

## Burst Abdomen – Causes, Consequences and Complications

Dr.Katta Srinivasa Rao.M.S<sup>1</sup>, Dr.M.Govind Naik. M.S<sup>2</sup>, Dr.G.Achyut. <sup>3</sup>

<sup>1</sup>(Associate Professor, Department of general surgery, Guntur Medical College, Andhra Pradesh, India)

<sup>2</sup>(Assistant Professor, Department of general surgery, Guntur Medical College, Andhra Pradesh, India)

<sup>3</sup>(Post graduate, Department of general surgery, Guntur Medical College, Andhra Pradesh, India)

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### Abstract:

**Background:** Burst abdomen is one of the most severe complication occurring in the post-operative period with high risk of mortality. It is one of the leading cause of re-admission. Apart from increasing the cost of treatment and patient stress it is a distressing condition for the surgeons in the post-operative period. This study aims to identify the risk factors for burst abdomen and optimize the patient with respect to these factors and thus prevent the dreaded complication.

**Materials and Methods:** In this prospective observational study, 60 patients who underwent emergency midline vertical laparotomy in Government General Hospital, Guntur and developed burst abdomen post-operatively were studied. They were evaluated with a detailed history, presence of any risk factors, intra-operative pathology and biochemical investigations.

**Results** Post-operative burst abdomen is a common complication occurring after emergency surgery. Anemia and hypoproteinemia were significant contributory factors along with pre-existing co-morbidities like Diabetes Mellitus and Hypertension. Intra-abdominal sepsis and peritonitis were found to be high risk factors for wound dehiscence. Post-operative respiratory complications like pneumonia also were significant risk factors for wound dehiscence. Burst abdomen occurred commonly between 7<sup>th</sup> to 10<sup>th</sup> post-operative day.

**Conclusion:** Better understanding of the risk factors and co-morbidities with optimizing the post-operative care have found to reduce the incidence of burst abdomen in by reducing psychological and financial stress to patients and relatives.

**Key Word:** Burst Abdomen, Emergency Laparotomy, Post-operative complications, Wound Dehiscence

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### I. Introduction

Burst Abdomen is defined as the post-operative separation of abdominal muscle layers which may be partial or complete which is recognized days after surgery and needs some form of intervention. It is the serious sequelae of impaired wound healing. Incidence as described in literature ranges from 0.4%<sup>(1)</sup> to 3.5%<sup>(2)</sup> Patients undergoing emergency laparotomy are at higher risk when compared to elective surgeries. It poses a threat to the surgeon, hindering the post-operative care, increasing the hospital stay and financial burden to the patients and also has a high risk of mortality. Mortality rate as high as 45% has been described.<sup>(3)</sup> It may range in magnitude from a failure of the deeper portions of the abdominal incision to unite, unrecognized in the postoperative course but resulting in a dramatic "burst abdomen" or evisceration in which dehiscence of the wound occurs suddenly and is accompanied by protrusion of abdominal contents, usually bowel, through the disrupted wound. Sometimes it may present as incisional hernia later. Significant wound dehiscence occurs in approximately 1% of all laparotomies.<sup>(4)</sup>

This study aims to find predisposing factors of burst abdomen in hospitalised patients, evaluate current management methods and to compare conservative and operative approach with respect to complication and outcomes.

### II. Material And Methods

This prospective observational study was carried out on patients who underwent emergency laparotomy in the Department of General Surgery at Government General Hospital, Guntur, Andhra Pradesh from January 2018 to December 2020. A total of 60 patients (both male & female) who developed burst abdomen post operatively were included in the study..

**Study Design:** Prospective observational study

**Study Location:** This was a tertiary care teaching hospital based study done in Department of General Surgery, at Government General Hospital, Guntur, Andhra Pradesh.

**Study Duration:** January 2018 to December 2020

**Sample size:** 60 patients.

**Aims and objectives:** To study the causes for wound dehiscence and burst abdomen following emergency laparotomy for acute abdomen.

To attempt to develop standard treatment protocols for patients presenting with post-operative burst abdomen to decrease the rate of morbidity and the length of hospital stay. .

