



## General Surgery

## A CLINICAL STUDY OF ABDOMINAL WOUND DEHISCENCE AND ITS MANAGEMENT IN A TERTIARY CARE CENTRE

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**ABSTRACT**

**INTRODUCTION:** Infection has always been a feature of human life and sepsis in modern surgery continues to be a significant problem for health care practitioners across the globe. Surgical site infection (SSI) is one of the most common hospital acquired types of infection. Abdominal wound dehiscence (burst abdomen, fascial dehiscence) is a severe postoperative complication, with mortality rates reported as high as 20%. Incidence as described in literature ranges from 0.4% to 3.5%. Various risk factors are responsible for development of wound dehiscence. Once dehiscence is diagnosed, treatment depends on the extent of fascial separation and the presence of evisceration or significant intra abdominal contamination. We have done this study 1) To identify the disease involved in causing abdominal wound dehiscence, 2) To assess the association and prevalence of risk factors involved in causing abdominal wound dehiscence and 3) To formulate a protocol in the prevention of wound dehiscence and to effectively manage cases of abdominal wound dehiscence.

**AIM AND OBJECTIVES:** To identify the disease involved in causing abdominal wound dehiscence.

To assess the association and prevalence of risk factors involved in causing abdominal wound dehiscence.

To formulate a protocol in the prevention of wound dehiscence and to effectively manage cases of abdominal wound dehiscence.

**METHODS:** Among the 1000 cases that underwent elective and emergency Surgery at Vardhman Mahavir Medical College and Safdarjung Hospital, New Delhi 200 cases presented as gaping of abdominal wound and discharge from the site during the period of 18 months. 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 and type of surgery and postoperatively, study of diagnosis and day of diagnosis of wound dehiscence is done till the patient is discharged from the hospital.

**RESULTS:** Males outnumbered females with ratio of 4:1. Patients in the age group of 21-30 years and 41-50 years found to have highest incidence of abdominal wound dehiscence. Mean age of the patients affected was 39.02 years. Incidence of abdominal wound dehiscence was more common in patients who were operated in emergency (84%) than elective settings (16%). Incidence of abdominal wound dehiscence was more common in patients having their BMI > 25. Incidence of abdominal wound dehiscence was more common in patients with anaemia (Hb% < 10g%) (43%). Mean day of presentation was day 3.12 day.

**CONCLUSION:** Abdominal wound dehiscence is a preventable complication. The care to prevent dehiscence starts in the preoperative period and continues as long as the patient is admitted in the ward. Simple investigations may help to detect predisposing factors for dehiscence. The incidence of wound dehiscence was found to be 13.33%. Age of the patient more than 40 years was a significant risk factor for the development of dehiscence. Peritonitis or any other cause associated with intra-abdominal sepsis and Malignancy is associated with higher incidence of wound dehiscence. A significantly higher incidence of post operative wound dehiscence is seen in emergency patients. Postoperative abdominal wound dehiscence can be prevented by improving the nutritional status of the patient, strict aseptic precautions, improving patient's respiratory pathology to avoid postoperative cough and by proper surgical technique.

**KEYWORDS :****INTRODUCTION**

Infection has always been a feature of human life and sepsis in modern surgery continues to be a significant problem for health care practitioners across the globe. Surgical site infection (SSI) is one of the most common hospital acquired types of infection, which is caused by contamination, especially from the enteric endogenous viscous bacteria. Surgical site infection contributes greatly to the morbidity and mortality associated with surgery, along with sequelae of wound infection, like wound dehiscence and incisional hernia, can result in long term problems. Post operative wound infection has a significant impact on health resources and cost.<sup>[1]</sup>

Wound dehiscence is described as partial or complete disruption of an abdominal wound closure with or without protrusion and evisceration of abdominal contents. Dehiscence of wound occurs before cutaneous healing. Abdominal wound dehiscence (burst abdomen, fascial dehiscence) is a severe postoperative complication, with mortality rates reported as high as 20%. Incidence as described in literature ranges from 0.4% to 3.5%. Various risk factors are responsible for development of wound dehiscence such as emergency surgery, intra abdominal infection, malnutrition (hypoalbuminemia, anaemia), advanced age, systemic diseases, etc. Good knowledge of these risk factors is mandatory for prophylaxis. Patients identified as high risk benefit from close observation and early intervention.<sup>[2]</sup>

