

# Multiple Colonic Injuries: For Grading and Universal Management Plan

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## Abstract

Wounds of the colon and rectum resulting from penetrating or blunt trauma are commonly encountered in civilian and War circumstances. Prior to the World War II, this type of injury was associated with significant mortality and morbidity.

**Objective:** Our main objective is to demonstrate the presence of multiple injuries of the colon due to gunshot wounds as a definite clinical and operative entity and to evaluate its prevalence in clinical practice.

**Design/methods:** This study has been conducted in 6 months period from October 2016 to March 2017, in a general hospital close to Saudi-Yemeni borders in a war zone. This study included 23 patients presenting with gunshot injuries of the abdomen and colon was injured in all of them. In this study, patients were managed according to ATLS guidelines and sent to or for laparotomy. Full exploration of the abdominal organs and viscera was done. Cases with colon injuries were involved in the study where we evaluate the site of injuries and the number of injuries as well as the grade of colon injury according to AAST grading system. Surgical management was done by primary repair, excision with colostomy or excision with anastomosis. Patients were followed in the postoperative period where complications were reported.

**Results:** Patients were at the age range of 19 to 39 years with a mean of  $26.65 \pm 4.49$  years. The most common part of the colon injured was the left colon (60.9%) followed by the right colon (17.4%), the transverse colon (13.0%), and the cecum (8.7%). Colonic injuries were graded according to the American association of trauma scale, where grade 1 injury was seen in 1 patient (4.3%), grade 2 was found in 6 patients (26.1%) grade 3 in 6 patients (26.1%), grade 4 in 6 patients (26.1%), while 4 patients sustained multiple perforations of the colon in a percentage of 17.4 which is a significant percentage.

**Conclusion:** Multiple injuries of the colon are frequently seen in gunshot injuries due to the use of shotgun weapons. These types of injuries are managed on individual basis with wide variety of results, which may be due to absence of proper grading and management guidelines.

## Introduction

Wounds of the colon and rectum resulting from penetrating or blunt trauma are commonly encountered in civilian and War circumstances. Prior to the World War II, this type of injury was associated with significant mortality and morbidity [1-3]. The recommended surgical treatment for colon trauma has undergone major changes in the last decades. There are various choices for colon injuries surgical repair but they can be grouped in two categories: primary repair (suture repair or resection and anastomosis) and diversion with colostomy formation at the time of injury. Surgeon's decision for one surgical procedure or another is influenced by a vast array of factors [4]. Many classification systems of colon injuries have been established to facilitate clinical research and have a uniform system of reference. The PATI was published in 1981 and was designed to access the degree of Injury to all abdominal organs and to predict the risk of postoperative complications [5]. Although mentioned in some research, yet multiple colonic injuries were not included in any of the classification systems for colon injury. The question here is to repair such multiple injuries primarily, especially for left colon injuries, or resect the entire involved segment with primary anastomosis or colostomy, with all possible complications of massive colonic resection affecting the quality of life.

## Objective of the Study

Objective of the study is to demonstrate the presence of multiple injuries of the colon due to gunshot wounds as a definite clinical and operative entity and to evaluate its prevalence in clinical practice.

## Materials and Methods

During the war activities through 6 months period in southern part of Saudi Arabia from October 2016 to March 2017, 23 wounded patient's sustained injury of colon. All patients were soldier's injuries at the battlefield; they were managed according to ATLS guidelines with proper management of airway, breathing and resuscitation of hemodynamic condition. Patients were examined thoroughly to define the bullet track (inlet and exit

wounds), CT abdomen with contrast was done for hemodynamically stable patients, while fast was done for unstable patient for rapid assessment. Laparotomy was done for all patients via midline abdominal incision. Full exploration of the abdominal contents was done. Homeostasis with control of bleeding sources was done as a first priority followed by full evaluation of abdominal organs and viscera. At the local vicinity of the bullet track, colon was mobilized to assess both anterior and posterior walls. Injuries of the colon were graded according to the American association of trauma and were managed accordingly. For grade 1 and 2, primary repair was done on both sides while for grade 3 and 4, right hemicolectomy was done on the right side while on the left side colostomy was done. We could identify another type of injuries for which we had to manage individually, the presence of multiple colon injuries due to shot gun injuries, the decision was difficult, either to do primary repair of such multiple injuries, resection anastomosis on the right side. On the left side, it was more difficult to decide. We had to choose either to repair those perforations individually or to resect the whole segment with primary anastomosis with or without proximal colostomy.

