

Diagnostic Laparoscopy for the Evaluation of Abdominal Impalement Injuries

Ory Wiesel MD¹, Vadim Makrin MD PhD², Nir Lubezky MD¹, Joseph Klausner MD FACS¹, Carl I. Schulman MD MSPH³ and Dror Soffer MD²

¹Division of Surgery B and ²Yitzhak Rabin Trauma Center, Division of Surgery B, Tel Aviv Sourasky Medical Center, Tel Aviv and Sackler Faculty of Medicine, Tel Aviv University, Ramat Aviv, Israel

³Division of Burns, Trauma and Critical Care, University of Miami Faculty of Medicine, Miami, Florida, USA

Key words: abdominal impalement, diagnostic laparoscopy

IMAJ 2008;10:314–315

Abdominal impalement injuries are seen routinely in trauma centers all over the world. Although the primary evaluation of these injuries at the scene and the emergency room is well established, the issue of whether these patients should undergo a formal laparotomy or less invasive diagnostic laparoscopy is still a matter of debate. In this report we describe the use of diagnostic laparoscopy in a morbidly obese young male with a knife impaled in his lower abdomen. We discuss the benefits and pitfalls of diagnostic laparoscopy in impalement injuries of the anterior abdomen.

Patient Description

A 35 year old morbidly obese male (body mass index > 40) presented to our emergency room after being stabbed in his abdomen. According to the ambulance report, he was found walking at the scene and talking with bystanders. Upon arrival, he was alert with a Glasgow Coma Scale of 15, blood pressure 134/70 mmHg, pulse 120/min, without any signs of respiratory distress (oxygen saturation 98% on room air).

On physical examination his abdomen was soft, without any signs of peritoneal irritation. An army knife was protruding from his left lower quadrant, approximately 8 cm above the anterior superior iliac spine, in the anterior-axillary line at the level of the umbilicus; the depth of penetration was initially estimated to be only 4–5 cm in this morbidly obese patient [Figure].

Following initial evaluation and stabilization, the patient was taken to the

operating room for diagnostic laparoscopy in order to evaluate the extent of the injury. Under general anesthesia, a Foley catheter and nasogastric tube were placed prior to the laparoscopy. Pneumoperitoneum was created using a Veress needle inserted through a small incision lateral to the umbilicus. A 30 degree laparoscope was inserted through a 10 mm trocar with an additional 5 mm trocar and grasper inserted in the lower midline. We performed an abdominal wall exploration, which revealed an intact peritoneum without penetration of the knife, and the rest of the laparoscopic examination was normal. Following extraction of the knife no air leak was noted from the peritoneum and no hematoma or active bleeding was demonstrated. The patient's postoperative course was uneventful.

Comment

Penetrating abdominal wall injuries are a frequent occurrence in trauma. The benefit of using minimally invasive techniques for diagnosing and treating



The patient prior to the operation, with the knife puncturing his lower abdomen.

penetrating abdominal injuries is still a subject of debate. In the 30 years since the first pioneers of laparoscopy used a rigid laparoscope to explore the abdomen in trauma patients, several studies on whether to use laparoscopy in trauma have been published.

In the era of cost reduction and efficient utilization of hospital resources, laparoscopy has been shown to decrease

length of stay, operating room time, and post-operative complications in certain types of operations (cholecystectomy, appendectomy).

Marks et al. [1] showed that diagnostic laparoscopy in penetrating abdominal or flank injuries resulted in total reduction in cost of more than 1000 U.S. dollars compared to laparotomy. Villaricencio and Aucar [2] reviewed 37 studies with more than 1900 trauma patients undergoing laparoscopy for trauma. When used as a screening tool (tool to identify an indication for laparotomy), laparoscopy missed 1% of injuries and prevented 63% of trauma laparotomy, with sensitivity of nearly 100%. When used as a diagnostic tool (i.e., laparoscopy followed by confirmatory laparotomy), laparoscopy had a 41–77% missed injury rate per patient. Overall, laparoscopy carried a 1% procedure-related complication rate. The authors concluded that screening laparoscopy is useful in patients suspected of having intraabdominal injuries or those undergoing non-abdominal operations. In terms of it being a diagnostic tool, their review supported other authors contending that laparoscopy cannot detect all abdominal pathology following trauma; hence it cannot be used as the sole diagnostic or therapeutic tool in penetrating abdominal trauma.

Several other reports have shown promising results of therapeutic laparoscopy in abdominal trauma in which selected injuries in the stomach, liver, gallbladder and diaphragm were treated by laparoscopy without the need for conversion to laparotomy.

Leppäniemi and Haapiainen [3] conducted a prospective randomized study to identify the optimal strategy for management of abdominal stab wounds,

and to incorporate it into the diagnostic workup for this group of patients. In their randomized trial, one arm included stable patients without peritonitis but with peritoneal penetration who were randomized to exploratory laparotomy or diagnostic laparoscopy. In another arm, they randomized patients about whom there was a doubt whether peritoneal penetration existed, into diagnostic laparoscopy or expectant non-operative management. Diagnostic laparoscopy significantly decreased the rate of non-therapeutic laparotomy from 65% in the exploratory laparotomy group to 11% in the diagnostic laparoscopy group. Overall, the laparoscopy-based strategy prevented 55% of trauma laparotomies. Similar results were reported in other studies that compared diagnostic laparoscopy to exploratory laparotomy.

Simon et al. [4] followed the use of diagnostic laparoscopy over 5 years and its impact on non-therapeutic laparotomies, complications and length of hospital stay. Among 429 patients reviewed, the rate of laparoscopy for penetrating abdominal trauma increased during the period reviewed from 8.7% to 16% and for stab wounds from 19.4% to 27%. As the rate of laparoscopy rose, the rate of non-therapeutic laparotomies dropped significantly (29 negative laparotomies were averted out of 44 laparoscopies performed during the 5 years of the study). Another major benefit was decrease in the length of hospital stay by 50% for patients undergoing negative laparoscopy compared to negative laparotomy.

According to Ahmed and co-authors [5], when used judiciously, laparoscopy can identify peritoneal or diaphragmatic defects, omental and mesenteric injuries, bleeding vessels, foreign objects, and

major abdominal injuries. It decreased the need for exploratory laparotomy for 77% of patients, and hospitalization was reduced by 55% [5].

To our knowledge this is the first case report describing the use of laparoscopy in the setting of an impalement injury in a morbidly obese patient, with favorable results. We conclude that diagnostic laparoscopy should be considered for the evaluation of abdominal impalement injuries in hemodynamically stable patients in whom no other indication for exploratory laparotomy exists.

Acknowledgments: The authors would like to thank Ms. Tali Wiesel for her contribution in the preparation of the graphic work.

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Correspondence: Dr. O. Wiesel, Division of Surgery B, Tel Aviv Sourasky Medical Center, 6 Weizmann Street, Tel Aviv, 64239. Israel.

Phone: (972-3) 697-4711; Fax: (972-3) 697-4819
email: seker13@gmail.com