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BURST ABDOMEN : CAUSES & MANAGEMENT

General Surgery

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ABSTRACT

Introduction – Burst abdomen is a severe post operative complication which causes significant amount of morbidity. Several risk factors, improper techniques or practice, postoperative infections, electrolyte imbalances and hypoproteinemia are associated with this.
Aim – To assess the patients who underwent exploratory laparotomy and developed burst abdomen and find out the etiological factors and observe the management outcomes.
Methods – The study included a total of 80 patients who developed burst abdomen and various parameters like age, sex, comorbidities, postoperative complication, culture sensitivity from discharge, suturing technique, management and follow up were observed and noted in the form of tables.
Results – Out of 80 patients, 70 were following emergency laparotomy (87.5%). The frequency was higher in the older age group (>50 years) and male:female ratio was 1.96:1. 47.5% of the patients had hollow viscus perforation and were associated with various risk factors. Post operative hypoproteinemia, cough, paralytic ileus were other aggravating factors. Conservative management with delayed suturing yielded good results but with an increase in overall morbidity whereas immediate suturing with vacuum drain also showed good outcomes. Double layer and single layer with tension suturing methods used for secondary closure showed better outcomes compared to single layer en-mass.
Conclusion – Adherence to proper precautionary measures, techniques and efforts to minimise the effects of the risk factors along with timely management can reduce the incidence of this grave condition.

KEYWORDS

Burst Abdomen, Risk Factors, Management, Suturing Methods.

INTRODUCTION

Burst abdomen is a severe post-operative complication experienced by Surgeons, who do a significant amount of surgery. Burst abdomen is defined as post operative separation of abdominal musculo-aponeurotic layers. It occurs mostly between the sixth and eighth day after operation. Factors relating to the incidence of burst abdomen are proper disinfection, incision, suture, closure, coughing, vomiting, distention, obesity, jaundice, malignancy, diabetes mellitus, hypoprotinaemia, anaemia, immunocompromised patients and wound infection.[1,2,3]

The suture should have excellent handling and knotting. Its prevention is important to reduce the postoperative morbidity, mortality and increased cost of care both in terms of increased hospital stay and treatment of complications.[2]

The frequency as described in the international data ranged from 0.4% to 3.5% and is also associated with a mortality rate in patients as high as 45%.[4] While in India data stated higher frequency of burst abdomen with overall rate of 4.8% and 6.6%.[5]

The study aims to find the etiological factors of burst abdomen in hospitalised patients, evaluate the current management methods and to compare conservative and operative approach with respect to complications and outcomes. Various techniques have been used till date to deal with this situation by the use of different kind of sutures and different suturing techniques like single layer en-mass closure, double layer closure of the abdominal layers and tension suturing are in use till date.

A surgeon can perform a technically perfect operation in a patient, who is severely compromised by the disease process and still have a complication.[6,7] Various pre-operative factors which are predisposing to this unpleasant and tragic post-operative complication are studied.

Because of high mortality rate due to burst abdomen in surgical operations. The management of these ranges from simple dressing to further closure of burst abdomen followed by a period of intensive care.

The purpose of this present study is to assess the efficacy of closure of laparotomy incisions by different techniques and its different predisposing factors.

AIMS & OBJECTIVES

- To find out the etiological factors leading to burst abdomen in all emergency and routine operative procedures.
- To observe the outcome of single layer en-mass, double layer and single layer with tension suturing in closure of the abdominal layers.
- To observe the efficacy of immediate secondary closure with vacuum drain vs conservative management with delayed closure.

MATERIALS & METHODS

This is a prospective, observational study carried out from October 2019 to May 2020 in the Department of General Surgery, Rajendra Institute of Medical Sciences, Ranchi.

A total of 80 patients who underwent either emergency or elective abdominal surgeries and developed post operative wound dehiscence were included in the study.

Inclusion Criteria – Patients above 10 years of age of either sex who underwent exploratory laparotomy and gave consent for investigation and treatment.

Exclusion Criteria –

- Patients not giving consent, primarily operated outside or had undergone previous laparotomy due to any condition and developed incisional hernia or burst abdomen.
- Patients below 10 years of age.

