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Original Article

Comparison of Primary Repair and Stoma Formation for Traumatic Gut Injury in terms of Frequency of Wound Infections

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ABSTRACT

Objective: To compare primary repair and stoma formation for the patients with traumatic gut injury.
Study Design: Quasi-experimental study.
Place and Duration of Study: The study conducted at Rawalpindi Medical University and Allied Hospitals from Jun to Dec 2021.
Methodology: The study was conducted to compare primary repair and stoma formation in patients of traumatic injuries. The patients were divided in two groups: Group-A (primary repair) and Group-B (stoma formation), Surgical site infection was considered as a primary outcome.
Results: A total of 60 patients (30 in each group) were analyzed. The mean age in Group-A and Group-B was 30.7±15.57 years and 35.4±17.53 years, respectively. Surgical site infections occurred in 30% (n=9) of patients in Group-A and 63.33% (n=19) of patients in Group-B, with a statistically significant difference (p=0.009).
Conclusion: Primary repair is superior to stoma formation for the patients with traumatic gut injures.

Keywords: Gut Injuries, Stoma Formation, Surgical Site Infection

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INTRODUCTION

The injuries to the gut or intestine, both small and large intestine, may result from blunt, penetrating or iatrogenic abdominal trauma.[1] In fact, abdomen is the 3rd most injured part of the body among the patients with civilian trauma where 25% patients require surgery.[2] It has been reported that 16.5% suffer from intestinal injuries among the patients with abdominal trauma.[3] The management of intestinal injuries has significantly evolved including primary repair, bowel resection with or without anastomosis and stoma formation.[4]

Intestinal leaks can occur after anastomosis with variable incidence in different parts of the intestine, ranging from 1% to 19%.[5] These anastomotic leaks can lead to varying clinical manifestations, including abdominal pain, wound infections, ileus, fever and sepsis.[5] In contrast, complications related to intestinal stomas occur in 20% to 70% of patients.[6] Stoma formation can profoundly impact quality of life, contributing to psychological stress, increased costs, social challenges, and low self-esteem.[7]

In the era of antibiotics and improved wound care, recent studies suggest that primary repair may be more advantageous than stoma formation or proximal colostomy.[8] However, surgical site infections (SSIs) still complicate abdominal surgeries, which can arise within 3 to 30 days post-operation.[9] One study found that 19.5% of patients in the primary repair group developed wound infections, compared to 57.9% among those with stomas.[10] There is limited data supporting primary repair over stoma formation in terms of reducing postoperative complications and wound infections. This study aimed to evaluate the efficacy of primary repair versus stoma formation in patients with traumatic gut injury to advocate better management practices in the future.

METHODOLOGY

A quasi-experimental study was conducted at Rawalpindi Medical University (RMU) and Allied Hospitals from June 2021, to December 2021. The sample size of the present study was calculated by WHO calculator with 5% level of significance and 80% power test via following data: anticipated population P1 (wound infection in Primary repair Group-A) =19.512%, anticipated population P2 (wound infection in stoma formation Group-B) =57.895%, and average sample size (n=30) patients in each group (total sample size as 60 patients).[11] After permission from the

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concerned authorities and ethical committee. Patients with the diagnosis of intestinal injury were selected.

Inclusion Criteria: Patients of both genders, aged between 13 to 70 years, who underwent exploratory laparotomy for gut injury were included in the study.

Exclusion Criteria: Patients were excluded if they had a delay of more than 12 hours between injury and surgery, required more than 4 units of blood transfusion before surgery, or had devascularization injury of the colon. Additionally, patients with gross contamination, sepsis, pre-existing bowel disease, or severe comorbid conditions such as uncontrolled diabetes mellitus, tuberculosis, malignancy, typhoid, ulcerative colitis, or Crohn's disease were excluded. Those with previous metabolic abnormalities were also not included in the study.

