



Study of an Effective Solution for Managing Abdominal Trauma

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ABSTRACT:

Damage Control Surgery has emerged as a crucial approach in regions with limited resources for resuscitation and surgical management, particularly in cases of rising abdominal trauma incidence. This strategy allows surgeons to address immediate issues, reduce mortality rates, and prove invaluable in critical situations.

In some circumstances, wherein conventional definitive fascial closure is not possible, interim closure techniques such as Opsite sandwich Bogota bag, negative pressure therapy, skin-only closure, may be done for successfully managing the open abdomen.

In order to manage cases of open abdominal trauma and prevent complications like wound dehiscence and infection at the surgical site, this prospective observational study was carried out in Dr. D. Y. Patil Medical College, Hospital and Research Centre, Pimpri, Pune between January 2022 and July 2023. According to the study's findings, skin-only closure can be a suitable substitute for other temporary abdominal closure procedures when carefully chosen. This is especially important in environments with limited resources, where solutions like wound VAC or ABThera facilities might not be offered.

1. Introduction

In resource-limited settings, management of Abdominal trauma cases necessitates effective strategies for resuscitation and surgical management. In response to these challenges, Damage Control Surgery has emerged as a valuable approach aimed at reducing mortality rates focusing on controlling hemorrhage, managing contamination, and temporarily abdominal closure. and providing surgeons with adequate time to address immediate concerns of fatal triad of hypothermia, acidosis, and coagulopathy^[1]. It helps in stabilizing the patient's condition and optimal resuscitation efforts. Subsequently, a second-look laparotomy is conducted to systematically address specific injuries and complications.

In Damage control surgery temporary abdominal closure is done without fascial closure. This technique reduces abdominal compartment syndrome, surgical site infections, wound dehiscence. This will help in making follow-up procedures easier. Despite many advantages of temporary closure, formation of entero-cutaneous fistulas, evisceration, skin necrosis, failure of subsequent

fascial closure, and the possibility of further incisional hernias are all potential complications. These issues show how crucial it is to thoroughly analyse and choose the right closure method in order to reduce complications.

To shed light on these challenges and guide clinical practice, our study aims to explore and compare different closure techniques in temporary abdominal closure following damage control surgery for trauma abdomen cases. By evaluating the outcomes associated with each technique, our study seeks to provide valuable insights into the effectiveness of various approaches for managing the Open Abdomen in these cases.

Inclusion Criteria:

Blunt and penetrating trauma abdomen patients

Exclusion Criteria:

All immunocompromised patients, pregnant patients and patients below age 18 years



2. Results

Statistical analysis was done using square statistics. All the analyses were done using the statistical package SPSS software v 20.0.

In our study, the age wise distribution showed 33.33 % of cases are between the age group of 18-35years; 26.67% are among 36-45 years; 26.67% are among 46-55 years and 13.33 % are above 55 years. Gender wise distribution showed 90 % males and 10 % females. 13.33 % of cases had Diabetis mellitus, 20% cases had hypertension; 10% cases had both diabetis mellitus and hypertension; 56.67% cases had no comorbidities.

Out of 30 patients, 9 had bowel perforation (30 %), 9 had hemoperitonium (30%), 6 had liver laceration, pancreatic injury, renal injury(20 %); and remaining 6 had splenic laceration (20%).

16 cases underwent primary closure (53.33 %); 9 cases underwent only skin closure(30%); 2 cases underwent wound VAC (6.67%), 3 cases underwent bagota bag closure(10 %).

Postoperative complications after primary surgery

Type of closure	Complications
Primary closure	SSI (43.7%) IAH (12.5%) Wound dehiscence (25%)
Only skin closure	SSI(33.3%) IAH(11.1%)
Wound vac	SSI(50%)
Bogota bag	IAH (27%) 2nd look laparotomy undertaken with definitive fascia closure after 2 days.

Among cases of primary fascial closure with dehiscence required Component separation (4 cases), mesh closure (1 case) and secondary suturing (2 cases) for definitive closure. Wound VAC and bogota bag closure were closed definitively with component separation while skin only closure needed component separation and mesh for definitive closure.

Correlation of primary closure technique with definitive closure method employed.