A comprehensive history, thorough physical examination and any other relevant history were recorded. Observations and results were depicted in the form tables. After approval from Institutional Ethics Committee of Rajendra institute of Medical Sciences, Ranchi, Jharkhand, India. Informed written consent was obtained from the patients.

OBSERVATION & RESULTS

Table 1 – Age Distribution

Age in Years	No. Of Patients
10-20	3
21-30	3
31-40	13
41-50	18
>50	27

Table 2 – Sex Distribution

Sex	No. Of Patients
Male	57
Female	23

Table 3 – Elective / Emergency Procedure

Type Of Surgery	No. Of Patients
Emergency	70
Elective	10

Table 4 – Intra-operative Findings

INTRA OP FINDING	No. Of Patients
Ileal perforation	15
D3 perforation	2
Caecal perforation	5
Antral perforation	6
Prepyloric perforation	4
Sigmoid Volvulus	6
Intestinal obstruction	10
Koch's abdomen	4
Carcinoma colon	6
Carcinoma rectum	3
Appendicular abscess	5
Caecal volvulus	2
Splenic injury with haemoperitoneum	4
Retroperitoneal haematoma	2
D1 perforation	6

Table 5 – Pre-op Predisposing Factors

Factors	No. Of Patients
Intra-abdominal sepsis	45
Diabetes Mellitus	36
Malnutrition	5
Anaemia	19
Smoking	29
Alcohol	33
Underlying malignancy	6
Obesity	15
Multiple factors	49

Table 6 – Post-op Predisposing Factors

Factors	Patients
Hypoalbuminaemia	21
Raised TLC (Sepsis)	19
Cough	16
Vomiting	10
Abdominal distention (Paralytic ileus)	14

Table 7 – Suture Material Used For Primary Closure (vicry, Pds – Rectus & Nylon, Silk – Skin)

Suture	Patients
Vicryl (Continuous), Silk	27
Vicryl (Interrupted), Silk	13
Vicryl (Continuous), Nylon	14
Vicryl (Interrupted), Nylon	8
PDS, Nylon	5
PDS, Silk	13

Table 8 – Post Operative Day Of Presentation

POD	No. Of Patients
POD 5	12
POD 6	18
POD 7	26
POD 8	24

Table 9 – Pus Culture And Sensitivity

Organisms	No. Of Patients
E. Coli	29
Klebsiella	11
No Growth	22
Pseudomonas	7
Proteus Vulgaris	6
Acinobacter	3
Candida	2

Table 10 – Type Of Burst Abdomen

Type	No. Of Patients
Complete	29
Partial	51

Table 11 – Management & Follow Up

OUTCOME	CONSERVATIVE MANAGEMENT WITH DELAYED SUTURING	IMMEDIATE SUTURING WITH PLACEMENT OF VACCUM DRAIN
Incisional Hernia	6	2
Reburst	7	1
Death	11	0
Uneventful	39	14

DISCUSSION

Burst abdomen is a very serious complication which increases the post operative morbidity and has a high mortality rate due septicaemia and multiorgan failure.

In a study by *Mahey R et al* [5], Male:Female ratio was 1.27:1 whereas in our study it was 1.96:1. Male preponderance may be explained by the fact that incidence of hollow viscus perforation either spontaneous, traumatic or due to peptic ulceration are higher in males.

According to *Maingot* [10], the average age of burst abdomen is 45 years. *Wolff* [11] , found that age is of some importance etiologically for disruption which was four times more common in patients above the age of 45 years than in the younger group. *Dr Sreenidhi GM et al* [9] , showed in her study that incidence of burst abdomen was mostly in the age group of 50-60 years and similarly in our study it was seen in the elderly age group (>50 years); youngest was 10 years and eldest was 76 years old. Factors common in this age group like chronic cough, chronic constipation, dysuria, straining, anaemia, hypoproteinemia, multiple vitamin deficiencies, post-operative respiratory infections and malignancies are important risk factors for the development of burst abdomen.

