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Original Research Article

A Clinical Study on Wound Dehiscence in Patients Undergoing Emergency Exploratory Laparotomy

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Abstract: Wounds and their management are fundamental to the practice of surgery. Any surgical intervention will result in a wound. The surgeon's task is to minimize the adverse effects of wound, remove or repair damaged structures and harness the process of wound healing to restore function. Wound dehiscence carries with it a substantial morbidity. This study investigates the incidence of wound dehiscence among emergency laparotomy and factors contributing to it. To study the incidence and factors contributing to wound dehiscence in patients undergoing emergency exploratory laparotomy patients. To analyse with special reference to pre-operative serum albumin, haemoglobin and obesity as the predictive factors of wound dehiscence in emergency exploratory laparotomy patients. Patients presenting to GRH from January 2016-September 2016 were included in the study. Details of cases who has undergone emergency laparotomy been recorded. Daily dressing and inspection of wound has been done till the patient gets discharged from the hospital. Patients who developed wound dehiscence were correlated with preoperative predictive factors such as pre op albumin, haemoglobin and BMI. Incidence of wound dehiscence in this study was 12%.Female patients were found to be more vulnerable for wound dehiscence with 15.38%. Perforation peritonitis was the most common cause for which emergency laparotomy was done. Pre-operative Hypoalbuminemia, Anaemia, obesity, sepsis, malignancy were found to have significant association with wound dehiscence. Diabetes mellitus and pulmonary complications did not have significant association. Our study data indicates elderly patients, female sex, and malignant patients showed higher vulnerability for wound dehiscence. Our aim to check the predictive ability of factors such as preoperative anaemia, Hypoalbuminemia, obesity showed that they can be used to predict patients who may not develop dehiscence rather in patients who may develop dehiscence.
Keywords: Emergency laparotomy; Wound dehiscence; Albumin; Haemoglobin; obesity; sepsis; malignancy.

INTRODUCTION

Abdominal wound dehiscence (Acute wound failure or a burst abdomen) refers to the postoperative separation of the abdominal musculoaponeurotic layers.1 it is one of the most serious postoperative complications; the incidence in the adult population is reported to be as 0.3-3.5%, and among the elderly it is as high as 10%. It is one of the most dreaded complications faced by surgeons and is of the greatest concern because of the need for intervention, the risk of evisceration, surgical wound infection, recurrence, and incisional hernia formation1. Dehiscence most often develops around 7 to 10 days postoperatively but may occur even upto 20 days. Despite major advancements in the preoperative care of surgical patients, which include the introduction of broader spectrum antibiotics and an improved understanding of all the effects of systemic illness on wound healing, the incidence of wound dehiscence has remained constant. In about 20-45% of cases, evisceration becomes a major significant risk factor, which is mostly associated with death during the perioperative period. Making abdominal incisions and closure of the same are some of the first things a surgeon in training is taught. The ability to

safely access abdominal cavity makes an otherwise difficulty operation look easy. As mentioned earlier open abdominal surgery has a variety of approaches in terms of incisions. These incisions can be vertical, horizontal and oblique.

MATERIALS AND METHODS

After obtaining approval from the Hospital Ethical Committee, patients admitted to Government Royapettah Hospital (GRH), Chennai between January 2016 and September 2016 who underwent laparotomy were included in the study. Type of study was cohort study Sample size was around 50 patient's .Inclusion criteria: Patients undergoing emergency exploratory laparotomy. Patients aged more than 12 years. Exclusion criteria: Patient on steroids, immunosuppressant or anticancer therapy Patients aged less than 12 years Patient undergoing re explorative laparotomy.

RESULTS

Among 50 patients who underwent emergency exploratory laparotomy, 6 patients developed wound dehiscence. 12% of patients developed wound dehiscence. Among patients who underwent emergency laparotomy 5 belonged to group of 11-20 years; 10 belonged to age group of 21-30 years; 16 belonged to group of 31-40 years 6 belonged to 41-50 years, 5 belonged to 51-60 years and 8 belonged to group of >60 years. In dehiscence group 66.6% of patients belonged to age group < 45 years. 33.4% belonged to age group > 45 years.

Table-1: Disease Pattern in Emergency Exploratory Laparotomy:

Disease	Male	Female
Perforation peritonitis	22	5
Intestinal obstruction	3	4
Blunt trauma	6	1
Penetrating Trauma	6	1
Malignancy	0	2

54% of patients underwent emergency exploratory laparotomy for perforation peritonitis. Intestinal obstruction was seen in 18%. 14% underwent surgery for blunt trauma abdomen and penetrating trauma was the causative factor for emergency laparotomy in 14% of patients. Malignancy presenting with acute abdomen was seen in 4% of patients. Among 6 patients who had wound dehiscence, 3 of them had perforation peritonitis, 1 had intestinal obstruction, 2 of them had malignancy.

