

Research Article

Laparostoma: a useful surgical tool

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ABSTRACT

Background: Closure of the abdomen has always been a challenging task especially in the emergency setting with presence of bowel edema, haemoperitoneum, peritonitis. The aim of this study is to assess the role of laparostoma in such cases where closure of abdomen is difficult or under tension.

Methods: Retrospective analysis of 15 cases of laparostoma done either at primary surgery or re-exploration when abdominal closure was under tension. Laparostoma was done using nonadhesive plastic like sterile urine collecting bag to cover the exposed bowel. Mortality, whether closure of abdomen could be achieved at a later date, bowel complications due to laparostoma, need for mesh/skin grafting were noted.

Results: Of 15 patients with laparostoma, 9 were cases of perforative peritonitis and 4 were blunt abdominal trauma. Age ranged from 19 to 65 year. Abdominal wall closure could be achieved in a median of 15 days. Closure of rectus sheath could be achieved in 4 patients while in 8 patients only skin closure was done with the intention of closing incisional hernia after full recovery.

Conclusions: When closure of the abdomen is likely to be under tension creation of a laparostoma would help to prevent abdominal compartment syndrome with its systemic complications. It is also likely to cause less damage to the skin and rectus than methods like tension band wiring. The abdomen can be closed at a later date once the edema settles without undue tension on the abdominal wall.

Keywords: Laparostoma, Abdominal compartment syndrome, Bogota bag

INTRODUCTION

Closure of the abdomen has always been a challenging task more so in the emergency setting. Presence of bowel edema, haemoperitoneum, peritonitis can all preclude a tension free closure of the abdomen. Excessive tension during closure could lead to a burst abdomen or a rise in Intra-Abdominal Pressure (IAP) leading to abdominal compartment syndrome with its systemic consequences.

Various techniques have been developed to assist in closing the abdomen like tension band wiring, use of meshes. These have their own advantages and disadvantages. Tension band suturing can lead to

significant post-operative pain, residual scarring and the potential hazard of entrapment of viscera in the sutures.¹ In addition, the presence of raised intra-abdominal pressure due to any cause could lead to fascial dehiscence at a later date in spite of apparent secure closure of the abdomen. Pre-operative factors like hypoalbuminemia, haemodynamic instability, obesity and malnutrition have also been identified as increasing the risk of wound dehiscence.²

In conditions where there is bowel edema, weak fascia or tissue loss of the abdominal wall temporary closure of the abdomen will allow tension free closure, prevent abdominal compartment syndrome and allow re-exploration if required. The closure technique must

protect the viscera in the abdomen while preventing infection and also reducing tension.

One such method is a laparostoma using the Bogota bag technique developed in Bogota, Columbia in 1984. Other methods of temporary closure include absorbable meshes, Wittman patch, towel-clip skin closure and vacuum assisted closure.

A Bogota bag is a sterile plastic bag used for temporary closure of abdominal wounds. Its use was first described by Oswaldo Borraez while a surgical resident in Bogota, Colombia in 1984.

METHODS

This is a retrospective analysis of 15 cases of laparostoma done using Bogota bag technique in cases where closure of the abdomen was under tension in a tertiary care institute.

Laparostoma was done for patients where closure of the midline incision was under tension either in the primary laparotomy or in a re-exploration. Patients who developed a burst abdomen which could not be closed were also included. The Bogota bag technique was used. A sterile urine collecting bag was placed over the exposed viscous and if required sutured to the skin or fascia with non-absorbable suture material. This was then covered with dressing. The dressing was changed every 24 hours or as frequently as needed.

The bowel edema and discharge were monitored. Once the edema and discharge decreased to a satisfactory level closure of the abdomen was attempted. If the rectus sheath could be closed without tension it was done with non-absorbable suture like nylon or polypropylene No 1. If tension free closure of fascia could not be achieved skin closure was done with nylon sutures. If even skin closure was not possible split skin grafting was done over the granulation tissue.

Patients were then monitored for wound healing and complications like gaping, discharge and infection.

RESULTS

15 patients were analysed retrospectively. Thirteen patients were initially operated in the emergency setting - four for blunt abdominal trauma, eight for perforative peritonitis and one for intestinal obstruction. For 2 patients the primary surgery was an elective procedure (Table 1).

The average age of the patients was 41.67 years with a range of 17 to 65 years. Nine patients (60%) were above the age of 40 years. Only 2 patients were under 20 years. There were 10 male and 5 female patients with a ratio of 2:1.

Table 1: Primary cases.

