

## A Clinical study on risk factors causing abdominal wound dehiscence and management.

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### **Abstract:**

**Background And Objectives:** Wound dehiscence/burst abdomen is a very serious post-operative complication associated with high morbidity and mortality. The need for this study is to highlight the risk factors for wound dehiscence and remedial measures to prevent or reduce the incidence of wound dehiscence. This will certainly reduce mortality and morbidity in the form of prolonged hospital stay, increased economic burden on health care resources.

**Methods:** Total 50 cases clinically presenting as abdominal wound dehiscence were taken for this study. Each case examined clinically 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.

**Results:** The incidence of abdominal wound dehiscence is more common in male patients in 4th to 5th decade. Patients with peritonitis due to duodenal perforation, intestinal obstruction and malignancy carried higher risk of abdominal wound dehiscence. Patients with surgical Wounds classified as dirty wound had higher incidence of abdominal wound dehiscence and was more common in patients operated in emergency. Patients with anaemia, jaundice and high BMI had higher incidence of wound dehiscence.

**Conclusion:** Wound dehiscence can be prevented by improving nutritional status of patient, proper surgical technique, controlling infections and correcting co morbid condition.

**Key words:** Dirty wound, peritonitis, malignancy, midline incision, wound dehiscence.

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### **I. Introduction:**

Wound dehiscence / burst abdomen is a very serious postoperative complication faced by surgeons and of greatest concern because of risk of evisceration, the need for immediate intervention, and the possibility of repeat dehiscence, surgical wound infection and incisional hernia formation.<sup>3</sup> Wound dehiscence carries with it a substantial morbidity. In addition there is an increase in the cost of care both in terms of increased hospital stay nursing and manpower cost in managing the burst and its complications. Many patients in India have a poor nutritional status and the presentation of patients with peritonitis is often delayed in the emergency. This makes the problem of wound dehiscence more common and graver in our setting as compared to the West. Despite increased knowledge about wound healing, advances in perioperative care and suture materials, wound dehiscence continues to be a significant problem which prolongs hospital stay and is associated with patients' morbidity

The incidence of wound dehiscence /burst abdomen varies from one center to another worldwide. While it is recorded to be 1-3 % in most centre's, some centre's in India recorded incidence of burst abdomen as high as 10-30%.<sup>16</sup> Burst abdomen is associated with a mortality rate as high as 45%.<sup>2</sup>

Numerous studies have been conducted evaluating a bewildering variety of closure techniques and suture materials. The need for this study is to highlight the risk factors for wound dehiscence, the incidence rate in this hospital and remedial measures to prevent or reduce the incidence of wound dehiscence and to predict the outcome of the management of abdominal wound dehiscence. This will certainly reduce mortality and morbidity in the form of prolonged hospital stay, increased economic burden on health care resources and long term complication of incisional hernia. Good knowledge of these risk factors is mandatory for prophylaxis<sup>5</sup>.

Total of 50 cases clinically presenting as gaping of abdominal wound and evisceration of bowel from the site were taken for study. Many risk factors were incriminated in causation of burst abdomen including malnutrition, anaemia, hypo-proteinaemia, pre and post-operative prolonged steroid therapy, peritonitis, malignancy, jaundice, uraemia, abdominal distension and cough. Surgeon factor like midline incision, improper suture technique, improper aseptic precaution play a role<sup>6</sup>.

### **II. Patients and methods:**

Total 50 cases clinically presenting as gaping of abdominal wound with burst abdomen during the period of October 2012 to September 2014 in Osmania general hospital Hyderabad were taken for study. This is a prospective study in which 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 the hospital based on facility available here were done.

### 2.1 Inclusion criteria:

- Patient more than 14 years of age and either sex.
- Patients presenting with abdominal wound dehiscence (burst abdomen) after undergoing elective or emergency operation.
- Patients who are ready for investigations and treatment for their condition.

