

## A COMPARATIVE STUDY OF TRAUMATIC AND NON-TRAUMATIC GASTROINTESTINAL PERFORATION IN GRH, MADURAI

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### Abstract

**Background:** Gastrointestinal perforations constitute one of the commonest surgical emergencies encountered by surgeons worldwide. This study compared traumatic and non-traumatic gastrointestinal perforation in GRH, Madurai. **Materials and Methods:** This prospective comparative study was carried out at Government Rajaji Hospital, Madurai Medical College, on 100 patients divided into two groups with 50 patients each. Initial preoperative work-up and resuscitation with intravenous fluids, antibiotics, analgesics, and nasogastric decompression were done in all the cases. Surgery, laparotomy, peritoneal lavage and the definitive procedure was done in all cases. Further resuscitation and ICU care were continued as necessary. Assessment of patients 48 hrs after surgery and postoperative complications was carried out. **Result:** Male predominance was recorded in traumatic (TR) and non-traumatic (NTR) groups. In the TR group, the Maximum (46%) of patients were in the age group of 31 to 50 years, whereas in group NTR, most patients (38%) were in the age group of less than 30 years. Ileum was the main (36%) site of perforations in TR group patients, whereas, in the NTR group, it was the duodenum (46%). Primary closure (60%) and Graham's omental patch closure (40%) were the main surgery reported in TR and NTR group patients. The sepsis was significantly ( $p < 0.05$ ) higher in the NTR group. The observation of complications and mean hospital stay was significantly less ( $p < 0.05$ ) in TR group patients. The death was found more in TR group patients (20%). **Conclusion:** Gastrointestinal perforations constitute one of the common surgical emergencies; non-traumatic patients observed a better outcome than traumatic patients.

## INTRODUCTION

Upper-bowel perforation can be described as either free or contained. Free perforation occurs when bowel contents spill freely into the abdominal cavity, causing diffuse peritonitis (e.g., duodenal or gastric perforation). Contained perforation occurs when an ulcer creates a full-thickness hole. Still, free spillage is prevented because contiguous organs wall off the area (as occurs, for example, when a duodenal ulcer penetrates the pancreas).<sup>[1,2]</sup> Lower bowel perforation (e.g., in patients with acute diverticulitis or appendicitis) results in free intraperitoneal contamination.<sup>[3]</sup> Lau and Leow have indicated that perforated peptic ulcer was clinically recognized by 1799, but the first successful surgical management of gastric ulcer was by Ludwig Heusner in Germany in 1892.<sup>[4,5]</sup>

In 1894, Henry Percy Dean from London was the first surgeon to report the successful repair of a perforated duodenal ulcer.<sup>[6]</sup> The physiologic effects of truncal vagotomy on acid secretion have been known since the early 19th century, and this approach was introduced to treating chronic duodenal ulcers in the 1940s. The next development in the management of peptic ulcer disease was the introduction of high-selective vagotomy in the late 1960s. However, neither of these approaches proved helpful, and several postoperative complications, including high ulcer recurrence rates, have limited their use. Currently, in patients with gastric perforation, simple closure of perforated ulcers is more commonly performed than gastric resection.<sup>[7,8]</sup>

During World War I, the mortality following isolated small intestine and colon injuries was

approximately 66% and 59%, respectively.<sup>[9]</sup> The high mortality and morbidity rates at the time may have been due to inadequate knowledge, lack of clinical skills and diagnostic techniques, lack of intravenous saline solutions or blood transfusions, no antibiotics, laparotomy not recommended, and technical manoeuvres not recommended. These factors contributed to the high mortality and morbidity rates.

During the early years of World War II, Ogilvie, a leading surgeon in the British Army, recommended colostomy to manage all colonic injuries. He reported a mortality rate of 53% for colonic injuries treated with colostomy, a rate similar to that observed during World War I. Several reports indicated that surgeons used colostomy during the Korean and Vietnam wars, particularly in managing left colonic injuries. However, it has been reported that primary repair can be successfully used in civilian injuries. By the end of the 1980s, primary repair was considered the management strategy of choice, and it replaced the use of colostomies in treating civilian patients in most hospitals.<sup>[10,11]</sup>

The present study deals with the aetiology, clinical features, treatment Modalities and factors influencing the prognosis of Gastrointestinal perforations at Government Rajaji Hospital, Madurai Medical College, Madurai.

## MATERIALS AND METHODS

This prospective comparative study was conducted on patients admitted to GRH with traumatic and non-traumatic gastrointestinal perforative peritonitis at Government Rajaji Hospital, Madurai Medical College, from September 2017 to September 2018. All 100 patients in the study were classified into traumatic and non-traumatic groups, each with 50 patients. Institutional ethical committee approval and written consent were taken before the start of the study.

