was 5.38% and that was more common in male (70%) patients in 4th to 5th decade (28%). With respect to clinical factors, patients with peritonitis due to duodenal perforation, complicated appendicitis, pyoperitoneum, intestinal obstruction, intra-abdominal infection, anemia (56%) and patients treated as emergency surgeries (92%) had higher incidence of wound dehiscence (29).

The another prospective study which was conducted in Gujarat, India among 50 Patients underwent routine and emergency laparotomies who developed abdominal wound dehiscence to assess the various pre and post operative risk factors and it showed that 5patients of them had developed complete disruption of abdominal wound and 45 (90%) cases had the dehiscence occurring in emergency procedures and it was highest in cases of midline incision, in emergency laparotomy group, GI perforation, poor nutritional status, anemia, post-operative cough were found significant as the risk factors. Also it is most common in age group of 31–40 years &post operative day of diagnosis of dehiscence is 7^{th}post op day. 22 of the patients were managed conservatively in the form of application of abdominal binder & 10 patients were managed by delayed suturing after subsidence of infection (30).

The retrospective cross sectional study was conducted among 3500 patients age over 75 years who underwent laparotomies in the department of surgery of Mesologgi General Hospital to evaluate the risk factors of wound dehiscence and determine which of them can be reverted showed that the overall prevalence of wound dehiscence was 0.43% with a mortality rate of 20% and tension free closure is preferable to reduce the tension of the abdominal wall (31).

The retrospective cross sectional study conducted to assess factors influencing wound dehiscence among 2761 patients in New Hyde Park, New York, USA showed that 31 abdominal fascial wound dehiscence occurred during a 5-year period (1%). Twenty-two specific local and systemic risk factors were analyzed and compared with the risk factors of a control group of 38 patients undergoing similar procedures without dehiscence. In third week after surgery the durability equals 20% of the initial strength, and after 6-12 weeks it reaches 70-80%. If the support system fails before the functional and structural integrity is regained, then the wound edges break apart. Many such factors like anemia, jaundice, uremia, diabetes, hypoalbuminemia, chronic obstructive pulmonary diseases, advanced malignancy, steroid use, obesity, wound infection,

peritonitis, old age >65, increased intra- abdominal pressure, hypertension, wound infection and also the experience of the surgeon have been defined (32, 33).

The study carried out to determine the frequency of wound dehiscence/burst abdomen in patients undergoing emergency and elective laparotomies through midline incisions and to identify the risk factors for wound dehiscence at department of General Surgery, Pakistan Institute of Medical Sciences, Islamabad among 117 showed that seven out of 117 (5.9%) patients developed wound dehiscence and five of them (4.2%) were operated in emergency and two (1.7%) were operated on elective list. The basic treatment principle for repair of the disrupted wound is re-suturing of wound edges which are to replace the eviscerated organs into the abdominal cavity and to prevent recurrent dehiscence and later development of ventral hernias. Critically ill patients are better served by conservative temporary measures and delayed operative closure (13).

2. OBJECTIVES

2.1 General Objective

The aim of the study is to determine the magnitude of abdominal wound dehiscence and describe patient and clinical factors related with Abdominal Wound Dehiscence and Management outcome of patients at St. Paul's Hospital Millennium Medical College, Addis Ababa, Ethiopia.

2.2. Specific Objectives

1. To determine the determine of Abdominal Wound Dehiscence
2. To identify socio demographic(patient) and clinical factors related with abdominal Wound dehiscence and management out come

3. MATERIALS AND METHODS

3.1 Study design and period

Institution based cross sectional study was conducted from May to June, 2018.

3.2. Study area

The study was conducted at SPHMMC, a tertiary teaching hospital. Which is located in the Northern part Gullale Sub-city, of Addis Ababa, and Ethiopia. St. Paul's hospital is the second big hospital in Addis Ababa which serves as a Referral center for patients from Addis Ababa and all over the country. The hospital serves as teaching and treatment center in Surgery, Internal Medicine, Gynecology and Obstetrics, Pediatrics and Child Health, ENT, Maxillofacial Surgery, Psychiatry, Ophthalmology, Pathology and Radiology. Department of Surgery is one of the major departments, divided in to outpatient department, in patient department and minor operating rooms. The inpatient department services include General surgery, urologic surgery, Neurosurgery, pediatric surgery, hepatobilliary, renal transplantation, plastic and reconstructive surgery, laparoscopic surgery, vascular surgery and orthopedics.

