

## **DETERMINANTS OF WOUND DEHISCENCE IN EMERGENCY ABDOMINAL SURGERIES IN PUBLIC SECTOR HOSPITAL**

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### **ABSTRACT**

**Background:** Abdominal wound dehiscence is a common complication of emergency laparotomy in Indian setup. It can result in evisceration, requiring immediate treatment, Prolong hospital stay, high incidence of incisional hernia, and subsequent reoperations underline the severity of this complication. Objectives were to identify determinants of wound dehiscence and to identify preventive interventions in emergency abdominal surgeries to avoid wound dehiscence in public sector hospital. **Methods:** An observational, longitudinal and prospective study was done from January 2014 to September 2015 in Department of Surgery, S. N. Medical College, Agra, India. This study reviewed 30 patients who had wound dehiscence over a period from January 2014 to September 2015. The total number of emergency abdominal surgery done in this period was 250. Patients of age above 10 year and of either sex who underwent emergency abdominal operation and willing for investigation and treatments were studied.

**Results:** The mortality rate in the study group was 3.33% (1/30). This study has analysed the possible causes of wound dehiscence, the management of these patients preoperatively, intra-operatively, postoperatively and evaluated the outcome of each case. **Conclusions:** The commonest cause in our set up was anaemia, post-operative infection, hypoproteinemia and inappropriate suture materials and patients with age group more than 60 years were more at risk. Surgical drains and nasogastric tube should be put when sepsis and ileus are expected. Not all patients should be subjected to relaparotomy those with partial or extr fascial wound dehiscence can be managed conservatively. Hospitalisation period is quite long though within limits of other studies of similar respect.

**Keywords:** *Wound Dehiscence, Emergency Abdominal Surgery, Risk Factors, Prevention*

### **INTRODUCTION**

Wound dehiscence is a medical term that defines a wound that fails to heal or one that opens along its incision line following surgery. Such complications are often seen following abdominal surgery and can be caused by several factors.

- I. Systemic Factor
  - Hypoproteinemia, especially hypoalbuminemia
  - Anaemia
  - Vitamin C deficiency
  - Steroid therapy
  - Active infection
  - Old age (affects rate of healing)
- II. Local Factors
  - Poor haemostasis
  - Poor blood supply
  - Ragged wound edges
  - Contamination of raw wound edges
  - Inadequate drainage of undercut wound

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- Poor technique in making incision
- Poor technique in closing incision
- III. Anaesthesia related Factor
  - Poor relaxation at time of closure and uneven tension and cutting of sutures
- IV. Postoperative factor
  - Violent coughing
  - Violent emesis
  - Ileus
  - Strain at urination
  - Strain at passing flatus

There are two basic types of wound dehiscence, partial or complete, depending on the extent of separation. 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. This can be seen in some cases of abdominal wound dehiscence.

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.

Wound dehiscence is a frequently reported post-operative complication encountered by surgeons, especially in emergency case (Waqar *et al.*, 2005). The deeper layers of wound are involved and infected and the covering skin is mostly spared.

Wound dehiscence is more reported in male patients. This was attributed to smoking as a possible confounder and its effect on tissue repair (Adrian *et al.*, 2000 and Cuschieri *et al.*, 2000).

An increased frequency of wound dehiscence is associated with layered closure of abdomen rather than mass closure and reason and factors associated with wound dehiscence are more understandable today as compared with old times due to increased understanding of pathophysiology of the underlying process of dehiscence. Various causing factors have been identified which include suturing material and technique, poor surgical technique and increased intra-abdominal pressure leading to poor wound healing (Waqar et al, 2005).

Optimized technique with regular follow-up results in better outcome and decreased incidence of dehiscence. Choice of incision is dependent on many variables including the abdominal wall, however many surgeons prefer the midline incision due to its easy access to abdominal cavity (Lodhi *et al.*, 1995). The surgical experience of surgeon is an important variable in wound dehiscence.

Suture material is also an important factor in determination of dehiscence. It is suggested that monofilament suture like Prolene should be used to prevent dehiscence (Agrawal *et al.*, 2009).

Judicious use of broad spectrum antibiotics should be considered. Wound infection should be dealt aggressively because it determines the morbidity and mortality.

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.

### **Aims and Objectives**

1. To identify determinants of wound dehiscence in emergency abdominal surgeries in public sector hospital.
2. To identify preventive interventions in emergency abdominal wound surgeries to avoid wound dehiscence

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**MATERIALS AND METHODS**

Patients who admitted for emergency abdominal surgery at Emergency Department of Surgery, S. N. Medical College, Agra with required eligibility criteria were considered in this study. The study period was from January 2014 to September 2015.

**Inclusion criteria:**

The patients of age above 10 year and of either sex who were underwent emergency abdominal operation and were willing for investigation and treatments

**Exclusion criteria:**

All patients below 10 years of age

All the patients who underwent elective abdominal surgery and developed wound dehiscence.

All patients who refused investigation and treatment

**Method:**

Patients with wound dehiscence after emergency abdominal surgeries were studied to determine of its cause.

1. History: Detail history had been taken, Specific co morbid condition like chronic cough, persistent vomiting, anaemia, jaundice, hypoproteinemia, electrolyte imbalance, ascites, diabetes, constipation were especially looked for, as also the primary cause of surgery such as gastrointestinal perforation, infective lesion of abdomen, malignancy, etc.
2. Investigations: Routine haematological investigations and imaging as appropriate for type were done.
3. Surgical details: Details regarding type of surgery and anaesthesia, suture material used for wound closure, use of any drain, duration of hospital stay etc. were studied. Surgical details like types of incision, use of nasogastric decompression tube were also noted.