**Inclusion criteria:**

Patients aged above 18 years and <70 years of either sex with acute abdomen undergoing emergency midline vertical laparotomy followed by single layer closure of abdominal wall and who developed partial or complete wound dehiscence/burst abdomen post-operatively in the Department of General Surgery , Government General Hospital, Guntur.

**Exclusion criteria:**

1. Pregnant women.
2. Patients with previous surgery elsewhere, presenting with acute abdomen.
3. Patients readmitted for staged surgical procedure.
4. Patients admitted for an elective laparotomy procedure.
5. Patients who refused to give informed consent.

**Procedure methodology**

All cases admitted who underwent emergency laparotomy for acute abdomen and developed post-operative wound dehiscence in various units of surgical department at our hospital were included in the study. Information regarding indication of surgery, procedure performed, date of admission, duration of stay in hospital, immediate post operative complications was maintained.

Information regarding the following pre-operative laboratory investigations was obtained for the study :

- Complete hemogram
  - Liver function tests
  - Renal function tests
  - Viral markers for Hep.B , Hep.C, HIV,
  - PT, aPTT , INR
  - Chest X-ray , X-ray erect abdomen , CECT Abdomen.

Pre-existing co-morbidities of the patient were also recorded.

Patients were either managed conservatively or underwent a tension suturing or delayed secondary suturing procedure

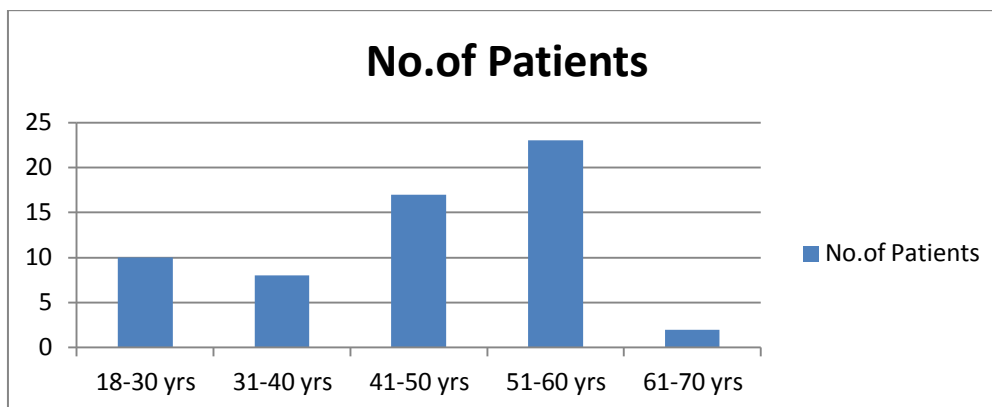
**III. Result**

Data regarding various possible factors that contributed to burst abdomen were collected and summarized :

**Age Distribution :**

**Table no 1:** Shows age distribution of patients who developed burst abdomen. It was found that out of 60 patients , majority of the patients were in the age group of 41 years to 60 years (66.6%) with a median age of 45 years.

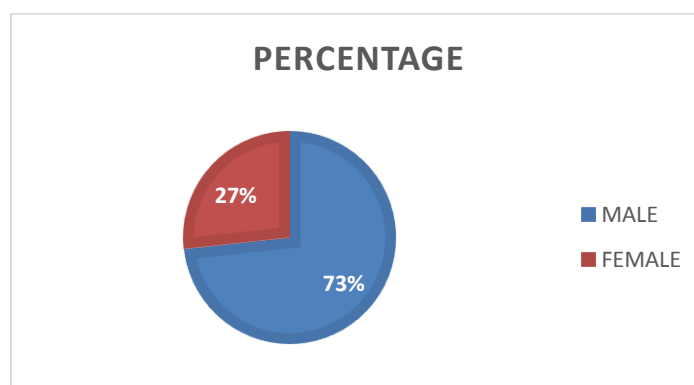
Age group of patients	Number of patients
18-30 yrs	10
31-40 yrs	8
41-50 yrs	17
51-60 yrs	23
61-70 yrs	2



**Gender distribution :**

**Table no 2** shows gender distribution of patients who developed burst abdomen post-operatively. Out of 60 patients 73.3% (46) were males and 26.7% (14) were females

