Original Research Article

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A clinical study of abdominal wound dehiscence with emphasis on surgical management in Bangalore medical college and research institute, Karnataka, India

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ABSTRACT

Background: Wound dehiscence is described as partial or complete disruption of abdominal wound closure with or without protrusion of abdominal contents. It is among the most dreaded complications faced by surgeons and regarded as a severe postoperative complication, with mortality rates reported as high as 45%. Incidence in literature ranges from 0.4% to 3.5%. This study aimed at finding out the prevalence of abdominal wound dehiscence with different risk factors and also to study the effective management of abdominal wound dehiscence.

Methods: All cases presenting with wound dehiscence after surgery were included. An elaborate clinical history was taken in view of the significant risk factors, the types of surgery performed including surgical incisions taken and the type of disease involved. A total of 60 cases were included in this prospective study. Data was analyzed using appropriate software.

Results: The results concluded that male patients have a higher incidence of laparotomy wound dehiscence and in 5th decade. Patients presenting with peritonitis secondary to hollow viscus perforation are more prone to abdominal wound dehiscence. Patients classified with contaminated wounds with emergency surgeries show higher predilection for wound dehiscence.

Conclusions: Co morbidities like diabetes, malnutrition, anemia, COPD, play significant role in delaying wound healing. Simple routine laboratory investigations may help identifying predisposing factors and be corrected accordingly. Most of the patients can be managed conservatively and with secondary suturing without the need of re exploration and repeated surgery.

Keywords: Abdominal wound dehiscence, Emergency operation, Midline incision, Peritonitis

INTRODUCTION

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 interchangeably are acute laparotomy wound failure and burst abdomen. Wound dehiscence usually occurs when a wound fails to achieve required strength to withstand

stresses placed upon it. Dehiscence occurs when overwhelming forces disrupt sutures, when absorbable sutures dissolve too rapidly or when tight sutures cut through tissues through unnecessary pressure.

Acute wound failure may be partial or complete. In partial dehiscence, only the superficial layers or part of the tissue layers reopen. In complete wound dehiscence, all layers of the wound thickness are separated, revealing

the underlying tissue and organs, which may protrude out of the separated wound. It is one amongst the most feared post-operative complications for the surgeons and is of greatest regard because of risk of burst abdomen, the need for immediate intervention, and the possibility of repeat dehiscence, surgical site infection ,and incisional hernia formation.² Abdominal wound dehiscence is reported to be a severe postoperative complication, with death rates reported as high as 45%. Incidence as reported in literature peaks from 0.4% to 3.5%. Many risk factors are accountable for wound dehiscence such as surgeries in emergency set up, intra-abdominal bacterial infection, malnutrition, decreased Hb, elderly age >65 years, systemic co-morbidities (uremia, diabetes mellitus) etc.⁴ Good knowledge of these risk factors is compulsory for prophylaxis. Mortality and morbidity in the form of increased hospital stay, long term repeated consultations, with extra burden on health care resources can be reduced by highlighting the risk factors for wound dehiscence, the incidence rate and prophylactic measures to prevent or reduce the incidence of wound dehiscence.⁵

AWD has been a long term dilemma for which no surgical unit has come with a 100% plan (i.e. none of the surgical units worldwide has reported 0% failure rate). However many institutes globally have been trying successfully to achieve and keep failure rates well below 1%. These statistics however do not discourage the continuing research in attempts to eliminate the problem. A wide variety number of publications have been done in the past ten years trying to explain how this problem can be overcome.

The objective of this study was to determine the prevalence of abdominal wound dehiscence with different risk factors, co morbidities and their effective management.

METHODS

This is a prospective study carried out from November 2014 to October 2016 in the Department of General Surgery, Bangalore Medical College and Research Institute, Karnataka, India.

60 Patients who underwent both emergency or elective abdominal procedure and developed post-operative dehiscence during the study period were included. The inclusion criteria used were patients above 18 years of age of either sex, who gave consent for investigations and treatment.

The exclusion criteria were those with age group below 18years, with wound dehiscence on sites other than the abdomen, patients who developed wound dehiscence after any gynaecological procedures. A comprehensive history and thorough physical examination with any other relevant history were recorded. Statistical analysis was processed using Excel software programs. Observations are represented as bar diagrams and pie charts.

RESULTS

Distribution of study subjects according to age

Table 1: Incidence in different age groups.