3.3 source and study population

3.3.1 Source Population

All patients who underwent abdominal surgery in the hospital

3.3.2 Study population

All patients who developed abdominal wound dehiscence after abdominal operation from September 2014 to September 2017 at St. Paul's Hospital millennium medical college department of surgery

3.4 Inclusion and Exclusion Criteria

3.4.1 Inclusion criteria

- All pediatrics and adults of either sex who have developed abdominal wound dehiscence during September 2014 to September 2017
- Patients who have undergone either emergency or elective abdominal operations and developed both partial or complete wound dehiscence during September 2014 to September 2017
- All patients who have developed wound dehiscence after the first surgery during September 2014 to September 2017
- All patients with complete records

3.4.2 Exclusion criteria

- All patients with wound dehiscence on sites other than the abdomen.

- All patients who have developed wound dehiscence after second surgery or 3rd surgery.
- All patients whose files with inconclusive documentation or missing.

3.5. Sample size determination and Sampling technique

Because of low and limited number of patients managed for this complication, so all cases with abdominal wound dehiscence which were registered during September 2014 to September 2017 at St. Paul's Hospital millennium medical college department of surgery were considered as a sample.

3.6 Study variables

3.6.1 Dependent variables

- Abdominal dehiscence

3.6.2 Independent variables

Socio demographic variables

- Age
- Sex

Clinical factors

- Symptoms at first presentation
- Urgency of operation
- Clinical co morbidities,
- HIV sero status
- Day of postoperative dehiscence
- Mode of management/ Type of abdominal incision
- Duration of hospital stay

3.7 Standard/Operational definitions

Dehiscence: from a Latin word, dehisce that means to gape which means splitting Open.

Wound dehiscence: means separation of the layers of a surgical incision.

Partial wound dehiscence: only the superficial layers or part of the tissue layers Reopen.

Complete wound dehiscence: all layers of the wound thickness are separated, revealing the underlying tissue and organs.

Laparotomy: means surgical incision made at any point of the abdomen to gain access to peritoneal cavity. (Definitions are from DOLARD'S illustrated medical dictionary).

Right Sub costal Incision (Kocher's) incision: this is sub costal incision for hepatobilliary surgeries

McBurney Incision: is transverse right lower abdominal incision for appendectomy surgeries

Mass closure: All the layers of the abdominal wall except the skin and subcutaneous tissue are closed in one layer

Layered closure: Closure of all the layers of the abdominal wall,(fascia, subcutaneous tissue and skin) layer by layer separately.

Retention suture: A heavy reinforcing suture placed deeply within the muscles and fascia of the abdominal wall to relieve tension on primary suture line and avoid postsurgical wound disruption.

Days of Hospitalization: Is a term to describe the duration of hospitalization, inpatient days are calculated by subtracting day of admission from day of discharge?

Mode of management: Is management method used either conservative or operative approach with respect to complication and outcomes.

Conservative management: is a form of daily dressings. Day by day healthy granulation tissue developed and the wound healed by secondary intention, or delayed suturing performed.

Management outcome: is defined as dead or alive after the second conservative or surgical management

3.8. Data collection procedures

3.8.1 Data collection materials

A structured written questionnaire was used to collect the data on socio-demographic characteristics (age, sex), Clinical factors (Symptoms at first presentation, Urgency of operation, Clinical co morbidities, HIV sero status, Day of postoperative dehiscence, Mode of management/ Type of abdominal incision, Duration of hospital stay) and information about the patterns and outcome of management by reviewing the charts of the patients.

3.8.2 Data processing and analysis

All questionnaires were checked for completeness and consistency of responses manually. After cleaning, data was entered in to SPSS versions 20 for analysis. Descriptive statistics (frequencies and percentages) was used to explain the study participant in relation to study variables. Texts, tables and charts used to display results. A frequency and crosstab descriptive analysis was used. Bivariate and multivariate analysis was used to determine the presences of

statistically significant associations between the independent variables and each types/patterns of abdominal wound dehiscence. The strength of the association was presented by odds ratio and 95% confidence interval. A p-value of< 0.05 on multivariate analyses was considered as statistically significant.

3.9 Ethical Consideration

Ethical clearance was obtained from IRB ethical review board of SPHMMC. To ensure confidentiality of respondents, their names were left out on the questionnaire and all the collected data were keeping only for this research work.

4. Result

4.1 Socio-demographic characteristics of the respondents

A total of 41 patients developed abdominal wound dehiscence during September 2014 to September 2017 among 4137 patients who were underwent abdominal laprotmy at SPHMMC department of Surgery. The mean age of these 41 patients with abdominal dehiscence was 29.8 (SD=1.21) years with 1year and 80 year of the lowest and oldest age respectively. Among the patients, the majority 21 (51.2%) were in age range of 41 and above years and 29 of the patients (70.7%) were male. (See Table 1)

Table1: Descriptions of Socio demographic factors among patients developed abdominal wound dehiscence during September 2014 to September 2017 at SPHMMC, Addis Ababa, Ethiopia.

