



Proximal Descending Colon Perforation Caused by Penetrating Trauma Abdomen; should it still be a Management Dilemma? A Case Report

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Abstract

Management of the colonic injuries has changed significantly over the past few decades. There was a time when such injuries were almost fatal. There was a management dilemma whether to close them primarily or do a colostomy. The undue fear associated with the primary closer of the colonic injuries has been laid to rest by many studies. Now a days the non-destructive colonic injuries are repaired primarily. Even the destructive wounds can be managed with resection and anastomosis of the involved segment with or without colostomy. We present the case of a patient who was brought with the history of penetrating trauma to the left side of the upper abdomen. Patient had penetrating trauma to the descending colon and was managed with primary closer of the colonic injury.

Keywords: Abdominal trauma; Colonic injury; Colostomy; Memphis group

Introduction

The management of penetrating abdominal trauma has evolved greatly over the last century. Most significant of all has been the developments made in management of colonic trauma. Before World War I, penetrating trauma of abdomen was managed expectantly, which was uniformly fatal, but in later decades, early laparotomy resulted in survival rate close to 50% [1]. About 56% cases of colonic injury are secondary to penetrating trauma with about 43% of the colonic injuries are being caused by blunt abdominal trauma. Recent studies from the time of Iraq and Afghanistan wars have put penetrating trauma to be the cause of colonic injuries in about 71% cases. However the overall incidence of colonic trauma is <1% of all the trauma patients [2]. Low incidence of colonic injuries and lack of a definitive diagnostic method often delays the management. Contrast Enhanced Computerised Tomography (CECT) scan of the abdomen can detect the colonic trauma and other associated injuries at the same time with greater accuracy [3]. In recent years the management of traumatic injury of colon has improved greatly. The mortality which was almost 90% about a hundred years ago has come down to almost 1%. At the same time the morbidity associated with the colonic injuries has fallen down to less than 15%. This has happened to a large extent because of the development of better antibiotics, triage, early evacuation out of the battle field, Sblood bank facilities and newer operative techniques [1]. Although American Association for the Surgery of Trauma (AAST) has laid down the guidelines but still there is debate among the surgeons and institutions about the right approach in dealing with the colonic injury patients [4]. We hereby present a case which presented with a history of accidental penetrating trauma to the abdomen causing descending colon injury. The patient was managed with primary repair of the colonic wound.

Case Presentation

A 57 year old male shepherd, slipped on the ground while he was walking over an uneven surface. He was carrying a scissor in his bag which was used to recover wool from the sheep. After he fell on the ground, patient sustained penetrating wound over left lumbar region. He was treated at a local primary health centre after which he was referred to our tertiary care centre. Patient presented in Emergency Room (ER) after about 10 hours of injury. On examination, he was a febrile; Pulse Rate (PR) was 110 beats per minute, Blood Pressure (BP) 98/68 mmHg (millimetre mercury) and respiratory rate 26 per minute. On abdominal examination, there was mild distension and tenderness in left hypocondrium and lumbar region. There was a lacerated wound present in

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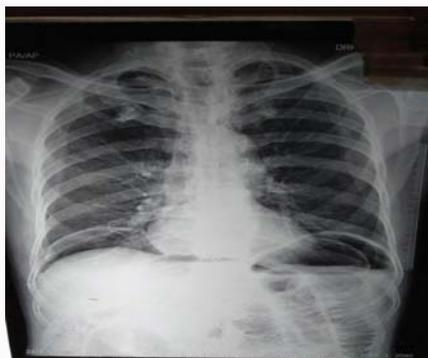
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Table 1: AAST guidelines and recommendations.