Table-2: Disease Pattern and Wound Dehiscence in Emergency Laprotomy

Causative factor for laparotomy	Number of cases underwent laparotomy	Number of cases developed dehiscence	% vulnerable to dehiscence
Perforation peritonitis	27	3	11.1%
Intestinal obstruction	7	1	14.2%
Blunt trauma abdomen	7	0	-
Penetrating trauma	7	0	-
Malignancy	2	2	100%

Out of 27 patients with perforation peritonitis, 3 of them developed wound dehiscence. That is 11.1% of perforation peritonitis patients undergoing emergency exploratory laparotomy were vulnerable to develop wound dehiscence. 14.2% of intestinal obstruction patients were found to develop wound dehiscence. No one developed dehiscence in blunt trauma abdomen and penetrating trauma. Out of 2 patients with malignancy both developed wound dehiscence. In patients who had malignancy, 100% developed wound dehiscence. From this analysis malignancy seems to be the most causative factor which makes the patient vulnerable for dehiscence followed by perforation peritonitis but the number of cases were less.

Table: 3 Anaemia And Wound Dehiscence:

23 of 50 patients had anaemia as per the set criteria. Among patients who had dehiscence 5 of 6 had anaemia and 1 patients who had no anaemia developed

dehiscence. 26 patients who had anaemia did not develop wound dehiscence.

Table-3: Anaemia and Wound Dehiscence

Anemia	No wound dehiscence	Wound dehiscence
YES	18	5
NO	26	1
Total		6

Table: 4 Anaemia And Wound Dehiscence: 23 of 50 patients had anaemia as per the set criteria. Among patients who had dehiscence 5 of 6 had anaemia and 1 patients who had no anaemia developed dehiscence. 26 patients who had anaemia did not develop wound dehiscence.

Table-4: Anaemia and Wound Dehiscence

Anaemia	No wound dehiscence	Wound dehiscence
YES	18	5
NO	26	1
Total		6

Table: 5 Hypoalbuminemia In Wound Dehiscence: Among 50 patients 15 had pre-operative hypoalbuminemia. Out of which developed wound dehiscence and 11 did not have dehiscence.

Table-5: Hypoalbuminemia in Wound Dehiscence

Hypoalbuminemia	No wound dehiscence	Wound dehiscence
YES	11	4
NO	33	2
Total		6

Table- 6 Diabetes Mellitus in Wound Dehiscence: 7 out of 50 patients had Diabetes mellitus, among which 2 of them had wound dehiscence.

Table-6: Diabetes Mellitus in Wound Dehiscence

Diabetes mellitus	No wound dehiscence	Wound dehiscence
YES	5	2
NO	39	4
Total		6

DISCUSSION

Acute wound failure addressed by various names like wound dehiscence, disruption, burst abdomen is a multifactorial problem. The understanding of wound healing and dehiscence are complicated considerably by the fact that it is uncommon for any factor to exist in isolation and to determine which factor is of greatest importance in a particular case becomes a difficult task indeed [1]. Abdominal wound dehiscence is one of the most dramatic and serious post-operative complications after any major abdominal surgery. Acute wound failure can present as mechanical wound separation or dehiscence. Dermal wound separation worsens cosmetic results but is unlikely to cause significant harm, while abdominal wall wound failure can have life-threatening outcomes [2]. Irrespective of the presentation of dehiscence, once the diagnosis is confirmed, the initial management includes replacement of intestinal contents into the peritoneal cavity and covering with moist saline packs, gastric decompression with nasogastric tube, intravenous fluids and broad spectrum antibiotics. Though it is considered a surgical emergency, the patient should be stabilized and any antecedent cause that led to dehiscence, if reversible, be corrected before embarking on surgical treatment. Surgery for burst abdomen involves reopening and