Definitive Procedure	Type of Closure			
	Primary closure	Only skin closure	Wound Vac	Bagota bag
CS	0 (0%)	0 (0%)	2 (6.67%)	3 (10%)
Delayed Healing With Dressings	1 (3.33%)	0 (0%)	0 (0%)	0 (0%)
Fascial Closure	1 (3.33%)	2 (6.67%)	0 (0%)	0 (0%)
Fascial Closure + C S	0 (0%)	5 (16.67%)	0 (0%)	0 (0%)
Fascial Closure + Mesh	2 (6.67%)	2 (6.67%)	0 (0%)	0 (0%)
Mesh Closure	1 (3.33%)	0 (0%)	0 (0%)	0 (0%)
Secondary Suturaing	2 (6.67%)	0 (0%)	0 (0%)	0 (0%)
Nil	9 (30%)	0 (0%)	0 (0%)	0 (0%)

(Using Chi Square Test)

3. Discussion

The Open abdomen post damage control laparotomy poses a variety of challenges to the surgeon in terms of post-op recovery, hemodynamic stabilization and deciding the ideal timing for obtaining definitive fascial closure. Characteristics of patients suitable for early

fascial closure include the absence of extensive bowel edema, significant abdominal wall tension, and pulmonary or hemodynamic deterioration upon closure, as well as favorable nutritional status and the absence of severe sepsis^[2,3]. It's intriguing to note that individuals with conditions like faecal contamination/peritonitis, large transfusion, multiple abdominal injuries,



hypothermia, acidosis, or coagulopathy may still be candidates for early fascial closure^[4].

In the study, it was observed that a significant proportion of patients underwent primary definitive fascial closure, indicating that they were suitable candidates for this approach. However, in cases where immediate definitive closure was not feasible, temporary abdominal closure using various techniques such as primary skin-only closure, Wound VAC, and Bogota bag closure^[5-8] was necessary.

Emergent laparotomies frequently result in surgical site infections (SSIs), with documented infection rates for intra-abdominal procedures ranging from 15% to 25%⁽⁹⁾. In our study, 28 percent of the patients had SSIs. The development of SSIs is influenced by factors including intra-abdominal sepsis at presentation and the physiological stress brought on by the need for a laparotomy^[10]. Improving patient outcomes depends on SSI prevention and management, which in turn emphasizes the importance of careful patient selection and consideration of temporary closure techniques when immediate definitive closure is not possible^[4].

By understanding the risk factors and potential complications associated with different closure techniques, healthcare professionals can optimize patient care, minimize SSIs, and improve overall outcomes following emergent laparotomy procedures. Yu Chen et al in his study described the postoperative complications including wound complications, secondary fistula, recurrent hernia, and intra-abdominal abscess, were reported in (88%), most commonly for fistula (79%) and abscess (61%)⁽⁶⁾. The most frequently documented complications after definitive abdominal closure include wound infection, intra-abdominal abscess, recurrent hernia, fistulae, and abscesses^[13]. These complications pose challenges in the management of patients undergoing abdominal closure. However, obtaining precise data on the incidence of postoperative complications can be challenging due to limited availability of comprehensive studies.

Many research studies tend to focus on comparing different temporary abdominal closure (TAC) methods in the management of the open abdomen, rather than specifically investigating the incidence of complications after definitive closure. These cases include those involving damage control, deliberate relaparotomies,

severe visceral edema, and retroperitoneal hematoma. In such cases, alternative strategies for closure, such as temporary abdominal closure techniques, become necessary to effectively manage the open abdomen. The duration to achieve definitive closure is influenced by post-operative complications, the need for a second look laparotomy, the presence of a stoma, and the patient's overall nutritional status.

In our study, we observed that the average duration to achieve definitive closure varied depending on the closure method used. Patients treated with wound VAC had an average duration of 10 days until definitive closure, while those treated with primary skin-only closure and the Bogota bag had an average duration of 7 days. Patients who initially underwent primary fascial closure but experienced wound dehiscence also had an average duration of 7 days until definitive closure. Furthermore, the ongoing research comparing outcomes between vacuum-assisted devices, Bogota bag, and skin-only closure is commendable. Our study emphasises how critical it is to manage the open abdomen as quickly as possible after using interim closure procedures in order to achieve ultimate abdominal closure. Early definitive closure is a key goal in these situations because prolonged open abdomen therapy is known to be associated with higher morbidity and mortality^[11-14]. By addressing these factors and optimizing the patient's condition, the risks and complications associated with prolonged open abdominal trauma can be reduced.

4. Conclusion

Skin-only closure being identified as a workable alternative for better outcome in patients who has multiple visceral injury, hemodynamically unstable, comorbidities, especially in environments with limited wound VAC or ABThera facilities, is important that can direct healthcare practitioners encountering comparable difficulties.

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