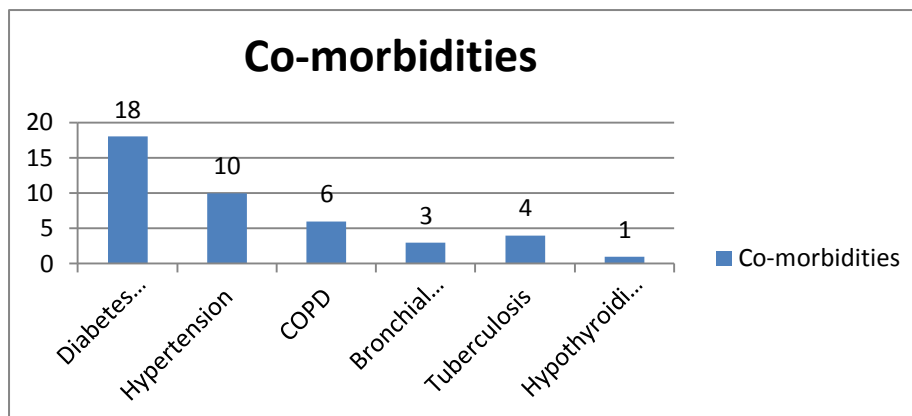
**Table no2:** Gender distribution of patients



**Co-morbidities :**

**Table no 3:** Patients were evaluated for presence of various co-morbidities such as Diabetes Mellitus, Hypertension, Hypothyroidism, Tuberculosis, Chronic Obstructive Pulmonary disease, Bronchial Asthma etc. Out of 60 patients, 42 patients had a co-morbidity thus showing that pre-existing co-morbidities played a significant role in contributing to wound dehiscence and post-operative complications to varying extents. Thus attention to these conditions and their optimum management contributes to reduced rates of wound complications. Diabetes Mellitus and Hypertension were the most common co-morbidities observed in the patients. Uncontrolled Diabetes Mellitus usually resulted in most alarming Post operative wound complications and its resultant consequences including Burst Abdomen

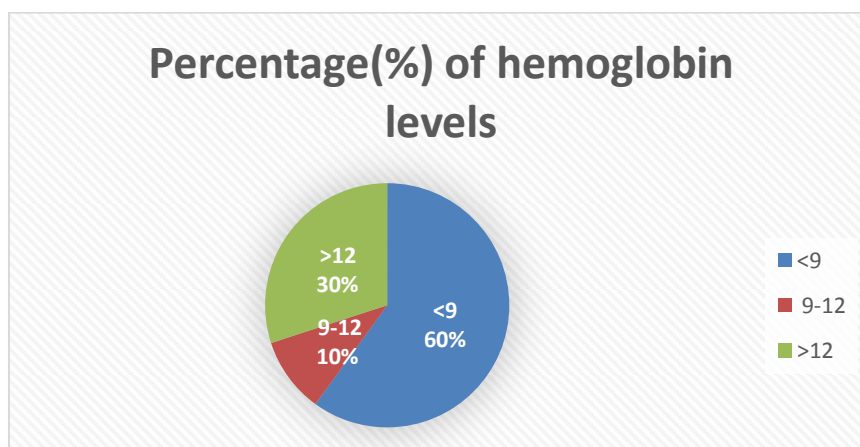
Co-morbidity	Number of patients
Diabetes Mellitus	18
Hypertension	10
COPD	6
Bronchial Asthma	3
Tuberculosis	4
Hypothyroidism	1



**Anaemia :**

Hemoglobin in gm/dl	Number of patients
>12 gm/dl	18
9-12 gm/dl	6
<9 gm/dl	36

**Table no 4** shows Hemoglobin levels of patients . Majority of patients ( 60%) had hemoglobin levels below 9 gm/ dl. Thus Hemoglobin level of patients was an important indicator of likelihood of development of wound dehiscence. Hemoglobin was indicator for nutritional status of patient.