Abdominal wound dehiscence is a known complication of emergency laparotomy in Indian setup. The wound dehiscence rate reported in the international literature varies from 1% - 2.6%. In these cases, wound

dehiscence mostly occurs between the sixth and the eighth post operative day. In addition there is an increase in the cost of the care both in terms of increased hospital stay, nursing and manpower cost in managing the burst abdomen and its complication.<sup>[3]</sup>

Patients with abdominal wounds following perforation of viscus have a higher incidence of wound infection in post operative period than clean wounds. In case of abdominal surgery if peritoneal cavity is contaminated, wound sepsis is inevitable. Surgical site infection (SSI) is seen in about 15% of all hospital acquired infections and occurs in 10-30% of patients having gastrointestinal surgery.

SSI is common complication after any surgery. It has been classified as incisional SSI, and organ/space SSI. Incisional SSI is further classified into superficial incisional SSI and deep incisional SSI. Superficial incisional SSI is infection that involves skin and subcutaneous tissue of the incision whereas deep incisional SSI involves deeper plane of incision. Organ/space SSI involves any part of the organ or space that is being manipulated during an operation other than incision.

Preventive measures are actions or set of actions intentionally to reduce rate of SSI by reducing degree of bacterial contamination, or adjunctive measures to reduce or eliminate preventable risk factors according to SSI's pathophysiology. Preventive measures should be done in all phases of care (i.e., preoperative, intraoperative, and postoperative) as SSI decrease quality of life of the patients.<sup>[4]</sup>

**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. It is also called 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. 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).<sup>[4]</sup>

While advances have been made in infection control practices, including improved operating room ventilation, sterilization methods, barriers, surgical techniques and availability of antimicrobial prophylaxis, surgical site infections remain a substantial cause of morbidity and mortality among hospitalized patients. All surgical procedure should be standardized in their management of wound care. This should be ongoing process of improving methods and techniques.

## ETIOLOGIC FACTORS OF ABDOMINAL WOUND DEHISCENCE

Following are the factors responsible for wound dehiscence

- Technical error in fascial closure
- Emergency surgery
- Intra abdominal infections
- Malnutrition
- Advanced age
- Chronic corticosteroids use
- Wound complications (Hematoma –infection, seroma)
- Previous wound dehiscence
- Increased intra abdominal pressure (coughing, abdominal distension)
- Radiation therapy and chemotherapy, Systemic disease (uremia, diabetes Mellitus)

### PATIENT RELATED RISK FACTORS:

Age, Sex, Obesity, Anaemia, Diabetes, Malnutrition, Vascular diseases, chemotherapeutic agents, Wound infection, Uremia, Jaundice, Smoking, and Alcoholism

### SURGEON RELATED RISK FACTORS:

Direction of the incision, Location of the incision, Length of the incision, Suture material, Technique of closure, Placement of stomas and drains

### INTRA OPERATIVE RISK FACTORS:

Emergency surgery, Abdominal surgery, Length of operation (>6hrs), Intra abdominal infection

### POST OPERATIVE RISK FACTORS:

Prolonged ventilation, Post-operative elevation of intra abdominal pressure, Post-operative blood transfusion, Poor tissue perfusion (e.g. post-operative hypotension), Excessive patient coughing, Radiotherapy, Hydration.

## PREVENTIVE MEASURES FOR ABDOMINAL WOUND DEHISCENCE

Preventive measures include pre operative, operative (Incisions, Suture Materials) and post operative measures.

### The method of wound closure:

It is recommended that laparotomy incisions be closed by a continuous suture technique in one layer. With this, less foreign material and fewer knots are deposited and allow tension to adjust evenly along the suture line. Self-locking knots should be used for the anchor knot.