Variables		Frequency	Percent (%)
Age	Below 41 years	20	48.8
	41 and above years	21	51.2
Sex	Male	29	70.7%
	Female	12	29.3%

4.2 Clinical characteristics of the patients

Regarding to clinical characteristics of the patients, the majority 37 (90.2 %) underwent emergency surgery, 21 (51.5%) of them had no any co-morbid illness but Anemia was a frequent preoperative co morbidity with a frequency of 24 % of those with clinical co morbidities, 28 (68.3%) of them were operated for Acute abd secondary to bowel obstruction, 36 (87.8%) of the incision were Vertical midline incision and 24 (58.5%) of them developed Wound Dehiscence within 6-10 days of postoperative. Regarding to the management related issues; 39 (95.2%) of them underwent re-laparatomy for the management of the wound dehiscence and 20 (48.8%) of them were treated with Tension suture during the 2nd operation of abdominal closure**.** (See Table 2).

Table 2: Description of clinical related factors among patients developed abdominal wound dehiscence during September 2014 to September 2017 at SPHMMC, Addis Ababa, Ethiopia.

Variables		Frequency	Percent (%)
Urgency of surgery	Elective	4	9.8%
	Emergency	37	90.2%
Co-morbid clinical illness	Anemia	10	24%

	Malnutrition	4	9.8%
	Pulmonary diseases	2	4.9%
	Malignancy	4	9.8%
	No co-morbid illness	21	51,5%
Indication for surgery	Acute abdomen secondary to penetrating abd. injury	4	9.8 %
	Acute abdomen secondary to Bowel Obstruction	28	68.3 %
	Acute abdomen secondary to appendicial Abscess	2	4.9 %
	pud perforation	3	7.3 %
	elective operation	4	9.8 %
Type of incision	Vertical midline	36	87.8 %
	Transverse right sub costal	4	9.8 %
	Transverse right lower abd.	1	2.4 %
Post operative day of Wound Dehiscence	0-5	13	31.7%
	6-10	24	58.5%
	11-15	4	9.8%
Mode of management	Relaprotomy	39	95.2%
	Conservative	2	4.8%
Abdominal closure in the 2nd operation	Mass closure	10	24.4%
	Tension suture	20	48.8%
	Layered closure	9	22%
	Conservative management	2	4.8%

4.3 Magnitude of abdominal wound dehiscence among patients who were operated during September 2014 to September 2017 at SPHMMC

A total of 41 patients developed abdominal wound dehiscence during September 2014 to September 2017 among 4137 patients who were underwent abdominal laprotmy at SPHMMC department of Surgery. This study revealed that the overall magnitude of abdominal wound dehiscence was 0.99% (41/4137) among these, partial wound dehiscence and complete wound dehiscence was 4.9% (CI 0, 12.2) and 95.1% (CI 87.8-100.0) respectively. (Fig.1)