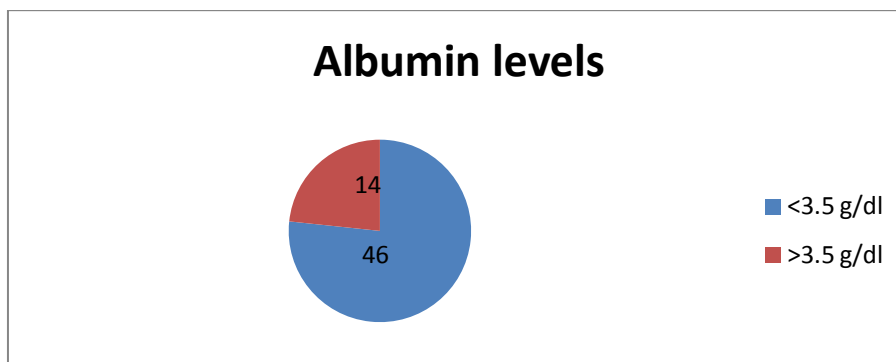


**Serum Albumin :**

**Table no 5.** Albumin level of patients was studied. Majority of patients had a low serum albumin levels thus indicating poor nutritional status of patient as an most important indicator for poor wound healing.

**Table no 6**

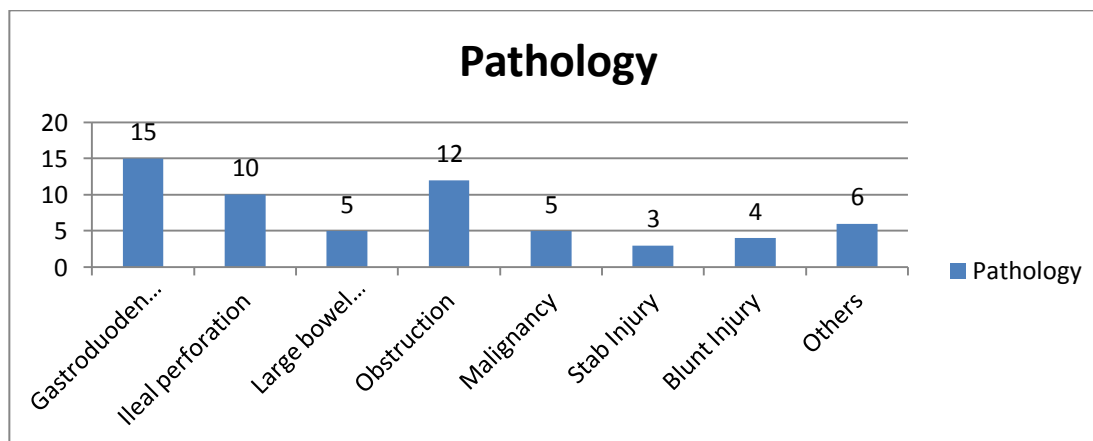
Albumin level	Number of patients
<3.5 gm/dl	46
>3.5 gm/dl	14



**Pathology found on Laparotomy:**

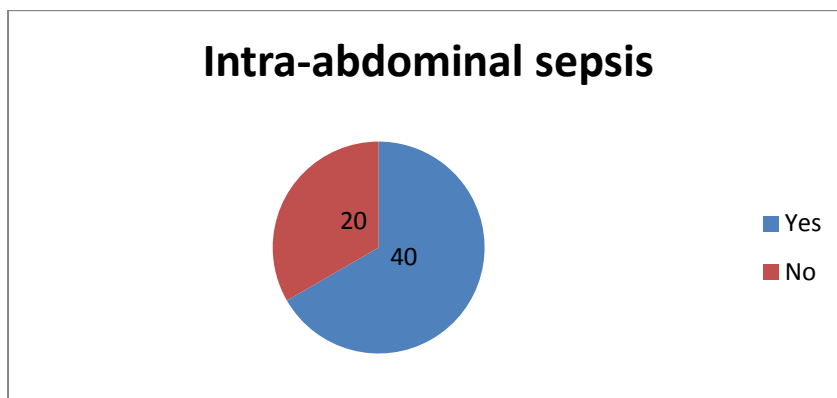
**Table no 6 :** Emergency laparotomy done at initial presentation of acute abdomen included the following pathologies

Pathology	No.of Cases	% of cases
Gastro-duodenal Perforation	15	25
Ileal Perforation	10	16.6
Large Bowel Perforation	5	8.3
Obstruction	12	20
Malignancy	5	8.3
Stab Injury	3	5
Blunt Injury	4	6.67
Others	6	10