AAST grade	Meaning	Expected treatment
I a	Mesenteric hematoma or colonic wall hematoma	Observed
I b	Simple partial thickness laceration or small full thickness laceration (<50% of circumference)	Simple suturing and primary repair
II	Above with associated peritoneal contamination	Simple suturing and primary repair
III	Large laceration involving >50% of the bowel wall circumference	Surgeon discretion and experience
IV	Transection of the bowel wall	Surgeon discretion and experience
V a	Transection with segmental tissue loss	Surgeon discretion and experience
V b	Devascularized tissue	Surgeon discretion and experience

**Figure 1:** Showing free gas under both domes of diaphragm.**Figure 2:** Showing the breach in the peritoneal wall.

left lumbar region of size about 4 cm × 3 cm at the level of 12th rib in posterior axillary line. His haemoglobin was 9.8 gram per decilitre (g/dl); total leukocyte count was 1600 per cubic millimetre (mm³) with 88% of neutrophils on differential counts. The blood biochemistry was suggestive of raised Blood Urea Nitrogen (BUN) of 26 mg/dl and serum creatinine of 1.6 mg/dl. Rest of the blood investigations were within normal limits. Chest X-ray showed free air under both domes of the diaphragm (Figure 1), Ultrasonography (USG) abdomen showed moderate free fluid with no solid organ injury. Patient underwent an exploratory laparotomy after initial resuscitation. On opening the abdomen, around 500 millilitre of blood was present in the peritoneal cavity with no evidence of faecal matter. Visible part of the splenic flexor and descending colon was grossly normal. There was a rent in the parietal peritoneum in the left lateral wall just adjacent to the splenic flexor of the colon, about 6 centimetres away from lower border of spleen (Figure 2). This rent could easily admit about 2 fingers, from where fractured part of the 12th rib was felt. Stomach, spleen, colon, mesentery of small bowel and transverse colon were grossly normal. By this time it was presumed that all the internal organs were normal. Haemoperitoneum and free air in the peritoneal cavity could be explained by large penetrating wound in left lateral wall with fracture of the 12th rib. However, mobilization of the splenic flexor and early descending colon was planned through the white line of Toldt, so as to confirm no injury to these structures. On mobilization, we were surprised to identify 2 perforations of size about 1.5 cm x 1.5 cm each, present about 2 cm distal to splenic flexor of the colon at its posterolateral and posterior surface respectively, which were divided by a relatively unhealthy wall of approximately 1 cm. These perforations were pointing towards injury by the tips of 2 prongs of the scissors which was the cause for penetrating injury. The margins of the perforations were excised along with the intervening unhealthy wall, so as to make it a single perforation. Primary closure of the perforation was done with single layer, interrupted, absorbable

sutures. Patient had uneventful stay in hospital and was allowed orally on 4th post operative day after recovery of normal bowel sounds. Patient was discharged on 8th post operative day. Patient has recovered well and is still in follow up after three months of surgery.

Discussion

Management of penetrating colonic wounds has evolved tremendously over the last hundred years. Most of the experience has been gained from the military medicine during world wars and later this knowledge has been applied to the treatment of civilian wounds too. High mortality and morbidity associated with the colonic trauma has come down significantly. W.H.O Gilvie wrote in an article about management of colonic injuries based upon his personal experiences in the world war. He suggested that only colostomy could save a patient's life after colonic injury. Similarly surgeons around the world followed the rule and made it mandatory for the management of every colonic trauma patient, followed by a delayed restoration of the bowel continuity [2]. With the passage of time people started questioning this belief because primary repair of colon injury without colostomy was thought possible. In 1979 Stone and Fabian did a randomised study which found equivalent rates of infection and mortality among the patients treated with either primary repair or diversion [5]. Similarly further studies showed it to be safe and practicable to close the traumatic colon wounds primarily without diversion colostomy. In 1994 Stewart found that intraoperative or perioperative transfusion of more than 6 units of Packed Red Blood Cells (PRBC) or presence of significant co-morbidities lead to more chances of anastomotic leak in primary repair patients. Based on this observation they formed an algorithm for the management of penetrating colonic injuries. They have divided these injuries into two types; Destructive and Non-destructive. The destructive wounds involve laceration involving greater than 50% of the colonic circumference, completely transected colon or devascularisation of the colon. Other injuries are