**OBSERVATIONS AND RESULTS**

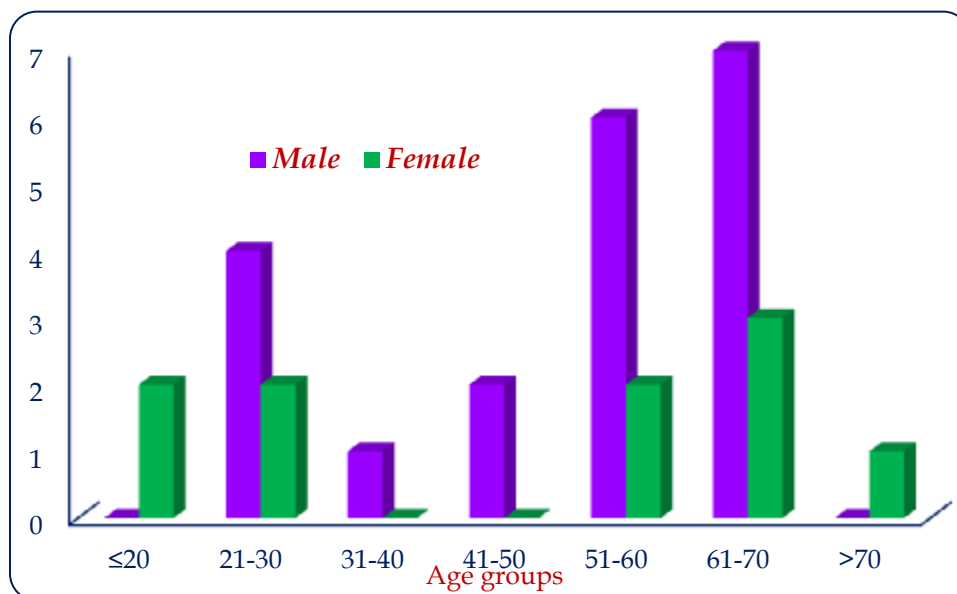
A total of 250 patients were admitted in emergency Department of Surgery, SN Medical College Agra from January 2014 to September 2015, out of them 30 patients who developed wound dehiscence were included in this study and following results were obtained:

**1. Age and sex wise distribution of cases**

In the present study, the age range was 11-75 years. Majority of patients were within the 61-70 age group(33.33%). There were 20 male (66.67%) and 10 female(33.33%) and male: female ratio was 2:1 showing male predominance.

**Table 1: Age and Sex Wise Distribution of Cases**

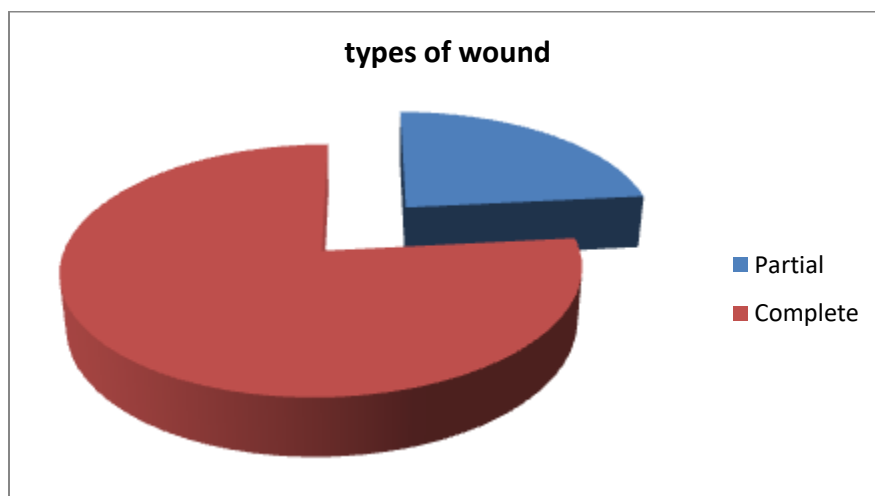
Age group	Male		Female		Total	
	No.	%	No.	%	No.	%
10-20	0	0.00	2	6.67	2	6.67
21-30	4	13.33	2	6.67	6	20.00
31-40	1	3.33	0	0.00	1	3.33
41-50	2	6.67	0	0.00	2	6.67
51-60	6	20.00	2	6.67	8	26.67
61-70	7	23.33	3	10.00	10	33.33
>70	0	0.00	1	3.33	1	3.33
Total	20	66.67	10	33.33	30	100.00



**Graph 1: Showing Age and sex wise distribution of cases**

## 2. Type of Wound

In the present study, 23(76.67%) patients had complete wound dehiscence and 7(23.33%) patients had partial wound dehiscence.



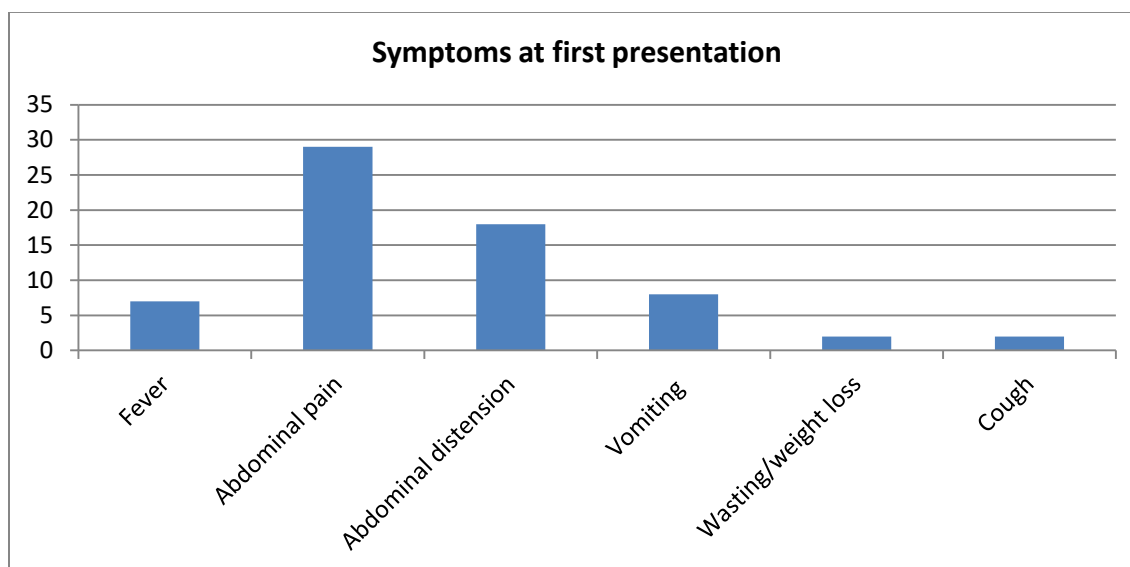
**Graph 2: Showing type of wound**

## 3. SYMPTOMS AT FIRST PRESENTATION

In the present study out of the 30 patients, majority of the patients presented with main complaints of abdominal pain (96.67%), followed by abdominal distension(60.00%), vomiting, fever, cough and weight loss respectively.