In vertical midline incisions, stitches should mainly include aponeurotic tissue and be placed at least 10mm from the wound edge. The length of each stitch should be less than 5cm; otherwise it will be associated with an unnecessary high rate of wound infection.

Incorporating peritoneum, muscle or subcutaneous fat in the suture is not necessary and may have deleterious effects. The surgeon should avoid excessive tension on the suture line.

Special emphasis is to be given to method of closure of skin as it can reduce SSI and AWD.

Wound infection: Important causative factor in cases of intra operative contamination.

## MANAGEMENT

Once dehiscence is diagnosed, treatment depends on the extent of fascial separation and the presence of evisceration or significant intra abdominal contamination.

A small dehiscence in proximal in aspect of upper midline incision can be managed conservatively by packing the wound with saline-moistened gauze and using an abdominal binder. In the event of evisceration, the eviscerated intestines must be covered by sterile, saline-moistened towel/paraffin gauze/urobag and preparations made to return to operation theater after fluid resuscitation. Treatment of infection is of critical importance before attempting closure. Measures like secondary suturing, Tension Suture, Bogota Bag, Urobag Laparostomy.<sup>[6-13]</sup>

## AIM AND OBJECTIVES

To identify the disease involved in causing abdominal wound dehiscence.

To assess the association and prevalence of risk factors involved in causing abdominal wound dehiscence.

To formulate a protocol in the prevention of wound dehiscence and to effectively manage cases of abdominal wound dehiscence.

## MATERIAL AND METHODS

A proper ethical clearance was taken before the start of the study. Among the 1000 cases that underwent elective and emergency Surgery at Vardhman Mahavir Medical College and Safdarjung Hospital, New Delhi 200 cases presented as gaping of abdominal wound and discharge from the site during the period of 18 months. Each case was examined clinically and properly in systematic manner and an elaborative study of history based on chief complaints, significant risk factors, investigations, time and type of surgery performed and postoperative events and day of onset of wound dehiscence. Following which management of these cases in Department of Surgery, Vardhman Mahavir Medical College and Safdarjung Hospital, New Delhi based on facility available here was done.

### Inclusion Criteria:

- Patients developing abdominal wound dehiscence after undergoing elective or emergency laparotomy procedures
- Patients of both the sex more than 12 yrs of age

### Exclusion Criteria:

- Patients less than 12yrs of age
- All patients with incisional Hernia.
- All patients with wound dehiscence on sites other than the abdomen.
- All female patients who developed wound dehiscence after undergoing any gynaecological procedures

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 and type of surgery and postoperatively, study of diagnosis and day of diagnosis 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. Intra operative findings noted and classification of surgical wounds done accordingly. The type of surgical procedure done was recorded.

## RESULTS AND OBSERVATIONS

### Age Wise Distribution

**Table -1: Incidence Of Abdominal Wound Dehiscence In Different Age Groups**

Age group	No. of Cases	Percentage (%)
20≤	28	14
21-30	44	22
31-40	32	16
41-50	44	22
51-60	28	14
61-70	24	12
Total	200	100.00

**Table – 2: Incidence Of Abdominal Wound Dehiscence In Different Gender**

Gender	No. of Cases	Percentage
Male	160	80%
Female	40	20%
Total	200	100.00%

**Table 3: Co Morbid Condition At The Time Of Admission**

Conditions	No. of Cases	Percentage
Intra-Abdominal Infection	132	66%
Malnutrition	84	42%
Anemia	86	43%
Diabetes(DM)	44	22%
Pulmonary disease	52	26%
CRF	24	12%
Malignancy	8	4%
Drug history	4	2%
Radiation	3	1.5%

**Table – 4: Effect Of Emergency Surgery In Development Of Abdominal Wound Dehiscence**

Surgery	No. of Cases	Percentage
Elective	32	16%
Emergency	168	84%
	200	100%

**Table – 5: Frequency Of Abdominal Wound Dehiscence In Relation To Type Of Incision**

Type of Incision	No. of cases
Upper midline	4
Midline (M)	136
Lower midline	12
Paramedian	4
Subcostal	8
Mc Burney's	36
	200