classified as non destructive injuries of the colon. At the same time management of such wounds depends on many other factors like associated peritonitis, associated injuries, hemodynamic stability, pre or intra operative hypotension, requirement of blood and significant underlying diseases [1]. Therapeutic approaches to colon injury are (1) Primary repair, (2) Resection with anastomosis and (3) Repair or resection with diverting colostomy. Earlier, most colon wounds were managed by exteriorization of the wound or proximal colostomy because of fear of a high rate of suture line break down. Exteriorization of the colon repair with early drop back (5 days to 7 days) into the peritoneal cavity was done between 1960 and 1970, but had been abandoned thereafter [6]. It is recognized that almost all of those patients can be more appropriately treated by primary repair. In the past 20 years, there has been an increasing trend toward primary repair. The past decades witnessed an increasing interest in primary repair of colon wounds, and some have even gone one step further to anastomosis after resection of destructive wounds of the colon. Primary repair avoids colostomy formation and the subsequent cost of maintaining and then closing a colostomy [7]. In recent years, there are several prospective studies which support primary repair over colostomy; still, some controversy is there, as to when primary repair is appropriate [8-11]. Memphis group has carried the research on the management of penetrating trauma a step forward. They did a study in 2002 on patients with colonic trauma who were managed according to the algorithm used by Stewart in 1994. Those patients with significant comorbid conditions and a PRBC requirement of >6 units were managed with diversion colostomy while other destructive colonic injuries were managed with resection and anastomosis. They did primary repair in all the non-destructive injuries. In follow up studies they demonstrated a lower complications and colon related mortality in the patients managed according to the algorithm. They demonstrated a suture line failure rate of less than 5% [12,13]. A study done by AAST in 2001 has found severe fecal contamination to be an independent predictor of complication but they still concluded that whenever possible primary repair should be tried for penetrating colonic trauma [4]. Although the studies have not been able to clearly mention the benefits, but most of the surgeons performed primary repair in right sided colonic injuries whenever permissible but left sided colonic injuries were managed by colostomy [14]. Although most of the surgeons would prefer using staples for colonic anastomosis in polytrauma patients the results of stapled as well as hand sewn anastomosis has been found to be comparable with no particular technique showing any disadvantage [15]. Not only the management of colostomy has its own implications, but the timing of closure itself has its own share of problems. In one study by Velmahos et al. [16] early closure was done between 9 days to 14 days (mean 11.8 days) and delayed closure was done between 92 days to 118 days (mean 104.8 days). There was no significant difference in morbidity between the two groups; however technically, early colostomy closure was far easier than the late colostomy closure. Similarly a study by Khalid et al. [17] found no differences in the complication rates when the colostomies were closed in the same admission as compared to the delayed closure. The overall complication rate associated with colostomy closure ranges from 25% to 44% whereas the mortality is very low ranging from 0.65% to 4.3% [18]. Studies have found that up to 55% patients may end up with permanent stomas [2]. American Association for the Surgery of Trauma (AAST) has laid down the guidelines to help determine severity and guide the decision making process in patients with penetrating colonic trauma but still the surgeons are more apt to go for diversion colostomies in these

patients depending upon their personal experiences [4,19] (Table 1).

Conclusion

Penetrating colonic trauma is no more limited to a military warfare. With increasing hostility in day to day life the incidence of these injuries is bound to go up. Management of such injuries does not necessarily involve the creation of colostomies but despite tons of evidence, surgeons still are apt to diversion colostomies in penetrating colonic trauma. Colostomies are easy to create but difficult to maintain. They increase the mental, social and economical stress on the patient. There is no shortage of evidence anymore that wherever possible primary repair should be done in non-destructive penetrating colon wounds. For destructive penetrating colon wounds, the data would support resection and anastomosis for stable patients without significant associated injuries. Patients with associated injuries or significant underlying disease have better results with resection and anastomosis along with colostomy.

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