**Table No. 2: Showing symptoms at first presentation**

Symptoms	Cases (n=30)	
	No.	%
Fever	7	23.33
Abdominal pain	29	96.67
Abdominal distension	18	60.00
Vomiting	8	26.67
Wasting/weight loss	2	6.67
Cough	2	6.67



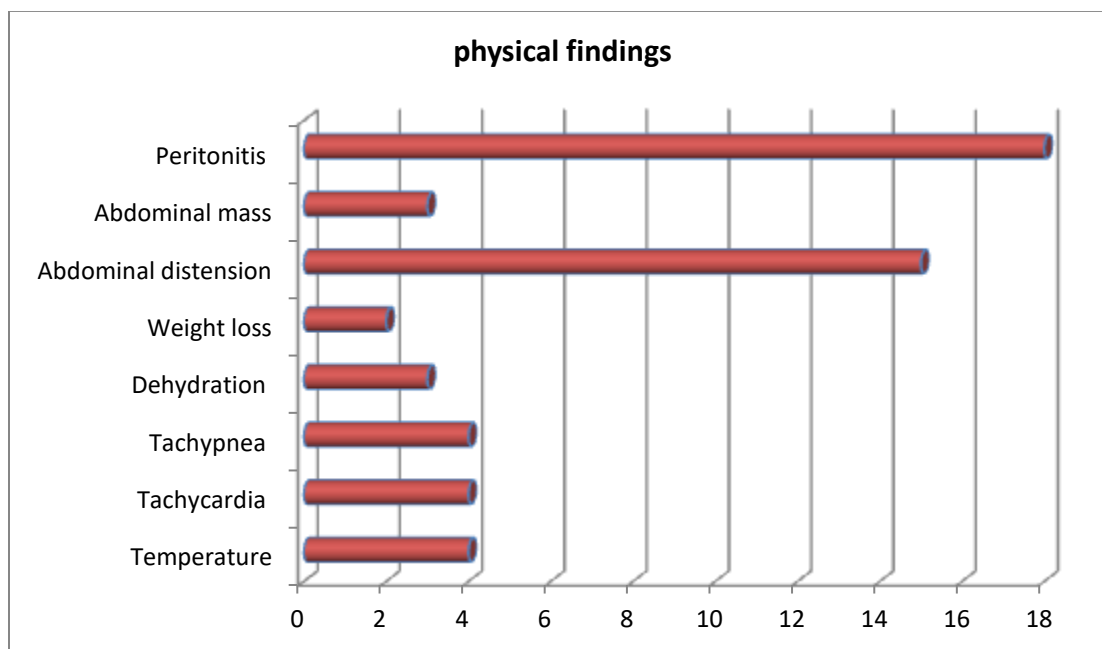
**Graph 3: Showing Symptoms at first presentation**

#### **4. Physical Findings:**

In the present study out of the 30 patients, majority of the patients presented with peritonitis (60.00%), abdominal distension (50.00%), and some patients with fever, tachycardia, tachypnoea, dehydration, weight loss and abdominal lump.

**Table No. 3: Showing physical findings in study group**

Physical findings	Cases (n=30)	
	No.	%
Temperature	4	13.33
Tachycardia	4	13.33
Tachypnea	4	13.33
Dehydration	3	10.00
Weight loss	2	6.67
Abdominal distension	15	50.00
Abdominal mass	3	10.00
Peritonitis	18	60.00



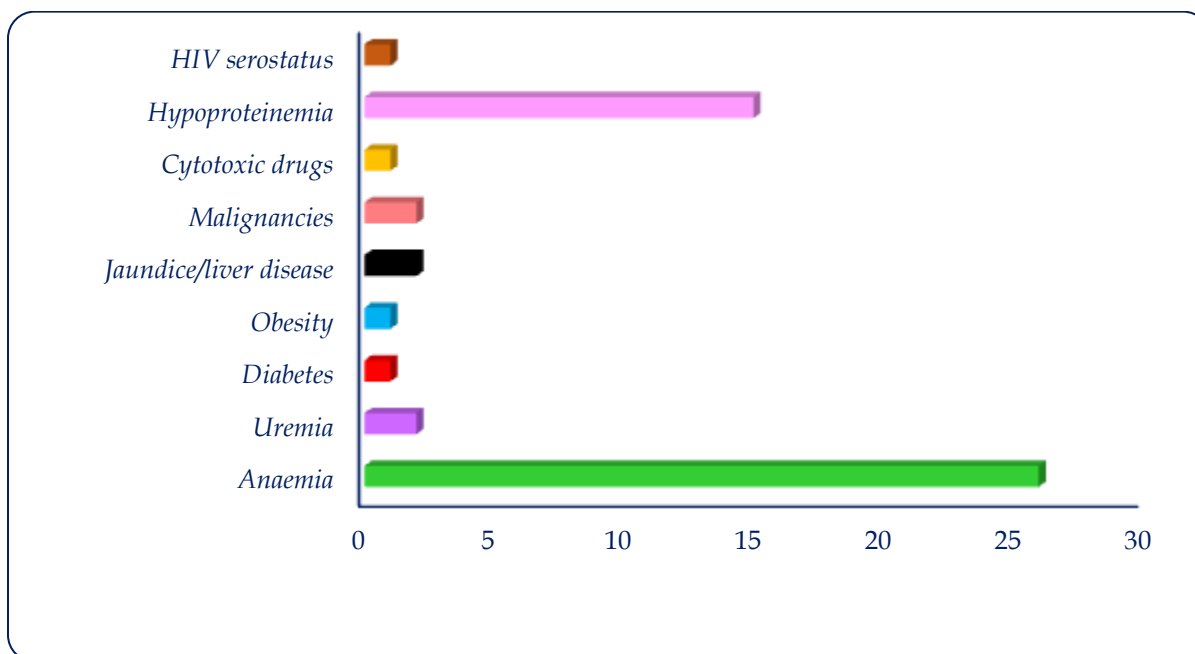
**Graph 4: Showing physical findings in study group**

#### **5. Clinical Comorbidities:**

In the present study anaemia (low haemoglobin) was a frequent preoperative co morbidity taking up 86.67% of clinical co morbidities that were associated with wound dehiscence in this study. Hypoproteinemia was also taking up 50% of clinical co morbidities. Malignancies (6.67%), uraemia (6.67%), diabetes mellitus (3.33%), obesity (3.33%), cytotoxic drug (3.33%) and jaundice (3.33%) to a little extent did contribute to the list of implicated comorbidities. None of the patients was on steroid therapy or radiotherapy. All patients had their viral marker checked. Out of these, 3.33% were HIV seropositive.

