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A Comparative Study of Deep Tension Suture versus Bogota Bag in the Management of Burst Abdomen

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Abstract:
Objective: *To compare the outcome of managing abdominal wound dehiscence by deep tension suture against the use of Bogota bag afteremergency and elective laparotomies.*
Materials and methods: *This comparative cross-sectional study was carried out in a tertiary care hospital in North East India. Four hundred and seven patients undergoing midline laparotomyeither in emergency or elective setup were included in the study. Wounds were examined from third postoperative day onwards for any signs of wound dehiscence. Patients were divided into two groups i.e. group A, managed with deep tension sutures and group B, managed with Bogota bagapplication.*
Results: *60 out of 407 (14.74 %) patients developed complete wound dehiscence (burst abdomen).Frequency of burst abdomen was significantly higher after emergency (16.62 %) than elective laparotomies (3.45%). Group A (n=30) was managed with deep tension sutures and group B (n=30) was managed with Bogotá bag. Group A was associated with lessmorbidity, less number of further surgeries and lower mortality.*
Conclusion: ***A****bdominal closurewith deep tension sutures is an effective way of managing patients with completewound dehiscence while Bogotá bag application may be used in difficult cases due to generalized gut edema or need of further re-operations.*
Keywords: *Wound dehiscence; complete; deep tension suture; Bogota bag.*

I. Introduction

The incidence of burst abdomen in the international literature range from 0.4 to3.5%[1-7]. Burst abdomen can result in evisceration, requiring immediate treatment. It prolongs the hospital stay of the patient and also increases the morbidity of the patients. Even the associated mortality rate may be as high as 45%[8-10]. The management of wound dehiscence ranges from simple dressing to further surgery for abdominal wash and subsequent closure of burst abdomen followed by a period of intensive care[11]. We compared two management strategies for burst abdomen: Deep tension suture (DTS) and Bogotá bag both of which are relatively cheap and offered widely by many surgeons.

II. Material & Methods

Type of study was comparative cross-sectional study and conducted at a tertiary care hospital in North Eastern part of India over a two year period. A total of four hundred and seven consecutive cases, irrespective of the age and sex, undergoing emergency/routine laparotomies through a midline incision, were included in the study. Patients operated through other incisions were excluded from the study.

A detailed history and clinical examination was conducted. The data was noted on a proforma which also included all the major risk factors for wound dehiscence like age, gender, nature of disease, emergency surgery, nutritional status of patient, anemia, jaundice and presence of comorbidities like diabetes mellitus, hypertension, chronic obstructive pulmonary disease, steroid use, immunodeficiency states etc. Baseline investigations, serum total protein, albumin/globulin ratio were noted in all cases as well as abdominal radiographs, ultrasonography and CT scan abdomen were done wherever deemed required. Postoperatively, abdominal wounds were opened first on the third postoperative day and then examined daily for any erythema, seroma formation, discharge of serosanguinous fluid or pus from one or more sites and subsequently partial or complete wound dehiscence was diagnosed.

Partial wound dehiscence was managed by laying open the wound, regular dressing along with antibiotics as and when indicated according to culture and sensitivity report.

Cases of complete wound dehiscence (burst abdomen) were divided into two groups i.e. group A (Odd numbered) managed with deep tension sutures and group B (Even numbered) managed with application of Bogotá bag. In group A patients, deep tension sutures were applied using number 1nylonesuture 3 cm from wound edges, 3 cm apart with a Ryle's tube of 6 cm length to avoid cutting of skin. Interrupted mattress sutures were applied in between the deep tension sutures.

In Group B, Bogotá bag applied, made from transparent side of a urine bag was sutured on all sides of open wound at least 3 cm apart from wound edges. Intravenous antibiotics and daily sterilized dressing were done in both the groups.

Statistical analysis was done by using SPSS version 22. Descriptive analysis was done for the frequencies while t-test was done to compare the difference in between the two groups.

