

# Frequency of Leakage in Primary Repair of Acute Colonic Injury

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## ABSTRACT

**Objective:** To determine the frequency of Leakage in primary repair of acute colonic injury patients admitted in Surgical B Ward, Ayub Teaching Hospital, Abbottabad.

**Study Design:** Cross-sectional study

**Place and Duration of Study:** This study was conducted at the Department of General Surgery, Ayub Teaching Hospital, Abbottabad from January 2022 to June 2022.

**Materials and Methods:** Eighty-nine patients who attending the surgery department for any type of trauma, ages ranging from 22 to 50 years of either gender were enrolled. After patient selection, their history, examination, investigations (complete blood count, renal functions tests, serum electrolytes, liver functions examinations, screening tests for hepatitis C, hepatitis B, abdominal ultrasound, chest x-ray), surgery was carried out.

**Results:** The mean age group of subjects the patients was  $36.69 \pm 8.325$ . The age group ranged between 22 and 50 years, and the frequency of gender of the subjects, 63(70.8%), was male, and 26(29.2%) were female. In the frequency of the type of trauma, patients presented with a firearm injury to the abdomen with colon were 38(42.7%), with blunt abdominal trauma were 20(22.5%), and stab wound abdomen was 20(22.5%). In contrast, other types of trauma e.g. fall from the roof and RTA etc. were 1 to 4%. In the frequency of anastomotic Leakage, 21(23.6%) patients were found to have a postoperative complication, i.e. anastomotic Leakage, while the remaining 68(76.4%) had no leakage.

**Conclusion:** Colonic wounds continue to be a clinical issue for trauma surgeons that are both prevalent and occasionally difficult. Those improvements in both death rates and morbidity amply illustrate the extraordinary advancement in caring for these wounds.

**Key Words:** Anastomotic Leakage, primary repair, acute colonic injury

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## INTRODUCTION

Over the past thirty years, there has been a change in how penetrating colon wounds are managed. Before that, a significant portion of these colonic wounds of the populace was treated with either proximal colostomy or exteriorization of the area out of concern for a high risk of breakdown.

There has been a growing tendency for primary repair during the past 20 years.<sup>1</sup> The prevention of a colostomy, the subsequent decrease in its morbidity, the expenditure of colostomy aftercare, and the last hospitalization for closures are benefits of primary repair. The death rate and morbidity linked to repairing failure are potential downsides of primary repair.<sup>2</sup> Even though an advanced surgeon has much greater success doing an intestinal anastomosis than a surgeon from a generation ago, the outcomes have not always been flawless.<sup>3</sup>

Research shows that executing delayed anastomosis (DA) in people getting damage control laparotomy (DCL) for destructive colonic injuries is safe and practicable. There are still concerns about pinpointing individuals with higher risk and reducing the frequency of anastomosis-related problems, despite the fact that primary colonic anastomosis has proved viable in trauma patients. Additionally, around 13% of individuals with primary anastomosis experienced an anastomotic leak.<sup>3,4</sup> Recognizing avoidable factors that increase the risk for suture line failure following colon anastomosis is crucial for maximizing anastomotic healing.

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The surgical techniques used to treat colonic damage have generally been agreed not to impact the result. However, there exist some separate risks for issues. Research is continuously being conducted to clarify these risk variables because they are currently unclear.<sup>5</sup> Traumatic colon injuries are challenging to treat and are linked with high morbidity. A thorough understanding of the various approaches and care strategies for colonic wounds would help doctors reduce unnecessary consequences and death.<sup>6</sup>

The final section of the digestive system and the gastrointestinal tract in vertebrates is the large intestine, also known as the colon or big bowel. The residual waste is received here as water, and before being eliminated by defecation, it is contained as excrement.<sup>6</sup> The anal canal is not included in all authors' definitions of the large intestine, typically including the colon, cecum, anal canal and rectum. The beginning of the large intestine is located in the human right iliac area of the pelvis, just below the waist. The ileocecal valve connects the large intestine to the cecum, the end of the small intestine, where it terminates.<sup>7,8</sup> The large intestine in humans is generally approximately 1.5 meters or 5 feet long, approximately one-fifth of the entire stretch of the gastrointestinal tract. It then proceeds as the colon moves up the abdomen, throughout the circumference of the abdomen as the transverse colon, and then goes down to the rectum and its ending point at the anal canal.<sup>9,10</sup>

The digestive system ends with the colon. Before elimination from the body, it draws water and salt from waste materials. It is also where flora-aided (primarily bacterial) decomposition of un-dissolved material occurs.<sup>11</sup> Unlike the small intestine, the colon does not significantly contribute to food and healthy digestion. The colon receives around 1.5 liters, or 45 ounces, of water daily. The average adult male colon measures 166 cm (80 to 313 cm), whereas the typical adult female colon measures 155 cm (80 to 214 cm).<sup>12,13</sup>