**Table No 4: Showing clinical comorbidities of the patients in the study group**

Clinical comorbidities	Cases (n=30)	
	No.	%
Anaemia	26	86.67
Uraemia	2	6.67
Diabetes	1	3.33
Obesity	1	3.33
Jaundice/liver disease	2	6.67
Malignancies	2	6.67
Cytotoxic drugs	1	3.33
Hypoproteinemia	15	50.00
HIV serostatus	1	3.33



**Graph no 5: Showing clinical comorbidities of the patients**

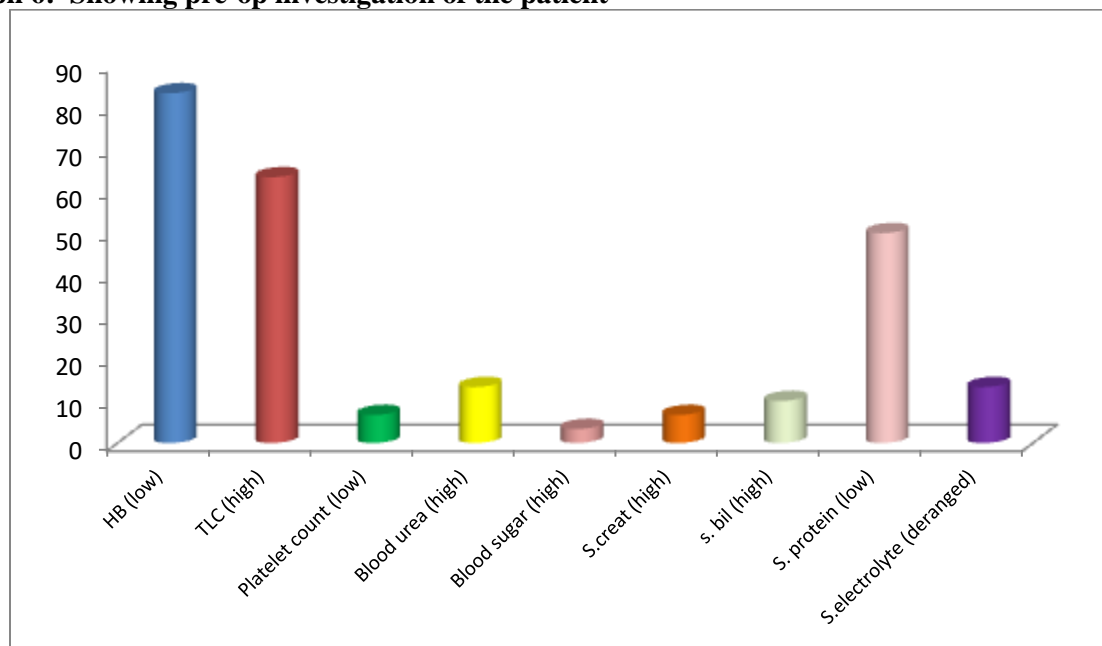
### **6. Pre-OP Investigation**

In the present study out of the 30 patients, 25 patients (83.33%) had low preoperative haemoglobin i.e. haemoglobin less than 10g/dl, 19 patients (63.33%) had high TLC i.e. more than 10,000/dl, 15 patients (50.00%) had low preoperative serum total protein i.e. total serum protein less than 6.0 g/dl, 4 patients (13.3%) had increase blood urea, whereas 4 patients (13.3%) had electrolyte imbalance, 3 patients (10%) had high S. Bilirubin, 2 patients (6.67%) had high serum creatinine level and only one patient (3.33%) had high blood sugar level.

**Table No. 5: Showing pre-op investigation of the patient**

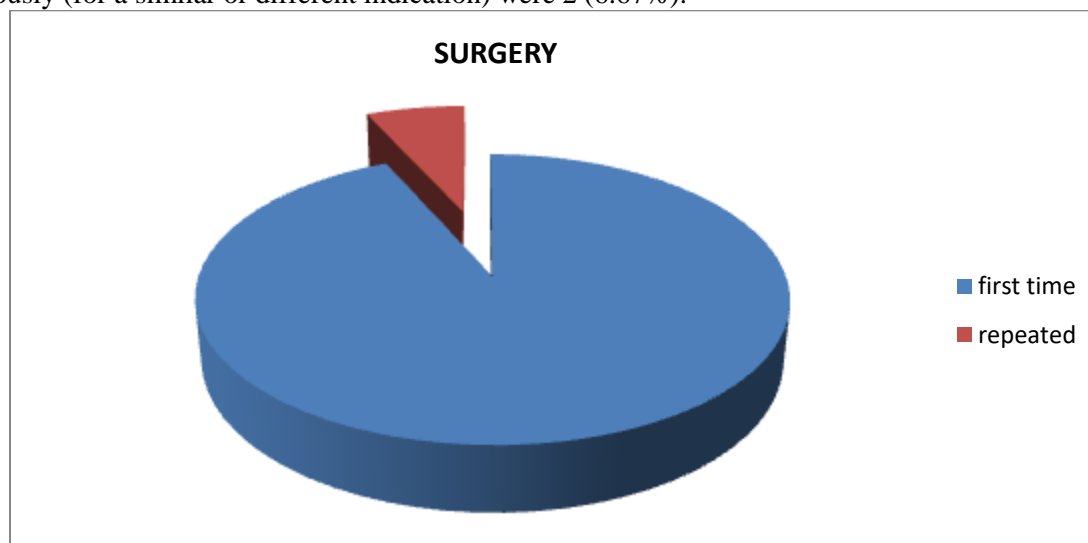
Investigation	Cases (n=30)	
	No.	%
HB (low)	25	83.33
TLC (high)	19	63.33
Platelet count (low)	2	6.67
Blood urea (high)	4	13.33
Blood sugar (high)	1	3.33
S. creatinine (high)	2	6.67
s. bilirubin (high)	3	10.00
S. protein (low)	15	50.00
S.electrolyte (deranged)	4	13.33

**Graph 6: Showing pre-op investigation of the patient**



### **7. First Surgery Versus Repeat Surgery**

In the present study the number of patients undergoing emergency abdominal surgery who later developed wound dehiscence, for the first time were 28 (93.33%) and those who had undergone surgery previously (for a similar or different indication) were 2 (6.67%).