### 2.2 Exclusion Criteria:

- Patients less than 14 years of age.
- All female patients who developed wound dehiscence after any gynaecological procedures.
- All patients with incisional hernia.
- All patients who refuse investigation and treatment.

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 burst abdomen is done till the patient is discharged from the hospital. In history, age, details regarding presenting complaints, duration, associated diseases, significant risk factors like, anaemia, malnutrition, hypoproteinemia, 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. Intraoperative findings noted and classification of surgical wounds done accordingly. The type of surgical procedure done was recorded. In all the cases the abdomen was closed with number one polypropylene (proline).

After the diagnosis of burst abdomen, the method of management of the burst abdomen were also recorded. The post closure outcome and duration of stay in the hospital was also recorded.

## III. Results and observation:

### 3.1 Age distribution:

In this study majority of patients belonged to the age group between 51-60 years, youngest patient was 25 year old and oldest patient was 79 years. The mean age of patients affected was 52.78yrs (S.D=12.5)

### 3.2 Sex wise distribution:

Out of 50 cases 32 were male (64%) and 18 were female (36%).

### 3.3 Comorbid conditions:

**Table 1: Comorbid Conditions At The Time Of Admission**

COMORBIDITIES	No. of patients	percentage
Intra-abdominal infection (IAI)	30	60
Diabetes mellitus (DM)	29	58
Malnutrition	26	52
Anaemia	28	56
Pulmonary disease	16	32
Chronic renal failure	8	16
Malignancy	12	24
Post radiation	2	4

Intra-abdominal infections remains the leading cause followed by Diabetes mellitus, anaemia and malnutrition. All the patients have more than one complication.

### 3.4 Timing of surgery

**Table 2: Effect Of Emergency Surgery On Development Of Burst Abdomen**

	No. of cases	percentage
Elective surgery	6	12%
Emergency surgery	44	88%

In the present study, out of 50 cases, 44 cases (88%) were operated as emergency surgery and 6 cases (12%) as elective surgery.

### 3.4 Type of incision:

**Table 3: Frequency Of Burst Abdomen In Relation To Type Of Incision**

Type of incision	No. of cases
Upper midline	10
Lower midline	14
Middle Midline incision	26

All the incisions were midline incisions and middle midline are highest in number accounting for 52% (26) of the cases.

### 3.5 Type of procedure done

**Table 4: Various Abdominal Procedures Leading To Burst Abdomen**

Procedure	No. Of Cases
Perforation Closure	14
Resection And Anastomosis	13
Stoma Preparation	17
Others	6

Out of 50 cases, perforation closure was performed for 14 cases, resection and anastomosis for 13 cases, Stoma preparation for 17 cases and other procedure like Gastrojejunostomy, mesenteric tear repair, Adhesiolysis, stricturoplasty etc.

### 3.6 Intra-abdominal pathology:

**Table 5: Distribution Of Patients With Abdominal Wound Dehiscence According To Underlying Intraabdominal Pathology**

Diagnosis	No. of cases
Intestinal obstruction	10
Hollow viscus perforation	21
- Duodenal ulcer	5
- Caecal perforation	4
- Others(GP,IP, JP)	12
Malignancy	12
Blunt injury abdomen	3
Appendicular perforation	2
Abdominal tuberculosis	4
Stab injury	2

Out of 50 cases 21 (42%) patients had peritonitis due to hollow viscus perforation secondary to duodenal ulcer, caecal perforation, gastric or small bowel perforation and rectal injury. 10 (20%) diagnosed has intestinal obstruction which included cases like sigmoid volvulus, gangrenous bowel, strictures and adhesions, 12 (24%) cases were malignancy which included cervical, colorectal malignancies. Blunt injury, stab injury, appendicular perforation and tuberculosis form the underlying pathology in few cases.

