Original Article

Role of laparoscopy in blunt abdominal trauma

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Objective: To evaluate the role of laparoscopy in the diagnosis and management of blunt abdominal trauma.

Methodology: This descriptive, prospective study was conducted in the departments of surgery, Ghulam Mohammad Mahar Medical College, Sukkur and Chandka Medical College, Larkana, Pakistan from June 2010 to May 2012. It included 32 patients with blunt abdominal trauma admitted in emergency at GMMMC, Sukkur and at CMC Larkana. Initially, all were resuscitated with iv fluids, analgesics, iv antibiotics and blood transfusion, if required and then investigated by ultrasound abdomen, plain x-ray abdomen and chest and other routine investigations. Laparoscopy was performed in hemodynamically stable patients not showing free gas under the diaphragm in plain x-ray abdomen and ultrasound showing hemoperitoneum. The patients with penetrating abdominal wounds, non-traumatic abdominal emergencies and iatrogenic injuries were excluded.

Results: Out of 32 patients, 29 were male and only 3 were female. The age ranged from 12 to 60 years. The organs injured were spleen in 5 (15.6%) patients, liver in 17 (53.12%), omental bleeding in 2 (6.25%), small bowel mesenteric bleeding in 6 (18.75%) and associated Jejunal injuries in 2 (6.25%) patients. Only 3 (9.37%) patients with Grade-iii liver injury developed post-operative collection, 1 (3.12%) patient developed biliary fistula and 1(3.12%) developed right sided pleural effusion. No post-operative bleeding or mortality was recorded.

Conclusion: Laparoscopy could be useful in selected patients with blunt abdominal trauma as a diagnostic and therapeutic tool, thus avoiding unnecessary laparotomies. (Rawal Med J 2013;38:40-43).

Keywords: Blunt abdominal trauma, diagnostic laparoscopy, therapeutic laparoscopy.

INTRODUCTION

The most common cause of blunt abdominal trauma in metropolitan trauma centers is the motor vehicle collision. Assaults, falls, automobile-pedestrian accidents and work-related injuries are also common.[1] The incidence of blunt abdominal trauma requiring laparotomy is 6% with most frequently injured organs being spleen (40-55%), liver (35-45%) and retroperitoneum (5%).[2] The assessment of a patient with blunt abdominal trauma is difficult and the resultant misdiagnosis or delay in diagnosis have contributed to the high mortality and morbidity. The prognosis of blunt abdominal trauma depends in most cases not only on the extent of existing injuries but also on prompt therapy. Thus, diagnostic measures have to clarify rapidly and accurately whether laparotomy has to be performed or not. Difficulties in decision for the surgeon arise especially in cases of blunt abdominal trauma where diagnostic imaging (ultrasonography, CT Scan) do not lead to clear-cut results.

Laparoscopy has gained widespread acceptance as a useful tool in the diagnosis and management of patients with blunt abdominal injuries.[3] It was first used for a trauma patient in 1956 by Lamy, who observed two cases of splenic injury and later, it was noted that laparoscopy is useful for determining the need for laparotomy.[4] In 1991, Berci et al reported that he had reduced the number of non-therapeutic laparotomies performed for hemoperitoneum by 25% by laparoscopy in patients with blunt abdominal trauma.[5] Laparoscopic evaluation of the abdominal cavity has been established as sensitive and specific in the trauma setting (sensitivity 94% and specificity 98%).[6] The inspection of the abdominal cavity and solid viscera is relatively easy to perform, but the complete examination of the intestine presents a greater challenge, with a 9-18%

missed injury rate per patient.[7] The purpose of this study was to evaluate the role of emergency laparoscopy as a diagnostic and potentially therapeutic modalities in blunt abdominal trauma.

METHODOLOGY

This prospective study included 32 patients with blunt abdominal trauma, admitted in emergency in surgical units, GMC Sukkur and CMC Larkana, Pakistan. All patients presenting with abdominal pain and positive signs (tenderness, rebound tenderness , diminished /absent bowel sounds) who were hemodynamically stable were selected. Inclusion criteria were hemodynamically stable patients with blunt abdominal trauma, ultrasound showed hemoperitoneum , but with no free gas under the diaphragm in plain x-ray abdomen or chest. Those who required immediate surgical intervention because of evidence of severe continuing internal bleeding or established peritonitis were excluded from the study. The patients with penetrating abdominal wound, non-traumatic abdominal emergencies and iatrogenic injuries were also excluded from this study.

After initial resuscitation with iv fluids, antibiotics, analgesics and blood transfusion, if required all were investigated by ultrasound abdomen, plain x-ray abdomen and chest and other routine laboratory tests. The laparoscopy with standard technique of 10mm supra umbilical port (Hassan's open technique) and another working port of 5mm for suction of blood and irrigation, was performed. The organs injured with grading and type of injuries, the amount of blood in the peritoneal cavity and associated gut or diaphragmatic injuries were noted on the laparoscopy. The findings were classified as: (i) minimal hemoperitoneum (small static amount of blood in either peracolic gutter), (ii) moderate hemoperitoneum (obvious pooling in the peritoneal gutters and/or pelvis), (iii) severe hemoperitoneum (generalized collection of blood throughout the peritoneal cavity) and (iv) solid organ trauma and/or perforation of hollow organ. Following grading was used in the study to assess the type of injury of solid visceral organs: Grade i: Hematoma (subcapsular<10% surface area), laceration (capsular tear <1cm parenchymal depth); Grade ii: Hematoma (subcapsular 10-50% surface area), laceration (1-3 cm depth <10cm in length); Grade iii: Hematoma (subcapsular >50% surface area or expanding), laceration (>3cm parenchymal depth); Grade iv: Laceration (parenchymal disruption 25-75% of organ); Grade v: Laceration (parenchymal disruption >75% of organ), vascular (Juxta-organic venous injuries) and Grade vi: Vascular (major vascular and/or organic avulsion). The data were analyzed on SPSS version 10.