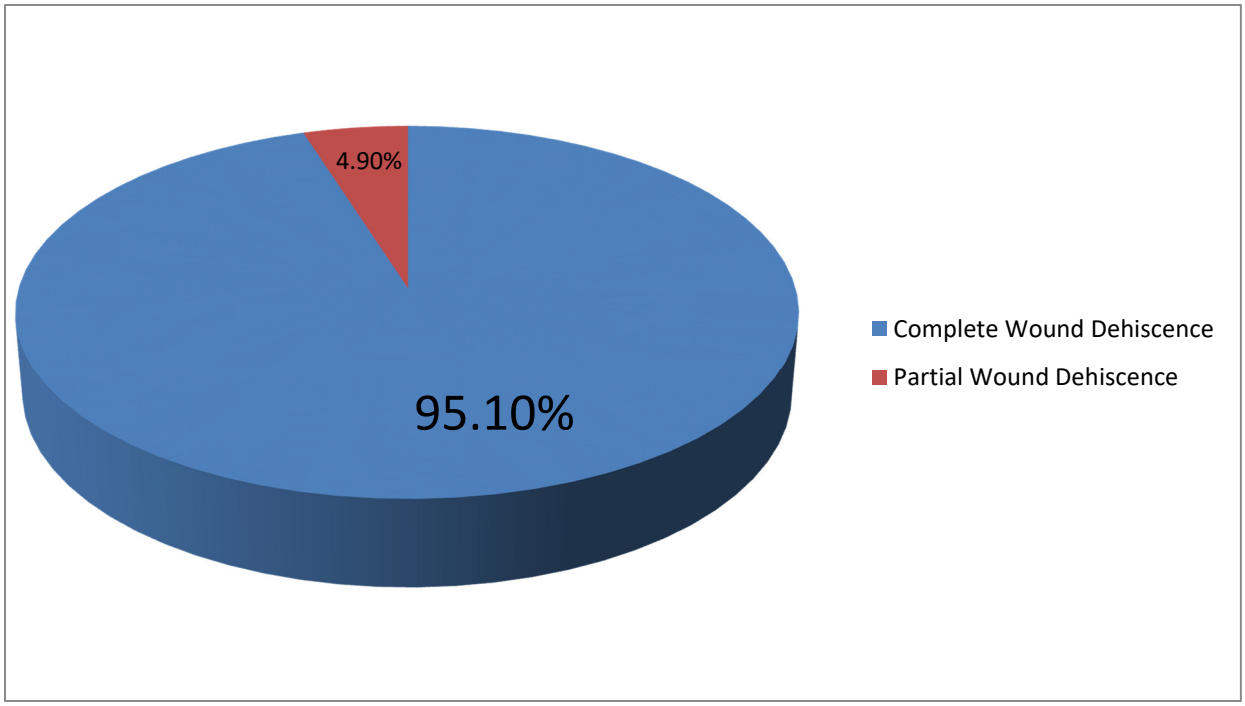

Figure1. Magnitude of specific types of abdominal wound dehiscence among patients who developed abdominal wound dehiscence during September 2014 to September 2017

4.4 Management outcome among patients who developed abdominal wound dehiscence

The current study showed that the 37 (90.2% of the patients were alive and discharged to home after the second management, however 4 (9.8%) of patients were dead within the institution after the second management. (Fig.2)

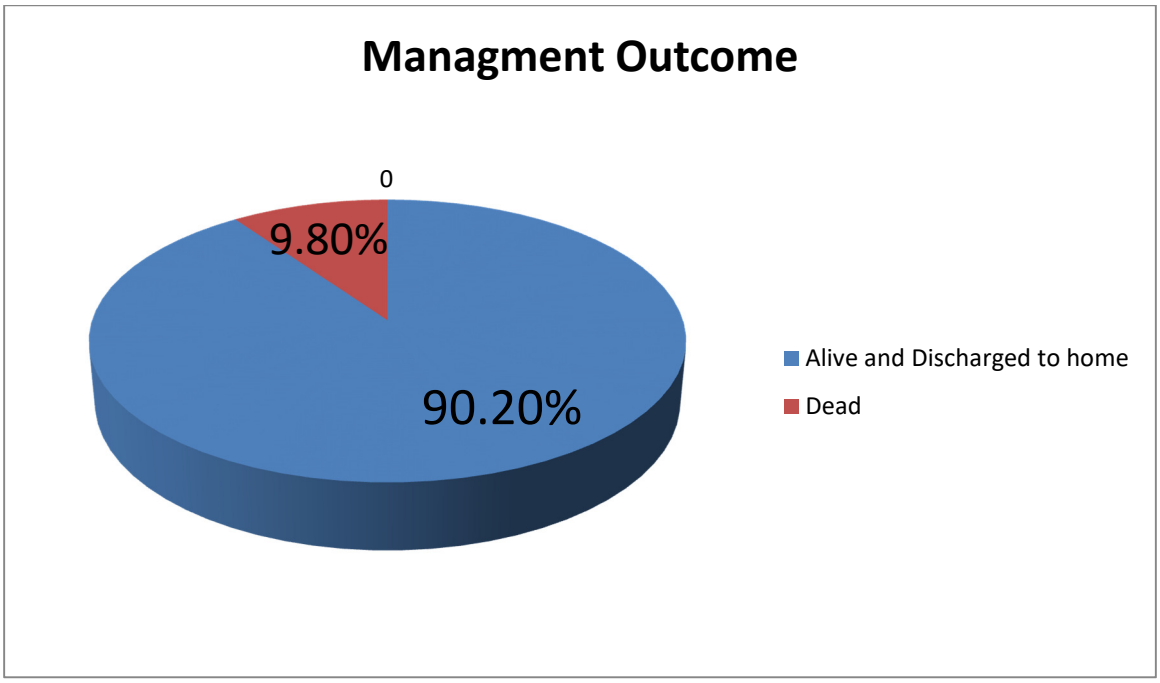

Figure 2. Management outcome of patients who underwent 2nd abdominal operation for the case of abdominal wound dehiscence during September 2014 to September 2017

4.5 Factors associated with abdominal wound dehiscence and management outcome

For each explanatory variable, bivariate analysis was done and socio-demographic factors such as age (those 41 years and above with p-value=0.004) and sex (female, p-value = 0.004), and clinical factors such as absence of co-morbid illness (p-value= 0.03) and mass closure (p-value= 0.037) were variables fulfilled the minimum requirement (p-value < 0.05 significance level) for abdominal wound dehiscence and factors such as sex (female, p-value= 0.000), absence of co-morbid illness (p-value= 0.002), getting conservative management during the first and second management (p-value= 0.00 and 0.037 respectively) were variables fulfilled the minimum requirement (p-value < 0.05 significance level) for management outcome for further multivariate logistic analysis.