**Table – 6: Various Abdominal Procedures And Intra-abdominal Pathology Leading To Abdominal Wound Dehiscence.**

Procedure	No. of cases
Perforation closure	92
Resection and anastomosis	24
Appendicectomy	46
Malignancy	12
Blunt Trauma Abdomen	26
Total	200
Diagnosis	No. of cases
Hollow viscus perforation	92
Intestinal obstruction	24
Appendicitis	46
Malignancy	12
Blunt trauma abdomen	26
Total	200

**Table -7: Post Operative Day Of Wound Dehiscence**

Time in Days	No.of Patients	Percentage
D2	51	25.5%
D3	62	31%
D4	28	14%
D5	20	10%
D6	12	6%
D7	4	2%
D8	3	1.5%

**Table-8: Treatment**

Type of Wound Dehiscence	No. of Patients	Management
Partial Wound Dehiscence	64	Conservatively management (healing by secondary intension)
	72	Secondary suturing
Complete Wound Dehiscence	48	Conservative
	16	Tension Suturing

## DISCUSSION

Abdominal wound dehiscence (burst abdomen, fascial dehiscence) is a severe postoperative complication, with mortality rates reported as high as 45%. The incidence, as described in the literature, ranges from 0.4% to 3.5%. Abdominal wound dehiscence can result in evisceration, requiring immediate treatment. Prolonged hospital stay, high incidence of incisional hernia, and subsequent reoperations underline the severity of this complication. Despite advances in perioperative care and suture materials, incidence and mortality rates in regard to abdominal wound dehiscence have not significantly changed over the past decades. This may be attributable to increasing incidences of risk factors within patient populations outweighing the benefits of technical achievements. Several, mainly retrospective studies have been performed to identify risk factors for this complication, often presenting conflicting results. Unfortunately, multivariate analysis has only been performed in a minority of studies and in general on small numbers of patients especially in elective operations should be recommended to reduce or eliminate the risk, such as no tobacco use, no steroid use prior to surgery, careful control of the patients co morbidities like anaemia, malnutrition, obesity and cardiovascular or lung diseases. During the surgical procedures, measure to reduce the risk of infections and hypoxia in the tissue are the two most important factors for the postoperative wound healing process. The type of abdominal closure may play an important role. The tension free closure is recommended and a continuous closure is preferable. A midline incision is frequently used in abdominal surgery. It provides a relatively quick and wide access to the abdominal cavity and can be made with minimal damage to muscles, nerves and blood supply as these structures do not cross the midline. The ideal wound closure provides strength and barrier to infection. To achieve that goal closure should be fast, efficient, performed without tension/ischemia, comfortable to the patient, technically easier to surgeon and anaesthetic. Hence, one should follow the principles of wound closure.

In this present clinical study, 200 patients who developed abdominal wound dehiscence after operation in Vardhman Mahavir Medical College & Safdarjung Hospital were studied. A total of 200 cases among 1000 cases that underwent exploratory laparotomy were included in a study conducted in the period February 2019 - August 2020.

**Table -9 : Comparison Of Incidence Of Wound Dehiscence In Various Studies**

Author	No. of Patients	Wound dehiscence (%)
Riou JP et al <sup>14</sup>	31	1.1%
Khan MN et al <sup>14</sup>	406	7.8%
S.H.Waquer et al <sup>14</sup>	117	5.9%

In the present study males predominated the picture with the ratio of 4:1. This male predominance may be due to the higher incidence of peptic ulcer perforation and intestinal obstruction in male sex.

Elective midline exploratory laparotomy and its closure is a frequent performed procedure in any surgical unit worldwide and secure closure of a laparotomy incision remains an important aspect of any abdominal operation with the aim to avoid the postoperative morbidity and hasten the patient's recovery<sup>67</sup>. Emergency surgical procedures have higher risk of dehiscence than elective procedures as the patients undergoing surgery in emergency are in suboptimal condition, hemodynamically unstable, and the risk of contamination of surgical field is high.