**Graph 7: Showing surgery**

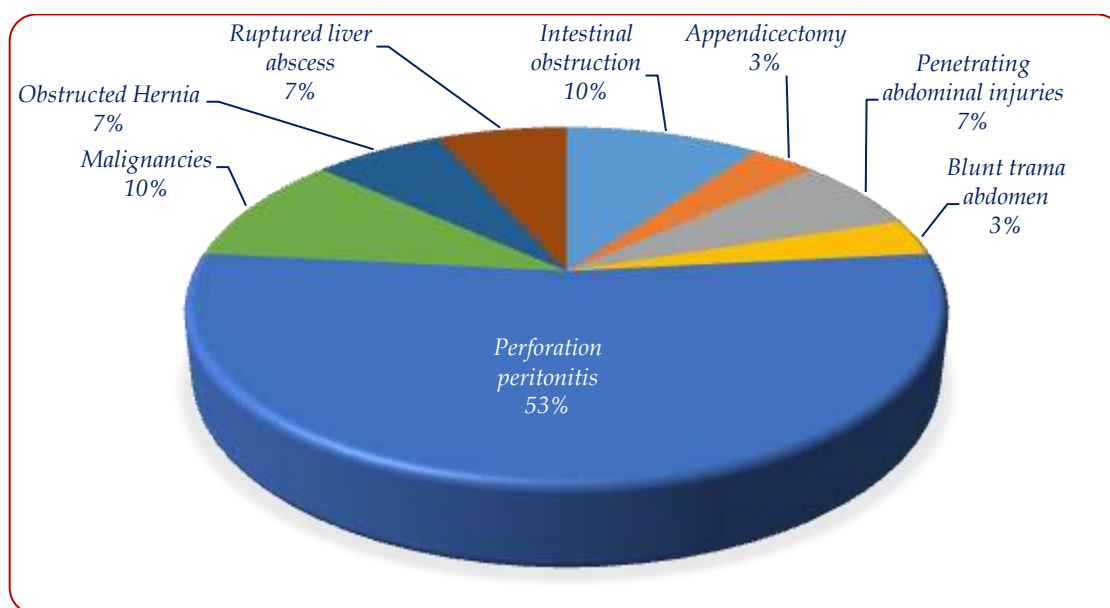
### **8. Indications for Surgery:**

In the present study Patients with perforation peritonitis who underwent for exploratory laparotomy were associated with highest wound dehiscence (53.33%). Whereas only one patient who underwent appendectomy had wound dehiscence.



**Table No. 6: Showing indications for surgery**

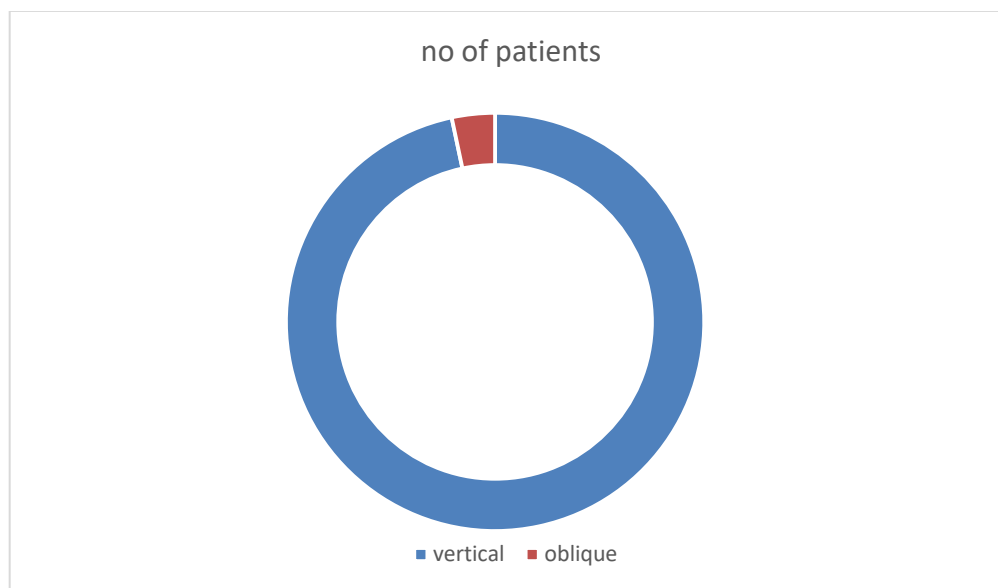
Indications for Surgery	Cases (n=30)	
	No.	%
Intestinal obstruction	3	10.00
Appendicitis	1	3.33
Penetrating abdominal injuries	2	6.67
Blunt trauma abdomen	1	3.33
Perforation peritonitis	16	53.33
Malignancies	3	10.00
Obstructed Hernia	2	6.67
Ruptured liver abscess	2	6.67



**Graph 8: Showing indications for surgery**

### **9. Type of Abdominal Incision**

In the present study out of the 30 patients, 29 patients (96.67%) who were operated through vertical (either midline or Para median) incisions were developed wound dehiscence. The other 1 (3.33%) had oblique incisions for appendectomy.



**Graph 9: Showing type of abdominal incision in study sample**

#### **10. Suture Material Used for Abdominal Closure**

In the present study Monofilamentus sutures were used in 24(80.00%) patients and braided in 6(20%) patients who developed wound dehiscence.

**Table No. 7: Showing suture material used for abdominal closure in study sample**

Suture used	Cases (n=30)	
	No.	%
monofilament	24	80.00
Braided	6	20.00

#### **11. Abdominal Closure Method:**

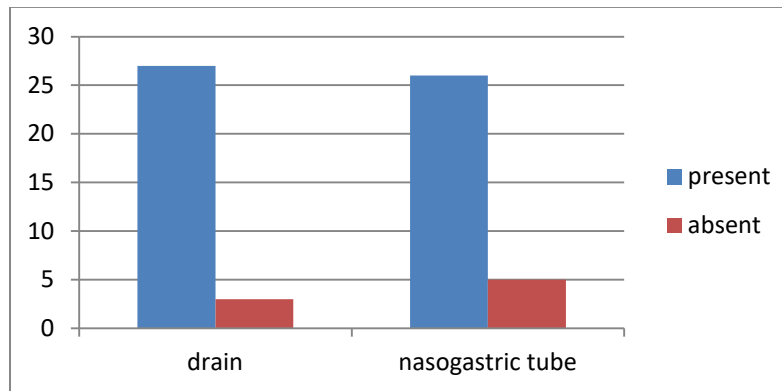
In the present study out of the 30 patients who developed wound dehiscence, layered closure had done in 20 patients (66.67%) and mass closure had done in 10 patients (33.33%)

**Table No. 8: Showing method of abdominal closure in patients**

Closure	Cases (n=30)	
	No.	%
Layer	20	66.67
Mass	10	33.33

#### **12. Use of Drain and Nasogastric Tube:**

In the present study out of 30 patients drains were used in 27 (90%) of the patients while in the other 3 no drains were used and 25 (83.33) had nasogastric tube inserted postoperatively.



**Graph 10: Showing method of abdominal closure in patients**

### **13. Post Operative Day When Dehiscence Occurred:**

In present study out of 30 patients majority of the patients 22 (73.33%) had wound dehiscence occurred between the sixth to tenth postoperative day. There were only 3(10%) patients who had dehiscence after the eleven postoperative day and 7 patients (23.33%) had early wound dehiscence within 5 days of operation.

**Table No. 9: Showing post operative day when dehiscence occurred**

Post op day	Cases (n=30)	
	No.	%
0-5	7	23.33
6-10	22	73.33
>11	3	10.00

### **14. Possible Post Operative Factors:**

The possible leading cause of wound disruption in present study was wound infection in 16 patients (53.33%). Serosanguinous exudate was the leading indicator of impending dehiscence (56.67%). All the patients received analgesic and antibiotic available in hospital postoperatively.