Age	No. of cases	Percentage
21-30	8	13.33%
31-40	12	20%
41-50	20	33.33%
51-60	11	18.33%
61-70	6	10%
>70	3	5%
	60	100

In this study major number of patients belonged to the age group between 41- 50 years, youngest age was 22 years and oldest patient was 82 years. The mean age of patients affected was 46.25 (SD13.95).

Distribution according to gender

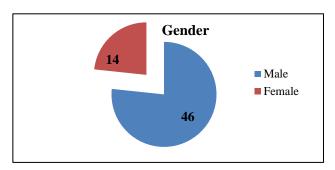


Figure 1: Incidence of abdominal wound dehiscence in different genders.

Out of 60 cases, 46 cases were male and 14 female cases.

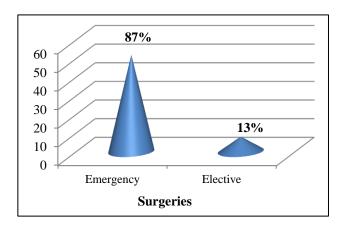


Figure 2: Effect of emergency surgery in development of abdominal wound dehiscence.

Surgery: in the present study, out of 60 cases, 52 cases (87%) were operated as emergency surgery and 8 cases (13%) as elective surgery.

38 cases i.e. (63%) in the presenting study have undergone procedures which are classified as contaminated and no case has undergone clean surgery.

Table 2: Different types of surgical wound presenting with abdominal wound dehiscence.

Type of Surgical wound	No. of cases	Percentage
Clean	0	0
Clean contaminated	6	10%
Contaminated	38	63.33%
Dirty	16	26.67%
	60	100

Table 3: Frequency in relation to type of incision.

Type of incision	No. of cases	Total
Upper midline (UM)	12	
Midline (MM)	22	44
Lower midline (LM)	10	
Right upper paramedian (RUP)	6	- 10
Right lower paramedian (RLP)	4	10
McBurney's (MCB)	6	6
Total	60	60

In this study, from a total of 60 cases, 44 cases (73%) were operated with mid line incision and 10 cases (17%) were operated with paramedian incision.

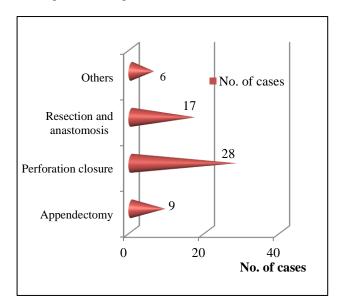


Table 3: Various abdominal procedures leading to abdominal wound dehiscence.

In this study, from 60 cases with abdominal wound dehiscence, perforation closure was done in 28 cases, resection anastomosis for 17 cases, appendectomy for 9 cases and other procedure like intestinal obstruction, Gut CA, splenectomy, mesenteric tear, adhesiolysis, stricturoplasty etc.

Table 4: Distribution of patients with abdominal wound dehiscence according to underlying intraabdominal pathology.

Diagnosis	No. of cases
Hollow viscus perforation	28
Duodenal ulcer	13
Others (GP,IP,JP,MDP)	15
Appendicular pathologies	9
Intestinal obstruction	12
Malignancy	3
Others	8
Total	60

In this study, amongst 60 cases studied, 28 patients were diagnosed to have peritonitis due to hollow viscus perforation, 9 patients had appendicular pathology, 15 patients with intestinal obstruction and 3 patients presented with malignancy.

Out of 60 cases 36 pts had B.M.I >25 and 24 patients had B.M.I <25.

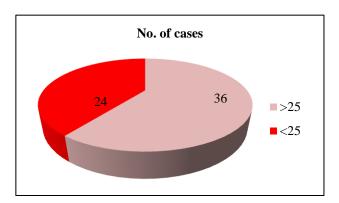


Figure 4: Frequency of abdominal wound dehiscence according to body mass index.

Table 5: Prevalence of abdominal wound dehiscence in relation to anemia.

Hb%	No. of cases
>10 g/dl	28
<10 g/dl	32
	60

Out of 60 cases 28 patients had Hb% more than 10 g/dl and 32 patients had Hb% less than 10 g/dl.

Table 6: Prevalence of wound dehiscence in relation to liver function test (LFT).

LFT	No. of cases	Percentage
Hypoprotinemia (albumin<2.9 gm/dl)	36	60%
Hyperbilirubinemia (total bilirubin> 1.5 mg/dl)	4	7%
Raised hepatic enzyme	2	3%

In the present study amongst 60 cases 2 patients had elevated hepatic enzymes, 36 patients had hypoalbuminemia, and 4 patients had hyperbilirubinemia.

