Case Report

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Laparoscopic management of penetrating abdominal trauma

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ABSTRACT

Trauma is a leading cause of mortality and morbidity worldwide. The National Trauma Institute ranks trauma as the number 1 cause of death in individuals aged 1-46 years, and the third leading cause of death across all age groups. Trauma cases are a common occurrence in the hospital with the abdomen being the third most commonly injured region. A decision between laparoscopy versus laparotomy as the most appropriate approach is still a matter of discussion. We present a case of a 30 years old male who presented with a penetrating stab wound on the anterior abdominal wall. After initial investigations and emergency management, a decision was reached for a laparoscopic approach in the definitive management of the patient. Following the procedure, the patient remained vitally stable and faced no other complications. This case highlights the importance of laparoscopic approach in penetrating abdominal trauma patients as it significantly reduces the amount of stress in traumatic patients, reduces hospital stay and allows for a faster recovery phase.

Keywords: Laparoscopic, Laparotomy, Penetrating trauma, Stab wounds, Therapeutic

INTRODUCTION

Abdominal trauma shares a huge burden of cases in patients who present with trauma of any cause. Abdominal injury can be classified traditionally as being either blunt or penetrating. Any instrument or object that can impale the abdominal cavity may cause penetrating abdominal trauma, and depending on the site, extend and number of penetrations, these patient may present with a wide variety of symptoms and clinical status.

Given the complexity in the initial judgment of the true burden of the trauma, decision of the most appropriate initial surgical approach for these patients is a daunting task.

Various studies have put forward a criteria to help clinicians make this decision, however none are without their shortcomings in either resulting in adverse outcome for the health of patient, or unnecessarily exposing the patient to the increased burden of laparotomy.^{1,2}

The surgical world currently faces the question of when laparoscopic management of penetrating abdominal trauma is the best initial surgical choice. Literature published over the last 10 years was searched for high quality trials and systematic reviews in order to reach a definite conclusion.

The following terms were included in the search: "laparoscopy", "acute surgical emergency", "penetrating abdominal trauma" and "stab wound management". The search was conducted through PubMed, the Cochrane library, and the EBSCo Host databases. Although an extensive search was conducted, it was not possible to find articles of a high quality.

CASE REPORT

A thirty-years-old male patient was brought by ambulance as a case of assault with history of a stab wound at the anterior abdominal wall one hour prior to presenting to the accident and emergence.

On arrival the patient was conscious, oriented and noticeably sweating. Vitals signs were as follows: pulse 95 beats/min, blood pressure 95/56mmhg and oxygen saturation 97%. He had an open and bleeding wound at the epigastric region approximately 3cm x 1cm with evisceration of omentum. There was equal and bilateral air entry in the chest.

Two large bore IV lines were placed and fluid resuscitation was provided. Simultaneously, blood samples were collected and four units of packed red blood cells (PRBc) were arranged. Oxygen supplementation was initiated and a nasogastric tube and Foley's catheter were also inserted. On examination, FAST ultrasound revealed approximately 1.5 liters of fluid in Morrison's pouch. The chest X-ray was found to be normal. The Anesthesia and surgical teams were immediately informed and the patient was transferred to the theatre.



Figure 1: Laparoscopic view of stab wound where one of the port inserted through the epigastric region (penetrating wound).

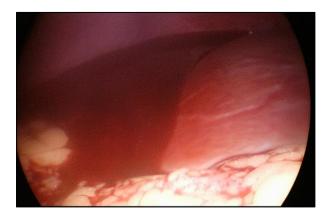


Figure 2: Right hemoperitoneum.

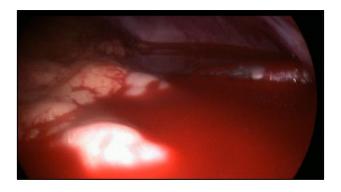


Figure 3: Left hemoperitoneum.



Figure 4: Mesenteric tear.



Figure 5: Small bowel perforation through and through.

A laparoscopic approach using four ports was performed; one of the ports was inserted through the site of the stab wound. Approximately two liters of blood were evacuated after which all the quadrants were explored. The liver, spleen, stomach, retro-peritoneum, duodenum, large and small intestines were examined. A tear was found at the mesentery root at the ligament of Trietz along with a perforation through the walls of the small bowel. The perforation was about 15 cm from the ligament of Treitz.

