

A Prospective Study of Abdominal Wound Dehiscence in a Tertiary Care Hospital

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Abstract

Background: Abdominal wound dehiscence is defined as the postoperative separation of layers of a wound, with or without eventration. AWD is one of the most feared postoperative complications for surgeons and is of great concern because of the risk of burst abdomen, the need for immediate intervention, and the possibility of repeat dehiscence, surgical site infection, and mortality. **Objective:** To estimate the burden of cases of abdominal wound dehiscence in elective and emergency operations, and to identify the aetiology and risk factors responsible for it. **Design:** A Prospective study was conducted, where the data was collected over a period of one year, from 1st June 2023 to 31st May 2024, in patients attending Government Medical College Jammu, who developed wound dehiscence after undergoing laparotomy for management of abdominal diseases. **Subjects/Patients:** The patients who had undergone laparotomy and developed wound dehiscence. **Methods:** A prospective observational study was carried out over a period of one year, from June 1, 2023, to May 31, 2024, in patients attending Government Medical College Jammu who developed wound dehiscence after laparotomy. Inclusion criteria included Patients of age > 14 years and of either sex who underwent either emergency or elective abdominal operations and developed wound dehiscence. Exclusion criteria: All patients with incisional hernia and patients with wound dehiscence on sites other than the abdomen. **Results:** Laparotomy wound dehiscence was more common in 46-55 years age group with a male-to-female ratio of 2.3:1 the incidence was higher in Emergency surgeries and those performed during night. Dirty wounds and Midline laparotomy had higher risk. Layered closure, of the abdomen, showed a higher rate of dehiscence compared to mass closure. Incidence was higher in BMI greater than 25, with haemoglobin levels below 10 g%, Albumin <3.5gm/dl, Proteins <6gm/dl. Average hospital stay was 22 days and mortality rate in our study was 8%. **Conclusion:** Keeping in view the morbidity, increased hospital stays, medical expenses, time lost to work, disabilities with future incisional hernia formation and mortality associated with abdominal wall dehiscence, the risk factors should be identified, preoperative optimisation should be done, corrective measures should be taken while closing abdomen and standard protocols should be followed to prevent wound dehiscence.

Keywords: abdomen, wound, dehiscence.

Introduction

Abdominal wound dehiscence is defined as the postoperative separation of layers of a wound, with or without eventration. Other terms used interchangeably include acute wound failure, burst abdomen, abdominal wound disruption, evisceration, or eventration [1]. AWD is one of the most feared postoperative complications for surgeons and is of great concern because of the risk of burst abdomen, the need for immediate intervention, and the possibility of repeat dehiscence, surgical site infection, and mortality [2]. AWD has an incidence of 2-3% and an associated mortality of 25%. It commonly presents with serosanguinous discharge from the wound in the first week after surgery. It ranges from superficial breakdown

of the skin with intact deeper musculo-aponeurotic layers to a complete failure of the wound with exposure of the viscera, i.e., burst abdomen [3]. Old age is an independent risk factor for abdominal wound dehiscence. The explanation for this might lie in the deterioration of the tissue repair mechanism in the elderly [4]. Diseases like diabetes, malnutrition, anaemia and COPD play a significant role in delaying wound healing [2]. Several important risk factors for wound dehiscence includes age (>65 years), hypoalbuminemia, wound infection, ascites, obesity, steroid use, chronic obstructive pulmonary disease, pneumonia, cerebrovascular accident with residual deficit, anaemia (haematocrit < 30), prolonged ileus, post-operative coughing, emergency operation, operative time greater than 2.5 hours, and postgraduate year 4

resident as surgeon [5]. Delayed primary skin closure of contaminated and dirty abdominal incisions reduces the rate of surgical site infection compared with primary skin closure. [6]. There is significant difference in the incidence of wound dehiscence between nonabsorbable or delayed absorbable suture material and absorbable sutures in the mass closure of vertical laparotomy wounds [7]. A "small steps" technique of continuous suturing with a slowly absorbable (polydioxanone) suture material in a wound-suture ratio of minimum 1: 4 has reduced the rate of fascial dehiscence significantly [8]. Serial IAP measurements in patients scheduled for emergency laparotomy and prompt implementation of corrective measures - such as ensuring adequate analgesia and sedation, nasogastric decompression, balanced fluid resuscitation and early vital organ support, can mitigate the local and systemic adverse effects of IAH and ACS [9].

Material and Methods

A prospective observational study was carried out over a period of one year, from June 1, 2023, to May 31, 2024, in patients attending Government Medical College Jammu who developed wound dehiscence after undergoing laparotomy for management with acute abdominal emergencies or elective abdominal operations.

Inclusion Criteria

- Patients of age > 14 years and of either sex who developed abdominal wound dehiscence.
- Patients who developed abdominal evisceration.
- Patients who had undergone either emergency or elective abdominal operations and developed wound dehiscence.
- Patients with abdominal wound dehiscence who were willing for investigation and treatment.

Exclusion Criteria

- All patients with wound dehiscence who were less than 14 years of age.
- All patients with incisional Hernia.
- All patients with wound dehiscence on sites other than the abdomen.
- Female patients who developed wound dehiscence after any gynaecological procedures.
- All patients who refuse investigations and treatment.

Results

In our study majority of patients belonged to the age group between 46-55 yrs. youngest patient was 16 yrs and oldest 96 yrs. The mean age of patients affected was 46.37 years.

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

Age Group	No. of Patients	Percentage (n=100)
15-25	12	12%
26-35	14	14%
36-45	16	16%
46-55	23	23%
56-65	20	20%
66-75	6	6%
>75	9	9%
TOTAL	100	100%

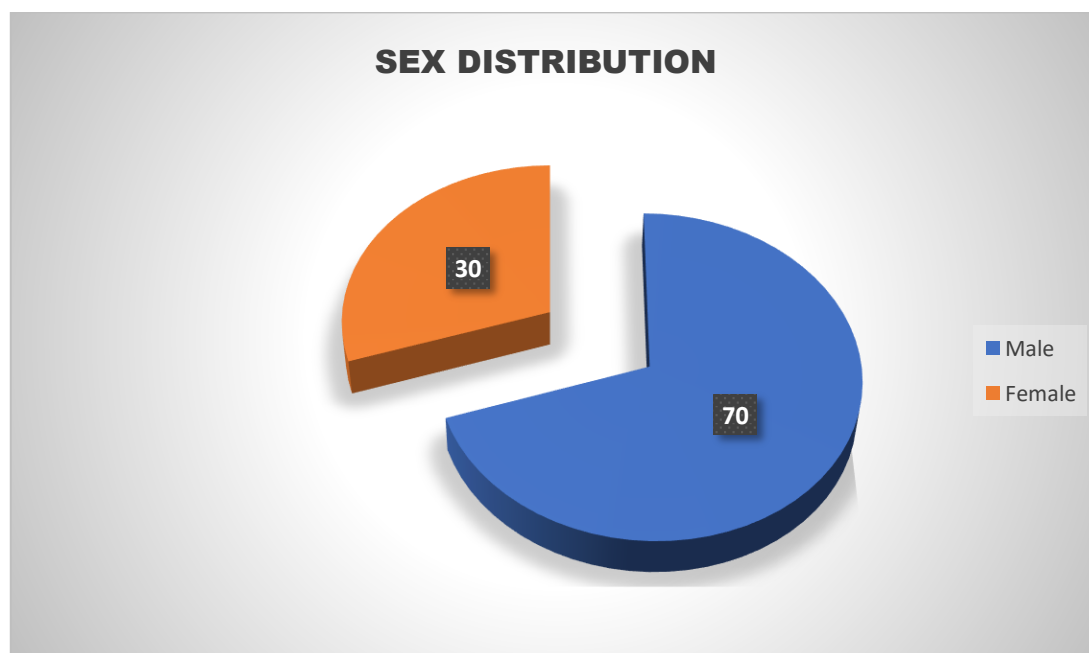


Figure 1: Incidence of abdominal wound dehiscence in different age groups.