RESULTS

Out of 32 patients, 29 were males and 3 female. The age ranged from 12 to 60 years. The mechanism of injury included motor vehicle collision in 15 (46.8%) patients, fall from height in 5 (15.6%), assault in 3 (9.37%) and automobile pedestrian accident in 9 (28.12%) patients. During laparoscopic inspection of peritoneal cavity, the organs injured were spleen (Grade-i and ii injuries) in 5 (15.6%) patients, liver (Grade-i, ii and iii injuries) in 17(53.12%), omental bleeding in 2 (6.25%), mesenteric bleeding and hematoma in 06 (18.75%) and associated small gut (Jejunum) injuries in 2 (6.25%) patients (Table 1).

Table 1: Organs injured noted.

Viscera injured	Number	Percentage
Liver	17	53.12
Spleen	05	15.6
Omentum	02	6.25
Mesentry	06	18.75
Gut	-02	6.25

In two patients with jejunal injuries, open conversion was made after initial diagnostic laparoscopy. In the remaining 30 patients, the laparoscopic drainage of about 500cc to 2 litres of blood was done and irrigation of peritoneal cavity with normal saline were done. In seven patients with liver injury and three patients with splenic injuries, the hemostasis was secured by applying sponge stone, while in rest of the injuries of liver, spleen, omentum and small bowel mesentry there was no active bleeding.

Table 2: Complications of laparoscopy in the study.

Complication	Number	Percentage
Post-operative Collection	03	9.37
Biliary fistula	01	3.12
Pleural Effusion	01	3.12
Post-operative Bleeding	00	00
Open Conversion	02	6.25
Mortality	00	00

Drain was kept in all cases for initial 2-3 days. Only 3 (9.37%) patients with liver trauma (Grade -iii) developed post-operative collection, which was drained by ultrasound guidance; of these 3 patients, 2 patients settled with no late complications, while 1 (3.12%) patient developed biliary fistula which was managed conservatively. One (3.12%) patient developed right sided pleural effusion, managed by chest intubation. No postoperative bleeding or mortality occurred in the study.

DISCUSSION

It is very important to determine the presence, location and severity of intra-abdominal injury to decide the surgical intervention; and to thoroughly evaluate intra-abdominal organs for associated injuries in the trauma patient. The focused assessment with sonography for trauma (FAST) examination is an important tool in the evaluation of blunt abdominal trauma. Stengel et al performed a meta-analysis of 30 prospective trials evaluating FAST for blunt abdominal trauma. They concluded that the FAST examination had an unacceptably low sensitivity for the detection of intraperitoneal fluid and organ injuries and recommended that additional diagnostic studies be undertaken in patients with clinically suspected blunt abdominal trauma regardless of the FAST results.[8]

The utility of diagnostic laparoscopy in blunt abdominal trauma is a developing field when performed in carefully selected hemodynamically stable patients, laparoscopy is safe and technically feasible. Chol et al reported reduced negative and non-therapeutic laparotomy rates in this identified population.[9] In our study, we diagnosed and managed laparoscopically 30 (93.75%) out of 32 patients with blunt abdominal trauma. So our success rate is 93.75%. As technology and instrument continue to advance, future directions will include more attempts at "awake" laparoscopy to achieve the advantages of minimally invasive surgery including decreased pain, expedited discharge and reduction of unnecessary laparotomy in suitable patients.[10]

Laparoscopy is useful in selected patients with blunt abdominal trauma who have equivocal findings on clinical examination and imaging investigations in order to clarify the diagnosis, thus avoiding unnecessary laparotomies.[11] Elliott et al concluded that diagnostic laparoscopy had poor sensitivity (<50%) for injuries to hollow viscera.[12] Villavicencio et al reported 41-77% missed injury rate per patient for emergency laparoscopy.[13] The optimum role for laparoscopy in trauma have yet to be established and its use should be in adjunct with sound and repeated clinical examination, and not discounting the more established imaging modalities.[14]

Laparoscopy is well established in solving diagnostic dilemmas and in many cases it can also be therapentic.[15] In our study, we diagnosed all cases laparoscopically even two cases of Jejunal perforations. Patients with liver, spleen and mesenteric injuries were managed successfully without open conversion and with minimal complications. The evaluation and management of blunt abdominal trauma is dependent on multiplle factors, including mechanism and location of injury, hemodynamic and neurological status of the patient, associated injuries, and institutional resources.

CONCLUSION

Laparoscopy is useful in selected patients with blunt abdominal trauma as a diagnostic and therapeutic tool, thus avoiding unnecessary laparotomies.

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Conflict of Interest: None declared
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Rec. Date: Jun 25, 2012 Accept Date: November 16, 2012

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