Traumatic gut injury was defined as gut perforation after blunt, penetrating, and iatrogenic injuries diagnosed clinically and on relevant investigations and confirmed per operatively. The diagnosis was confirmed by detailed history, thorough clinical examination and relevant investigations. Hospital registration numbers and informed consent was taken from all patients regarding procedure. Pre-anesthesia workup was completed. Appropriate same intravenous antibiotic prophylaxis (i.e., injection Ceftriaxone 2 gram and Metronidazole 500mg) was given to all patients before surgery. The patients were divided randomly into two groups (Group-A and Group-B) by lottery method. All surgical procedures were done under standard general anesthesia. Surgeries were performed by primary repair and stoma formation in Group-A and Group-B, respectively (Figure). Primary repair was defined as closure of perforation primarily or resection and anastomosis. Stoma formation was defined as exteriorization of gut in the form of jejunostomy, ileostomy or colostomy. After the operation, all the patients were kept nil per os (NPO) - 24 hours for Group-A and 6 hours for Group-B. All the patients received antibiotic according to the procedure performed. The analgesic injection Ketorolac 30 mg (intravascular, every 8 hours) was given. All patients were discharged after tolerating soft diet. As the primary outcome of the study was wound infection surgical site infection (SSI), the patients were followed up in outdoor department (OPD) after 1 week and 2 weeks for the assessment of wound infection. All the data and other parameters were recorded on the specially designed performa.

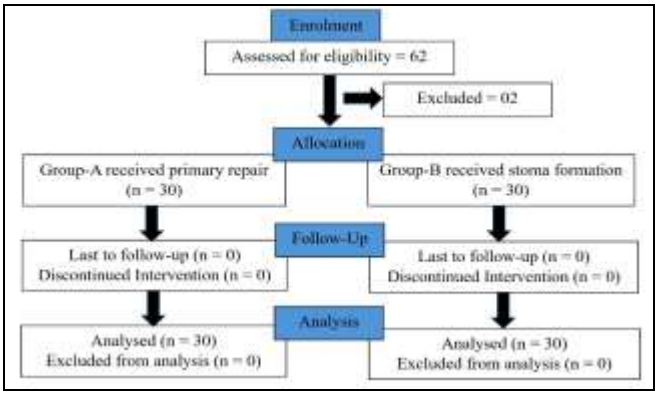

Figure: Patient Selection, Randomization, and Treatment Allocation Flowchart

The data was analyzed using Statistical Package for Social Sciences (SPSS) version 22. Descriptive statistics were calculated for qualitative and quantitative variables. Quantitative variables like age were presented as means with standard deviation. Qualitative variables like gender, mechanism of injury and wound infection was presented as frequency or percentage. The normality of the data was confirmed through statistical tests (Shapiro-Wilk, Kolmogorov-Smirnov, and D'Agostino-Pearson), with all *p*-values >0.05. Histograms and density plots supported normality, justifying the use of parametric tests. Chi square test was performed for both groups. Post stratification Chi-square test was performed, and a *p*-value of <0.05 was considered significant.

RESULTS

A total of 60 patients (30 in each group) fulfilling the inclusion criteria were enrolled to compare primary repair and stoma formation for traumatic gut injury in terms of frequency of wound infections. Age distribution showed 83.33% (n=25) in Group-A and 70% (n=21) in Group-B fall into 13-50 years of age group whereas 16.67% (n=5) in Group-A and 30% (n=9) in Group-B fall into 51-70 years of age group. Mean age in Group-A and Group-B was 30.7±15.57 years and 35.4±17.53, respectively. Gender distribution showed 83.33% (n=25) in Group-A and 86.67% (n=26) in Group-B were males whereas 16.67% (n=5) in Group-A and 13.33% (n=4) in Group-B were females. Mechanism of injury showed 7(23.33%), 20(66.67%), 3(10%) patients suffered from blunt, penetrating, and iatrogenic trauma in Group-A. Whereas, 11(36.67%), 17(56.67%), and 2(6.66%) suffered from blunt penetrating and iatrogenic injuries, respectively (Table-I). Comparison of primary repair and stoma formation for traumatic gut injury in terms of

frequency of wound infections showed 30% (n=9) and 63.33% (n=19) wound infection in Group-A and Group-B, respectively (p=0.009) (Table-II).