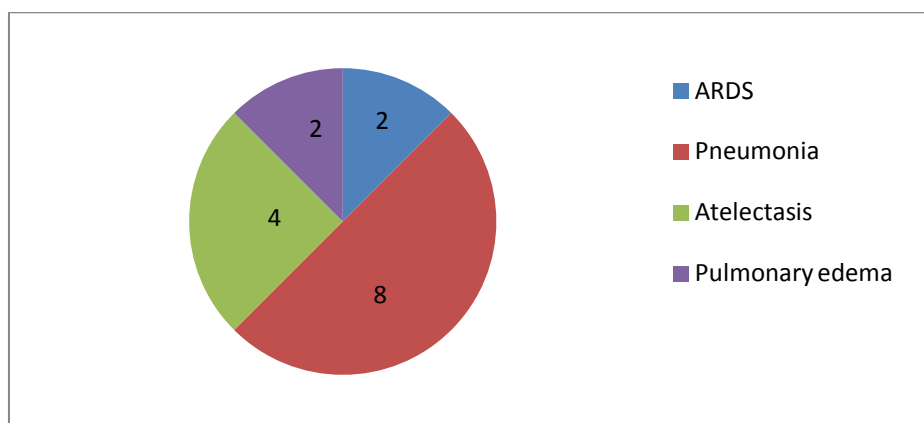
**Intra-abdominal sepsis:**

**Table no 7:** Among all the cases with above mentioned pathologies, two-thirds of the cases were found to have intra-abdominal sepsis and contamination intra-operatively thus resulting in poor wound healing post-operatively.



**Respiratory complications :**

**Table no 8 :** Some of the patients developed Respiratory complications like ARDS, Atelectasis, Pneumonia, Pulmonary edema during the post-operative period. All these pathologies resulted in tachypnoea causing increased intra-abdominal pressure and thus contributing to the burst abdomen.

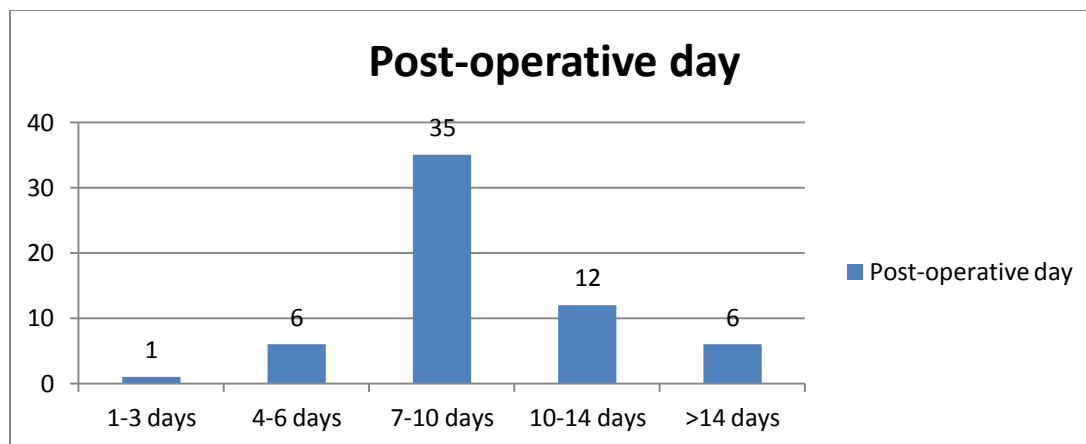


**Table 8 :** Respiratory complications encountered in cases of burst abdomen

**Post-Operative Day :**

**Table no 9 :** Post-operative day of wound dehiscence. It was found that majority of patients developed burst abdomen between 7<sup>th</sup> to 10<sup>th</sup> post-operative day.

Post-operative day	No. of patients	% of patients
1-3	1	1.6
4-6	6	10
7-10	35	58.3
10-14	12	20
>14 days	6	10



**Management :**

**Table no 10 :**Management of cases developing burst abdomen.Majority of the patients were managed with the immediate tension suturing while some others patients were managed without tension sutures or on conservative management.