## Results

Our study included 23 patients presenting with abdominal gunshot injuries with varying degrees of hemodynamic stability. Patients fell in the age range of 19 to 39 years with a mean of  $26.65 \pm 4.49$  years, an expected figure because all of them were young soldiers. All patients included in this study were male (soldiers). The most common part of the colon injured was the left colon (60.9%) followed by the right colon (17.4%), the transverse colon (13.0%), and the cecum (8.7%). Colonic injuries were graded according to the American association of trauma scale, where grade 1 injury was seen in 1 patient (4.3%), grade 2 was found in 6 patients (26.1%), grade 3 in 6 patients (26.1%), grade 4 in 6 patients (26.1%). While 4 patients sustained multiple perforations of the colon in 17.4% which is a significant percentage, with multiple injuries. Two cases were managed by primary repair of such injuries while the other 2 cases were managed by closure with proximal diversion. Primary repair was done in 14 cases (61.9%) while diversion by means of colostomy was done in 9 cases (39.1%). Two of 14 cases managed with primary repair showed postoperative leak and needed redo surgery with diversion with a success rate of 85.7% and a failure rate of 14.3%, while in cases of colostomy, no immediate postoperative complications were detected. All colostomy patients were re admitted 6 weeks later for closure of colostomy.

## Discussion

The colon is the second most frequent organ injured in penetrating abdominal trauma after the small bowel [6]. A colon injury is involved in approximately 27 per cent of trauma cases undergoing laparotomy for GSWs with the transverse colon being the segment most frequently injured [7]. In our study, left colon was the most commonly involved segment.

Many classification systems of colon injuries have been established to facilitate clinical research and have a uniform system of reference. The PATI was published in 1981 and was designed to access the degree of injury to all abdominal organs and to predict the risk of postoperative complications. For all injuries, a score of 25 is the cut-off above which there is a dramatic increase in postoperative complications, especially septic complications. Flint et al. [8] in 1981 developed the Flint Grading Scale for colon trauma. Grade 1 injuries are isolated colon injuries with minimal contamination, minimal delay in operation, and minimal shock. These injuries are generally all managed with primary repair. Grade 2 injuries are through-and-through perforations or lacerations with moderate contamination and possible associated injuries. Grade 3 injuries have severe tissue loss, devascularisation, heavy contamination, and can have profound shock. The management of grade 2 and 3 injuries is more widely debated than for grade 1 [9].

The American Association for the Surgery of Trauma Colon Injury Scale (CIS) was established in 1990 to develop objective criteria for the classification of the severity of the injury and to enable the reliable comparison of results [10]. Injuries are classified as Grades I to V with Grade I injuries being partial-thickness injuries without perforation or hematoma and Grade V being transection of the colon with segmental tissue loss or a vascularized segment of colon. Destructive and non-destructive colon injuries are terms used in the literature based on the two former classification schemes [11].

In our study, injuries were classified according to American association of surgery of trauma and colon. The wide variations in the results of surgical treatment of colon injuries is probably due to the presence of other types of injuries that are not included in present classification systems. For example, Busic et al. mentioned the presence of multiple injuries in the colon and managed them on individual basis [12].

In our study, we found that in four patients, there were multiple injuries of the colon in a percentage of 17.4, which is significant. Two cases were treated by primary repair, while the other 2 were managed by diversion with or without resection of a part of colon.

## Conclusion

In conclusion, the wide variation in the results of colonic injuries may be attributed to the absence of some clinically evident types or patterns of injuries that are not mentioned in the present classification systems. These patterns of injuries need to be addressed with clear guidelines for adequate management plan.

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