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Original Research Article

A Study to Investigate the Possible Root Causes of Abdominal Wound Dehiscence

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Abstract

Background: The most infamous complication seen following abdominal surgery is unquestionably abdominal wound dehiscence. In order to understand the factors influencing the disruption and incidence of abdominal wound dehiscence in various types of incisions, this study was conducted on 35 patients with abdominal wound dehiscence who were admitted and treated in the general surgery department at PIMS hospital.

Methods: The study comprised 35 individuals who had abdominal wound dehiscence or bowel protrusion following any abdominal incisions for either emergency or elective abdominal procedures.

Results: Age groups between 41 and 60 years saw the highest abdominal wound dehiscence (34%), followed by more than 60 years with 28 %, 21 to 40 years (22%) and least in less than 20 years patients (14%). It was discovered that men (65%) were more affected than women (35%). Compared to elective procedures (43%), emergency surgeries (57%) had a higher prevalence of it. The most prevalent condition linked to wound dehiscence was appendicitis (31%), followed by cholelithiasis (29%), intestinal obstruction (12%) and ileal perforation (12%). The most frequent incision linked with wound dehiscence was vertical midline (57%) followed by Kocher's incision (29%) and Mcburney's incision (12%).

Conclusions: Anaemia, malnutrition, obesity, diabetes mellitus, coughing, and surgery factors such as type of surgery (elective/emergency), underlying condition, type of incision, type of closure, suturing material, and suturing procedure all play significant roles in the development of wound dehiscence.

Keywords: Wound dehiscence, Abdominal surgeries,

Introduction

Easily the most well-known complication seen following abdominal surgery is abdominal wound dehiscence. Both the patient and the attending physician find it upsetting. Abdominal wound dehiscence significantly raises the price of medical care for patients and hospitals alike. Its death rates ranged between 15% and 45%. In all laparotomies, the incidence ranges from 0.4% to 3.5% [1-3].

However, according to data from our country, the overall rate of abdominal ruptures was between 4.8% and 6.6%. Laparotomy wound disruption, or abdominal wound dehiscence, typically happens between days 5 and 8 after surgery.

An abdominal wound's ability to heal completely or partially can be disrupted, and the abdominal contents may protrude or not. Separation of the facial margins without evisceration and occasionally fibrin-coated intestinal loops are characteristics of partial wound dehiscence. Full separation of the fascia and skin, along with the evisceration of the intestinal loops, is referred to as complete wound dehiscence [1].

A number of things can cause a wound to dehisce. These are divided into two categories: patient- and operation-related. Dehiscence has been connected to patient-related characteristics like age, sex, obesity, malnutrition, systemic disease, post-operative cough, and BMI 20 and >25 [2-4].

Wound dehiscence has been connected to surgery-related parameters like the surgical indication (elective vs. emergency), underlying abdominal disease, kind of suture used, style of incision, and abdominal closure technique. For such difficulties to be avoided, a thorough understanding of these risk factors is essential [4].

The purpose of this study was to clarify the variables influencing abdominal wound dehiscence.

Methodology

This prospective study involved 35 patients with abdominal wound dehiscence who were treated in general surgery department, PIMS, Udaipur. The institutional ethical committees of our hospital gave the approval to this study protocol. All of the patients who were enrolled signed informed consent forms and detailed proforma was filled.

Inclusion standards

The study included all patients aged > 18 years of either sexe who had abdominal wound dehiscence or bowel protrusion following any abdominal incisions for either emergency or elective abdominal procedures.

Exclusion standards

The study excluded all patients who had wound dehiscence after re-exploration surgery, wound dehiscence on sites other than the abdomen, wound dehiscence in female patients who had undergone any gynaecological procedures, and wound dehiscence in patients who were younger than 18 years old.

Up until the patient is discharged from the hospital, a thorough analysis of these cases is done, taking into account the date of admission, clinical history, mode of presentation, important risk factors, investigations, time of operation, kind of surgery, and post-operative day of wound dehiscence.

Details about symptoms, duration, accompanying disorders, and important risk factors such anaemia, malnutrition, obesity, chronic coughing, smoking, and drunkenness were recorded in the past. Clinical diagnosis information was noted, along with the type of incision made and whether the surgery was performed as an emergency or on an elective basis.