### 3.7 Relationship of burst abdomen with body mass index

Out of 50 cases 19 (38%) patients had B.M.I >25 and 31 (62%) patients had B.M.I <25

### 3.8 Other factors:

Out of 50 cases 32 (64%) patients had HB% more than 10g% and 18 (36%) patients had HB% less than 10. Out of 50 cases 4 (8%) cases had raised liver enzymes, 31 (62%) patient had hypoalbuminemia, 16 (32%) patient had hyperbilirubinemia. Out of 50 cases, 18 (36%) patients had elevated renal parameters.

### 3.9 Post-operative day of burst abdomen:

Out of 50 cases, 29 (58%) cases reported burst between 6<sup>th</sup> to 9<sup>th</sup> post-operative day (POD) and 12 cases and 9 cases after 9<sup>th</sup> POD and before 6<sup>th</sup> POD respectively.

### 3.10: of closure:

In the present study, of the 50 cases 35 patients have undergone deep tension suturing and 15 cases have undergone laparostomy using urosac bag covering the wound.

### **3.11 Outcome of the patient:**

Of the 50 cases included in the study, after closing the burst abdomen, 60 % of the patients developed incisional hernia. These hernia were repaired at a later stage in few patients by abdominoplasty. In about 18% of the people complete closure was achieved and these patients are on regular follow up.

### **3.12 Hospital stay:**

Average stay in hospital was about 26.1 days with range of stay from 23 to 37 days.

## **IV. Discussion**

Acute wound failure has been discussed under various names i.e. wound dehiscence, burst abdomen, wound disruption and evisceration. It is a very serious complication of abdominal surgery, with very high mortality rate and no single cause being responsible: rather it is a multi-factorial problem<sup>17</sup>.

Two basic events are seen in wound dehiscence are decreased wound strength and increased collagenolysis, most commonly due to infection.

The higher frequency of burst abdomen is, in contrast with many Western studies which showed an incidence of 0.4 to 3.5% but is in accordance with the study done by Mathur et al which showed that the problem of wound dehiscence is much more prevalent in South East Asia than the Western world<sup>18</sup>. This may be attributable to poor nutritional state of the patients, delayed presentation to the tertiary care hospitals, poor quality of suture material, disease like tuberculosis of the abdomen which is endemic in the countries of South East Asia and higher load of emergency surgeries<sup>18</sup>.

Abdominal wound dehiscence remains a major cause of morbidity following any laparotomy whether elective or emergency.

The burst abdomen is associated with high morbidity of up to 40% and mortality of up to 18% in elderly or malnourished patients in whom a burst represents a final additional insult to their already stressed physiology<sup>15</sup>.

In our study also males were 32 in number and predominated the females who were 18 in number with the ratio of 1.7:1. This male predominance probably due to the higher incidence of peptic ulcer perforation, intestinal obstruction and malignancies in male sex. The mean age of presentation was 52.78 years as incidence of perforation and intestinal obstruction was common in this age group.

The lower incidence of burst abdomen in the elective cases compared to the emergency cases can be explained by that, in elective cases we have time to correct or control their risk factors such as anaemia, diabetes, malnutrition, hypo-proteinaemia etc. Also they have no abdominal sepsis. Moreover increased intra-abdominal pressure is much less recorded in the elective cases.

In our setup emergency laparotomies are usually performed for acute abdomen cases which have been deteriorated due to course of acute illness, as well as mismanagement by local dispensers etc. Then, patients seek help from local health centers, who visualizing the patient's critical condition and lack of facilities at that center refer the patients to tertiary care hospitals like Osmania general hospital. Most of the patients are already having complications like septicemia and fluid and electrolytes derangements. Also, poverty plays a vital role in making patients malnourished and compelling them to seek cheaper treatment at outside hospitals and local dispensaries. In our study 88% of patients underwent laparotomy in an emergency setting and developed burst abdomen. This is probably attributed to improper pre-operative preparation when compared to elective cases. Second factor responsible for this high incidence of wound dehiscence especially in emergency cases may be the lack of proper sterilization in an emergency setup. Third factor which can also play a major role in developing wound dehiscence, is lack of experience on part of surgeon. The emergency laparotomies are performed most of the time by surgical residents. Technical errors can be avoided in elective setup.

