

Critical Evaluation of Laparoscopy in Trauma

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ABSTRACT

Background: New diagnostic and therapeutic methods has changed trauma treatment in the last decades, aiming to decrease the morbidity of non-therapeutic laparotomy. The use of laparoscopy in trauma has emerged as an alternative for diagnosis and treatment of blunt and penetrating abdominal trauma. The objective of this study is to evaluate laparoscopy as a diagnostic and therapeutic method in selected cases, which is according to the diagnostic protocol for laparoscopy in trauma, and its ability to avoid unnecessary laparotomies. **Methods:** Patients' medical records were reviewed during three years to evaluate: how cases were handled, the indications for laparoscopic surgery, the presence of associated injuries, the need for conversion to open surgery, the length of hospital stay and complications. From 2003 to 2006, 34 hemodynamically stable patients who were admitted with abdominal trauma were submitted to laparoscopic procedures. These patients underwent a serial physical examination, and image and laboratory exams to confirm their hemodynamic stability. **Results:** Diagnostic laparoscopy is an important tool for the thorough examination of the abdominal cavity and hemoperitoneum identification. In 41.1% of them (18/34) it was positive, 11 cases of stab and gunshot wounds penetration and 23 cases of hemoperitoneum in closed abdominal trauma were identified. Identification and specification of injuries occurred in 18 patients, the major part by closed abdominal trauma. Seven cases were converted to surgery and, in 11 patients, laparotomy was avoided. **Conclusions:** Using the hemodynamic stability as a primary condition, we observed lower sensibility for detecting hollow viscera and retroperitoneal injuries. There were limitations regarding the spleen and hollow viscera exploration, as well as in regard to the removal of large clots. However, it was effective for chest and abdominal injuries. The laparoscopy was useful in avoiding unnecessary laparotomy in a considerable number of patients, thus it was more useful in penetrating trauma.

Key words: Laparoscopy – Therapeutic laparoscopy – Penetrating trauma- Abdominal wounds.

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INTRODUCTION

The evaluation of patients with penetrating and blunt abdominal trauma has been facing a critical, technical and conceptual reevaluation. Changes in the criterion to indicate surgery by means of a CT, the concept of selective nonoperative management (SNOM) [Demetriades 1997] for penetrating wounds through physical examination in series and recently by the use of diagnostic and therapeutic laparoscopy has been a benefit to patients who were routinely submitted to laparotomy.

Although it was considered almost harmless, nontherapeutic laparotomy procedure has been identified as a cause of significant morbidity and mortality rates to patients [Ross 1995, Weigelt 1988]. For blunt trauma laparotomy is avoided by conservative

treatment through serial evaluation with ancillary computed tomography. However, for penetrating trauma the methods habitually used fail to promote an adequate selection. For stab wound penetrating trauma, stable patients with negative peritoneal lavage has the possibility to be submitted to a conservative treatment, even though in most trauma centers after penetration to the abdominal cavity is confirmed, these patients are submitted to surgery. Comparing to stab wounds injuries, in case of suspicious penetration mandatory laparotomy for gunshot wounds injuries is required, such conduct is consolidated by Moore who in 1980 adopted this concept based on a high incidence of gunshot wounds injuries – above 90%. [Moore, 1980]. This policy has led to nontherapeutic exploration in 5-20% of the cases with significant morbidity to patients submitted to negative laparotomy

[Demetriades 1987, Ortega 1996, Moore 1980, Ross, Weigelt].

The use of laparoscopy in trauma is not recent, it was first reported by Gazzaniga and cols. in 1976[Gazzaniga 1976]; nevertheless, it has become widespread with the advent of laparoscopy, and the first series were reported in 1992 [Ivatury 1992, Poole 1996].

Nowadays, there are doubts if laparoscopy is able to safely detect all abdominal injuries without missing any injuries, laparoscopic indications and therapeutic potential for penetrating and blunt trauma.

Modern approach to abdominal trauma requires a serial physical examination and a judicious use of the available diagnostic methods. The objective of the present study is to evaluate the current role of laparoscopy as a diagnostic and therapeutic method for abdominal trauma, as well as its ability to avoid unnecessary laparotomies through a prospective evaluation of 100 patients that have been submitted to this method.

METHOD

From February 2003 to February 2006, 34 medical records of our institution were reviewed to evaluate: how the cases were handled, the indications for laparoscopic procedures in patients with abdominal trauma, the presence of associated injuries, the need for conversion to open surgery, the length of hospital stay and complications. Using hemodynamic stability as a requirement, the patients were divided in three groups according to the trauma: blunt abdominal trauma (BT, 23 patients), stab wound penetrating trauma (SW, 08 patients), and gunshot wound penetrating trauma (GSW, 03 patients). Patients that were included to perform laparoscopy in trauma at the moment of the surgery were upon arrival or after initial resuscitation hemodynamically stable, they presented normal Glasgow scale and limited associated injuries, and surgical team and technical conditions were adequate.