Group	Management	No.of patients	% of Patients
1	Immediate suturing with tension sutures	28	46
2	Immediate suturing without tension sutures	14	23
3	Delayed Seconary suturing	12	20
4	Conservative management	6	10

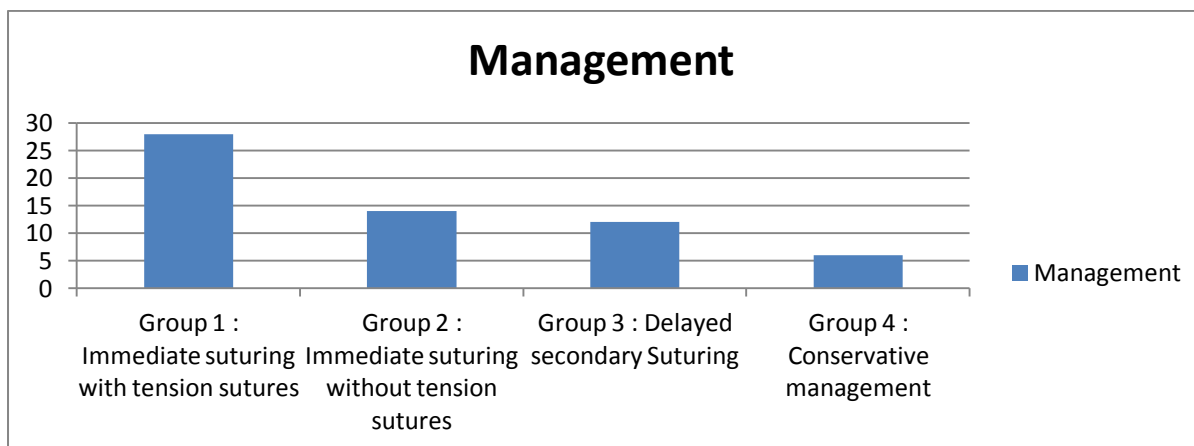


Figure 1: Partial wound dehiscence



Figure 2: Complete wound dehiscence



Figure 3: Burst abdomen with protrusion of bowel loops

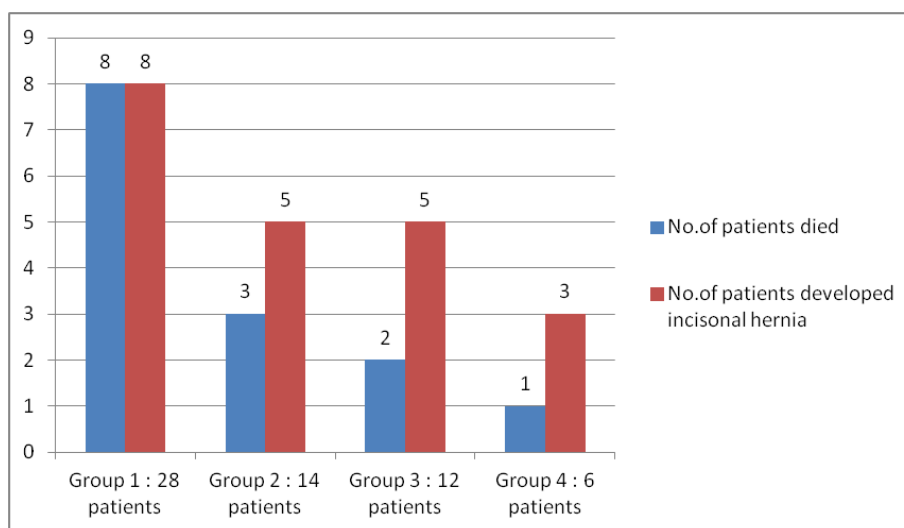


Figure 4 Wound suturing with tension sutures

**Complications :**

**Table no 11 :**Complications of the cases who developed burst abdomen and managed by various methods as described above.Among 60 patients in the 4 management groups, 14 patients died, 21 patients developed incisional hernia between 6-18 months period.