In a continuous suturing cutting out of even a single bite of tissue leads to opening of the entire wound. This is the probable explanation for a high prevalence of burst in our emergency group.

Rural hospitals and nursing homes often keep patients with perforative peritonitis on conservative therapy (antibiotics and even steroids). Hence at laparotomy we observe profound necrosis of the aponeurotic layers of abdomen in these cases. Such necrotic linea Alba does not hold sutures well which cut out with a bout of coughing or sneezing<sup>17</sup>.

In the present study almost 36 % of the patients have elevated renal parameters. This probably may be due to intra-abdominal sepsis which led to renal failure in many of the cases. Pre-operative chronic renal failure was seen in 6 (12 %) of the cases. But elevated renal parameters alone cannot be significant risk factor but co-existence of other factors is necessary to give rise to burst abdomen.

## **V. Management and outcome of patients:**

Burst abdomen remains a terrifying postoperative event that carries high morbidity and mortality for laparotomy patients. This fact makes prevention of burst abdomen a holy goal, for which every effort should be done.

Our study showed that deep tension suturing (DTS) is a simple and effective way of managing burst abdomen which is associated with less morbidity and mortality. The mean length of stay was significantly higher in UROSAC bag group than DTS group and later development of incisional hernia was also a problem which was seen in urosac bag group which increased the frequency of re-explorations and further surgeries on patients. Almost 60 % of the people developed post-operative incisional hernia and was managed later on.

The idea of this technique is that by approximating the two recti without strangulating the tissue, we release tension over the midline sutures and giving the wound a better chance to heal with no tension or cutting through<sup>16</sup>.

Regarding complications recorded with the technique, most of them can be avoided by proper application of the technique, strict selection of the trocar size and sites and by avoiding much tension on tying the plastic tubes. Because of many complications, this technique is not recommended for routine use and should be restricted to patients with risk of burst abdomen. It is worth to mention that the supporting tubes method is prophylactic only for burst abdomen not for incisional hernia<sup>16</sup>.

Other methods of closure of burst abdomen like X-stitch, Bogota bags and vacuum technique were not employed due to lack of technical expertise and also as most of the patients cannot afford these methods of management.

In our study 11 patients with wound dehiscence (22%) died. Mortality rate associated with wound dehiscence mentioned in literature is 15-24 %.

The number of patients with wound dehiscence increased with an increase in the number of risk factors, reaching 100 % for patients with 8 or more risk factors. The risk factors of wound dehiscence can be predicted early and their number can be decreased before and after surgery by an experienced surgeon, leading to a lowered incidence of burst abdomen<sup>16</sup>.

Further studies are recommended on a large scale of patients to evaluate the effectiveness of the technique or possible modifications of it. Also I hope that a special manufactured set will be available to apply this technique instead of using nasogastric tubes and intravenous sets.

## **VI. Conclusion:**

Abdominal wound dehiscence causes significant morbidity and mortality. Intra-peritoneal infection is the most important factor in predicting wound dehiscence. Patient factors like older age group, male sex, anaemia, malnutrition, obesity, patients with peritonitis due to bowel perforation, intestinal obstruction act as determinant for wound dehiscence. Emergency procedure is prone for burst abdomen. Simple investigations like Hb%, RBS, RFT, LFT, chest x-ray, may help to detect predisposing factors. Surgeon factors like midline incisions, improper suture technique and improper aseptic precautions which may lead to wound infection and then wound dehiscence. Hospital stay and health expenditure is usually protracted. Patients with these risk factors require more attention and special care to minimize the risk of occurrence. Postoperative abdominal wound dehiscence can be prevented by improving the nutritional status of the patient, strict aseptic precautions, avoiding midline incisions, improving patients respiratory pathology to avoid postoperative cough and by proper surgical technique.

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