Male sex was most commonly associated with wound dehiscence (70%) than females (30%). The male to female ratio was 2.3:1. This data is graphically represented in Figure 2.

Table 2: Distribution of patients with abdominal wound dehiscence according to sex of patient.

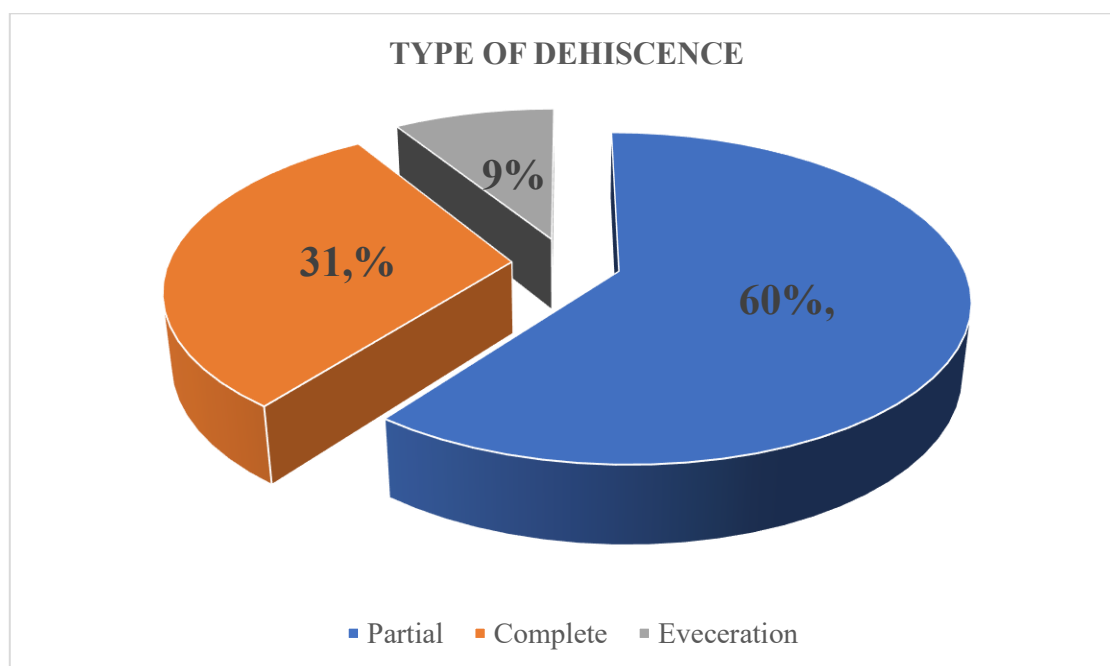
Sex	No of patients	Percentage
Male	70	70%
Female	30	30%
Total	100	100%

**Figure 2: Distribution of patients with abdominal wound dehiscence according to sex of patient.**

Out of total of 100 patients 60% had partial wound dehiscence, 31% patients had complete wound dehiscence, while only 9% patients developed evisceration. This has been represented graphically in Figure 3.

Table 3: Distribution of patients according to type of abdominal wound dehiscence

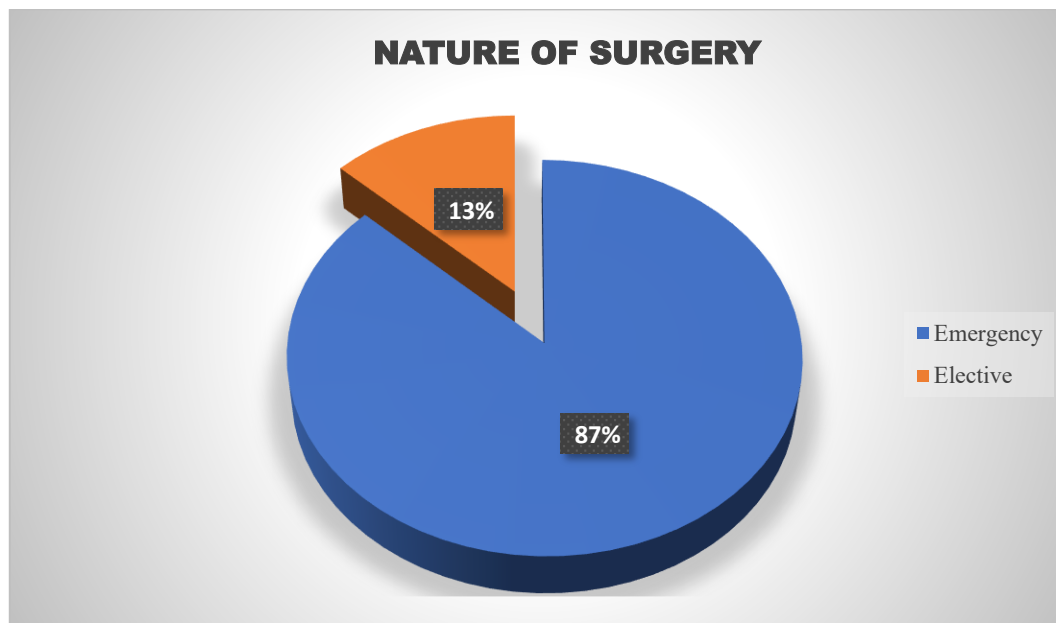
Type	No of patients	Percentage
Partial	60	60%
Complete	31	31%
Evisceration	9	9%
Total	100	100%

**Figure 3: Distribution of patients according to type of abdominal wound dehiscence**

Patients undergoing Emergency surgeries were more prone to develop abdominal wound dehiscence (87%). While in case of elective surgeries only 13% developed abdominal wound dehiscence. This data is graphically represented in Figure 4.

Table 4: Effect of type of surgery in development of abdominal wound dehiscence

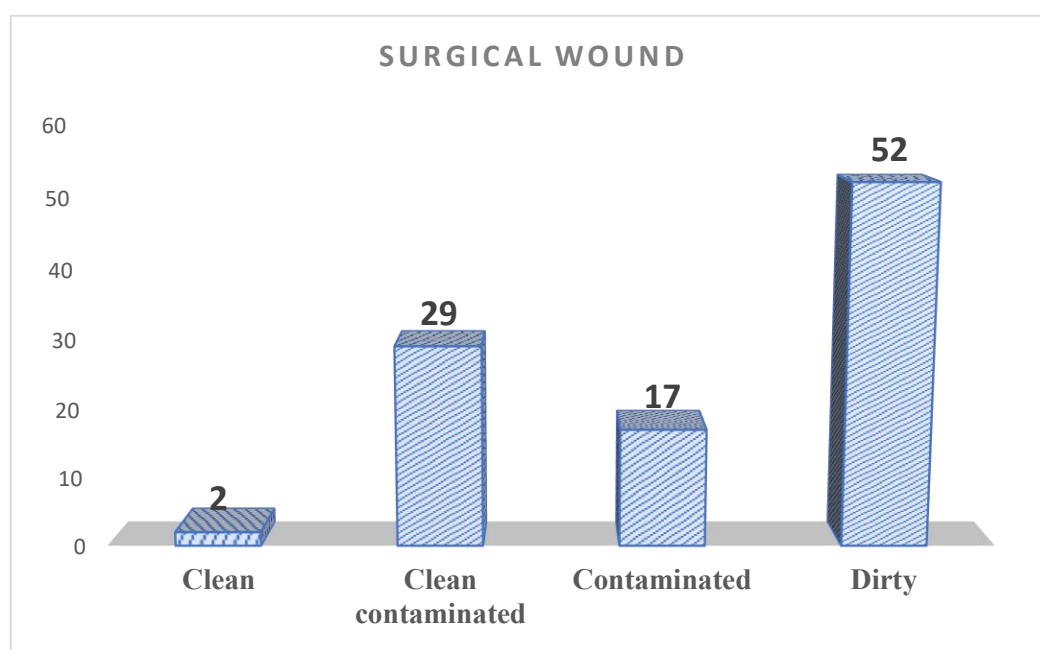
Nature of surgery	No of patients	Percentage
Emergency	87	87%
Elective	13	13%
Total	100	100%