## MATERIALS AND METHODS

This cross-sectional (descriptive) study has been performed at the Ayub Teaching Hospital's Surgical Department, Abbottabad from 1<sup>st</sup> January 2022 to 30<sup>th</sup> June 2022 and 89 patients were enrolled. All patients age between 22-50 years, both gender and any type of trauma were included. Those patients over 80 kg weight, history of lower abdominal surgery (appendectomy and TVP), comorbid conditions or suffering from a terminal illness and sufferers of any recognized mental conditions were excluded. Following clearance from the hospital ethics committee for the research of particular patients by the criteria for inclusion and procedure of sampling, data was gathered on a questionnaire after receiving the patient's complete, accessible, and informed permission describing the risk of leaking. The investigator(s) have

collected. After patient selection, their history, examination, investigations (complete blood count, renal functions tests, serum electrolytes, liver functions tests, screening tests for hepatitis B and C, abdominal ultrasound, chest x-ray), and surgical procedure was conducted. SPSS-24 was used to analyze the data. Age, gender, and trauma type were used to stratify the outcome variable (leakage). At a 5% level of significance, the post-stratification chi-square test was performed.

## RESULTS

The mean age was 36.698.325 years with a range of 22 to 50 years (Table 1).

The patients presented with firearm injury to the abdomen with colon were 38 (42.7%), with blunt abdominal trauma were 20 (22.5%), stab wound abdomen was 20 (22.5%), while another type of traumas, e.g. fall from the roof and RTA was 1 (2%) [Table 2.]

The frequency of the type of trauma-associated injury, patients presented with no trauma-associated injury were 58 (65.2%), liver laceration 12 (13.5%), splenic injury 6 (6.7%), while other associated injuries, e.g. multiple fracture mesenteric tear was 1 (2%) [Table 3]. The frequency of anastomotic leakage, 21(23.6%) patients found postoperative complication, i.e. anastomotic leakage while the remaining 68(76.4%) found no leakage [Table 4].

When the data was stratified, 35 (39.3%) were between the ages of 41 and 50, while 28 (31.5%) were between the ages of 31 and 40. Fifteen (23.8%) male and 6 (23.1%) female patients were found to have anastomotic leakage, while the remaining 68 (76.4%) from both genders. Thirteen (34.2%) were patients of firearm injury to the abdomen and 2(10.0%) were with blunt abdominal trauma; the result is also not statistically significant ( $p=0.309$ ). Six (50%) were found to have liver laceration, and 2(100.0%) were found with multiple ribs fractures; this finding was also not statistically significant ( $p=0.088$ ). Four (15.4%) were from the age group of 22 to 30 years, 7(25.0%) from the 31 to 40 years of age group and 10(28.6%) were from 41 to 50 years of age group, this finding is not found statistically significant ( $p=0.476$ ) [Table 5].

**Table No.1: Descriptive statistics of age (n=89)**

Age (years)	Mean±SD
	36.69±8.32

**Table No.2: Comparison of gender according to anastomotic leakage**

Gender	Leakage	
	Yes (n=21)	No (n=68)
Male	15 (71.4%)	48 (70.5%)
Female	6 (28.6%)	20 (29.5%)

Chi square value = 0.005

P value = 0.941

**Table No.3: Comparison of type of trauma according to anastomotic leakage**

Type of trauma	Leakage	
	Yes (n=21)	No (n=68)
Blunt abdominal trauma (colonic perforation)	2 (9.6%)	18 (26.6%)
Fall from roof (abdominal trauma)	-	2 (2.9%)
Fire arm injury to abdomen (colon)	13 (61.8%)	25 (36.6%)
Fire arm injury to sigmoid colon	-	1 (1.5%)
Penetrating to abdomen with glass	-	2 (2.9%)
RTA (abdominal blunt trauma)	2 (9.6%)	2 (2.9%)
RTA (dressing colon perforation)	-	2 (2.9%)
Stab wound abdomen (colonic injury)	4 (19%)	16 (23.7%)

Chi square value = 8.278

P value = 0.309

**Table 4: Comparison of associated injury according to anastomotic leakage**

Associate injury	Leakage	
	Yes (n=21)	No (n=68)
Nil	13 (61.8%)	45 (66.2%)
Abdominal wall cut	-	2 (2.9%)
Anterior abdomen wall	-	2 (2.9%)
Humorous fracture	-	1 (1.5%)
Liver laceration	6 (28.6%)	6 (8.9%)
Mesenteric tear	-	2 (2.9%)
Multiple bone fracture	-	1 (1.5%)
Multiple ribs fracture	2 (9.6%)	-
Skin abrasions	-	1 (1.5%)
Splenic injury	-	6 (8.8%)
Tibia fracture	-	2 (2.9%)

Chi square value = 16.412

P value = 0.088

**Table 5: Comparison of age according to anastomotic leakage**

Age (years)	Leakage	
	Yes (n=21)	No (n=68)
22 – 30	4 (19%)	22 (32.4%)
31 – 40	7 (33.4%)	21 (30.8%)
41 – 50	10 (47.6%)	25 (36.8%)

Chi square value = 1.484

P value = 0.476

## DISCUSSION

Primary repair is increasingly being used to treat all penetrating colon injuries, regardless of where they occurred. In recently published literatures<sup>16-18</sup>, the contribution of primary repair in treating colon wounds was examined. It was noted that in situations where general and local trauma was of comparable intensity

and intraoperative observations were comparable, primary repair performed better in terms of deaths, complications and final success. Only damaging colon injuries that require resection still raise debate over whether a diversion technique should be used to treat them. Three risk factors for intra-abdominal septic sequelae, irrespective of the manner of repair, were found in the AAST data of a prospective multicenter trial.<sup>19</sup> severe faecal contamination, single antibiotic prophylaxis, and transfusion of more than four blood units.