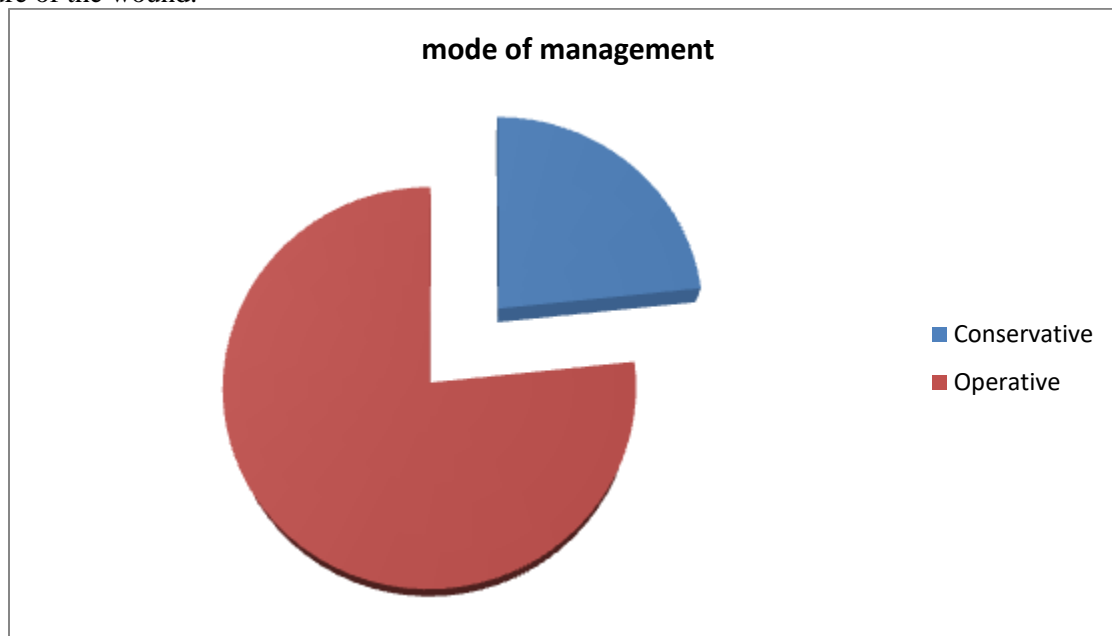
**Table No. 10: Showing possible post operative factors**

Factors	Cases (n=30)	
	No.	%
Wound infection	16	53.33
Abdominal distension	4	13.33
Serosanguinous discharge	17	56.67
Surgical drain	3	10.00
NG tube	3	10.00
Constipation	1	3.33
Antibiotics	30	100.00
Analgesic opioid/NSAID	30	100.00

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**15. Mode of Management:**

In present study 7 patients who had partial dehiscence (dehiscence part did not involve rectus sheath) were managed conservatively. The other 23 patients were taken back to operation theatre for relaparotomy and closure of the wound.



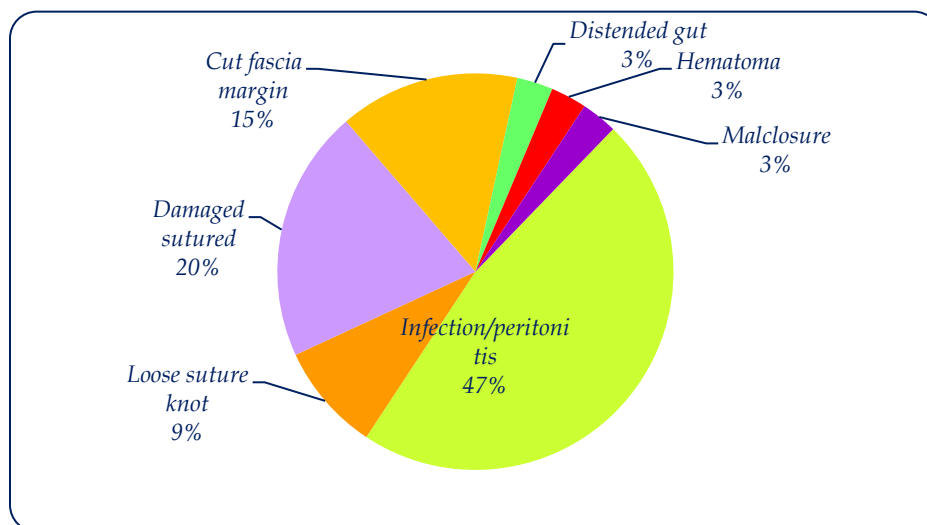
**Graph 11: Showing mode of management**

**16. Operative Findings During Relaprotomy:**

As demonstrated below, the relaparotomy findings varied. In a descending order (from most frequent to the least frequent) they were peritonitis, damaged sutures, cut fascia margins, loose suture knot, early removal of sutures, haematoma and poor wound closure technique.

**Table No. 11: Showing operative findings during relaprotomy**

Findings	Cases (n=30)	
	No.	%
Infection/peritonitis	16	53.33
Damaged sutured	7	23.33
Cut fascia margin	5	16.67
Loose suture knot	3	10.00
Distended gut	1	3.33
Hematoma	1	3.33
Malclosure	1	3.33



**Graph 12: Showing operative findings during relaprotomy**

#### 17. Abdominal Closure in Repeat Surgery:

There were 23 patients who were taken back to operation theatre, 20 of them had mass closure of their abdominal wound, with insertion of tension sutures in 5 of them. The other 3 had layered closure with insertion of tension sutures in all of them. All these patients received antibiotics and analgesics.

**Table No. 12: Showing method of abdominal closure in repeat surgery**

Abdominal closure	Cases (n=23)	
	No.	%
Mass closure without Tension sutures	15	56.22
Mass closure with Tension sutures	5	21.74
Layered closure without Tension sutures	0	0
Layered closure with Tension sutures	3	13.04

#### Outcome

The average hospitalisation duration was 25 days with a range of 5 – 70 days and one patient died during treatment.

**Table No. 13: Showing duration of hospitalisation**

No of days	Cases (n=30)	
	No. of days stayed in Hospital	%
0-10	1	3.33
11-20	10	33.33
21-30	14	46.67
>30	4	13.33
Died	1	3.33

### **19. Risk Factor in Dehiscence and Non Dehiscence Cases for Emergency Abdominal Surgery**

**Table no. 14**

S. N.	Risk factor	Non-dehiscenced cases(n=220)	Dehiscenced cases (n=30)	Relative risk	Z-statistic	p-value
1	Peritonitis	11	18	12.00	7.541	<0.0001
2	Anaemia	18	25	10.18	9.66	<0.0001
3	Age more than 60 yrs	13	11	6.20	5.06	<0.0001
4	Uraemia	10	4	2.93	1.93	0.0541
5	Diabetes mellitus	29	1	0.253	1.377	0.1684
6	CLD with Ascites	10	1	0.733	0.301	0.7635
7	Jaundice	0	1	21.39	1.889	0.0589
8	Use of steroids	1	0	2.38	0.534	0.593
9	Obesity	5	1	1.46	0.355	0.722
10	Hypoproteinemia	0	15	221.00	3.79	0.0002

On analysis in emergency abdominal surgeries, peritonitis ( $p<0.0001$ ), anaemia ( $p<0.0001$ ), age more than 60 years ( $p<0.0001$ ), and hypoproteinemia ( $p<0.0002$ ) were found significant as the risk factor for wound dehiscence.