The mesenteric tear was successfully repaired and the perforations were closed using endostich vicryle 2/0. The patient responded well to the treatment and was discharged home after 4 days in a good condition.

DISCUSSION

Penetrating abdominal trauma is a presentation that has the potential to present in a wide array of symptoms and clinical status. Meticulous initial evaluation is crucial for such patients as it may help clinicians decide on the most appropriate clinical pathway. A debate stands on weather laparoscopic approach, or a laparotomy is the best initial approach in patients who present with penetrating abdominal trauma.

Colwell and Moore explain that there are now several steps towards managing such an acute emergency and calls immediate laparotomy an, "obsolete" intervention. Criteria for immediate laparotomy include, "hemodynamic instability, unequivocal peritoneal signs on physical examination, signs of gastrointestinal hemorrhage, and implement in situ," as well as evisceration of bowel or mesentery. However these criteria often lead to a number of nontherapeutic laparotomies, one study found this to occur as much as 1/3.3

The protocol suggested by Colwell and Moore for a heamodynamically stable patient was followed in this case with an initial examination followed by local wound exploration, bed side radiography, and a FAST ultrasound which showed a fluid collection of approximately 1.5 liters.¹

Laparoscopy can be used as a diagnostic and therapeutic tool as it was in this case. It is universally known to result in a shorter hospital stay, fewer complications and reduced costs. M. Wiewióra report that laparoscopy is useful in revealing, "the kind of injury, its location and severity" and allows the treatment of minor injuries. In 2006, the European association for endoscopic guidelines developed evidence based protocol for the management of acute abdominal emergencies. They found that, "more clinical data are needed on the use of laparoscopy after blunt or penetrating trauma of the abdomen.

In a systematic review published by O'Malley et al, 51 studies are included of which 13 is prospective trials.⁵ 43.95% of the total patients evaluated within the review were found to have injuries through laparoscopy of which 33.8% were subsequently treated by laparotomy.⁵ The authors conclude that although more evidence of a higher quality is needed laparoscopy has, "screening, diagnostic and therapeutic roles, when conducted by a proficient surgeon and can be used, "in determining the need for laparotomy but detects hollow visceral injuries less reliably.⁵

Lin HF et al conducted a retrospective study of 87 patients in 2010 and report a decrease from 57.9% in the group that underwent immediate laparotomy to 0% in the group that underwent laparoscopy first (P value <0.001).⁶ The patients who underwent laparoscopy had a shorter surgery duration, which is stated to depend upon surgical

expertise and quicker wound closure as compared to laparotomy.⁶ Hospital stay was also shorter due to the use of a minimally invasive approach.⁶ The authors have provided recommendations to ensure that visceral injury is not missed and include techniques such as changing the patient's position during laparoscopic procedures for inspection; and use of atraumatic grasping forceps for bowel manipulation.⁶ Emphasis has been placed on surgical expertise being vital as well as the hemodynamic stability of the patient since otherwise, emergent surgical exploration of the abdomen is lifesaving.⁶

A retrospective study conducted over 10 years was published by Johnson J et al and concluded that laparoscopy is a useful diagnostic and therapeutic surgical tool. 7 70% of patients can avoid traditional laparotomy when explorations indicated. The relative morbidity and mortality, complication rates, and missed injury rates are low and comparable with open approaches. Additionally, a wide variety of intraabdominal pathology can be addressed. 7

However complications of the procedure have also been listed and include gas embolism and tension pneumothorax specifically in patients with diaphragmatic injury due to the pneumoperitoneum created to conduct the surgery. Intracranial hypertension is a fatal possibility and Johnson et al recommend the avoidance of CO2 pneumoperitoneum in the evaluation of patients with head injuries.⁷ Finally, the potential for a missed hollow viscous injury exists and may have devastating consequences and like Lin et al a careful and methodical approach while exploring the abdomen recommended.^{6,7} Similar to Lin et al surgical expertise is highlighted as being the key factor.6

CONCLUSION

In this paper we highlight the role of therapeutic use of laparoscopy, in cases such as this one, in penetrating abdominal trauma. This is provided that the surgeon operating has the appropriate expertise. In addition in should be made sure that the patient is hemodynamically stable before undergoing such therapy. Although there are some particularly dangerous complications such as missed injury that might occur, these can be avoided through a careful and diligent surgical technique.

In general the complications of laparoscopy are fewer as compared to laparotomy and include shorter duration of time in the operating theatre and a quicker recovery time.

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