Table 7: Co morbid conditions at the time of admission.

Conditions	No. of cases	Percentage
Diabetes (DM)	23	38%
Hypertension (HTN)	15	25%
Pulmonary disease	38	63%
Malnutrition	36	60%
Anemia	32	53%
CRF	4	7%
Malignancy	3	5%
Steroid use	-	-
Radiation	-	-

Malnutrition, DM, HT, pulmonary diseases, anemia etc. are important risk factors for wound dehiscence.

Seniority of the surgeon

Professors and associate professors operated on 6 out of the 8 elective patients. All emergency procedure and one elective procedure were done by final year post graduates. However owing to the usual practice where the assistant surgeon tends to be the one who closes the abdomen, seniority was not considered as a significant factor. More over senior post graduates are the assisting surgeons to their seniors.

Table 8: Duration of hospital stay.

Average stay	18 days
Range of stay	5-36 days

Table 9: Management of wound dehiscence.

Type of wound dehiscence	No. of patients	Management
Partial wound dehiscence	32	Conservative Management (healing by secondary intention)
deniscence	16	Secondary suturing
Complete wound	8	Tension suturing
dehiscence	4	Mesh repair

Average stay was 18 which increases economic burden both on hospital and patients. There were 2 deaths. Mortality was mainly due to post-operative complication like septicemia and respiratory tract infection.



Figure 5: Wound dehiscence in a duodenal ulcer perforation case.



Figure 6: Wound dehiscence in an Ile-Ile intussusception case.



Figure 7: Wound healing by secondary intention.



Figure 8: Tension suturing.

DISCUSSION

This study reviewed 60 patients who had laparotomy wound dehiscence over a period from November 2014 to October 2016. Our study has analyzed the potential causes of abdominal wound dehiscence, their respective course of treatment before, during, and after surgery and

also assessed the outcome of each case. In the present study, the average age of patients with delayed wound healing was found to be 46.25 years. Incidence of hollow viscus perforation and bowel obstruction was common in this age group. The following are the mean age groups in some other studies.

Comparison of sex distribution

In a study conducted between 2007, 3500 patients underwent abdominal surgeries in department of surgery of Mesologgi General Hospital and Urban Community Teaching Hospital of 150 beds, reported incidence of abdominal wound dehiscence was more common in male gender 60%. In a study conducted between January 1985 to December 2005 at Department of Surgery, Erasmus University Medical Center, male were 75% and female pts 25%.^{5,8} In our study there was a higher male population with a ratio of 3.3:1. This increased number of males can be attributed to the higher incidence of peptic ulcer perforation and intestinal obstruction in male gender.

Table 10: Comparison of age group.

Age	Spiliotis J et al ⁸	Waqar SH et al ⁷	Guo S and DiPietro LA ⁶	Our study
Mean	69.5 years	39.67 years	68.6 years	46.25 years

Table 11: Comparison of sex distribution.

Sex	Spiliotis J et al ⁸	Gabrie¨lle H. van Ramshorst et al ⁵	Our study
Male	9 (60%)	272 (75%)	46 (77%)
Female	6 (40%)	91 (25%)	14 (23%)

Comparison of incidence in elective versus emergency surgery

In a study conducted in Department of Surgery, Case Western, Reserve University, Cleveland Veterans Affair's Medical Center USA, 107 cases were report to have abdominal wound dehiscence over a period of 7 years. It was noted that these patients having intraabdominal pathologies were more likely to have undergone an emergency operations (p < 0.02), colon surgeries (p < 0.005), or an operation with greater wound classification (p < 0.02) and wound dehiscence is more

common emergency operation and surgeries with higher wound classification.⁹

In our study, among 60 patients developing laparotomy wound dehiscence, 87% of patients were operated on emergency basis. Our study showed that abdominal wound dehiscence is more commonly in patients operated for peritonitis due to hollow viscus perforation (47%). Amongst which duodenal perforation accounted for 22%. Other perforations which included gastric perforation, ileal perforation, jejunal perforation accounted for%. 20% of the patients had small bowel obstruction and 5% of the patients had underlying malignancy. For the patients with bowel perforation which were classified mostly into contaminated surgical wounds, the procedure performed was peritoneal lavage with perforation closure. Most of the patients presenting with enteric obstruction underwent resection and anastomosis while remaining few were subjected to adhesiolysis and colostomy.