However, during the multivariate analysis there were no factors/independent variables had statistically significant associated with the dependent variable that are abdominal wound dehiscence pattern and management outcome. So, for that matter I did the crosstab frequency analysis as shown at subtopic 4.5.1 and 4.5.2.

4.5.1 Factors related with abdominal wound dehiscence

For the outcome variable of abdominal wound dehiscence crosstab descriptive analysis was done and regarding socio-demographic factors those who were male (70.73%) and those whose age was 41 and above years (51.22%) developed abdominal wound dehiscence. Regarding to clinical factors, the majority of the wound dehiscence were relatively occurred among those who were operated for emergency case (90.24%), who had anemia as a clinical co-morbid illness (50 %), those operated for acute abdomen secondary to bowel obstruction during the 1st surgery (68.3%) and those who underwent vertical midline incision (87.80%). Also, 58.53% of the wound dehiscence occurred within 6-10th of post operative days. (SEE TABLE 3)

4.5.2 Factors related with management outcome of abdominal wound dehiscence

For the outcome variable of management outcome, crosstab descriptive analysis was done and with respect to socio-demographic factors those who were female (16.67% of them or 50% of all deaths) and those their age was 41 and above years (19.04% of or 100% of all deaths); regarding to clinical factors like urgency of surgery those who were operated for emergency case (10.81% of them or 100% of all deaths), who had pulmonary disease as a clinical co-morbid illness (50 % of them or 25% of all deaths) among those who had co-morbid illness. Those operated for acute abdomen secondary to appendicial abscess during the 1st surgery (50% of them or 25% of all deaths), those who underwent vertical midline incision (11.11% of them or 100% of all deaths), those who had re-laparatomy during the 2nd surgery (10.25% of them or 100% of all deaths) and those who had Tension suture of abdominal closure during 2nd surgery (15% 0f them or 75% of all deaths) had poor management outcome (dead).

Table 3 Factors related with abdominal wound dehiscence and management outcome among patients developed abdominal wound dehiscence during September 2014 to September 2017 at SPHMMC, Addis Ababa, Ethiopia.

Explanatory Variables	Frequency of abdominal wound dehiscence	Frequency (%) of Management Outcome	
		Alive and Discharged	Dead
Age			
Below 41 years	20	20 (48.8%)	0
41 and above years	21	17 (41.5%)	4 (9.7%)
Sex			

Male	29	27 (65.8%)	2 (4.9%)
Female	12	10 (24.4%)	2 (4.9%)
Urgency of surgery			
Elective	4	4 (9.7%)	0
Emergency	37	33 (8.5%)	4 (9.7%)
Co-morbid clinical illness			
Anemia	10	9 (21.9%)	1(2.4%)
Malnutrition	4	3 (7.3%)	1(2.4%)
Pulmonary diseases	2	1 (2.4%)	1(2.4%)
Malignancy	4	4 (9.7%)	0
No co-morbid illness	21	20 (48.8%)	1(2.4%)
Indication for the 1st surgery			
Acute abdomen secondary to penetratingabd. Injury	4	4(9.7%)	0
Acute abdomen secondary to SBO	13	11(26.8%)	2 (4.9%)
Acute abdomen secondary to LBO	15	14 (34.1%)	1(2.4%)
Acute abdomen secondary to appendicial Abscess	2	1(2.4%)	1(2.4%)
pud perforation	3	3 (7.3%)	0
elective operation	4	4(9.7%)	0
Type of incision in the 1st operation			
Vertical midline	36	32 (78.0%)	4(9.7%)
Transverse right sub costal	4	4(9.7%)	0
Transverse right lower abd.	1	1(2.4%)	0
Post operative day of Wound Dehiscence			
0-5	13	11 (26.8%)	2(4.9%)
6-10	24	23 (56.1%)	1(2.4%)
11-15	4	3(7.3%)	1(2.4%)
Mode of management in the 2nd operation			
Relaprotomy	39	35 (85.4%)	4(9.7%)
Conservative	2	2(4.9%)	0
Abdominal closure in the 2nd operation			

Mass closure	10	10 (24.4%)	0
Tension suture	20	17 (41.5%)	3 (7.3%)
Layered closure	9	8 (19.5%)	1(2.4%)
Conservative	2	2 (4.9%)	0

Table 4 Factors associated with abdominal wound dehiscence and management outcome among patients developed abdominal wound dehiscence during September 2014 to September 2017 at SPHMMC, Addis Ababa, Ethiopia.