### **DISCUSSION**

This study reviewed 30 patients who had wound dehiscence over a period from January 2014 to September 2015 were included in our study. The total number of emergency abdominal surgery done in this period was 250. Out of these 250 patients the number of patients who recovered well was 210, while 10 patients died without dehiscence and 30 patients develop wound dehiscence. Only one out of the 30 patients in this study died. The mortality rate in the study group was therefore 3.33% (1/30). This study has analysed the possible causes of wound dehiscence, the management of these patients preoperatively, intra-operatively, postoperatively and evaluated the outcome of each case. Wound failure rate of 12% is much higher than reported in a number of recent studies of similar respect.

Niggebrugge A and Hansen B(1995) reported a failure rate of 1% (45/3768) in patients who had undergone midline laparotomy in a 5year period (1986-1990). Bucknall TE et.al (1982) reported failure rate of 1.7% (19/1129) in patients who had undergone major laparotomies over 5 year period (1975-1980). The possible explanations for such big discrepancy may due to the fact that majority of the patients were done as emergency operations. Emergency surgery is a risk factor to wound disruption in that, being a lifesaving procedure there is hardly any time to adequately stabilise patients and more often than not, the chronic health status may not be an immediate priority. In this study unavailability and/or wrong choice of suture materials and right antibiotic cover may also have contributed to the high failure rate.

Ian Capperauld (1985) stated that “The choice of suture material is frequently motivated by emotional rather than scientific thought process. Choice is dictated by what historically the surgeon was taught by his Chief who in turn emulated his Chief. This decision process could, therefore, be well out of date by a period in excess of 50 years”. Senior house officers who are surgical trainees usually do these operations. Krause R et al (1987) said that incidence of relaparotomy is high in training institutions and also depends on the type of health facility.

The mean age was 66.2 years with a range of 11 to 75 years. The male to female ratio was 2:1 (20:10). The youngest patient was a boy who had dehiscence of a grid iron (appendectomy) incision. The 75-year-

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old patient was a man with perforation peritonitis and had undergone exploratory laparotomy. The highest number of patients (10) was within 61-70 years age group, which can be explained. In emergency abdominal surgery wound dehiscence occurs in an older age group and afflicts men more than women. Madsen G et al (1992) reviewed 198 patients with burst abdomen and reported a median age group of 66 years with a male to female ratio of 2.5:1.

The commonest presenting symptom was abdominal pain (96.67%). Pain is a nagging symptom and not many patients will tolerate it and therefore it is the main reason why many patients will seek medical attention. Fever is an indication of infection and 13.3% of the patients had it. The other symptoms included vomiting, cough and weight loss. Clinical evaluation of these patients confirmed these complain. At time of admission in this study, 60% of the patients had abdominal distension, 13.33% were clinically febrile, 13.33% had tachycardia and were dehydrated, 10% had palpable abdominal masses and 6.67% were clinically wasted. These variations in symptomatology indicate that presentation was both acute and chronic in nature. However this wasn't useful in determining which patients would have wound dehiscence because the better fraction of the patients did not have most of them and still had wound disruption.

In the series by Madsen G et al (1992) the complicating illness prior to surgery did not affect the outcome of surgery, whereas Bucknall et al (1983) did mention old age, male sex, obesity, chest infection and abdominal distension as pre-operative risk factors to wound dehiscence. However in surgical practice it is necessary to stabilise the patient first prior to surgery thus the physical findings like dehydration, anaemia and low blood pressure should be corrected prior to surgery.

Roe et al (1998) outlines the hazards of presenting a patient for surgery with existing fluid deficits. He therefore emphasises the need to correct fluid imbalance before operation. Clinically, 26 (86.67%) patients were found to be pallor (low haemoglobin) whereas 25 (83.33%) had low haemoglobin (below 10g/dl) as per laboratory findings. In this study this is considered as one of main contributors to wound failure. Low haemoglobin means poor oxygen supply to tissues and therefore poor tissue healing and inability to resist infection. One of the patients who died in this study had low pre-operative haemoglobin. Haemoglobin before her death was 3.8g/dl.

Simon et al (2000) reported that mortality and morbidity are significantly increased in patients who undergo surgery with preoperative haemoglobin of less than 8g/dl and receive no transfusion<sup>47</sup>. Four patients (13.33%) had high urea pre-operatively. This may have been due to dehydration because electrolytes were within normal ranges. All patients except one had normal electrolytes. This is in keeping with surgical practice of correcting electrolyte imbalance before surgery and thus this might have been achieved through replacement therapy.

There were 3 patients with malignancies i.e. carcinoma of ascending colon, adenocarcinoma of oesophagus and endometrial carcinoma. Whereas no evaluation as relates to the effects of neoplastic or paraneoplastic syndrome were done, it's common knowledge that patients with malignancy are emaciated (especially carcinoma of oesophagus and stomach) usually with anaemia and hypoproteinemia. These patients pose a great challenge in term's recovery from anaesthesia, predictability of outcome of surgery and ability to fight infection. Some authors encourage oral or stomal nutritional supplement before surgery is attempted (Christopher, 2000 and Elia *et al.*, 1995).

Soran A et al (1998) mentioned hypoproteinemia as risk factor for abdominal wound dehiscence in their study. One (3.33%) patient had diabetes mellitus, one (3.33%) had pneumonia and two (6.67%) had jaundice. These factors are mentioned in the literature review as possible causes, but statistically the numbers are quite low in this study for any useful inference to be made. No patients were undergoing radiotherapy or steroid therapy. These factors are known to cause poor tissue healing and were therefore included in the study.

In this study all patients were tested for human immunodeficiency virus (HIV) and only one of them was seropositive. The other 29 were seronegative. From this kind of statistics it would be difficult to conclude



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whether HIV infection in isolation affects tissue healing and therefore no inferences were made as relates to HIV infection.

Seymour et al (1999) reported that, patient with HIV infection and AIDS generally do not have difficulty with wound healing. The wound complications found in AIDS patients have not been properly defined neither has a direct relationship between leukocyte defect and wound healing reported.

Jellis J (2002) reported that, appendicitis, gynaecological pelvic abscesses and primary peritonitis are common in patients with HIV infection. These patients present with difficulties in surgical wound healing due to the existing infection.