inspecting the entire surgical wound, exploratory laparotomy to look for any intraabdominal abscesses or anastomotic leaks, thorough peritoneal lavage, and a good re-closure2.6%.116 (continuous re-closure using heavy non-absorbable suture material such as 0 poly propylene, with large tissue bites of 1.5 cm, a small stitch interval, and appropriate wound tension works best) along with application of retention sutures In this study fifty patients underwent midline emergency exploratory laparotomy. Out of this 6 patients developed partial or complete wound dehiscence [3]. This accounts for 12.0% of patients developing wound dehiscence. The wound dehiscence rate reported in international literature varies from 1% to in observation by Penninckx *et al*., dehiscence rate was found to be6.7%119 in emergency laparotomy. While local studies show a higher incidence, varying from 6%117, 118 to 12%. In study by Pandey S *et al*., over all incidence of wound dehiscence was 11.5% and 17% in patients in whom mass closure was done with Vicryl120. In this study higher incidence of wound dehiscence may be because most of the studies included both elective and emergency cases leading to lower incidence [4]. In this study only emergency cases were included which may be the reason for higher incidence compared to international studies. This fact may be attributed to poor patient preparation, complicated inflammatory disease, premorbid factors, contaminated wounds and operating at odd hours. When the sex ratio is considered, 37 of 50 patients were male who underwent emergency exploratory laparotomy and 13 were female. The ratio is found to be 2.8:1. When wound dehiscence proper is considered, the ratio was 2:1. There appears to be male predominance on looking at sex ratio [5]. But when analysis is done, out of 37 male patients 4 developed dehiscence whereas 2 female patients out of 17 developed wound dehiscence. That is in this study 10.81% male were vulnerable for wound dehiscence as against 15.38% in female group. Thus in this study female sex group was found to be slightly more vulnerable for wound dehiscence. In study by White H *et al*., there were 75 males and 48 females in the group studied, which gives a male: female ratio of 1.6: 1. This nature of male predominance is found in this study as well [6]. In study by Munieah NS *et al*., male: female sex ratio was 3:1 which coincides with this study. Kenig J *et al*., in their study had 56 patients with wound dehiscence from all type of abdominal surgeries. Of which 37 were men and 19 women; there was a statistically significant difference with regard to gender, men accounted for more of the cases (p = 0.034). Male predominance (37/50) was observed in study by Ramneesh G *et al*., with ratio of male to female being 2.84:1 which is near to the present study [7]. This contradiction in this study may be because of more number of patients in less than 45 years of age group. Age-associated aberrations in macrophage functions decrease or delay vascularization, collagen deposition, and collagen remodeling123. The vasoregulation of the microcirculation of aged skin is impaired, which reflects changes in inflammatory responses, fewer progenitor cells, and declines in circulatory mediators. Age-associated delays in microvascular responses to stressors lead to impaired temperature regulation and greater likelihood of tissue hypoperfusion which inhibits wounds from reaching the angiogenic stage of repair124. Gould L *et al*. 125, said, optimal healing strategies after surgery and other stressors must therefore use multifactorial approaches to address changes in the microcirculation in older adults. [8]In this study, only cases which underwent emergency laparotomy was considered, as wound dehiscence is established to be more common in emergency cases than elective surgeries. Most of the studies have included both emergency and elective cases which make it difficult to compare the disease pattern with each other.

In study by Ramneesh G *et al*. 122, 35 patients (70%) had perforation of hollow viscus with peritonitis. 10 patients (20%) had intestinal obstruction with no evidence of peritonitis. There were 5 patients (10%) who had injury to solid organs or mesentery with hemoperitoneum secondary to trauma [9]. Three cases (6%) had malignancy of large gut. This study also had disease pattern like Ramneesh G *et al*. 122. In this study, perforation peritonitis was the most common disease in patients who had dehiscence. This may be due to 54% of emergency laparotomy patients had perforation peritonitis [10]. From this study it was found patients with malignancy were more vulnerable to wound dehiscence. 100% of patients having malignancy developed wound dehiscence as (but the number of cases were less) against 11.6% for perforation peritonitis and 14.2% for obstruction. None of them patient who had blunted or penetrating injury abdomen without peritonitis developed wound dehiscence in this study [11]. This can be attributed to clean wound in case of blunt trauma without peritonitis. Pre-operative hypoalbuminemia was noted in 15 patients out of 50 emergency exploratory laparotomies. Among 6 patients who developed wound dehiscence 4

of them had pre-operative hypoalbuminemia. Chi square test was done in statistical analysis and found to be significant with p value 0.037 [12]. This significance of hypoalbuminemia in influencing wound dehiscence coincides with most of the studies in literature. In current study, 6 patients had pulmonary complications in post-operative period. Pulmonary complication was included as a risk factor in many studies as well [13]. This is because cough and strenuous breathing following pulmonary complications lead to raised intra-abdominal pressure which was found to be a significant risk factor for dehiscence. Second reason is that pulmonary complications lead to hypoxia at tissue level which hampers wound healing. Here 1 out of 6 patients had post-operative pulmonary complications. P value was not significant. In this study the controversial result may be because of another reason that the greater number of study population were less than 45 years of age in whom prevalence of pulmonary complication is less likely [15].

CONCLUSION

Various putative risk factors for abdominal wound dehiscence were investigated and significant risk factors for abdominal wound dehiscence identified in this study are pre-operative hypoalbuminemia, pre-operative anaemia, intra-abdominal sepsis/wound infection and obesity [16]. Elderly patients, female sex and malignant patients showed higher vulnerability for wound dehiscence. Our aim to check the predictive ability of factors- pre-operative anaemia, hypoalbuminemia and obesity showed that they can be used to predict patients who may not develop wound dehiscence rather than in predicting patients who may develop wound dehiscence [17]. From the results of this study, we can also conclude that a number of risk factors for abdominal wound dehiscence can be mitigated during the perioperative period. Thus we conclude that if the above predisposing factors are well understood before doing any emergency abdominal surgery, the present incidence and burden on health care system can be reduced further [18-20].

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