Results

The most prevalent age range for abdominal wound dehiscence was reported to be 41–60 years were 34%, patients with age more than 60 years were 28 years and with age 21–40 years as 22 %. It was discovered that men (65%) were more affected than women (35%).

Table 1: Presence of wound dehiscence in different age group.

Age group	No. of Cases	Percentage	Male		Female	
			Number	%	Number	%
< 20 Years	5	14	2	6	3	9
21-40 Years	10	22	6	17	2	6
41-60years	10	34	8	22	4	11
>60 Years	13	28	7	20	3	9
Total	35	100	23	65	12	35

In the study, it was discovered that wound dehiscence occurred more frequently during emergency procedures (57%) than during elective surgeries (43%). (Table 2)

Table 2: Presence of wound dehiscence in different type of surgeries

Type of surgery	No. of Patients	Percentage (%)
Elective	15	43
Emergency	20	57
Total	35	100

In the analysis, appendicitis (31 %), cholelithiasis (29 %), Intestinal obstruction (8 %) and ileal perforation (8 %) were the most prevalent diseases linked with wound dehiscence.(Table 3)

Table 3: Presence of wound dehiscence in different surgical procedures

Type of surgery	Patient No.	Percentage (%)
Appendicitis	12	31
Cholelithiasis	10	29
Illeal Perforations	3	8
Gall stone ileus	2	6
Abdominal TB	2	6
Carcinoma Stomach	2	6
Carcinoma Rectum	2	6
Intestinal obstruction	3	8
Total	35	100

The analysis on the type of incision revealed that Kocher's incision (29 %) and McBurney's incision (12%) were the next most frequent types of incisions connected to wound dehiscence after vertical midline (57 %). (Table 4).

Table 4: Distribution of wound dehiscence patients according to type of incision

Type of incision	No. pf patients	Percentage
Vertical midline	20	57
Kochers incision	10	29
Mcburneys incision	4	12
Roof top incision	1	2
Total	35	100

Discussion

Acute wound failure is sometimes called evisceration, burst abdomen, wound disruption, and wound dehiscence. There is a very high fatality rate associated with this

very dangerous abdominal surgical complication. It is a multifaceted issue. Studies done in the West indicated a prevalence of 0.4 to 3.5% [5].

There were 35 total patients included in our study, with 23 male patients and 12 female patient. The higher prevalence of intestinal blockage, peptic ulcer perforation, and cancers in the male sex was likely the cause of the male preponderance. The majority of the patients in our study were between the ages of 41 and 60. In the current investigation, wound dehiscence was discovered in the younger age group due to the prevalence of intestinal obstruction and perforation in this age group. The majority of patients who underwent laparotomies had malignancy and diverticular disease. Spiliotis J *et al* (2009) found that the incidence of abdominal wound dehiscence was higher in males (60%) and had a mean age of 69.5 years. Of the 15 out of 3500 patients who experienced wound dehiscence, 9 (60%) underwent emergency laparotomies [6].

In the study, patients with emergency laparotomies had wound dehiscences. Improper pre-operative planning was found to increase the risk of wound dehiscence. Due to the course of severe disease, delayed presentation, etc., the emergency conditions themselves are harmful. The majority of patients already had problems such septicemia and fluid and electrolyte imbalances [7].

In the emergency group, a high prevalence of burst is most likely explained by this. Patients with perforative peritonitis are frequently treated with conservative measures in rural hospitals and nursing homes (antibiotics and even steroids). In these situations, laparotomy reveals severe necrosis of the aponeurotic layers of the abdomen. Such necrotic Linea Alba does not retain sutures properly since they break when you cough or sneeze. According to a study by Hermosa JI *et al*. (2005), wound dehiscence was more frequent during emergency procedures [8,9].

In our study had a laparotomy through a midline incision. The medial portion of the rectus abdominal muscle becomes denervated and eventually atrophies if the incision is made slightly farther laterally, leading to a weak area in the wall and a ruptured abdomen. This is the justification for staying within the midline. According to a study by Sinha A. *et al*.(2015), midline incisions that required emergency laparotomies had the highest rate of observed wound dehiscence. The study done by Khan MN-S *et al*. (2004) also reported similar results [10.11].