Explanatory Variables	Frequency of Abdominal wound dehiscence	P=value (for **abdominal wound dehiscence**) (bi-variate VS multivariate)	P= value (for **management outcome**) (bi-variate VS multivariate)
Age			
Below 41 years	20	.972 VS 1	.998 VS 1
41 and above years	21	**.004*** VS .999	.998 VS .999
Sex			
Male	29	.522 VS 1	.352 VS 1
Female	12	**.022*** VS .529	**.000* VS** .999
Urgency of surgery			
Elective	4	.999 VS 1	.999 VS 1
Emergency	37	.999 VS .999	.999 VS 1.000
Co-morbid clinical illness			
Anemia	10	.587 VS .983	.999 VS .998
Malnutrition	4	.999 VS .529	.401 VS 1.000
Pulmonary diseases	2	.999 VS .999	.159 VS 1.000
Malignancy	4	.999 VS 1.000	.999 VS 1.000
No co-morbid illness	21	**.003* VS** .999	**.002* VS** .998
Indication for the 1st surgery			
Acute abdomen secondary to penetrating abd. Injury	4	1.000 VS .999	.999 VS 1.000

Acute abdomen secondary to bowel obstruction	28	.999 VS 1.000	.999 VS .999
Acute abdomen secondary to appendicial Abscess	2	1.000 VS 1.000	1.000 VS .999
pud perforation	3	1.000 VS 1.000	1.000 VS 1.000
elective operation	4	1.000 VS 1.000	.999 VS .999
Type of incision in the 1st operation			
Vertical midline	36	1.000 VS	.998 VS 1.000
Transverse right sub costal	4	1.000 VS	.998 VS 1.000
Transverse right lower abd.	1	1.000 VS	1.00 VS 1.000
Post operative day of Wound Dehiscence			
0-5	13	.999 VS 1.000	.662 VS .999
6-10	24	.999 VS .999	.186 VS 1.000
11-15	4	.999 VS 1.000	.341 VS 1.000
Mode of management in the 2nd operation			
Relaprotomy	39	.999 VS .999	.999 VS 1.000
Conservative	2	.999 VS 1	**.00*** VS .999
Abdominal closure in the 2nd operation			
Mass closure	10	**.037 VS** .999	.960 VS 1.000
Tension suture	20	.999 VS .999	.999 VS 1.000
Layered closure	9	.774 VS .999	.774 VS 1.000
Conservative	2	.960 VS 1	**.037*** VS .999

Note; * Significant association (p-value < 0.05 in bivariate analysis)

5. Discussion

5.1 Magnitude Abdominal Wound Dehiscence

The current study revealed that the overall magnitude of Abdominal Wound Dehiscence at study area was 0.99% and among this, 4.9% and 95.1% were partial wound dehiscence and complete wound dehiscence respectively. The current study's finding was similar with the studies carried out in New York, USA 1% (35), but it was slightly higher than the study done in Mesologgi General Hospital 0.43% (32).

On the other hand, the current study finding is lower than the studies done in Siddhartha Medical College, in Pakistan Institute of Medical Sciences, Islamabad 5.9% (14), in RNT Medical College, Udaipur, India 5.38% (29) and in Gujarat, India 10% (30).

Table 5; comparison of magnitude of the current finding with other finding

Author	Sample size	Wound dehiscence (%)
Riou J, et al (32)	2761	1%
Gabrie¨lle H, et al(30)	930	5.38%
Spiliotis J, et al (32)	3500	0.43%
Our study	4137	0.99%

The variation might be due to the difference in sample size which was 930 in Udaipur India (30) and 3500 patients in Mesologgi General Hospital (32). The other reason might be also due to the difference on the study population that those who were above 70 years old patients with the mean age was 69.5 years were included in the sample in Mesologgi General Hospital (32).

With respect to the management outcome of the second surgery, the current study showed that 9.8% of patients were dead within the institution after the second operation, which is lower than the studies conducted in Mesologgi General Hospital 20% (32), 45% in Pakistan (13) and 39.3% in WiadLek (6). The reason might be due to the difference sample size and difference in sociodemographic characteristics of the patients.

Table 6; comparison of management outcome the current finding with other finding

Author	Sample size	Death rate (%)
Waqer.S, et al (13)	117	45%
Anielski R, et al (6)	61	39.3%
Spiliotis J, et al (32)	3500	20%
Our study	4137	9.8%

Regarding to the specific factors, the current study showed that some of the variables were significantly related to Abdominal Wound Dehiscence and Management outcome. With respect to gender, 70.73% of the cases happened among males. This result is in line with the studies conducted in osmania which shows78.7% among males (22), 76.67% in India (29) and70%in UdaipuIndia (30).