III. Results

Significantly higher frequency of burst abdomenin emergency laparotomies i.e. 16.62 % as compared to elective laparotomies i.e. 3.45 % (Table 1).The mean length of hospital stay was significantly higher in Bogota bag group (39.80 ± 5.85 days) than DTS group (Table 2). Later developmentof incisional hernia (Table 3) was also higher in Bogotá bag group increasing the frequency of re-explorations and further surgeries on patients. The mortality (Table 4) in group B was 33.33 % whereas in group A 13.33 % which was statistically significant (P value < 0.05).

Table 1: Frequency of burst abdomen in different pathologies

Diagnosis	**Frequency**	**No of burst abdomen**
Duodenal ulcer perforation	71	7
Jejunal/ ileal perforation	45	8
Appendicular perforation	27	5
Penetrating abdominal trauma	19	2
Gunshot wound abdomen	8	2
Blunt abdominal trauma	80	9
Adhesive/ band intestinal obstruction	46	7
Large bowel obstruction	17	7
Colo- rectal malignancy	13	5
Abdominal tuberculosis	23	6
Others	58	2
Total	**407**	**60**

Table 2: Comparison of Management Groups

Groups	**Mean length of hospital stay (days) ± SD**	**P value**
Group A	17.77 ± 2.82	0.000
Group B	39.80 ± 5.85	

Table 3: Incidence of incisional hernia

Groups	**Incisional hernia**	**%**	**P value**
Group A	3	10.00	0.000
Group B	23	76.67	

Table 4: Incidence of mortality

Groups	**Mortality**	**%**	**P value**
Group A	4	13.33	0.005
Group B	10	33.33	

IV. Discussion

A burst abdomen usually occurs on the 6th to 8th post-operative day and is considered present when intestine, omentum or other visceras are seen through the abdominal wound following surgery. Factors relating to the incidence of burst abdomen are suture material, closure technique, postoperative coughing and vomiting, distention, obesity, malignancy, hypoproteinaemia, anaemia, immunocompromised states and contaminated surgeries [12].

Despite increased knowledge about wound healing, advances in perioperative care and suture materials, wound dehiscence continues to be a significant problem which prolongs hospitalstay and is associated with patients' morbidity,subsequent re-operations, higher incidence ofincisional hernia and increased mortality. This may be attributable to increasing rates of emergencylaparotomies being performed in high risk patients withmultiple comorbidities outweighing the benefits oftechnical achievements[2,7,13].

The frequency of burst abdomen in our study was 14.74 % which is higher than the Western studies which showed an incidence of 0.4 to 3.5% but is in accordance with the study done by Mathur and A Q Amini

et al [14,15] which showed that the problem of wound dehiscence is much more prevalent in South East Asia than the Western world.

Our study showed a significantly higher frequency of burst abdomen in emergency laparotomies i.e. 16.62 % as compared to elective laparotomies i.e. 3.45 %. This is also reflected in many other studies [7,11-13, 16-20, 21].

This may be attributable to poor nutritional state of patients, delayed presentation to the tertiary care hospitals, poor quality of suture material, tuberculous abdomen, higher load of emergency surgeries in suboptimal condition of patients, higher chances of contamination of the surgical field in emergency surgery and relatively inexperienced surgeons performing the emergency surgeries. Moreover the performance of the surgeon might be affected at night which could lead to suboptimal closure of the abdomen at the end of operation [15].

Our study showed that deep tension suturing (DTS) is a simple an effective way of managing burst abdomen which is associated with less morbidity and mortality. The mean length of hospital staywas significantly higher in Bogota bag group (39.80± 5.85 days) than DTS group and later developmentof incisional herniawas also a problem whichwas seen in Bogotá bag group which increasedhe frequency of re-explorations and further surgeries on patients. The mortalityin group B was 33.33 % whereas in group A 13.33 % which was statistically significant (P value < 0.05). The higher mortality in group B may be due to mostly pulmonary complications resulting from prolonged hospitalisation and intensive care stay.

V. Conclusion

Deep tension suture is an effective way of managing patients with burst abdomen and is associated with shorter hospital stay, lesser development of incisional hernia as compared to Bogotá bag.In those patients where deep tension suture may not be feasible due to non- approximation of the wound edges, Bogotá bag may be offered as an alternative.

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