According to Bailey, the eighth post-operative day is when the largest incidence is discovered. The majority of cases in the current study occurred between the sixth and tenth post-operative days, with the highest number occurring on the seventh post-operative day. Typically, stitches are removed seven or eight days after surgery. Until then, the incident frequently goes unnoticed. The rupture is visible once the stitches have been taken out. This explains why ruptured abdomen is most common on the seventh post-operative day. Once the drugs are stopped, there may be a recurrence of the infection, which could lead to a burst abdomen later on [9].

Patients who have undergone major abdominal surgery remain in bed for four or five days while receiving intravenous infusions. They start to move and try to pass stools after that. Intra-abdominal pressure is raised by all of this. Additionally, the ability to keep things together gets progressively worse until, after 10 days, stitches are hardly useful.

Peritonitis affected 12% of the study's participants. In patients with peritonitis, the colon is oedematous, the tissues are brittle from infections, and the suture line experiences higher tension during the closure

of the abdominal wall. Intestinal infection and colon surgery were cited by Graham DJ *et al*. (1998) as the two main causes of wound dehiscence [12].

In present study, 22% of the patients had haemoglobin levels under 10 g/dL. Anaemia makes the heart work harder and reduces the blood's ability to deliver oxygen. Additionally, it establishes the need for a post-operative ventilator, which in turn raises intra-abdominal pressure and tension on the suture line and causes the development of wound dehiscence. According to Simon JS *et al* (2000), patients who undergo surgery with preoperative haemoglobin levels less than 8g/dl and no transfusion experience significantly higher rates of mortality and morbidity.. In comparison to non-diabetics (1.9%), diabetics (7.6%) have more burst [13,14].

Compared to 18% of patients who underwent mass closure in present study, 82% of patients got multilayer closure. Poole GV *et al* (1984) proposed that flowing nylon sutures would be a better way of closure in clean incised wounds for midline abdominal facial wounds. T. P. N. Jenkins (1976) recommends using sutures for the mass closure approach that are at least four times longer than the length of the incision (suture length: wound length 4:1). The incidence of wound dehiscence was lower with the mass closure technique in all reported series when comparisons between layered and mass closure procedures were made. For ten patients, negative pressure wound treatment was used. VAC is a cutting-edge strategy for managing wound healing. By accelerating cellular proliferation and angiogenesis in the wound, mechanical stress is able to encourage the formation of granulation tissue. Underlying tissue may be mechanically eroded by the suction tubing's mechanical pressure, and the skin just beneath the VAC may macerate. Open drainage is permitted in 18-21 VAC, which continuously absorbs exudate. Additionally, VAC therapy minimises surgical trauma while providing a mass filling effect and an approximated wound edge without creating a new wound (e.g., abdominal wound in omental flap) [15,16].

A 2014 study by Yoon Song Ko *et al*. on 207 patients with post-laparotomy wound dehiscence found that the failure rates for vacuum-assisted closure and conventional treatment, respectively, were 0% and 14.3% (P = 0.002). 13 patients had meshplasty for wound dehiscence. Similar to Abbott DE *et al* (2007) study.'s observed primary closure from 2007 is connected to a disproportionately high rate of recurrent wound dehiscence.

Although closure using polyglactin mesh interposition has a greater first success rate, the abdominal wall defect must be repaired through future procedures. The mortality rate after an abdominal explosion varies greatly among the reported studies. Wolff claimed it to be as low as 11% and Hartzell W (1950) to be as high as 40%, and Winfield Hampton (1963) noted the death rate to be 23% in 1963. 23-24 The mortality rate in the current study was 10%. [17-20].

Conclusion

An very hazardous consequence of poor wound healing is burst abdomen. This serious complication may be predisposed by a number of variables. The risk of wound dehiscence is exacerbated by preoperative conditions such anaemia, malnutrition, obesity, and elevated abdominal pressure (chronic cough, postoperative ventilatory support, postoperative abdominal distention, etc.). Diabetes mellitus is a significant factor in the growth of wound infection and, in turn, the growth of wound dehiscence. The development of wound dehiscence is influenced by surgically linked factors such as the type of surgery (elective/emergency), the underlying condition, and the type of incision, type of closure, suturing material, and suturing technique. Patients who have

these risk factors need extra care and attention to reduce the likelihood of an incident. It is possible to avoid postoperative abdominal wound dehiscence by enhancing the patient's nutritional state, taking stringent aseptic precautions, and optimizing.

Ethical approval: The study was approved by Institutional ethics committee.

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