### Inclusion Criteria

All patients admitted to the General surgery department with hollow viscus perforative peritonitis with both traumatic (blunt and

penetrating injury) and non-traumatic causes, patients willing for definitive surgery, and giving consent for the study were included.

### Exclusion Criteria

The patient expired before definitive surgery and was unwilling for definitive surgery. Patients not willing for the study were excluded from the study.

After obtaining clearance and approval from the institutional ethical committee, patients fulfilling the inclusion/exclusion criteria were included in the study after obtaining informed consent. Initial preoperative work-up and resuscitation with intravenous fluids, antibiotics, analgesics, and nasogastric decompression was done in all the cases. The MPI scoring was applied along with other parameters recorded in proforma. Surgery, laparotomy, peritoneal lavage and the definitive procedure was done in all cases. Further resuscitation and ICU care were continued as necessary. Assessment of patients 48 hrs after surgery and postoperative complications was carried out. The outcome of the study was evaluated.

After collection, the Data will be compiled and entered into Microsoft Excel Sheet, and the analysis will be done using the Statistical software SPSS version 18. All Continuous variables will be expressed as Mean and Standard Deviation, and all Categorical variables will be expressed as percentages and proportions. The test will be considered Significant if  $P < 0.05$ , at a 95% Confidence Interval.

## RESULTS

This prospective comparative study was performed on 100 patients admitted with traumatic and non-traumatic gastrointestinal perforative peritonitis. Male predominance was recorded in traumatic (TR) and non-traumatic (NTR) groups. In the TR group, 23 (46%) patients were in the age group of 31 to 50 years, whereas in the group NTR majority of patients, 19 (38%) were in the age group of less than 30 years. Stab injury was the main 26 (52%) mode of onset for traumatic perforation among patients [Table 1].

**Table 1: Demographic and other variables of patients in both groups.**

Parameters	Observation N (%)		P-value
	Traumatic (TR) (N=50)	Non-Traumatic (NTR) (N=50)	
Gender			
Male	41(82%)	43(86%)	0.785
Female	9(18%)	7 (14%)	
Age group (years)			
<30	20(40%)	19 (38%)	0.015
31-50	23 (46%)	17 (34%)	
>50	7 (14%)	14 (28%)	
Mode of onset			
Blunt Injury	21 (42%)	-	-
stab injury	26 (52%)	-	
penetrating injury	3 (6%)	-	
Site of perforation			
Gastric	9 (18%)	4 (8%)	0.012
Jejunum	14 (28%)	1 (2%)	
Ileum	18(36%)	4 (8%)	

transverse colon	9 (18%)	1 (2%)	
Duodenum	0	23 (46%)	
Appendicular	0	17 (34%)	
Type of surgery			
primary closure	30 (60%)	-	
primary closure with feeding jejunostomy	3 (6%)	-	
patch closure with feeding jejunostomy	2 (4%)	-	
Resection and anastomosis	15 (30%)	-	
Double barrel ileostomy	-	2 (4%)	
Graham's omental patch closure	-	20 (40%)	
Graham's omental patch closure with FJ	-	2 (4%)	
Modified Graham's omental patch closure	-	6 (12%)	
Open appendicectomy	-	17 (34%)	
primary closure with colostomy	-	2 (4%)	
Resection and anastomosis	-	1 (2%)	
Comorbidities			
SHTN	2 (4%)	3(6%)	
T2DM	2 (4%)	0	
T2DM/SHTN	13 (26%)	0	
NIL	33 (66%)	47 (94%)	
Previous surgery			
Sterilization	4 (8%)	0	
DU	0	1	
Post TVGJ status	0	1	
Post-DU closure status	0	1	
Nil	46 (92%)	47 (94%)	
Complications			
Sepsis	10 (20%)	29 (58%)	
Sepsis + wound gap	7 (14%)	4 (8%)	<0.001
Wound gap	12 (24%)	10 (20%)	
NIL	21 (42%)	7 (14%)	
Secondary suture			
Yes	12 (24%)	1 (2%)	<0.001

In the present study, the ileum was reported as the main 18 (36%) site of perforations in TR group patients, whereas in the NTR group, it was duodenum in 23 (46%) patients. Primary closure 30 (60%) and Graham's omental patch closure 20 (40%) were the main surgery reported in TR and NTR groups, respectively. The observation of associated comorbidities and history of previous surgery were higher in TR group patients than in NTR group patients. The sepsis was reported significantly ( $p<0.05$ ) higher in NTR group patients (Table 1). The observation of complications and mean hospital stay was significantly less ( $p<0.05$ ) in TR group patients than in NTR group patients. The death was found more in TR group patients 10 (20%) than in NTR group patients 7 (14%), but the effect was statistically insignificant. The second suturing was also found to be statistically higher ( $p<0.05$ ) in TR group patients [Table 2].