**Figure 4: Effect of type of surgery in development of abdominal wound dehiscence**

Most common surgical wound associated with abdominal wound dehiscence was class IV (Dirty) (52%). In case of clean wounds only 2% patients developed abdominal wound dehiscence. This has been represented graphically in Figure 5.

Table 5: Type of surgical wound associated with Abdominal wound dehiscence

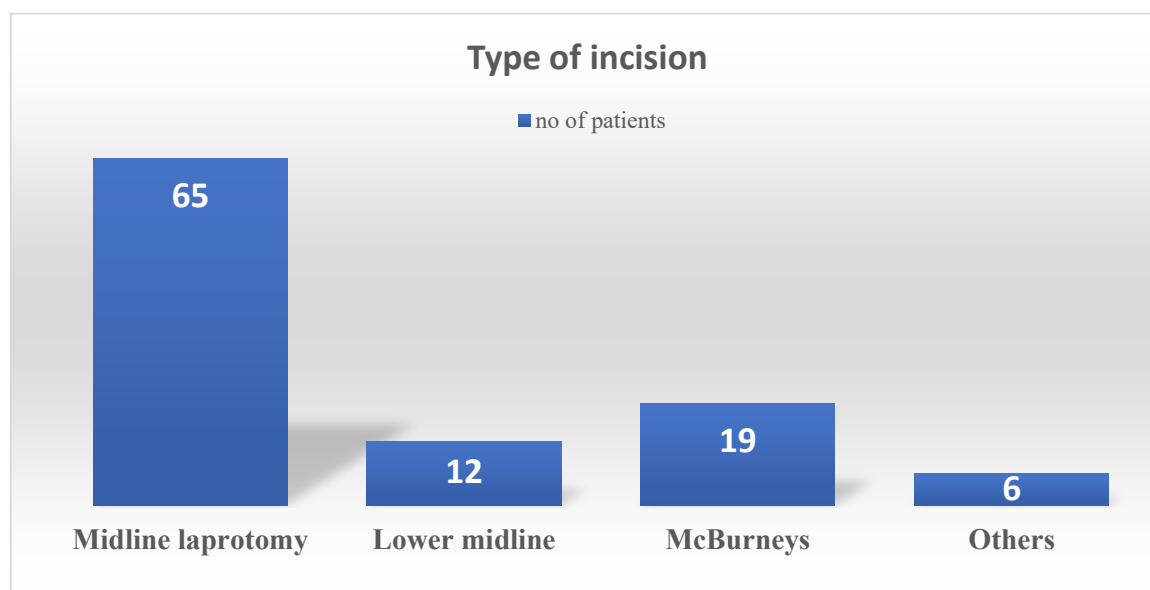
Type of Surgical wound	No of Patients	Percentage n= 100
Clean	2	2%
Clean contaminated	29	29%
Contaminated	17	17%
Dirty	52	52%
Total	100	100%

**Figure 5: Distribution of patients according to type of surgical wound**

Midline laparotomy incision was found to be most common incision associated with abdominal wound dehiscence in this study population 63%. This data has been represented graphically in Figure 6.

Table 6: Frequency of Abdominal wound dehiscence in relation to type of Incision.

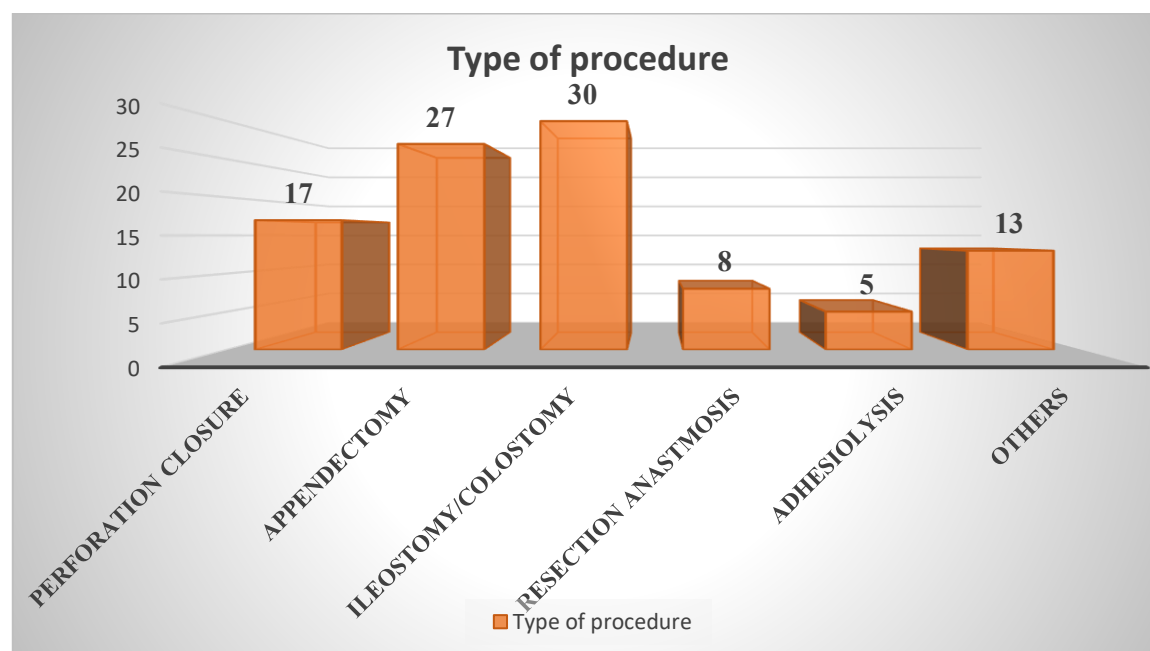
Incision	No of cases	Percentage
Midline laparotomy incision	63	63%
Lower midline incision	12	12%
Mc Burney's incision	19	19%
Others	6	6%
Total	100	100%

**Figure 6: Frequency of Abdominal wound dehiscence in relation to type of Incision.**

The most common surgery that preceded the onset of abdominal wound dehiscence was midline laparotomy with ileostomy, accounting for 30% of cases followed by appendectomy, which occurred in 27% of cases. This data is graphically represented in Figure 7.

Table 7: Various abdominal procedures leading to abdominal wound dehiscence

Procedure	No of cases	Percentage
Perforation closure	17	17%
Appendectomy	27	27%
Laparotomy with stoma	30	30%
Resection anastomosis	8	8%
Adhesiolysis	5	5%
Others	13	13%
Total	100	100%

**Figure 7: Various abdominal procedures leading to abdominal wound dehiscence**

Patients included in this study had been operated for diverse surgical conditions, most common being hollow viscus perforations in 54% patients. This has been represented graphically in Figure 8.

