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## The evaluation of risk factors in abdominal wound dehiscence

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### Abstract

**Background:** The partial or complete disruption of an abdominal wound is described as wound dehiscence; which could be complete or partial depending on the extent of separation. This study aims to analyze the risk factors for wound dehiscence, several clinical presentations and post-surgical complications following laparotomy.

**Methods:** A record of 50 patients who underwent major abdominal surgery were analyzed. The data on patient characteristic, cause for laparotomy, type of surgery performed, type of sutures and post-operative complications were recorded and analyzed using SPSS16.00 program. Significance was determined as  $p < 0.05$ .

**Results:** Out of 50 patients, 35 were male (70%), 31 patients aged >50 years. Smoking considered as a considerable patient factor ( $n=60\%$ ). Wound dehiscence incidence was high in patients undergoing laparotomy for perforation. Incidence was higher in emergency surgeries (37 patients). Wound infection was commonest complication followed by seroma formation.

**Conclusion:** The incidence of wound dehiscence, morbidity in terms of prolonged hospital stay and increased economic burden on health care resources can be reduced by highlighting the risk factors, incidence rate and remedial measures for prevention of wound dehiscence.

**Keywords:** Wound dehiscence, laparotomy, abdominal surgery

### Introduction

Abdominal wound dehiscence (burst abdomen/fascial dehiscence) is considered as a severe post-operative complication following abdominal surgeries. It is considered as the most dreaded complication faced by general surgeons, which needs immediate intervention<sup>[1]</sup>.

The mean time for wound dehiscence is 3-7 days. Incidence of wound dehiscence occurs in 0.4-1.2 % patients after elective laparotomies<sup>[2]</sup> while rates upto 12% observed after emergency laparotomy<sup>[2]</sup>.

Despite improved surgical techniques, the prevalence of wound dehiscence has increased over the past century attributing to the pre-operative patient factors<sup>[3]</sup>.

Hence, sound knowledge of pre-operative risk factors such as malnutrition (anaemia, hypoalbuminemia, hyperbilirubinemia, age >50 years), systemic disease (COPD, diabetes, chronic kidney disease) is mandatory.

Several clinical presentations of wound disruption ranging from a pink sero-sanguinous discharge from the wound to patient having a sudden "give away" feel occur. Thereby, in all cases the wound needs to be thoroughly examined for presence of any boggy swelling or any haematoma post-operatively signifying abdominal wall dehiscence<sup>[4]</sup>.

This study aims to study factors affecting surgical wound healing leading to incidence of wound dehiscence in post-operative period.

### Material or Methods

50 patients who underwent laparotomy for abdominal surgeries in JSS Hospital, Mysuru over a period of 18 months were included in this study. Patients were followed for a period of 30 days postoperatively.

### Inclusion criteria

Patients aged >18 years undergoing laparotomy both elective and emergency.

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**Exclusion criteria**

1. Age <18 years were excluded from the study.
2. Patients not willing for regular follow up.

**Statistical Analysis**

1. Descriptive statistics
2. Repeated measures
3. Cross tabulations
4. Independent samples “t” test

All statistical methods were carried out through SPSS version 16.00

P value <0.05 was considered statistically significant.

**Results**

In our study of 50 patients, majority of them were male gender with 31 patients more than 50 years of age. Diabetes was a significant risk factor in patients with wound dehiscence. Anaemia accounted for 30 patients with Hb<12gm%. Smoking was an elusive risk factor in 30 patients out of 50.

21 patients underwent surgery with perforation of the bowel as the underlying cause ( $P < 0.005$ ). Emergency laparotomies were performed in 37 patients. Midline incisions were preferred over other incisions. 40 patients out of 50 underwent continuous fascial closure.

Wound infection rates were 28% reported in 14 patients ( $p < 0.005$ ).

18 patients underwent re -surgery accounting for re-laparotomy (10%) and secondary suturing (13%).

**Discussion**

Complications of wound dehiscence and wound infection in patients undergoing abdominal surgery lead to increase in morbidity, mortality and length of total hospital stay.

In our study, the incidence of wound dehiscence was higher in males accounting for 35 patients out of 50. In a study conducted by Pennick FIV *et al.* in 1979, analysis of 4538 patients undergoing abdominal surgery also shared male predominance<sup>5</sup>. Incidence of post- operative complications were higher in patients >50 years of age signifying poor healing capacity due to age related changes.

Amongst the pre-operative factors, anemia (Hb<12 gm%) was one of the prime factor for wound dehiscence ( $p < 0.05$ ).

22 out of 50 patients had diabetes which signifies a major co-morbidity for poor wound healing and surgical site infection. Hypo-proteinemia is considered as a risk factor for delayed post-operative recovery and wound healing. Due to acute presentation of majority of cases and manifestations of hypoproteinemia mainly in chronic diseases. Only 6 patients of 50 recorded hypoproteinemia.

As majority of the cases studied were of acute intra-abdominal infection, leukocytosis (33 out of 50 patients) was a known indicator for wound dehiscence.

Chronic kidney disease and elevated creatinine levels have a negative influence on wound healing. In our study, 6 out of 50 patients had elevated creatinine levels but were not on renal dialysis. Hence it was difficult to comment upon the relation of chronic kidney disease and wound healing.