Table 12: Comparison of incidence in elective versus emergency surgery.

Type of surgery	John Spiliotis et al ⁸	S H Waqar et al ⁷	Afzal S et al ²	Our study
Emergency	60%	72%	90%	87%
Elective	40%	28%	10%	13%

Day of presentation of abdominal wound dehiscence

Study conducted at the long Island Jewish Medical Centre reports the mean post-operative day of abdominal wound dehiscence to be 11.1 days after surgery. Anielski et al showed average time of 6.5 days while Madsen et al reported the sixth post-surgical day. 11,12

In a study conducted at Department of Surgery, Erasmus University Medical Center, post-operative day 9 was the mean day of developing wound dehiscence.⁵ Study conducted at department of surgery of Mesologgi General Hospital and Urban Community Teaching Hospital reports 9th post op day as the mean for wound dehiscence with a range from 6th to 15th day.⁸ In our study mean post-operative day was also 9th day.

Table 13: Day of presentation of abdominal wound dehiscence.

Day of wound dehiscence	Anielski et al ¹¹	Gabrie¨lle H. van Ramshorst et al ⁵	Madsen et al ¹²	Our study
Mean post op day	6.5 days	9 th day	6 th day	9 th day

In a study carried out at Oula University Hospital, out of 48 patients who had wound dehiscence, mortality was reported to be 4% (2 patients). The mean hospital stay was 25 ± 15 days. 31 (65%) patients had pre-operative hypoalbuminemia; other risk factors included anemia, malnutrition, pulmonary complication and emergency procedure. ¹³

In this study out of 60 patients, the mean hospital stay was 18days with a range of 5-36 days. About 53% of patients showed hemoglobin < 10 gm%. Other risk factors in the study included, hypoalbuminemia (60%), chronic lung diseases (63%), old age, malignancy (5%), obesity (40%), emergency procedure (87%) and peritonitis with grossly contaminated surgical wounds.

2 patients (i.e. 2%) died, one was due to mesenteric ischemia and other was due to septicemia.

In a study at Department of Surgery Sundsvaell County Hospital, Sweden being overweight (BMI > 25) was considered as a risk factor for delayed wound healing due to increased chance of infection but this could be minimized if patients are sutured with a suture length to wound length ratio of 4 - 4.9. Our study 36 patients were overweight, (BMI > 25), 24 patients were having their BMI below 25.

In a study conducted in Department of Surgical Gastroenterology, University of Copenhagen, Hvidovre Hospital in 2001 reported that the incidence of abdominal wound dehiscence and burst abdomen is more common in patients with vertical incision in comparison to those with horizontal incision (p=0.0001).

In this present study out of 60 patients 73% patients underwent surgery with midline incisions and 17% patients with right paramedian incisions, i.e. 90% patients with vertical incisions had wound dehiscence.

Recommendations

A comprehensive guideline should be articulated and made available to all the personnel managing and treating surgical patients who require laparotomy. In the protocol it should clearly specified the best and most appropriate surgical approaches for various surgeries, choice of suture materials, style or method of wound closure and requirement of drains and nasogastric tube. Decide on any controversy surrounding to abdominal closure in the presence of severe abdominal contamination, peritonitis and gross distension.

The choice of best suture materials to avoid technical failure. The need for use of intra-abdominal absorbable mesh to prevent wound dehiscence should also be discussed. To establish better teaching and training for junior surgeons of the institute by their seniors.

CONCLUSION

Laparotomy wound dehiscence is more common in males when compared to females with ratio of 3.3:1.

Patients in the age group of 41-50 years found to have highest incidence of abdominal wound dehiscence with the mean age reported to be 46.25 years. Incidence of abdominal wound dehiscence is more common in patients with peritonitis due to hollow viscus perforation than in case of intestinal obstruction. Patients with surgical wound classified as contaminated shows more tendency towards developing wound dehiscence. Emergency surgeries have a higher incidence of abdominal wound dehiscence than elective (6.5:1).

Midline laparotomy incision carried higher risk for wound dehiscence than those operated with paramedian incisions due to poor blood supply at Linea Alba. BMI>25 predisposes to a higher chance of wound dehiscence than those having their BMI≤25.

Patients with hemoglobin levels below 10 g% are at a greater risk for abdominal wound dehiscence. 9th post op day showed maximum cases of wound dehiscence. Prolonged surgery duration of more than 90 minutes, along with layered closure of abdomen showed more dehiscence compared to mass closure.

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