Spiliotis J et al [8] , showed that the incidence of abdominal wound dehiscence was more common in male gender (60%) with most of the patients who underwent laparotomy had malignancy or diverticular disease and 60% of the patients who developed wound dehiscence had undergone emergency laparotomy. In our study 87.5% of the patients who developed burst abdomen underwent emergency laparotomy.

In emergency setup various factors such as delayed referral of the patient from the PHC and CHC results in most patients with a underlying intestinal perforation develop features of peritonitis, sepsis and presents with features of shock which is one of the important risk factor for development of wound infection and ultimately burst abdomen. Other factors such as improper operation theatre sterilisation, unsterilised instruments, non availability of good quality and variety of suture materials, pre-operative fluid resuscitation and bowel preparation leads to contamination during the surgery and thus the nidus of infection stays which results in post operative complications and wound infection. In our study 47.5% of the patients presented with features of hollow viscus perforation amongst which ileal perforation was 18.75% of the cases. The higher number of cases associated with perforation can be attributed due to intraperitoneal leakage of bile / faecal content which with delayed presentation results in development of pyoperitoneum so to prevent this grave outcome these cases need to dealt with high urgency without delay and after proper preoperative fluid resuscitation, antibiotic prophylaxis and intra operative blood transfusion.

10 elective cases were carried out for the patients with carcinoma rectum, colon including 1 splenectomy due to blunt trauma abdomen.

In our study we found various pre-operative predisposing factors among which intra-abdominal sepsis / peritonitis was found in 56.25%, diabetes mellitus in 45%, alcoholism in 41.25%, smoking in 36.25%, anaemia in 23.75%, obesity in 18.75%, malnutrition in 6.25%

of the patients. Among 80 patients, 49 patients had multiple risk factors like diabetes, smoking, alcoholism, anaemia and sepsis. According to *Maingot* [10], at least 70% of the normal haemoglobin level is required for elective safe surgery. Haemoglobin contributes the oxygen to the regenerating granulation tissue and lower haemoglobin levels affect the wound healing. According to *Silverstein P* [12], Cigarette contains nicotine which is a vasoconstrictor that reduces nutritional blood flow to the skin, resulting in tissue ischemia and impaired healing of injured tissue. Nicotine also increases platelet adhesiveness, raising the risk of thrombotic microvascular occlusion and tissue ischemia. In addition, proliferation of red blood cells, fibroblasts, and macrophages is reduced by nicotine. According to *Rosa DF et al* [13], a high-fat diet and excessive alcohol consumption are among the main external factors related to a lifestyle that hinders the repair process of cutaneous tissue. Tissue recovery becomes even more difficult when these two factors are associated. The main effects observed seem to be associated with the control of the cutaneous inflammatory and oxidative processes and the inhibition of granulation tissue formation, collagen maturation, and re-epithelialisation.

We found out that amongst the suture materials used for primary closure polyfilament sutures like vicryl and silk were mostly associated with wound infection. Interrupted closing of rectus was found to be better in comparison with continuous as they were associated with lesser cases. This can be explained by the fact that in continuous suturing if a part of the wound gets infected and the suture gets loosened the whole suture gets ultimately sloughed out and resulting in complete burst. Monofilament sutures like PDS, Nylon were associated with less number of cases. *Dr. D. Geetha* [18], stated that continuous suturing of rectus sheath, in emergency cases leads to increased rate of wound dehiscence in the post operative period hence such patients needs re-surgery in the post operative period in the hospital or may undergo incisional hernia repair in the future. Disadvantages of continuous sheath closure includes, single knots are usually placed. Hence if patients developed wound infection, or any factors that increases intra abdominal pressure it leads to give away of rectus. In contrast if Interrupted X suturing is applied, three or four intermittent knots will hold the rectus and will prevent the formation of wound dehiscence.