Primary surgery	
Blunt abdominal trauma	4
Perforative peritonitis	9
Intestinal obstruction	2
Total	15

Laparostoma was done for 3 patients (20%) at the time of first exploration - one case of pelvic trauma with retroperitoneal haematoma and two cases of perforative peritonitis. In the case of 5 patients (33.33%), laparostoma was done after the midline wound burst with or without an anastomotic leak. These patients were managed conservatively without re-exploration for the leak. In the remaining 7 patients (46.67%) a laparostoma was created at the time of re-exploration for leak or obstruction. The median time of re-exploration was 7 days with the earliest at 3 days and the latest at 25 days (Table 2).

Table 2: Timing of laparostoma.

Laparostoma done at	Number
Primary surgery	4
Re-exploration	6
After wound dehiscence	5

Abdominal closure was done for 13 patients. Earliest was on the 10th day and latest was 40th day after creation of laparostoma. Median time of closure was 15 days. Fascial closure could be achieved in 4 patients while in 8 patients only skin closure could be done. One patient required a split skin graft. Mesh was not applied for any patient (Table 3).

Table 3: Closure of abdomen.

Closure	
Fascia	4
Skin	8
Split skin graft	1
Total	13

There was no incidence of any bowel complication like enterocutaneous fistula or adhesions leading to obstruction in any patient as a result of the laparostoma.

Three patients (20%) expired due to causes unrelated to the laparostoma like ARDS and septicaemia. Of these laparostoma was not closed in 2 patients while one patient expired after closure of the abdomen.

Twelve patients were discharged after abdominal closure. Hospital stay ranged from 20 to 52 days with a median duration of 35 days.

DISCUSSION

Closure of the abdomen after an exploratory laparotomy can be difficult in cases of trauma or perforative peritonitis where there may retroperitoneal haematoma, bowel edema due to contamination all of which hinder a tension free closure. In addition extensive preoperative resuscitation to correct septic or haemorrhagic shock can result in massive edema of the bowel, retroperitoneum and the abdominal wall causing the abdominal wall to lose its compliance.³ Primary closure under such circumstances can lead to an increase in intra-abdominal pressure.

IAP may be measured by an intravesical catheter. Intra-Abdominal Hypertension (IAH) is usually defined as IAP of greater than 20 mmHg. Abdominal Compartment Syndrome (ACS) exists when IAH is accompanied by signs of organ dysfunction, with a return to normal upon decompression of the abdomen.⁴ ACS usually presents with ventilator insufficiency in the form of elevated peak airway pressures and hypercarbia along with renal failure manifesting as oliguria.⁵ The abdomen will be tensely distended and patient may be hypotensive with a low cardiac output.

This may be avoided by doing a temporary closure of the abdomen. Methods of temporary closure include towel clipping of the skin edges, open packing of the abdomen, use of synthetic or biological meshes and use of silastic covers like the Bogota bag technique.



Figure 1: Laparostoma.

Creation of a laparostoma will help in prevention of ACS with its pulmonary, cardiac and renal complications. The laparostoma will allow bowel and abdominal wall edema to settle. It prevents tension on the abdominal wall skin which in turn prevents necrosis and infection. Injury and tearing of the fascia is also avoided. In addition the use of transparent sterile plastic allows observation of the bowel on a daily basis to watch for edema, gangrene. Intra-

abdominal discharge/contamination can also be drained contributing to reduction in bowel edema. Enteral nutrition may also be started early if there are no intestinal complications thus allowing the bowel function to return and edema to settle. The risk of infection of the open abdomen is minimal if the dressing is changed frequently and a good antibiotic cover is given (Figure 1).

Human chorioamniotic membrane prepared under sterile conditions may be an alternative to conventional plastics bags used routinely as it may prevent serosal erosion and fistulas in patients with an open abdomen. It can be sutured easily to the skin.⁶

In this study no patient developed any intestinal complications like enterocutaneous fistula. Twenty percent mortality was seen, however the patients expired of causes unrelated to the laparostoma.

Closure of the abdomen could be achieved as early as 10 days after formation of laparostoma with a median of 15 days. Fascial closure was possible in 4 of 13 patients (30.7%) whereas for the remaining skin was approximated. Though not used in this study, a dual surface mesh may be used when approximation of the rectus sheath is not possible during closure.

One of the drawbacks of a laparostoma is the loss of fluids and electrolytes through the open abdomen. The use of a sterile drape over the laparostoma to create an almost watertight seal may minimise this. However a close watch must be kept on fluid and electrolyte losses which must be replenished.

Closure of only the skin could lead to formation of a ventral hernia which can be managed at a later date once the patient is completely stable.

CONCLUSION

Creation of a laparostoma when abdominal wall closure is under tension will prevent development of ACS with its systemic effects and thus could lead to decreased morbidity. It also allows the abdominal edema to settle while preventing necrosis of the abdominal wall fascia and skin. The risk of development of ventral hernia in the future remains, however the hernia can be repaired at a later date.

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