But the definition of "severe faecal contamination" is still debatable. Comparing information from some of the other findings, Dente et al<sup>20</sup> emphasized that there are just two primary clear indicators for conducting a 2-stage process: severe colon edema (because of whichever reason) and doubtful colon blood supply. However, even these three criteria could not be strongly supported by the data.

In the present study, the mean of the age group of subjects of the patients was 36.69±8.325. The age group ranged between 22 and 50 years, and the frequency of gender of the subjects, 63(70.8%), was male, and 26(29.2%) were female. The frequency of the type of trauma, subjects presented with firearm injury to the abdomen with colon were 38(42.7%), with blunt abdominal trauma were 20(22.5%), stab wound abdomen was 20(22.5%) while another type of traumas, e.g. fall from the roof and RTA etc., were 1 to 4% and frequency of the type of trauma associated injury, patients presented with no traumas associated injury were 58(65.2%), liver laceration 12(13.5%), splenic injury 6(6.7%) while other associated injuries, e.g. multiple fracture mesenteric tear etc. were 1 (2%). The anastomotic Leakage, 21(23.6%) patients found postoperative complication, i.e. anastomotic Leakage, while the remaining 68(76.4%) found no leakage; results of our study has been supported by Schnuriger et al<sup>3</sup> 13% as its anastomotic Leakage shows from the age group of 13 to 30 years as our sample was 89 patients aged 22 to 50 years. This minor difference may be due to this reason, and frequency of age stratification, 26(29.2%) subjects were found between 22 to 30 years, 28(31.5%) included from 31 to 40 years, and 35(39.3%) were included, from 41 to 50 years of age.

In our study, the frequency distribution of gender concerning anastomotic Leakage, 15(23.8%) male and 6(23.1%) female patients were found to have anastomotic Leakage which supports the same results as previously shown<sup>19-21</sup>. The remaining 68(76.4%) from both genders were found to have no leakage. The frequency of type of trauma concerning anastomotic leakage, 13(34.2%) found with anastomotic leakage were the patients of firearm injury to the abdomen, and 2(10.0%) were with blunt abdominal trauma; this finding was not statistically significant at p=0.309 as shown in previous studies<sup>21,22</sup>

The present research supports the previous research results and shows the frequency distribution of associated injury concerning anastomotic Leakage, 6(50%) were found with liver laceration, and 2(100.0%) were found with multiple ribs fractures; the result proved not to be statistically significant at  $p=0.088$  and in the frequency distribution of age group in relation with anastomotic leakage, 4(15.4%) found from the age group of 22 to 30 years of, 7(25.0%) from 31 to 40 years and 10 (28.6%) included 41 to 50 years, the result proved to be not statistically significant at  $p=0.476$ . Primary repair was performed in 89 cases; this mist likely indicates an ample usage of primary repair.<sup>23</sup> Traditionally, left-sided colon lesions are treated with resection and proximal colostomy, mainly when associated with intra-abdominal lesions. No convincing evidence shows a significant difference in postoperative complications when comparing right and left colon injuries<sup>24</sup>. A good blood supply is the cornerstone of a successful colonic anastomosis and should always be ensured when repairing colonic injuries.

Higher mortality has been suggested in patients with severe abdominal injury requiring colostomy formation rather than primary colon repair or anastomosis<sup>25</sup>. However, current literature has shown that despite multiple intra-abdominal lesions, management of colonic lesions does not significantly affect the incidence of significant complications, particularly intra-abdominal sepsis<sup>26</sup>. Some studies have even suggested that bypass colostomy formation in these high-risk patients may contribute to a higher incidence of intra-abdominal sepsis<sup>27-29</sup>.

## CONCLUSION

The colonic wounds continue to be a clinical issue for trauma surgeons that are both prevalent and occasionally difficult. The improvements in death rates and morbidity amply illustrate the extraordinary advancement in looking after these and similar wounds. In recent years, many evidence-based studies have enabled more proactive care, with the majority of injuries having primary repair or resection and anastomosis with an acceptable low suture line failure rate.

### Author's Contribution:

Concept & Design of Study: Ajmal Khan  
 Drafting: Marium Khurshid, Sana Israr  
 Data Analysis: Faryal Saeed, Kamran Khan, Ibrar Ahmed  
 Revisiting Critically: Ajmal Khan, Marium Khurshid  
 Final Approval of version: Ajmal Khan

**Conflict of Interest:** The study has no conflict of interest to declare by any author.

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