Peritonitis was a leading cause of emergency exploratory laparotomy followed by intestinal obstruction, appendectomies and penetrating abdominal injury. Three patients with gastrointestinal malignancies were operated in emergency, two for feeding jejunostomy and one for diversion colostomy. All the approaches were through vertical incisions. These incisions were either midline or paramedian. One patient who had appendicitis was operated through a grid iron incision that gave way after discharge from hospital. Vertical incisions are known to give way more frequently than any other type of abdominal incision (Hugh *et al.*, 1986).

All the patients except the one who had undergone appendectomy had drains and nasogastric tubes. This shows that nasogastric tubes and drains may not prevent wound dehiscence in presence of infection although they are helpful in abdominal distension caused by temporary ileus.

Graham *et al.*, (1998) in the paper, "The association of intra-abdominal infection and abdominal wound dehiscence", pointed that intra-abdominal infection and colonic surgery were a leading cause of wound dehiscence.

After the initial surgery most patients (66.67%) had layered closure of the abdominal wound. The rectus sheath was the layer of interest in this study because it maintains the integrity of abdominal wall after surgery. In 80% of the patients the rectus sheath was closed using monofilament nonabsorbable suture. In 20% of the patients vicryl was used. This shows that the choice of suture material was governed by either the operating surgeon or by availability and not necessarily by principle. Ian Capperault says, suture materials are the commonest implants used by surgeons and therefore thorough knowledge of their properties is a must for every surgeon.

Poole *et al.*, (1984) suggested that closing midline abdominal fascial wounds with a running nylon suture might be a superior method of closure in clean incised wound.

Layered closure results in significantly more burst abdomen than any other method of closure (Niggebrugge *et al.*, 1995).

Most (73.33%), of the wounds dehiscd in the sixth to tenth postoperative day. This duration is within the period quoted by other similar studies. Anielski *et al.*, (1997) reports average time of 6.5 days while Madsen et al (1992) reported the sixth postoperative day. Wounds that dehiscd within the first 5 days accounted for 23.33%. This is due to technical failure of wound closure. The other 10% of the wounds dehiscd after eleventh day. This was mainly due to infections and after removal of sutures. The leading postoperative causes of wound dehiscence were wound infection and peritonitis (16 patients). Infection interferes with wound healing and thus in the presence of the same there is increased incidence in dehiscence. Most studies do quote wound infection, presence of peritonitis, colonic surgery and pelvic abscess as possible contaminants of the incision leading to dehiscence.

Another indication of impending dehiscence is serosanguinous exudate. As mentioned earlier gastrointestinal surgery has to be accompanied by nasogastric tube to reduce abdominal distension in case of transient ileus, which does occur regularly after intra-abdominal surgery. In this study 3 patients developed constipation and 6 developed cough. However these symptoms did not occur in isolation and cannot be wholly blamed for wound dehiscence although they are capable of causing the same one patient had suture removal before the wound gained sufficient strength and thus there was complete dehiscence. Six patients had high blood pressure a possible postoperative factor. One patient had incisional haematoma while another one had poor incision margins approximation.



### **Research Article**

There were 23 patients who were subjected to re-laparotomy while 7 had conservative management. Conservative management involved dressing of the wound regularly until it healed. Some did require insertion of skin sutures under local anaesthesia in the ward treatment room.

Dodson *et al.*, (1994) pointed out that superficial skin closure of extrafascial wound dehiscence appear to be superior to deep en bloc closure in terms of time and pain control. These benefits are achieved with minimal risks while allowing timely wound healing. 23 patients who were taken to operation theatre for re-exploration, 10 were found to have infection, 6 had damaged suture, 5 had cut fascia margins, 3 had loose sutures and 1 had distended gut. As regards to failed suture or suture technique, it would be worthwhile to mention that this is inexcusable in the current surgical practice where litigation is on the increase against the profession.

Cliff Snyder said in 1972- "The faults in making sutures are the manufacturers, the errors in using them are surgeon's." Other findings were haematoma and poor closure. Those who had loose sutures damaged suture or cut fascia margins were 14 in total. This presented technical failure where sutures were either poor, stitching was poorly done (too tight or too close to fascia edge or loosely tied). The purpose of suture is to hold a wound together in good apposition until natural healing process is sufficiently well established to make the support from the suture material unnecessary and redundant. During re-laparotomy, 15 patients had mass closure of the abdominal wound, with 5 of them having tension sutures. The other 3 had layered closure and tension sutures. The suture used this time round to close the rectus sheath was nylon suture. All the patients received antibiotics and analgesics.

As regards to tension suturing, Eden C G recommends use of a strong Nylon suture to be inserted in all layers of the wound at 3 cm from wound edge and at 3 cm interval without undue tension over polyethylene bars and to be retained for 10 to 14 days.

Niggebrugge A et al (1995) suggest that a continuous monofilament, non-absorbable suture should be used to close a laparotomy incision. Stretchable suture material, loop sutures, and the continuous figure of eight technique should all be investigated.

Paye *et al.*, (1992) compared the use of polyamide mesh applied externally to skin and intraperitoneal polyglactine absorbable mesh for treatment and prevention of wound dehiscence. They concluded that use of intraperitoneal mesh reduced rate of dehiscence significantly (4% versus 13%) and lowered the frequency of reoperation in eviscerated patients (25% versus 61%). All patient studied had one or more risk factors of evisceration (Paye F et al,1992). Although no meshes were used in this study, the work by Paye F and colleagues shows that the use of "prophylactic" absorbable mesh may go a long way in reducing laparotomy wound dehiscence in suspect patients in institution plagued by this surgical complication.

The average hospitalisation duration was 25 days with a range of 6 days to 70 days. The patient who stayed the shortest had burst abdominal within few hours after laparotomy. He was taken back to theatre and repaired immediately. He was discharged on 6th postoperative day. Anielski et al (1997) reports an average hospitalisation of 35.9 days. One out of thirty patients died (3.33%). This mortality is much lower than reported in other series.

### **CONCLUSION**

On the basis of the findings of this study the conclusion is:

1. Wound dehiscence in emergency abdominal surgeries has multifactorial causes. These include certain indications of laparotomy (e.g. peritonitis), intra-operative technique and post-operative co morbidities and factors.
2. The commonest cause in our set up is anaemia, post-operative infection, hypoproteinemia and inappropriate suture materials.
3. Surgical drains and nasogastric tube should be put when sepsis and ileus are expected.
4. Patients with age group more than 60 years were more at risk than any other patient category.

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5. Not all patients should be subjected to relaparotomy. Those with partial or extrafascial wound dehiscence can be managed conservatively.
6. Hospitalisation period is quite long though within limits of other studies of similar respect

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