RESULTS

Diagnostic laparoscopy is an important tool to abdominal cavity examination and hemoperitoneum identification. There were 18(41,1%) cases of positive diagnostic laparoscopy and 16(47,0%) cases of

negative diagnostic laparoscopy. Therapeutic exploratory laparotomy was performed in seven (38,8%) of the patients with positive diagnostic laparoscopy because of bowel injuries (n=3), liver laceration with active bleeding (n=2), retroperitoneal hematoma (n=1), and splenic pedicle laceration with significant bleeding(n=1). There were 11 (61,1%) positive diagnostic laparoscopies that were not converted to open surgery. Three patients had their injuries repaired laparoscopically, hepatorrhaphy(n=2) and diaphragmatic repair (n=1). The other 7 patients had isolated nonbleeding injuries. On the first postoperative day a diet was allowed to patients and the mean postoperative hospital stay was 3.3 days. The greatest part of the injuries was caused by blunt abdominal trauma (23), stab wound penetrating trauma (08), and gunshot wound penetrating trauma (03).

DISCUSSION

Technical and conceptual innovations have caused a great impact to abdominal trauma approach in the last years. The use of computerized tomography, laparoscopy and selective nonoperative management (SNOM) for penetrating injuries improved the progress to detect injuries and to avoid unnecessary laparotomy. Nowadays, negative and nontherapeutic laparotomies represent an important source of morbidity to patients, followed by longer periods of hospital stay and mortality [Ross, Fabian, Renz, Weigelt 1988].

The study demonstrated that laparotomy was avoided in 61,1% of the patients, and unnecessary laparotomy was avoided in 11 patients.

Therapeutic laparoscopy was performed in 12 patients, including diaphragmatic repair and hemostasis of solid viscus. In 7 patients (38,8%) conversion was necessary because of inadequate examination, injuries that can not be repaired by laparoscopy, surgeon's lack of experience and clinical instability. All the patients were discharged without morbidity and mortality, and none of the patients were reoperated for complications.

The use of this method was beneficial for penetrating thoracoabdominal injuries. In a study with 73 patients with penetrating injuries in this region, SOLDÁ recognizes laparoscopy as the best method to evaluate diaphragmatic injuries [Soldá 1996]. In a similar study, Ortega recognizes the value of laparoscopy to diagnose diaphragmatic injuries, abdominal cavity penetration and upper abdominal organs

injuries [Ortega 1996]. Despite the theoretical risk to develop tension pneumothorax with CO₂ in case of diaphragmatic injury, this complication was not reported in our casuistic. Simon described in a prospective study with patients submitted to laparoscopy for penetrating trauma [Simon 2002] that one of the greatest advantages of this method was the shorter hospital stay comparing to patients submitted to laparotomy ranging from $2,2 \pm 1,1$ to $4,0 \pm 1,7$ days, respectively. Beside this, unnecessary laparotomy was avoided in 25 patients, out of the 45 patients submitted to laparoscopy.

ZANTUT and col. evaluated the role of diagnostic and therapeutic laparoscopy in a multicenter study of 510 patients. Laparotomy was avoided in 277 patients (54,3%), whom did not presented relevant injuries. Therapeutic procedure was performed in the other 26 patients (5,1%). Therapeutic laparotomy was performed in 155 patients out of the 203 patients submitted to laparotomy and 52 patients (25%) were submitted to unnecessary laparotomy.

In contrast, CHOL and LIM performed therapeutic procedure associated with laparoscopy in 100% of the 78 patients of the series [Chol]. Under a proposal of an essentially therapeutic approach more complex procedures such as enterectomy, pancreatectomy and splenectomy were performed in this group with suspicious abdominal injuries for penetrating and blunt trauma, presenting morbidity in only three patients and no mortality.

Results showed that diagnostic laparoscopy has become an essential factor to reduce nontherapeutic laparotomies and effective in selecting patients to abdominal exploration. Laparoscopy neither presented significant morbidity nor missed an injury as laparotomy was indicated in case of an incomplete evaluation. It is of greatest value to avoid unnecessary laparotomies in penetrating stab wounds and penetrating gunshot wounds, as well as to define abdominal cavity penetration and thoracoabdominal injuries. In blunt trauma and retroperitoneal injuries diagnostic laparoscopy has a limited use; however, there are therapeutic possibilities to selected injuries.

CONCLUSION

Diagnostic laparoscopy currently is an important tool in the evaluation of penetrating and blunt abdominal trauma in stable patients. It is of greatest importance to avoid unnecessary laparotomies in stab

wound and gunshot penetrating injuries specially to define abdominal cavity penetration and thoracoabdominal injuries. It has a limited use for blunt trauma; however, there are therapeutic possibilities to selected injuries.

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