Those patients who were 41 and above years were more likely to develop abdominal wound dehiscence with the frequency 51.22%, which is similar finding with the studies conducted in Tirupati that abdominal wound dehiscence is more common in patients around the age group of 45 year (25), in DHQ hospital those who were in advancing age (28), in Karnataka India those who were 5thdecade (29), in Udaipur India those who were 4th to 5th decade (30) and in Vijayawada among those more than 50 years of old (26). However, that was in contrast with the study conducted in India that abdominal wound dehiscence is most common in age group of 31–40 years (31).

Table 7; Comparison of age and sex distribution in between different researches

Authors	**Risk Age groups**	Sex	Result
G. Lakshmi, et al (22)	3rd to 6th decade	Male	78.8%
Gabrie¨lle H, et al (30)	4th to 5th decade (28%)	Male	76.67%
P. Nancharaiah, et al (26)	More than 50 years (26.67%)		
Our study	41 and above years (51.22%)	Male	70.73%

Regarding to clinical factors, those who were operated for emergency case (90.24%), those who had anemia as a clinical co-morbid illness (50 %) among those who had co-morbid illness, those operated for acute abdomen secondary to bowel obstruction during the 1st surgery (68.3%) and those who underwent vertical midline incision (87.80%) were more likely to developed abdominal wound dehiscence than the other groups of patients. The current finding was similar with the studies conducted in Osmania general hospital that showed 72.72% of emergency laparotomies, 51.51%of patients with peritonitis and 63.63%) of patients who had anemia (22); in Tirupati,patients operated in emergency and patients with anemia (25); in Udaipur, India 56% of patients with anemia and 92% of patients treated as emergency surgeries (30); in Gujarat India patients with of midline incision, in emergency laparotomy group, GI perforation (31) and 43.33% of patients who had anemia were more likely to develop abdominal wound dehiscence in Vijayawada (25).

In the current study 58.53% of the abdominal wound dehiscence occurred within 6-10 days of post operative course. The result is in line with the studies conducted in Gujarat India (31) the majority of the wound dehiscence has occurred at 7thpost operative day and it most commonly occurs from 5th to 8thpost operative day in WiadLek (6).

Table 8; Comparison of clinical factors associated with abdominal wound dehiscence in between different researches

Authors	Associated factor	Result
G. Lakshmi, et al (22)	emergency laparotomies,	72.72%
	Peritonitis	51.51%
	Anemia	63%)
Gabrie¨lle H, et al (30)	anemia	56%
	emergency surgeries	92%
P. Nancharaiah, et al (35)	Anemia	43.33%
Our study	emergency case	90.24%),
	Anemia	50%
	operated for acute abdomen secondary to peritonitis secondary to LBO during the 1st surgery	36.59%
	vertical midline incision	87.80%

With respect to patient and clinical factors related with management outcome; those who were female (16.67%) and in the age group of 41 and above years (9.4%) were more likely to poor management outcome (dead) after the second management. The current study result is similar with the other studies conducted in Faisalabad (32) which stated that mortality rate associated with wound dehiscence is reported as high in elderly patients.

Table 9; Comparison of age distribution in between different researches regarding the management outcome

Authors	Risk Age groups	Result/died
Afzal S, et al (32)	More than 65 years	5%
Our study	41 and above years	9.4%

Regarding to clinical factors like urgency of surgery, those patients who were operated for emergency case (10.81%), who had pulmonary disease as a clinical co-morbid illness (50 %), those operated for acute abdomen secondary to appendical absence during the 1st surgery (50%), those who were underwent vertical midline incision (11.11%), those who had re-laparatomy during the 2nd surgery (10.25%) and those who had Tension suture of abdominal closure during 2nd surgery (15%) had poor management outcome (dead). The current study finding is supported by the other study finding like the study done in Osmania general hospital showed that 72.72% of patients with emergency laparotomies, 51.51%of patients with peritonitis, 63.63% of patients with anemia and 51.51% of patients with respiratory infections (22); in India patients with complicated appendicitis, anemia (56%) and patients treated as emergency surgeries (92%) (30) and also the study conducted in Vijayawada showed that patients anemia (43.33%) and

pulmonary disease (23.33%)had highly significant factor for wound dehiscence related mortality (25).

In addition the current study also tried to assess the post operative day of mortality and the current study result showed that 25% of all deaths happened within 11-15 days of post operative after the second surgery.