Burst abdomen occurred in the patients in between POD 5-8, highest incidence being on POD 7 and these findings were in correlation with *Parmar et al* [14], *Pradeep Soni et al* [15] studies. All cases of burst abdomen are preceded by serous or purulent wound discharge which is the 1st sign of impending wound dehiscence and burst abdomen. We found in our study that gram negative organisms were mostly associated in causing infection among which E.Coli (36.25%) was predominant. 22 out of 80 patients showed no growth in culture and sensitivity reports and these findings were in correlation with *Shekhar et al* [2] study where E.Coli was found in 43.90% of the patients. Post-operative cough, hypoprotinemia, sepsis, abdominal distention due to hypokalaemia were the causes found in most of the patients. According to *Lakshmi et al* [16], 63.33% of the burst abdomen cases had hypoprotinemia with serum protein <6gm%. It also showed that post operative respiratory infection and cough is a risk factor with poor prognosis. [17] Hypokalaemia is caused by inadequate intake or loss of potassium and can occur for many reasons. Abdominal surgery is characterised by involvement of more tissues, severe damage, much exudation in the surgical field, excessive loss of digestive fluid, long fasting times as well as an inhibition of gastrointestinal motility after the surgery.

29 patients out of 80 had complete and the remaining had partial midline burst abdomen.

63 patients were managed conservatively by intravenous broad spectrum antibiotics, daily wound lavage with normal saline and packing with eusol soaked gauze and delayed suturing was done after the appearance of granulation tissue. 17 patients in whom the wound had less slough were sutured immediately after proper freshening of the wound margins and insertion of vacuum drain in the subcutaneous space along with air seal dressing. In the long run 8 patients developed incisional hernia and 8 patients developed reburst. Mortality rate was 13.75%. In a study by *Shekhar et al* [2], Out of 82 patients 28 developed incisional hernia. There was a 28% mortality in present study. Although the incidence of burst abdomen has not changed much, the mortality due to it has decreased due to early recognition, early ambulation, better broad-spectrum antibiotics, better post-operative management and increasing awareness about the condition.

Patients were divided into 3 groups on the basis of different suturing techniques used for secondary suturing among which single layer suturing with Nylon along with placement of tension sutures with PDS were found to be most effective as incidence of incisional hernia and reburst were less during follow up.

CONCLUSION

Burst abdomen is one of the most common complication faced by the surgeons. Many factors predispose to this serious problem like anaemia, diabetes, smoking, alcoholism, underlying malignancy, malnutrition which are very common in our country. Proper resuscitation, early referral, proper sterilisation, aseptic measures and use of proper skill and suture material can reduce the incidence. It occurs generally around POD 5-8 and so post operatively we must try to prevent respiratory infections, cough, paralytic ileus, sepsis, hypoprotinemia by giving proper replacement fluids, total parenteral nutrition, albumin and amino acid infusions as and when required because patients are kept NPO for about 5 to 6 days after an abdominal surgery. Gram negative organisms were involved in causing wound infection so proper antibiotic coverage must be given. Severe peritonitis cases should be closed with interrupted sutures primarily as this minimises the risk of rectus giving away. Silk must be avoided in closure of skin as it is a polyfilament suture and it acts as a nidus of infection. Conservative management with delayed suturing with proper wound lavage and dressing carries good results but it increases the overall morbidity. Immediate suturing with vacuum drain can also be tried if there is less slough. Single layer en-mass closure should be avoided except in cases where there is rectus retraction and closure of rectus is not possible. Tension suturing or double layer closure of abdomen carries similar results and choice of one depends on the experience of the surgeon.

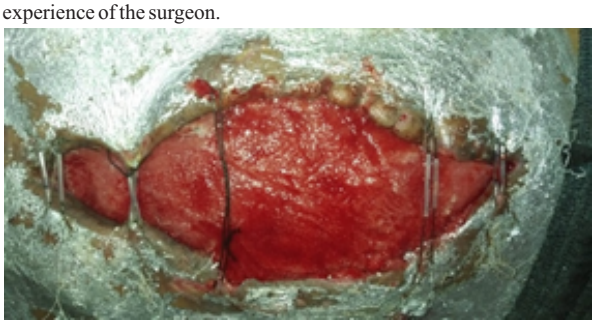

Image showing burst abdomen after 11 days of conservative treatment in a 26 year old patient with appearance of granulation tissue and stay sutures taken. Aluminium paint has been applied to prevent skin excoriation from bile leak.

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