**Table 2: Observation of mean hospital stays and outcome of the patients**

		Traumatic (TR)	Non-Traumatic (NTR)	P-value
Hospital stays (days)	< 10	13 (26%)	16 (32%)	0.006
	11- 20	22 (44%)	13 (26%)	
	>20	5 (10%)	3 (6%)	
	Mean	13.13	10.27	
	SD	5.8	4.2	
Outcome	Death	10 (20%)	7 (14%)	0.594
	Survived	40 (80%)	43 (86%)	
	Total	50	50	

## DISCUSSION

Gastrointestinal perforation from the upper oesophagus to the anorectal junction may occur at any anatomical location. Delay in resuscitation and definitive surgery will progress rapidly into septic shock, multi-organ dysfunction, and death. Hence it should be one of the first diagnoses considered and excluded in all patients with acute abdominal pain.<sup>[12]</sup> The main feature of gastrointestinal perforation is pain. Typically, this is a rapid onset and sharp. Patients are systemically unwell and may also have associated malaise, vomiting, and

lethargy. On examination, patients will look unwell and often have features of sepsis. On examining their abdomen, they will have features of peritonitis.<sup>[13]</sup>

In our study, males were predominant was observed, which is similar to the study done by Agarwal et al., where the male-to-female ratio was 2:1. In the present study, the most common age of presentation was in 3<sup>rd</sup> and 4<sup>th</sup> decade of life, this is following a similar study done by Jain et al.<sup>[14]</sup> The stab injury was the leading cause of traumatic perforations in our study, similar to Mukherjee et al.<sup>[15]</sup>

In the present study, the ileum was reported as the main site of perforations in TR group patients, whereas in the NTR group, it was the duodenum. Meena et al., in their study, reported gastroduodenal (46.4%) as the most common site of perforation, followed by small bowel (41%), appendix (8.1%) and large bowel (4.5%).<sup>[13]</sup> More commonly, the perforations involve the proximal part of the gastrointestinal tract, in contrast to studies from Western countries, where perforations are common in the distal part. Generalized peritonitis due to small bowel perforation is common in developing countries. It is usually secondary to typhoid ulcer perforation, as seen in the present series of enteric fever. Perforation of the terminal ileum constitutes the fifth most common cause of abdominal emergencies in the tropical countries.<sup>[16]</sup>

Primary closure and Graham's omental patch closure were the main surgery reported in TR and NTR group patients. Gupta et al. conducted a study on patients with perforation peritonitis and performed Primary closure of the perforation as the most commonly done procedure.<sup>[17]</sup> However, Hota et al. reported Graham's omental patch closure as the primary surgery in their investigation.<sup>[18]</sup>

The observation of associated comorbidities and history of previous surgery were higher in TR group patients than in NTR group patients. These findings in the present study are following earlier reported studies.<sup>[17]</sup> Sepsis was reported to be significantly higher in NTR group patients and was the main cause of perforations. In their investigation, Sharma et al. also reported sepsis as the main cause of perforation.<sup>[19]</sup>

The mean hospital stay was significantly less ( $p < 0.05$ ) in TR group patients compared to NTR group patients. Death was found more in TR group patients than in NTR group patients, but the effect was statistically insignificant. Thota et al., in their study, reported 50% of the patients with postoperative complications, out of which wound sepsis was seen in 22% of cases, and the study further reported mortality of 4%.<sup>[20]</sup> Singh et al. reported surgical site infection (31.8%) as the most common complication, followed by burst abdomen (20%), septicaemia (12.72%) and mortality (9.09%).<sup>[21]</sup>

The second suturing was also statistically higher ( $p < 0.05$ ) in TR group patients; therefore, less mortality was reported in NTR group patients. These observations in the present study are following earlier reported studies.<sup>[22]</sup>

## CONCLUSION

Gastrointestinal perforation is more common in younger age groups, and male predominance was reported in gastrointestinal perforation. Stab injury abdomen is the most common cause of traumatic gastrointestinal perforation, and the duodenum and

appendix is the most common site for non-traumatic gastrointestinal perforation. The ileum and jejunum is the most common site for traumatic gastrointestinal perforation, and Comorbidities increase the incidence of postoperative wound complications. Simple omental patch closure in the gastrointestinal perforation improves the patient's outcome. Two-layer closures in small bowel perforation is a better outcome, and the most common complications were septicemia and wound infection. Still, the cause of death was septicemia and cardiac arrest.

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