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A prospective study of risk factors for abdominal wound dehiscence

Rajesh Mahey, Smruti Ghetla, Jitesh Rajpurohit, Dhaval Desai*, Sachin Suryawanshi

Department of Surgery, TNMC and Nair Hospital, Mumbai, Maharashtra, India

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*Correspondence: Dr. Dhaval Desai,

E-mail: manishkkn1120@gmail.com

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ABSTRACT

Background: Dehiscence of abdominal wound is easily the most notorious complication observed in abdominal surgery. This study was conducted on 50 patients of abdominal wound dehiscence admitted and treated in department of general surgery at Nair charitable hospital for 1 year and a follow up period of 6 months to elucidate factors contributing to disruption and incidence of abdominal wound dehiscence in different types of incision.

Methods: Fifty patients who have developed abdominal wound dehiscence or having bowel protrusion after any abdominal incisions for either emergency or elective abdominal operations were included in the study.

Results: Abdominal wound dehiscence was most commonly seen in age group of 41-60 years (40%) followed by 21-40 years (34%). Males (56%) were found to be more affected than females (44%). It was more common in emergency surgeries (56%) compared to elective surgeries (44%). Cholelithiasis (18%) was the most common disease associated with wound dehiscence followed by appendicitis (16%) and ileal perforation (12%). Vertical midline (70%) was the most common type of incision associated with wound dehiscence followed by Kocher's incision (18%) and Mcburney's incision (10%).

Conclusions: Factors like anaemia, malnutrition, obesity, diabetes mellitus and cough and surgery factors like type of surgery (elective/emergency), underlying disease and type of incision, type of closure, suturing material and suturing method play important role in development of wound infection and subsequently development of wound dehiscence.

Keywords: Abdominal wound dehiscence, Abdominal surgery

INTRODUCTION

Dehiscence of abdominal wound is easily the most notorious complication observed in abdominal surgery. It is disturbing for both to the patient and the treating surgeon. Abdominal wound dehiscence has significant impact on health care cost, both for patients and hospitals. Its mortality rates reported as high as 15% - 45%. The incidence is ranged from 0.4% to 3.5% in all laparotomies. 3

Whereas our country data stated still higher frequency of burst abdomen with overall rate of 4.8% and 6.6%. Abdominal wound dehiscence is the disruption of

laparotomy wound occurring usually between 5th to 8th post-operative days. Wound dehiscence is described as partial or complete disruption of an abdominal wound closure with or without protrusion of abdominal contents. Partial wound dehiscence is defined by separation of facial edges without evisceration and occasionally, fibrin covered intestinal loops. Complete wound dehiscence is defined as full separation of fascia and skin with evisceration of intestinal loops.

There are several factors leading to wound dehiscence. These are categorized as patient related and operation related. Patient related factors such as age, sex, obesity including malnutrition, systemic disease, post-operative cough and BMI <20 and >25 have been linked to development of dehiscence. 3,4

Operation related factors such as indication of surgery elective/emergency, underlying abdominal pathology, type of suture used, type of incision, technique of abdominal closure have been linked to development of wound dehiscence.⁴ Good knowledge of these risk factors is important for prevention of such complications.

This study was aimed to elucidate factors contributing to abdominal wound dehiscence.

METHODS

This prospective study was conducted on 50 patients of abdominal wound dehiscence admitted and treated in department of general surgery at our tertiary care centre for 1 year and a follow up period of 6 months. This study protocol was approved by the Institutional Ethical Committees of our hospital. Informed consent was signed from all the enrolled patients.

Inclusion criteria

All patients of age > 18 years and of either sex who have developed abdominal wound dehiscence or having bowel protrusion after any abdominal incisions for either emergency or elective abdominal operations were included in the study

Exclusion criteria

All patients with wound dehiscence who are less than 18 years of age or wound dehiscence on sites other than the abdomen or female patients who developed wound dehiscence after any gynecological procedures and wound dehiscence after re-exploration surgery were excluded in the study.

An elaborative study of these cases with regard to date of admission clinical history regarding the mode of presentation, significant risk factors, investigations, time of surgery, type of surgery and post-operative day of wound dehiscence is done till the patient is discharged from the hospital.

In history, details regarding presenting complaints, duration, associated diseases, significant risk factors like, anaemia, malnutrition, obesity, chronic cough, smoking, alcoholism were noted. Details regarding the clinical diagnosis, whether the operation was conducted in emergency or electively, type of incision taken were noted.

RESULTS

Abdominal wound dehiscence was seen at all ages, the most common age group was found to be 41- 60 years

(40%) followed by 21-40 years (34%). Males (56%) were found to be more affected than females (44%).

Table 1: Incidence of abdominal wound dehiscence in different age groups.