Table 8: Distribution of patients according to intra-abdominal pathology

Intra-abdominal pathology	No of patients	Percentage
Hollow viscus perforation	54	54%
Intestinal obstruction	10	10%
Acute Appendicitis	15	15%
Malignancy	8	8%
Traumatic spleen and liver injury	4	4%
Hernia	2	2%
Others	7	7%

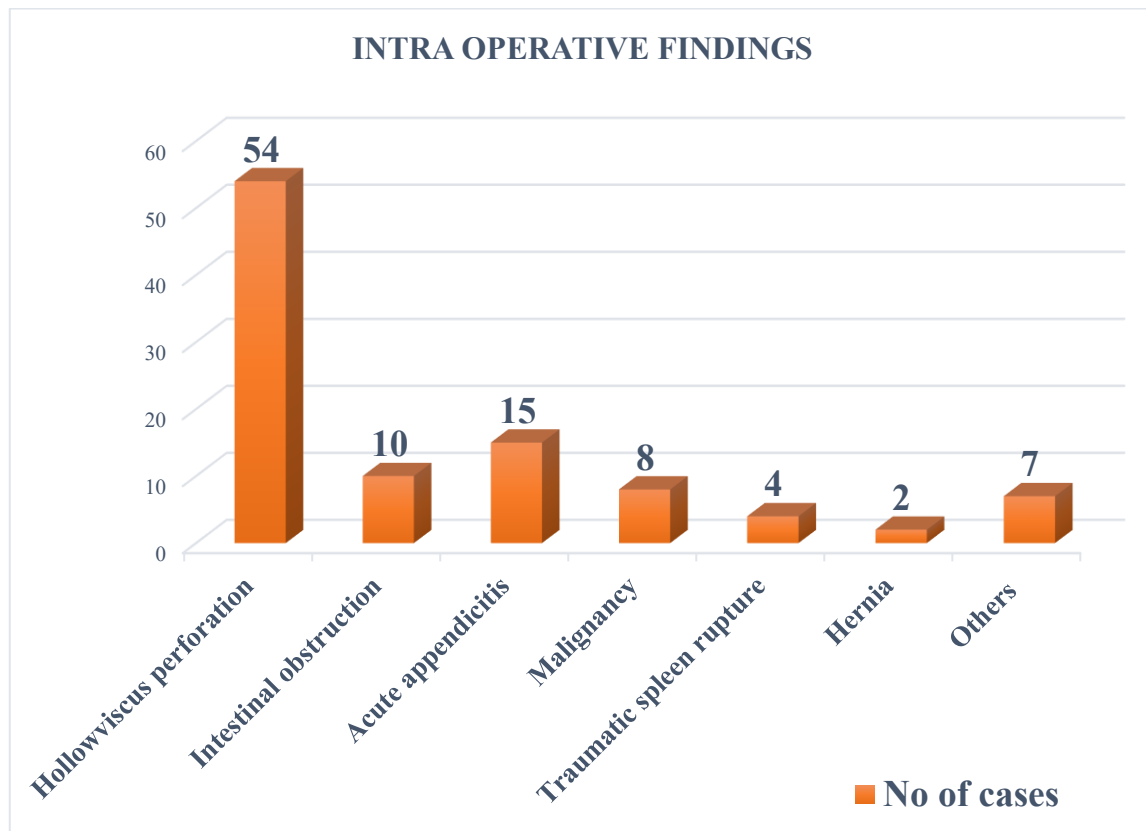


Figure 8: Distribution of patients according to intra-abdominal pathology

Out of 100 patients in our study in 98% patients the incision was closed in layers and only in 2% patients mass closure was done.

Table 9: Distribution of patients according to type of closure of incision.

Type of closure	No of patients	Percentage
Layered closure	98	98
Mass closure	2	2
Total	100	100

In our study, PDS loop suture was found to be most commonly associated with abdominal wound dehiscence (41%). This has been represented graphically in Figure 9.

Table 10: Distribution of patients according to Type of suture used.

Type of suture	No of patients	Percentage
Poly-dioxanone(PDS)p	41	41%
Polypropylene (Prolene)	31	31%
Polyglactin 910 (Vicryl)	26	26%
Silk	2	2%
Total	100	100%

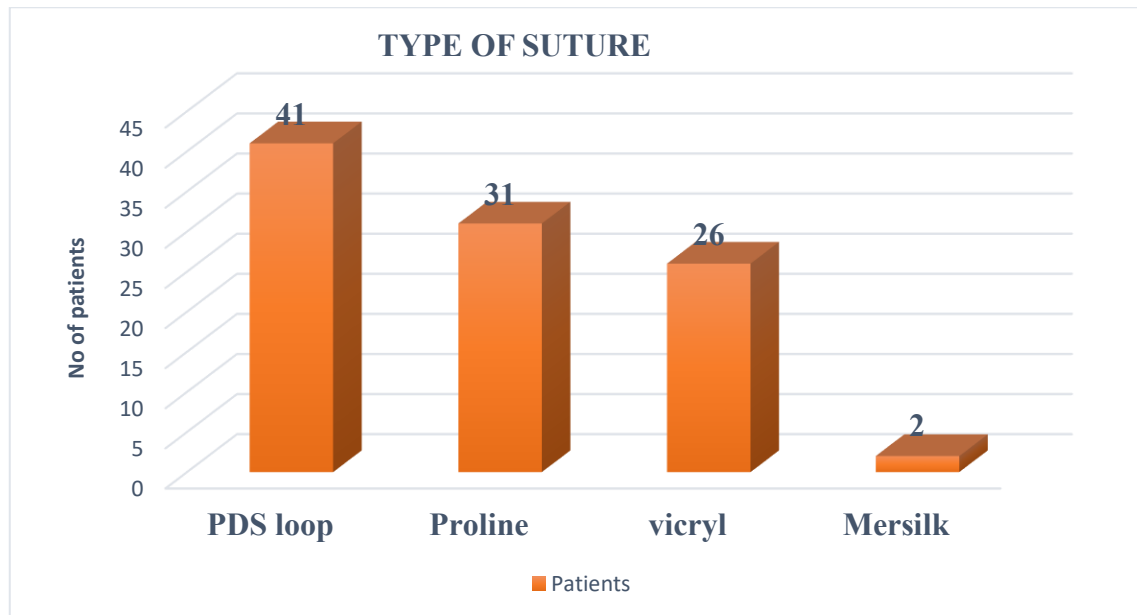


Figure 9: Distribution of patients according to type of suture used.

In our study with wound dehiscence skin was closed primarily in 97% patients while in 3% patients delayed primary closure was done.

Table 11: Skin closure in abdominal wound dehiscence

Skin closure	No of patients	Percentage
Primary closure	97	97%
Delayed closure	3	3%
Total	100	100%

We also studied Surgeon factor in relation to abdominal wound dehiscence.

Maximum number of patients who developed abdominal wound dehiscence were operated by surgeon (experience <10 years) i.e. 84% and least was seen when operated by surgeon (experience >10 years) i.e. 16%. This has been represented graphically in Figure 10.

