Online Case Report

Aortic injury using the Hasson trocar: a case report and review of the literature

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Case reports of major vascular injury during open primary access during laparoscopy are very limited. An injury to the aorta with the Hasson trocar is documented here, followed by a review of the literature on major vascular injury during primary access.

Keywords: Aortic injury – Hasson trocar

A 34-year-old woman, with a body mass index of 19 kg/m², was admitted acutely with a clinical picture of acute appendicitis. She had no previous history of abdominal surgery and she consented for a laparoscopic appendicectomy.

Following the administration of general anaesthesia, a curvilinear supra-umbilical skin incision was made. Blunt dissection of the linea alba was performed down to the parietal peritoneum, which was elevated and opened with scissors under direct vision. Entry into the peritoneal cavity was confirmed with the index finger. The skin of the anterior abdominal wall was retracted vertically with the left hand and the blunt Hasson trocar was inserted into the peritoneal cavity with the right hand. The movement of the trocar was down and then lateral, in a sweeping 'U'-shaped motion.

Following insufflation, a 0° laparoscope was inserted; upon general laparoscopic examination of the peritoneal cavity, it was apparent that a retroperitoneal haematoma was forming. The patient remained haemodynamically stable and a midline laparotomy was performed. Exposure of the anterior abdominal aorta demonstrated some bruising of the anterior aortic wall but no laceration or puncture of the aorta. It appeared that the peritoneum had 'sheared' away from the aorta and there was bleeding from some minute vessels on the anterior wall of the

aorta. The bleeding was easily controlled with a simple monofilament vascular suture.

Appendicectomy was then performed for acute appendicitis. The patient did not require a blood transfusion and was discharged on the 6th postoperative day.

Discussion

It is highly likely that the injury to the anterior aortic wall in this case occurred during placement of the Hasson trocar. The 'U'-shaped sweeping motion that was employed to place the trocar either caused it to 'bounce' off the aorta, or shear the overlying peritoneum away from the anterior aortic wall. As a result of the lack of intra-abdominal fat in this patient, the distance between her anterior abdominal wall and aorta was negligible, thereby increasing the risk of the rounded end of the Hasson trocar making direct contact with the aorta.

Too much force was probably employed in placing the trocar. This was no doubt due to the incision in the rectus sheath being too small, thereby making the point of access too tight for passing the trocar. Had this incision been extended, then the trocar would have dropped in, rather than been forced in. A potential air leak around the trocar is easier to deal with than an injury to the aorta!

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Although an aortic injury was not suspected until a full laparoscopic examination of the abdominal cavity was performed, immediate recognition of the insult and conversion to laparotomy certainly prevented a more serious outcome.

Literature review

Injuries to intraperitoneal and retroperitoneal structures during laparoscopy have been documented using all types of primary access techniques. However, the frequency of these injuries is very difficult to determine. This is due to data on the total number of laparoscopic procedures performed being elusive, the heterogeneous nature of primary access techniques used by laparoscopists, the well documented complexities in conducting controlled clinical trials and an undoubted under-reporting of adverse events.¹

Methods of primary trocar insertion are split between 'open' and 'closed' techniques. The closed techniques for establishing the pneumoperitoneum employ either a Veres needle or direct access with the primary trocar. The Emergency Care Research Institute estimates that 40% of surgeons use the Veres needle to establish a pneumoperitoneum, 30% employ direct trocar insertion and 30% use the open cut down Hasson method.²

The spring-loaded Veres needle was developed by János Veres in Hungary in 1936. Initially, he devised it for the safe establishment of a pneumothorax in the treatment of patients with tuberculosis;³ in 1952, he described using it in order to establish a pneumoperitoneum to cure a patient of chronic hiccoughs.⁴ Once the pneumoperitoneum is established, the primary trocar is inserted.

Direct trocar insertion may be performed using either the pyramidal or conical trocars. More recently, the use of optical trocars for direct access has been debated as a safe method of establishing a pneumoperitoneum.⁵ Open-access laparoscopy was first described by Hasson in 1971 using direct dissection into the abdominal cavity prior to insertion of the blunt Hasson trocar.⁶ Figure 1 illustrates a few of the different types of primary trocars that are available.

In order to evaluate the prevalence of major vascular injuries (*i.e.* to the aorta, inferior vena cava, iliac or named visceral vessels) from trocar insertion, one has to rely upon retrospective reviews of the published literature. Records from the Physicians Insurers Association of America (which covers more than 60% of private practice physicians in the US) documented 64 major vascular injuries from 1980–1999.⁷ However, these were only cases which proceeded to litigation and there is no record of the denominator. The US Food and Drug Administration Center (FDA) estimate of the incidence of trocar-related major vascular injury (from either primary or secondary trocars) is about 0.1%.¹ A meta-analysis, in 2003, reported

Figure 1 Some of the primary trocars that are currently available.

major vascular injury at a frequency of 0.003–1.33% with the Veres technique and 0–0.03% with the open technique.⁸ A single-centre, retrospective review of 2297 blind-access and 2066 open-access related complications from Sweden did not demonstrate any major vascular complications in either group.⁹ Two cases of aortic injury with the Hasson trocar have been reported previously.¹⁰ One of the injuries was caused by the scalpel at the time of the skin incision and the other was due to a sharp metal spur on the edge of the Hasson trocar.

Conclusions

In the absence of a prospective clinical trial, the evidence for open and closed access is based upon a retrospective review of the literature. Lack of reporting of injuries contributes to the thin evidence base and surgeons should be encouraged to publish any adverse events, thereby adding to this evidence base. Meanwhile, laparoscopists need to be familiar with the techniques and devices available, as well as the evolving evidence, so that informed decisions can be made with respect to primary trocar access at laparoscopy.

It is assumed that access by the Hasson technique abolishes the risk of major vessel injury, but this article belies that.

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