Age group	No. of cases	Percentage
<20	3	6%
21-40	17	34%
41-60	20	40%
>60	10	20%

Table 2: Incidence of abdominal wound dehiscence in different type of surgery.

Type of surgery	No. of patients	Percentage
Elective	22	44
Emergency	28	56
Total	50	100

Wound dehiscence in our study was found to be more common in emergency surgeries (56%) compared to elective surgeries (44%).

Table 3: Incidence of abdominal wound dehiscence in different type of procedure done.

Type of procedure	No. of patients	Percentage
Cholelithiasis	9	18
Appendicitis	8	16
Ileal perforation	6	12
Paraumbilical hernia	5	10
Gastric perforation	4	8
Intestinal obstruction	2	4
Sigmoid volvulus	2	4
Ileocaecal TB	2	4
Ascending colon mass	2	4
Meckels diverticulum	1	2
Gallstone ileus	1	2
Carcinoma stomach	1	2
Klatskins tumour	1	2
Carcinoma rectum	1	2
Gastric outlet obstruction	1	2
Abdominal TB	3	6

In our study, cholelithiasis (18%) was the most common disease associated with wound dehiscence followed by appendicitis (16%) and ileal perforation (12%).

In our study, vertical midline (70%) was the most common type of incision associated with wound dehiscence followed by Kocher's incision (18%) and McBurney's Incision (10%) (Table 4).

Table 4: Incidence of abdominal wound dehiscence in different type of incision.

Type of incision	No. of patients	Percentage
Vertical midline	35	70
Kochers incision	9	18
Mcburneys incision	5	10
Roof top incision	1	2

DISCUSSION

Acute wound failure also known as wound dehiscence, burst abdomen, wound disruption and evisceration. It is a very serious complication of abdominal surgery, which carries very high mortality rate. It is a multi-factorial problem. Western studies showed an incidence of 0.4 to 3.5%.

In our study total 50 patients were included out of which, males were 28 in number and females were 22 in number with the ratio of 1.27:1. The male predominance was probably due to the higher incidence of peptic ulcer perforation, intestinal obstruction and malignancies in male sex. In our study most of the patients were in the age group 40-60 years. The mean age of presentation was 42.1 years. In present study wound dehiscence was found in younger age group as incidence of perforation and intestinal obstruction was common in this age group. Spiliotis J et al, showed the incidence of abdominal wound dehiscence more commonly in male gender (60%) and with the mean age of 69.5 years most of the patients who underwent laparotomy had malignancy and diverticular disease and 15 out of 3500 patients developed wound dehiscence (0.43%) amongst which 9 (60%) undergone emergency laparotomy.⁶

In our study 56% of patients of burst abdomen underwent laparotomy in an emergency setup. More chances for wound dehiscence were attributed improper pre-operative preparation. The emergency conditions itself have detrimental effect due to course of acute illness as well as delayed presentation etc. Most of the patients were already having complications like septicaemia and fluid and electrolytes derangements due lack of facilities in nearby local health centres. One of the factors which can also play a major role in developing wound dehiscence is lack of experience on part of surgeon. The emergency laparotomies are performed most of the time by surgical residents. Technical errors can be avoided in elective setup. This is the probable explanation for a high prevalence of burst in our emergency group. Rural hospitals and nursing homes often keep patients with perforative peritonitis on conservative (antibiotics and even steroids).⁷ Hence at laparotomy we observe profound necrosis of the aponeurotic layers of abdomen in these cases. Such necrotic Linea Alba does not hold sutures well which cut out with a bout of coughing or sneezing. This is in accordance to study conducted by Hermosa JI et al, where wound dehiscence was more common in emergency operation and operations with higher wound classification. In our study, 35 out of 50 patients of wound dehiscence had undergone laparotomy through midline incision. Anatomical factors which might make a vertical upper abdominal wound more likely to burst because interference with blood supply as it runs transversely, the rectus abdominal muscle has a segmental blood and nerve supply. If incision is little more laterally, the medial part of the rectus abdominal muscle gets denervated and ultimately atrophied creating a weak spot in the wall and burst abdomen. This is the reason why one should not go beyond the midline. In a study done by Sinha A et al, observed wound dehiscence was most common in cases of midline incision undergone emergency laparotomies. Similar findings were observed by Khan MN-S et al.

According to Bailey, the maximum incidence is found on the 8th post-operative day. In the present study, the maximum number of cases occurred between 6th to 10th post-operative day, with the maximum on the 7th postoperative day. We usually remove stitches on the 7th or 8th post-operative day. Until that time the occurrence often remains undetected. On removing the stitches, the burst becomes evident. This explains the maximum incidence of burst abdomen on the 7th post-operative day. We continue antibiotics for one week and on stopping them there might be relapse of infection and burst abdomen may thus occur later on. The patients with major abdominal surgery are in the bed having intravenous infusions up to 4 or 5 days. Then they begin to move and try to pass stools. All this increases intraabdominal pressure. The holding-together capacity also becomes less and less until, after 10 days, stitches hardly have value.