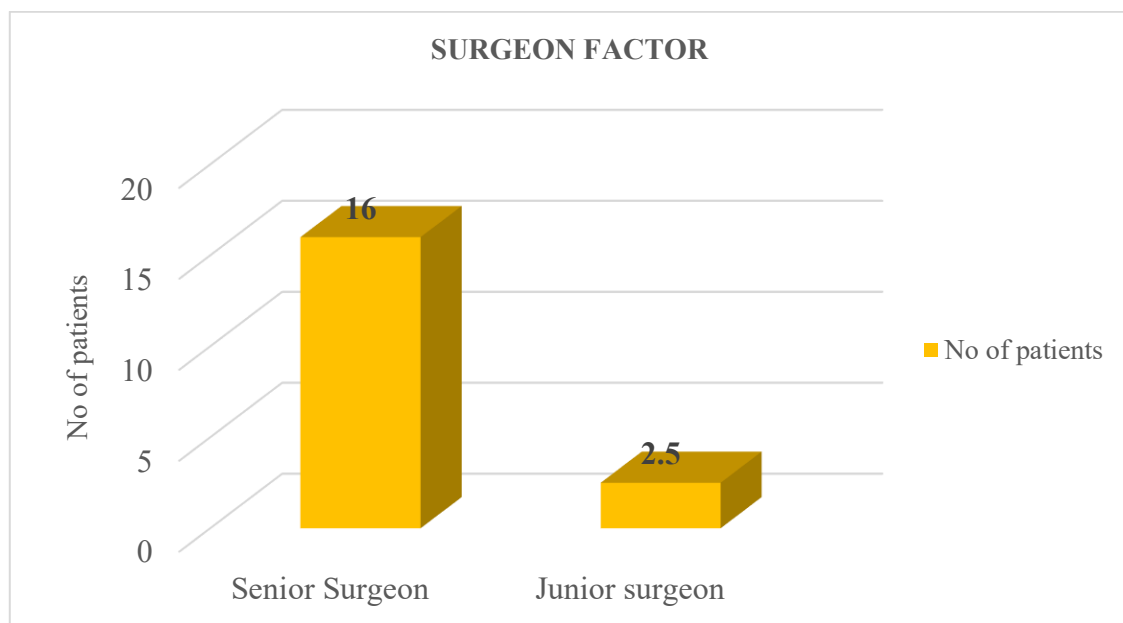


Figure 10: Distribution of patients according to Surgeon factor

Maximum number of patients with Abdominal wound dehiscence was found in Obese patients, i.e. BMI between 25-30 (54%). After that abdominal wound dehiscence was mostly seen in patients who were underweight i.e. BMI <18 (32%), and least common was in patients with average weight or well-nourished i.e. BMI 18-25 (14%). These results have been represented graphically in Figure 11.

Table 12: Distribution of patients according to BMI

BMI	No of patients	Percentage
<18	32	32%
18-25	14	14%
25-30	54	54%

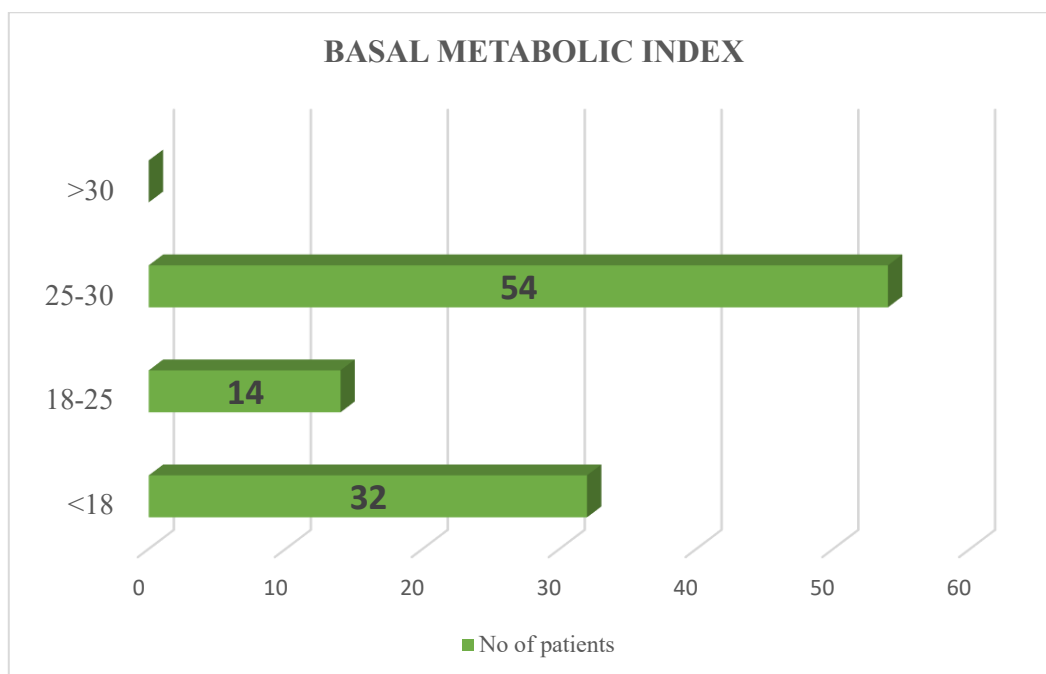


Figure 11: Distribution of patients according to BMI

In our study out of 100 patients 71 (71%) patients were anemic with Hb <10 and rest had normal Hb levels i.e. >10 (29%). This has been shown graphically in Figure 13.

Table 13: Prevalence of abdominal wound dehiscence in relation to anemia

Hb	No of patients	Percentage
<10	71	71%
>10	29	29%
Total	100	100%

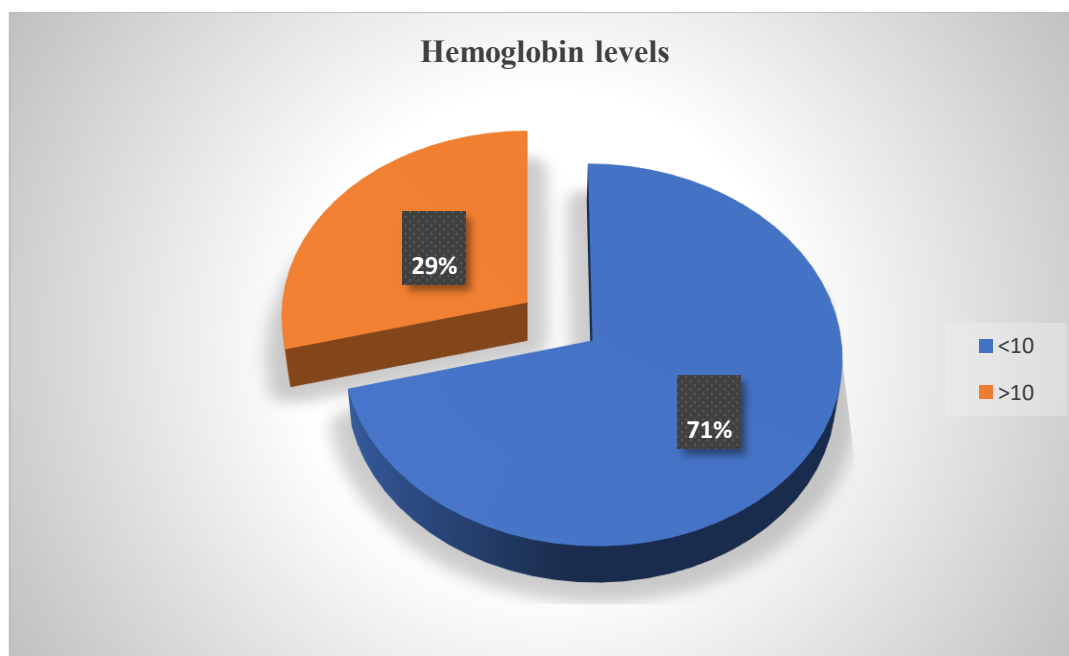


Figure 12: Prevalence of anemia in patients with abdominal wound dehiscence

Hypoalbuminemia was an important risk factor for abdominal wound dehiscence. About 60% patients had low albumin levels i.e. <3.5. This has been represented graphically in Figure 14.