Anaemia is a risk factor that is related to increased perioperative stress, blood transfusions, and decreased tissue oxygenation. The effect of anaemia on wound healing often is compounded by the associated hypovolemia or hypoxia. Anaemia and hypovolemia cause decreased tissue oxygenation causing impairment of wound healing by decrease in wound tensile strength.

In our study, 84(42%) out of 200 patients were malnourished at the time of surgery, making it a potent risk factor in the development of wound dehiscence. Diabetes is considered as one of the significant risk

factor in the present study as 44(22%) out of 200 patients were associated with diabetes. Diabetes has significant impact on all stages of wound healing. Moreover, diabetics are further more susceptible to infections. Granulocyte defects and local ischemia secondary to accelerated atherosclerosis and small vessel disease result in increased susceptibility to infection. This may increase the risk of developing dehiscence.

52(26%) out of 200 patients in our study were associated with pulmonary disease. Chest physiotherapy, tracheobronchial toilet will reduce the frequency of wound failure. Therefore post operative cough is considered as an independent risk factor. In our study, 8(4%) out of 200 cases who developed abdominal wound dehiscence were having a malignant disease. The average day of abdominal wound dehiscence was found to be 3.12 days.

Out of the 200 patients who developed abdominal wound dehiscence, 112 were managed conservatively, secondary suturing (SS) was done in 72 patients and the remaining 16 were managed with tension suturing (TS).

#### Protocol In The Prevention Of Wound Dehiscence

- Wound dehiscence risk assessment
- Reduce the incidence of surgical site infections
- Postoperative wound assessment
- Educational Recommendation
- Effectiveness of Action Items

#### CONCLUSION

Abdominal wound dehiscence is a preventable complication. The care to prevent dehiscence starts in the preoperative period itself. The surgeon and the surgical techniques play a very important role in prevention. The prevention strategy continues into the postoperative period also. Significant risk factors for the development of post operative abdominal wound dehiscence are multiple patient factors and surgeon factors like improper suture technique and improper aseptic precautions which may lead to wound infection and then wound dehiscence. Postoperative abdominal wound dehiscence can be prevented by improving the nutritional status of the patient, strict aseptic precautions, improving patient's respiratory pathology to avoid postoperative cough and by proper surgical technique.

- Simple investigations like Hb%, RBS, RFT, LFT, chest x-ray, may help to detect predisposing factors.
- The incidence of wound dehiscence was found to be 13.33 %.
- Age of the patient more than 40 years was a significant risk factor for the development of dehiscence.
- Anaemia was a highly significant factor for wound dehiscence.
- Peritonitis or any other cause associated with intra-abdominal sepsis increases the incidence of wound dehiscence
- Malignancy is associated with higher incidence of wound dehiscence.
- A significantly higher incidence of post operative wound dehiscence is seen in emergency than in elective patients.
- The nutritional status of the patient was important. Patients with either obesity or malnutrition had a higher incidence of wound dehiscence.
- All measures to reduced postoperative chest infection should be made, because cough increases intraabdominal pressure.

#### SUMMARY

- Males outnumbered females with ratio of 4:1 .
- Patients in the age group of 21-30 years and 41-50 years found to have highest incidence of abdominal wound dehiscence. Mean age of the patients affected was 39.02 years.
- Incidence of abdominal wound dehiscence was more common in patients with peritonitis due to duodenal and appendicular perforation than in cases of intestinal obstruction.
- Incidence of abdominal wound dehiscence was more common in patients who were operated in emergency (84%) than elective settings(16%).
- Surgical procedures which included perforation closure (46%) carried higher incidence of wound dehiscence.
- Patients operated with midline incision carried higher risk (68%) for wound dehiscence.
- Incidence of abdominal wound dehiscence was more common in patients having their BMI>25.
- Incidence of abdominal wound dehiscence was more common in

patients with anaemia (Hb% <10g %) (43%)

- Mean days of presentation was day 3.12 days.

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