Table-I: Frequency of SSI in Terms of Gender, Age and Mechanism of Injury (n=60)

Variables		Group	Wound Infection		*p*-value
			Yes	No	
Gender	Male	A	9(36%)	16(64%)	0.12
		B	15(57.69%)	11(42.31%)	
	Female	A	0(0.00%)	5(100%)	0.007
		B	4(100%)	0(0.00%)	
Age (Years)	13-50	A	7(38%)	18(72%)	0.04
		B	12(57.14%)	9(42.86%)	
	51-70	A	2(40%)	3(60%)	0.16
		B	7(77.78%)	2(22.22%)	
Mechanism of Injury	Blunt	A	0(0.00%)	7(100%)	0.10
		B	5(45.45%)	6(54.56%)	
	Iatrogenic	A	1(33.33%)	2(66.67%)	0.40
		B	2(100%)	0(0.00%)	
	Penetrating	A	8(40%)	12(60%)	0.09
		B	12(70.59%)	5(29.41%)	

Table-II: Comparison of Primary Repair and Stoma Formation for Traumatic Gut Injury in Terms of Frequency of Wound Infections (n=60)

Wound Infection	Group-A (n=30)	Group-B (n=30)	*p*-value
Yes	9(30%)	19(63.33%)	0.009
No	21(70%)	11(36.67%)	

DISCUSSION

This study was conducted to compare primary repair with stoma formation for patients presenting with traumatic intestinal injuries in terms of wound infection or SSIs. The study revealed that SSIs were significantly fewer in patients who underwent primary repair compared to that observed in patients who underwent stoma formation (p=0.009). In other words, primary repair was superior to stoma formation for the patients presenting with traumatic intestinal injuries, especially when the gender was female.

The operative management of traumatic hollow viscus injuries has been a topic of significant debate, particularly regarding colon injuries, which remain a serious challenge for the healthcare professionals.[12] For approximately three decades following World War-II, the standard treatment for traumatic colon injuries was colostomy creation, as evidenced by numerous studies.[13,14] However, in the late 1970s, civilian surgeons began to pursue primary repairs and anastomoses.[13] This shift in practice was soon validated by a substantial volume of literature, including several randomized controlled trials and a meta-analysis.[15,16]

Tantardini *et al.*,[13] conducted a study including 133 patients with traumatic bowel injuries and prospectively reviewed the management techniques of traumatic bowel injuries. They reported that stoma formation was associated with severe overall post-operative morbidity, advocating that primary repair should be the preferred for the patients with traumatic gut trauma. Hence, this study supports the findings of the present study. Similarly, Asif *et al.*,[17] conducted a quasi-experimental study at Mayo Hospital Lahore comparing primary repair with colostomy in patients with colonic injuries. They reported that primary repair was safer and more effective than colostomy. However, on the contrast, De Robles and Young[8] evaluated the surgical management of traumatic colonic injuries and reported no significant difference among primary repair, resection-anastomosis and colostomy formation in terms of complications and hospital stay. Similarly, Feroz *et al.*,[18] conducted a comparative study at Dow Medical College Karachi to evaluate primary versus delayed skin closure after intestinal stoma formation in terms of wound infection, reporting no significant difference between the two methods of skin closure.

The present study has advantages and limitations. It is a valuable addition to the lacking literature in terms of wound infection for primary repair and stoma formation in patients with traumatic gut injuries. This study supports the findings reported in the study by Asif *et al.*,[16] from Lahore. However, being a single-center study with a small sample size, its findings cannot be generalized. Therefore, further studies at large scale on the same topic are required to be conducted to formulate future strategies for the management of traumatic gut injuries.

CONCLUSION

The wound infection in this study demonstrates that primary repair is significantly superior to stoma formation in terms of reducing surgical site infections (SSI) among patients with traumatic gut injuries. The findings indicate that patients undergoing primary repair experienced fewer complications, shorter recovery times, and lower rates of wound infections compared to those who underwent stoma formation.

Despite these promising results, the study is limited by its single-center design and small sample size, which may affect the generalizability of the findings. Future multi-center studies with larger cohorts are necessary to validate these results and provide more comprehensive

recommendations for clinical practice. Additionally, assessing secondary outcomes such as hospital stay, mortality, and overall quality of life will further strengthen the understanding of optimal treatment strategies for traumatic gut injuries significantly lower in primary closure when compared with stoma formation for the patients presenting with traumatic gut injury.

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Authors' Contribution

Following authors have made substantial contributions to the manuscript as under:

SA & ADK: Data acquisition, data analysis, critical review, approval of the final version to be published.

ST & AA: Study design, data interpretation, drafting the manuscript, critical review, approval of the final version to be published.

AM & SM: Conception, data acquisition, drafting the manuscript, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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