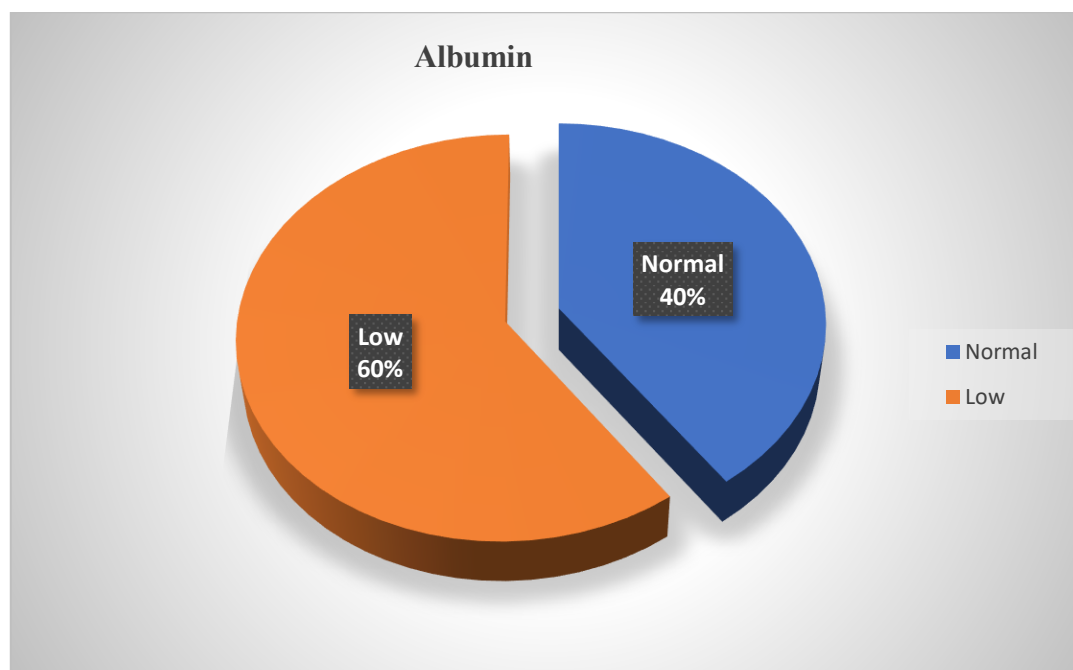


Figure 13: Prevalence of abdominal wound dehiscence in relation to albumin level

Only in 14% patients with wound dehiscence serum bilirubin levels were raised. This has been represented graphically in Figure 15.

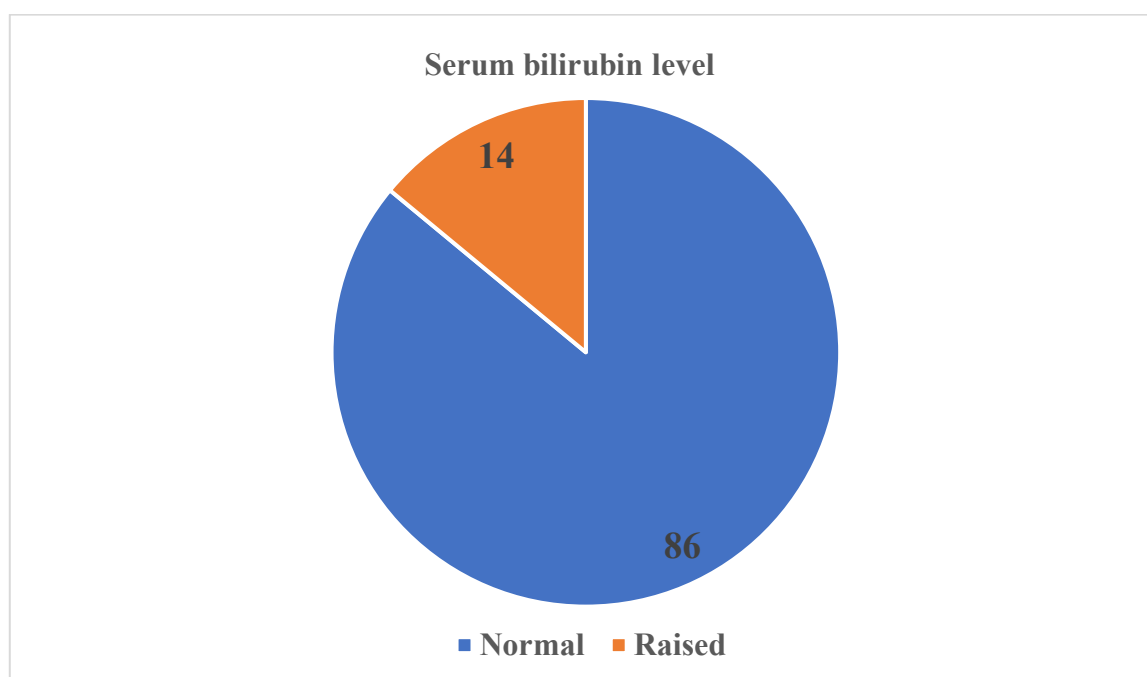


Figure 14: Prevalence of abdominal wound dehiscence in relation to S. bilirubin levels

Out of total of 100 patients 9% patients had Diabetes mellitus, 4% had hypertension, 6% had Malignancy, 4% had history of ATT intake, 8% had Ascites, 16% had Malnutrition and in 53% patients there was no comorbidity. This has been represented graphically in Figure 16.

Table 14: Comorbid conditions associated with abdominal wound dehiscence

Comorbidity	No of patients	Percentage
Diabetes Mellitus	9	9%
Hypertension	4	4%
Malignancy	6	6%
ATT intake	4	4%
Ascites	8	8%
Malnutrition	16	16%
No Comorbidity	53	53%

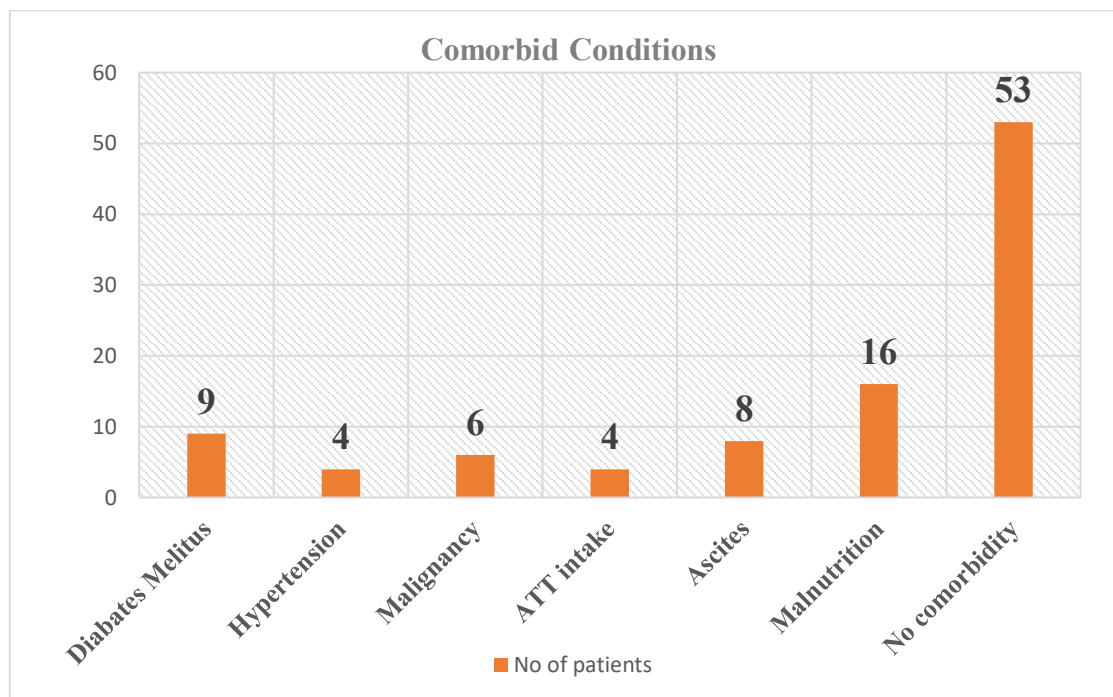


Figure 15. Comorbid conditions associated with abdominal wound dehiscence

Discussion

Abdominal wound dehiscence is a common complication following abdominal surgeries. Dermal separation primarily affects cosmetic outcomes, whereas abdominal wall failure can be life-threatening.