Summary of the current findings; as the findings discussed above showed that the magnitude of Abdominal wound dehiscence at the current study area is high as compared to some studies. During the bivariate analysis, socio-demographic factors such as age (those 41 years and above with p-value=0.004) and sex (female, p-value = 0.004), and clinical factors such as absence of co-morbid illness (p-value= 0.03) and mass closure (p-value= 0.037) were variables fulfilled the minimum requirement (p-value < 0.05 significance level) for abdominal wound dehiscence and factors such as sex (female, p-value= 0.000), absence of co-morbid illness (p-value= 0.002), getting conservative management during the first and second management (p-value= 0.00 and 0.037 respectively) were variables fulfilled the minimum requirement (p-value < 0.05 significance level) for management outcome for further multivariate logistic analysis. However, during the multivariate analysis there were no factors/independent variables had statistically significant associated with the dependent variable that are abdominal wound dehiscence pattern and management outcome. While, the crosstab frequency analysis indicated that, the majority of the factors related with AWD and OM were gender, age, operated for emergency case, having anemia as a co-morbid illness, operated for acute abdomen secondary to bowel obstruction during the 1st surgery, operated for acute abdomen secondary to appendicial abscess during the 1st surgery and vertical midline incision.

6. Conclusion and Recommendation

6.1 Conclusion

The current study revealed that the overall magnitude of Abdominal Wound Dehiscence at study area was 0.99% and among this, 4.9% and 95.1% were partial wound dehiscence and complete wound dehiscence respectively. Regarding the management outcome, 9.8% of patients were died within the institution after the second operation which is high mortality rate. Abdominal Wound Dehiscence (AWD) and management outcome (MO) had significantly related with gender (male for AWD, and female for MO), age (41 and above years), operated for emergency case, anemia, operated for acute abdomen secondary to bowel obstruction during the 1st surgery (for AWD), operated for acute abdomen secondary to appendicial abscess during the 1st surgery (for MO) and vertical midline incision (for MO).

6.2 Recommendations

To Department of Surgery at SPHMMC

Since the magnitude of abdominal wound dehiscence is high according the current findings, so the department or surgeons who are working at the department should give more emphasis or attention on the following recommendation as mentioned below;

- Those patients with the age groups of 41 and above years who come for abdominal operation should be given more emphasis to prevent AWD,
- Those patients operated for emergency case, acute abdomen secondary to peritonitis, secondary to bowel obstruction during the 1st surgery have strict evaluation and pre operation preparations and strictly followed to prevent for further complication
- Nutritional status of the patients should be assess before any abdominal operation to early identify anemia,
- Appropriate management approach/special attention should be given by senior surgeons for those operated for acute abdomen secondary to appendicial abscess during the 1st surgery and having vertical midline incision to prevent post operative mortality

To researchers;

- To conduct case control studies to for such rare case it will help investigate the cause effect relationship between the risk factors and abdominal wound dehiscence by including other institution.

7. Strength and limitation of the study

7.1 Limitation of the study

Among the limitations of this study, the fact related to the cross-sectional design used, which simultaneously evaluate variables of the effect of interest and their associated factors, should be emphasized. Thus, it could not possible to identify the possible risk factors.

Reviewing only the 41 cases with abdominal dehiscence

May not reflect the burden of this dreaded postoperative complication in the hospital, most of patients who were managed none operatively in the word were not documented on the registration OR / Nursing log books.

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AnnexI: **QUESTIONNAIRE**

A three-year retrospective study on, associated risks, management outcome of Abdominal wound dehiscence in SPHMMC (September 2014 –September 2017)

1. **Socio-demographic factors**

- MRN : _____

- 1 - Gender (sex) : male: _____ Female : _____
- 2- Age(inyears)……

2. **Clinical factors**

1. ----Urgency of initial surgery.

Emergency	Yes	No
Elective	Yes	No

2. ---- Clinical Cormobodities:

A. Anemia (hemoglobin)
B. Uremia
C. Diabetes Mellitus
D. Jaundice / liver disease
E. Malignancies
F. Radiotherapy
G. Steroid therapy
H. Cytotoxic
I. Chest infection
J. Other specify……

3.Human Immunodeficiency Virus (HIV) serostatus

A. sero negative
B. sero positive
C. not tested

4. ---Indication of first surgery (specify)……

5-------Types of Incisions

A. Vertical midline
B. Transverse right sub costal
C. Transverse right lower abd.

D. Other specify----------

6..Post operative day of Wound Dehiscence mention in day----------

7. Mode of management in the 2nd operation

A. Relaprotomy

B. Conservative

8.Type of Abdominal closure in the 2nd operation

A. Mass closure

B. Tension suture

C. Layered closure

D. Conservative

9. Symptoms at first presentation.

A. Fever
B. Abdominal
C. Cough
D. Vomiting

10 Physical findings:

A. Temperature (febrile)
B. Tachycardia (pulse)
C. Wt loss / wasting
D. Dehydration
E. Abdominal Distension
F. Abdominal Masses

11. Types Wound Dehiscence ----------

A. Partial Wound Dehiscence

B. Complete Wound Dehiscence

12. Outcome of the management (with perspective of patient status)

A. alive and discharged to home

B. dead