Oxygen is essential component for wound healing. Post-

operative hypoxia has been noted in COPD patients. In our study, COPD was not considered as a major risk factor.

Due to majority of cases in the study being acute presentation and early presentation of patients in sepsis, steroid intake was not considered as a significant risk factor ( $P < 0.05$ ).as shown in table no1.

Technique of abdominal wall closure, presence of intra-abdominal sepsis and general condition of patient all have influences on healing. 74% of cases in the study underwent emergency surgeries. Perforation was the major etiology for laparotomy followed by malignancy (30% cases). Ischemia and gangrene of bowel accounted for least number of cases.

Inregard to type of incision affecting early post -operative wound complication has remained a subject of debate for over a long time. In a study by Cohrane a review of randomized controlled trials compared midline and transverse incisions and revealed a lower trend of wound dehiscence with transverse incision<sup>[6]</sup>.

**Table 1:** Patient Factors

Hyperbilirubinemia	Yes	4	8
	No	46	92
Hypoproteinemia	Yes	6	12
	No	44	88
COPD	Yes	9	18
	No	41	82
Chronic Steroid Use	Yes	4	8
	No	46	92
Leucocytes	Normal (<11000)	17	34
	High (>11000)	33	66
Intraabdominal			
Malignancy	Yes	17	34
	No	33	66
Chronic Kidney Disease	Yes	6	12
	No	44	88
Smoking	Yes	30	60
	No	20	40

In our study transverse abdominal incision were the least in number although they appear to be the most natural and “anatomic” as dissection through aponeuroticfibres are done in a parallel fashion hence bearing integrity of contracting apparatus intact.

In a systematic review by Burger *et al.* [7], para median incision was compared to midline incision and incisional hernia rates were higher with midline incision. In our study, 40 patients underwent midline laparotomy and had a significant ( $p < 0.005$ ) post-operative wound dehiscence incidence. In order to achieve a quick and complete access to intra-abdominal organs while commencing emergency and exploratory procedures, midline incisions are preferred.

For a long time, over decades, mass closure had been advocated for midline laparotomies. In a comparative trial using stitches with a SL: WL (suture length: wound length) ratios of 4 or even more reduces the incidence of incisional hernia [8].

In our study 40 cases underwent continuous closure of abdominal layers as shown in table no 2. Layered closures (separate components sutured separately) are associated with longer operation time and increased wound dehiscence as compared to mass closure.

**Table 2: Surgical Properties**

<b>Resection &amp; Anastomosis</b>		
(Malignant)	16	32
Time of Surgery:		
Elective	13	26
Emergency	37	74
<b>Retention Sutures:</b>		
Yes	15	30
No	35	70
Location of Incision		
Upper Abdominal Incision	22	44
Lower Abdominal Incision	28	56
<b>Fascial Closure Technique</b>		
Separate	10	20
Continuous	40	80
<b>Abdominal Incision Type</b>		
Above Umbilicus Median	20	40
Below Umbilicus Median	20	40
Sub costal	2	4
Paramedian	5	10
Transverse	3	6

In a study conducted by Zhamak Khorgam Saeed Shoar *et al.* at Shariah Hospital, Tehran University concluded that prophylactic retention sutures reduce the occurrence of wound dehiscence in high risk patients with multiple risk factors [9].

In our study 15 patients underwent prophylactic retention sutures for abdominal wound closure.

In cases of perforation and extra abdominal sepsis wound infection is a common complication of laparotomy wounds which can lead to wound dehiscence and incisional hernias. In our study, there were a total of 14 cases of wound infection and 6 cases of wound dehiscence. All were subsequently treated by thorough wound toileting, antibiotics and secondary closure when needed.

In a prospective study by Mohamed Abdul Retha, Thiaqar University of 150 cases, concluded that prophylactic retention sutures can decrease the incidence of abdominal wound dehiscence [10].

Re-laparotomies and old incision length causes problem in wound healing and abdominal closure. In our study 13 patients underwent secondary suturing and (5 out of 50) underwent re-laparotomy and fascial closure as shown in table no 3.

**Table 3: Surgical Complications**

<b>Seroma Formation</b>		
Yes	7	14
No	43	86
<b>Wound Infection</b>		
Yes	14	28
No	36	72
<b>Wound Dehiscence</b>		
Yes	6	12
No	44	88
<b>Skin Ulceration</b>		
Yes	4	8
No	46	92
<b>Resurgery</b>		
Relaparotomy & Fascial Closure	5	10
Secondary Suturing	13	26
Mortality	2	4

Wound dehiscence is a devastating incident that causes pain, mental disorder, infections, complications and financial burden for the patient. Several predisposing factors mentioned in the

above study have been suggested to predispose patients to abdominal wall dehiscence. Due importance has to be given to the pre-operative care of the patient including the nutritional status of patient in order to lower the incidence of abdominal wall dehiscence. Due to incidence of post-operative pain and skin maceration, routine application of retention sutures have been avoided.

As our study suggests, patient selection amongst the high risk population with multiple risk factors is a prudent approach for prevention of wound dehiscence.

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**Declarations:** None

**Conflicts:** None

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