Majority of patients in our study belonged to the age group between 46-55 yrs. The mean age of patients in our study group was 46.37 years. Similar findings have been seen by Waqar SH *et al.*,^[10] who found the mean age to be 39.67. Spiliotis J *et al.*, in their study found mean age to be 69.5 years^[11].

Advanced age is an independent risk factor for abdominal wound dehiscence, as noted in other studies. This may be due to the decline in tissue repair mechanisms in older individuals. During the initial days of the wound healing process, the immune system is crucial, and age-related functional changes can negatively impact the influx of cells and compounds essential for tissue repair.

One interesting risk factor identified in our study is gender. Male sex was most commonly associated with wound dehiscence (70%) than females (30%). The male to female ratio was 2.3:1. Similar results have been seen in following studies

Table no 15. Showing comparison of male to female ratio in different studies.

Sex	Spiliotis J <i>et al.</i> , ^[11]	Penninckx FM <i>et al.</i> , ^[12]	Van Ramshorst GH <i>et al.</i> , ^[13]	Present Study
Male	9 (60%)	88 (75%)	272 (75%)	70 (70%)
Female	6 (40%)	29 (25%)	91 (25%)	30 (30%)

In our study patients undergoing emergency surgeries were more prone to develop abdominal wound dehiscence (87%). while in case

of elective surgeries only (13%) developed abdominal wound dehiscence. Similar results have been shown in following studies

Table 16: Showing comparison of abdominal wound dehiscence in different type of surgeries in different studies.

Type of surgery	Spiliotis J <i>et al.</i> , ^[11]	Afzal S <i>et al.</i> , ^[14]	Waqar SH <i>et al.</i> , ^[10]	Present Study
Emergency	60%	90%	72%	87%
Elective	40%	10%	28%	17%

In our study abdominal wound dehiscence was mostly seen between 4th – 7th post op day, with highest incidence on 6th post operative

day. Similar results have been seen in following studies

Table no 17: Showing comparison of the day of start of abdominal wound dehiscence

Day of wound Dehiscence	Van Ramshorst GH <i>et al.</i> , ^[13]	Spiliotis J <i>et al.</i> , ^[11]	Present study
Mean post op day	9th Day	9th day	4th day
Range	0-32 days	6th -15th day	4th – 6th day

In our study we found that 44% patients who developed wound dehiscence were operated during late hours (12:00am- 8:00am) similar results have been shown by Gislason H *et al.*,^[15] Niggebrugge AH *et al.*,^[16] Pavlidis TE *et al.*,^[17] Webster C *et al.*,^[18] and Swaroop M *et al.*,^[19]. It was observed that patients who had undergone emergency surgery during late hours were generally nutritionally depleted and the chance of contamination of the surgical field was higher than as compared to elective surgeries at

day time. The performance of the surgeon could be affected at night, which could lead to suboptimal closure of the abdomen at the end of the operation.

Patients opened with vertical midline incisions had highest incidence of abdominal wound dehiscence (63%). This is consistent with other studies where a midline incision at a higher risk of dehiscence than other incisions. Parmar G *et al.*,^[20] and Lozada Hernández EE *et al.*,^[21].

The most common surgery that preceded the onset of abdominal wound dehiscence was midline laparotomy with ileostomy, accounting for 30% of cases. Waqar SH *et al.*,^[10] similarly identified ostomy as a risk factor in their study. Additionally, Riou JP *et al.*,^[4] have also reported creation of an ostomy as a risk factor for burst abdomen.

In our study 98% wound dehiscence were reported in patients where incision was closed in layers and it was 2% where incision was closed as mass closure. This finding is consistent with systematic reviews by Ceydeli A *et al.*,^[22] and Cengiz Y *et al.*,^[23] who concluded that mass closure should be the standard.

In our study maximum no of wound dehiscence were seen with PDS loop (41%). Tolstrup MB *et al.*,^[8] and Pandey S *et al.*,^[7] stated in their study that polypropylene was better than polydioxanone 910. It was found in our study that 97% patients who developed wound dehiscence skin was closed primarily while in 3% delayed primary closure was done but no benefit was seen, Chiang RA *et al.*,^[24] in his study found PC 38.9% vs. DPC 2.9% and Duttaroy DD *et al.*,^[25] in their study found the incidence of abdominal dehiscence to be PC 42.5% vs. DPC 2.7%. However, both studies included early wound failures that were not recorded as such and the closure period was extended indefinitely, making the closure technique more secondary rather than delayed primary.

In our study, DPC did not prove effective in lowering SSI incidence. On the contrary, the SSI rate was higher in patients who underwent DPC compared to those in the PC group. This finding is consistent with the work of Chatwiriya Charoen W (26) who recorded an SSI incidence of 9.1% in the PC group versus 27.3% in the DPC group. Bhangu A *et al.*,^[6] also indicated that DPC was not superior to PC.

Surgical technique and the surgeon's experience play a pivotal role in preventing wound dehiscence. In our study maximum no of patients who developed wound dehiscence were operated by surgeon with < 10yrs (84%) as compared to (18%) patients who were operated by surgeon with more than 10 yrs experience. Similar results were shown by Campuzano TIJ *et al.*,^[27]

Most of the patients who developed wound dehiscence in our study were having peritonitis secondary to hollow viscus perforation (54%) Peritonitis has been identified as a significant risk factor for burst abdomen, likely due to its role in causing sepsis-induced anemia and wound infection. This finding is supported by previous studies. Jaiswal NK *et al.*,^[28] reported that 56% of cases involved peritonitis while Parmar G *et al.*,^[20] noted that most patients (53.3%) had gastrointestinal perforation.

Obesity is another important predisposing factor. In our study 54% patients of abdominal wound dehiscence were obese (BMI – 25-30). Kapoor *et al.*,^[29] also showed similar findings in their study.

In our study 60% patients had low albumin levels (<3.5). This finding is consistent with previous studies of Parmar G *et al.*,^[20] where the incidence of hypoalbuminemia was found to be 46.6%.

In our study 14 % patients had serum bilirubin levels >1.5 and was not significant. This finding is similar to study done by Afzal S *et al.*,^[14]. However, some studies have listed jaundice as a major risk factor for dehiscence Van Ramshorst GH *et al.*,^[13]

In our study 9% patients had Diabetes mellitus. Mahey R *et al.*,^[30] found that diabetes mellitus was the most common comorbid condition found in 42% of patients who had wound dehiscence.

Incidence of diabetes reported as cause of wound dehiscence is 29% by Jaiswal NK *et al.*,^[28] 17.86% incidence by Choudhury A *et al.*,^[31]. However, Van Ramshorst GH *et al.*,^[13] found that diabetes was an insignificant risk.