Management Group	Total no.of patients	No.of patients died	% of patients died	No.of patients who developed Incisional Hernia	% of patients developed Incisional Hernia
1	28	8	28.5	8	28.5
2	14	3	21.4	5	35.7
3	12	2	16.6	5	41.6
4	6	1	16.6	3	50
<b>Total</b>	<b>60</b>	<b>14</b>	<b>23</b>	<b>21</b>	<b>35</b>



**Table 11 :** complications in various treatment groups



The above results can be summarised as follows

- Most of the patients who have developed burst abdomen were in the age group of 41 to 60 years and predominantly were males.
- Majority of the patients who were underwent exploratory laparotomy for hollow viscus perforation developed burst abdomen post-operatively.
- More than half of the patients developed wound dehiscence between 7<sup>th</sup> to 10<sup>th</sup> post-operative days .
- Patients with comorbidities like diabetes mellitus, hypertension, anemia, hypoproteinemia had a higher incidence of surgical site infections and burst abdomen.
- Almost half of the patients were managed with immediate suturing along with the tension sutures.

Patients who had a prolonged hospital stay had a significant rate of surgical site infections that progressed to developed septicemia.

#### **IV. Discussion**

This study reviewed and analyzed 60 patients who underwent emergency laparotomy and developed post-operative wound dehiscence later. Burst abdomen is the most serious complication that develops in the post-operative period with increased rates of morbidity and mortality.

Various demographic indicators like age, gender have found to affect the rates of burst abdomen. Most of the cases of wound dehiscence occurred in middle age patients between 41-60 yrs with median age of 45 yrs when compared to 39.67 yrs in Waqar et al<sup>(5)</sup> and 69.5 yrs in Spiliotis J et al<sup>(6)</sup> studies. In our study, burst abdomen occurred with more frequency in males (73%) than in female(27%). Hampton<sup>(7)</sup> observed that males are three times more often affected than females (1963). Mayo and Lee (1951) also observed the same pattern of frequency of burst abdomen, i.e. males were affected more often than females.<sup>(8)</sup> Various reasons like increased rates of smoking, alcohol consumption tend to increase the risk in males.

Biochemical parameters like Hemoglobin levels influence the post-operative tissue hypoxia levels and impair the wound healing. In our study 60% of cases had hemoglobin levels less than 9 gm/dl. . The incidence of anaemia in cases of burst abdomen varies widely from series to series. It was only 6.66% in the study conducted by Wolf WI et al,<sup>(9)</sup> while it was 90% in study conducted by Pierre J et al<sup>(10)</sup> and 100% in study conducted by Waqar SH et al.<sup>(5)</sup> Hypoalbuminemia tends to decrease the collagen and matrix synthesis and impairs the wound healing. A In our series, 46 out of 60 patients had hypoproteinemia(76%).

Pre-existing co-morbidities like Hypertension, Diabetes Mellitus, Hypothyroidism also alter the wound healing process. Uncontrolled Diabetes predisposes to wound infection and accounts for nearly half of the cases of burst abdomen. Proper glycemic control must be achieved in these patients to promote the wound healing.

Also the type of pathology defines the rate of occurrence of burst abdomen. Patients with Hollow viscus perforation having intra-abdominal sepsis are at the greatest risk due to increased bacterial load..Gastroduodenal perforations contribute to 25 percent of all cases in the study same as explained in Halasz NA et al<sup>(11)</sup> study in comparing to 29 percent by Waqar SH et al<sup>(5)</sup> and 12 percent stated by Jean-Pieere et al.<sup>(10)</sup> other common pathologies in our study were ileal perforation(16.6%), obstruction(20%) and large bowel perforation(8.3%).

Management of burst abdomen included immediate bedside treatment by protecting the viscera and bowel loops with sterile towels and administration of analgesics. Later the patient was shifted to operating room, and suturing was done with the tension sutures in 28 out of 60 cases and routine suturing without tension sutures in a few cases(14 out of 60 cases). Also some of the cases of partial wound dehiscence were managed by delayed secondary suturing and a few by conservative management.

Risk of mortality was found to be similar (~20%) in all methods of management due to risk of septic shock while 35 percent of patients overall were found to develop incisional hernia in long term follow-up. Mortality rate was found to be 23 percent overall compared to 11 percent by Wolf et al<sup>(9)</sup> and 40 percent by Winfield Et all.<sup>(12)</sup>

#### **V. Conclusion**

As the Burst abdomen increases the cost of treatment and patient stress, identification of risk factors pre-operatively and early prophylaxis were found to be beneficial. Application of tension sutures intra-operatively in cases of intra-abdominal sepsis and correction of biochemical parameters like hemoglobin and albumin levels with early mobilization of patients decreases the chance of wound dehiscence.

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