In present study 26% patients had peritonitis. In patients with peritonitis bowel is oedematous, tissues are friable due to infections and there is increased tension on suture line during abdominal wall closure. Graham DJ et al pointed that intra-abdominal infection and colonic surgery were a leading cause of wound dehiscence. 12

In our study, 24% patients had haemoglobin <10gm/dL. Anaemia decreases the oxygen carrying capacity of blood and increases the work of heart. It also determines the post-op ventilator requirement and subsequently increases the intra-abdominal pressure and tension on suture line leading to development of wound dehiscence. Simon JS et al reported that mortality and morbidity are significantly increased in patients who undergo surgery with preoperative haemoglobin of less than 8g/dl and receive no transfusion. 13 Diabetes mellitus was found to be the most common comorbid condition found in 42% of patients who had wound dehiscence. Diabetics undergoing surgery suffer an increased risk of perioperative complications, mainly because of higher infection rate, compromised wound healing, ischemic complications, difficulties in controlling glycaemic levels and longer hospital stay. In a study by Shetty AR et al.,2013 the incidence of wound dehiscence was higher in diabetics (7.6%) as compared with non-diabetics (1.9%). ¹⁴

In our study, 38% patients had BMI <20 i.e. underweight whereas 18% had BMI >30 i.e. overweight or obese and 20 % of patients had elevated renal parameters. Malnourished patients have hypoproteinemia and hypoalbuminaemia which decreases the wound strength. In a study done conducted by Garg R et al,16 out of 50 patients were found to be obese (BMI>30). Out of these 16 patients, 4 (8%) were females having BMI 28.6 or more. Nineteen patients (38%) of the total 50 patients with wound dehiscence, had raised blood urea level (>40 mg%). ¹⁵

In our study 82% patients had undergone layered closure as compared to 18% who had mass closure. Poole GV et al suggested that closing midline abdominal facial wounds with a running nylon suture might be a superior method of closure in clean incised wound. ¹⁶ T. P. N Jenkins advocates the usage of suture of at least four times length of the length of the wound (suture length: wound length 4:1) for the mass closure technique. In all the reported series in which comparison was done between layered and mass closure techniques, the incidence of wound dehiscence was less with the mass closure technique. ¹⁷

Negative pressure wound therapy applied for 10 patients. VAC is a novel approach in wound-healing management. The application of mechanical stress to the wound accelerates cellular proliferation and angiogenesis, thus promoting the growth of granulation tissue. It is possible that erosion of underlying tissue by mechanical pressure from the suction tubing, and maceration of skin beneath the VAC may occur. 18-21 VAC allows open drainage that continuously absorbs exudate. Furthermore, VAC therapy approximates the wound edges and provides a mass filling effect with a low degree of surgical trauma, without establishing a new wound (e.g., abdominal wound in omental flap). Study conducted by Yoon Song Ko et al, 2014 on 207 post laparotomy wound dehiscence patients observed that the failure rate to first-line treatment with vacuum-assisted closure and conventional treatment were 0% and 14.3%, respectively (P = 0.002).²¹

Meshplasty was done for 13 patients for wound dehiscence. Similarly in the study conducted by Abbott DE et al, 2007 observed primary closure is associated with a relatively high rate of recurrent wound dehiscence. Closure with polyglactin mesh interposition has a higher initial success rate, but necessitates additional surgeries for repair of the abdominal wall defect.²²

Mortality following burst abdomen varies considerably in different reported studies. It is reported as low as 11% by Wolff and as high as 40% by Hartzell and Winfield Hampton observed the mortality rate to be 23% in 1963. ²³⁻²⁴ In the present study the mortality rate was 10%.

CONCLUSION

Burst abdomen is a serious sequel of impaired wound healing. Many factors can pre-dispose to this grave complication. Pre-op factors like anaemia, malnutrition, obesity and increased abdominal pressure (chronic cough, post op ventilatory support, post op abdominal distention etc.) increase the risk of wound dehiscence. Diabetes mellitus play important role in development of wound infection and subsequently development of wound dehiscence. Surgery related factors like type of surgery (elective/emergency), underlying disease, and type of incision, type of closure, suturing material, and suturing method influence development of wound dehiscence. Patients with these risk factors require more attention and special care to minimize the risk of occurrence. Postoperative abdominal wound dehiscence can be prevented by improving the nutritional status of the patient, strict aseptic precautions, optimization of patient's respiratory pathology to avoid postoperative cough and by proper surgical technique. Early diagnosis of burst abdomen and aggressive treatment helps in reducing morbidity and mortality.

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institutional ethics committee

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