Conclusion

Wound dehiscence is an Achilles heel for operating surgeon keeping in view the morbidity, increased hospital stays, costly medical expenses, time lost to work, disabilities with future incisional hernia formation and mortality associated with abdominal wall dehiscence, the risk factors should be identified, preoperative optimisation done, corrective measures taken while closing abdomen and standard protocols are to be followed

Declarations

Acknowledgements

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Conflict of interest

I have no conflicts of interest

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Ethical Clearance

Done

Trial details

Not applicable

References

- [1] Carlson MA. Acute wound failure. Surg Clin North Am. 1997; 77:607–636. doi:10.1016/S0039-6109(05)70571-5.
- [2] Savage A, Lamont M. Oxford textbook of surgery. Alison Langton; 2000. Wound dehiscence, incisional hernia, and parastomal hernia; p. 1883.
- [3] Wong SY, Kingsnorth AN. Abdominal wound dehiscence and incisional hernia surgery. Surg (Oxford). 2002;20(5):100–3.

- [4] Riou JP, Cohen JR, Johnson H Jr. Factors influencing wound dehiscence. *Am J Surg.* 1992; 163:324–30.
- [5] Webster C, Neumayer L, Smout R, *et al.* Prognostic models of abdominal wound dehiscence after laparotomy. *J Surg Res.* 2003; 109:130–7.
- [6] Bhangu A, Singh P, Lundy J, Bowley DM. Systematic review and meta-analysis of randomized clinical trials comparing primary vs. delayed primary skin closure in contaminated and dirty abdominal incisions. *JAMA Surg.* 2013; 148:779–86.
- [7] Pandey S, Singh M, Singh K, Sandhu S. A prospective randomized study comparing non-absorbable polypropylene and delayed absorbable polyglactin 910 suture material in mass closure of vertical laparotomy wounds. *Indian J Surg.* 2013; 75:10–4.
- [8] Tolstrup MB, Watt SK, Gögenur I. Reduced Rate of Dehiscence After Implementation of a Standardized Fascial Closure Technique in Patients Undergoing Emergency Laparotomy. *Ann Surg.* 2017
- [9] Dugar D, Goel S. Intra-abdominal pressure measurement as a predictor of postoperative wound complications in patients undergoing emergency laparotomy: A prospective observational study. *Cureus.* 2024 Feb 25;16(2): e54860.
- [10] Waqar SH, Malik ZI, Razzaq A, Abdullah MT. Frequency and risk factors for wound dehiscence/burst abdomen in midline laparotomies. *J Ayub Med Coll Abbottabad.* 2005; 17:70–73. (Regional journal — DOI not found).
- [11] Spiliotis J, Tsiveriotis K, Datsis AD, *et al.* Wound dehiscence: is still a problem in the 21th century: a retrospective study. *World J Emerg Surg.* 2009; 4:12. doi:10.1186/1749-7922-4-12.
- [12] Penninckx FM, Poelmans SV, Kerremans RP, *et al.* Abdominal wound dehiscence in gastroenterological surgery. *Ann Surg.* 1979; 189:345–352. doi:10.1097/0000658-197903000-00016.
- [13] Van Ramshorst GH *et al.*, Van Ramshorst GH, Nieuwenhuizen J, Hop WC, *et al.* Abdominal wound dehiscence in adults: development and validation of a risk model. *World J Surg.* 2010; 34:20–27. doi:10.1007/s00268-009-0277-y.
- [14] Afzal S *et al.*, Afzal S, Bashir MM. Determinants of wound dehiscence in abdominal surgery in public sector hospital. *Ann King Edward Med Univ.* 2008; 14:110–115. (PDF on journal site — DOI not available).
- [15] Gislason H, Grønbech JE, Søreide O. Burst abdomen and incisional hernia after major gastrointestinal operations — comparison of three closure techniques. *Eur J Surg.* 1995; 161:349–354. (PubMed indexed — DOI not listed).
- [16] Niggebrugge AH, Hansen BE, Trimpos JB, *et al.* Mechanical factors influencing the incidence of burst abdomen. *Eur J Surg.* 1995; 161:655–61.
- [17] Pavlidis TE, Galatianos IN, Papaziogas BT, *et al.* Complete dehiscence of the abdominal wound and incriminating factors. *Eur J Surg.* 2001; 167:351–354. doi:10.1080/110241501750215221.
- [18] Webster C, Neumayer L, Smout R, *et al.* Prognostic models of abdominal wound dehiscence after laparotomy. *J Surg Res.* 2003; 109:130–137. doi:10.1016/S0022-4804(02)00097-5.
- [19] Swaroop M, Williams M, Greene WR, *et al.* Multiple laparotomies are a predictor of fascial dehiscence in the setting of severe trauma. *Am Surg.* 2005; 71:402–5.
- [20] Parmar G, Gohil A, Hathila V. Burst abdomen: a grave postoperative complication. *Internet J Surg.* 2008; 20:1–8. (Internet Journal — DOI not listed).
- [21] Lozada Hernández EE *et al.*, (2013) Abdominal wound dehiscence and incisional hernia prevention in midline laparotomy: a systematic review and network meta-analysis. *Langenbecks Arch Surg.* 2023 Jul 7;408(1):268. doi: 10.1007/s00423-023-02954-w. PMID: 37418033.
- [22] Ceydeli A, Rucinski J, Wise L. Finding the best abdominal closure: an evidence-based review of the literature. *Curr Surg.* 2005;62:220–225. doi:10.1016/j.cursur.2004.08.014.
- [23] Cengiz Y, Gislason H, Svanes K, Israelsson LA. Mass closure technique: an experimental study on separation of wound edge. *Eur J Surg.* 2001; 167:60–63. doi:10.1080/110241501750069846
- [24] Chiang RA, Chen SL, Tsai YC. Delayed primary closure versus primary closure for wound management in perforated appendicitis: A prospective randomized controlled trial. *J Chin Med Assoc.* 2012; 75:156–9.
- [25] Duttaroy DD, Jitendra J, Duttaroy B, Bansal U, Dhameja P, Patel G, *et al.* Management strategy for dirty abdominal incisions: Primary or delayed primary closure? A randomized trial. *Surg Infect (Larchmt).* 2009; 10:129–36.
- [26] Chatwiriacharoen W. Surgical wound infection post-surgery in perforated appendicitis in children. *J Med Assoc Thai.* 2002; 85:572–6.
- [27] Campuzano TIJ, López JDS, Malagón L *et al.*, Risk factors and management of wound dehiscence in abdominal surgery. *Int J Med Sci Clin Res Stud.* 2023;3(11):10–16.
- [28] Jaiswal NK *et al.*, (29) Jaiswal NK, Shekhar S. Study of burst abdomen: its causes and management. *Int Surg J.* 2018;5:1035–1040. doi:10.18203/2349-2902.isj20180826.
- [29] Kapoor K, Hassan M. A clinical study of abdominal wound dehiscence with emphasis on surgical management in Bangalore Medical College and Research Institute, Karnataka, India. *Int Surg J.* 2017; 4:134–140. doi:10.18203/2349-2902.ISJ20164078.
- [30] Mahey R *et al.*, (Mahey R, Ghetla S, Rajpurohit J, Desai D, Suryawanshi S. A prospective study of risk factors for abdominal wound dehiscence. *Int Surg J.* 2016; 4:24–8.
- [31] Choudhury A *et al.*, (33 Choudhury A, Deka RK, Gogoi B, Kumar N. A clinical study of abdominal wound dehiscence including its causes and management. *J Evol Med Dent Sci.* 2017; 6:1519–23.



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