Major vascular injuries in laparoscopic surgery

Still of interest?

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Abstract

Background: Major vascular injuries (MVI) still occur in laparoscopic surgery.

Methods: We report our institution’s experience of two MVI (aortic lesions) in a series of 3545 laparoscopies (July 1991–December 2000). We compared this experience with other series reporting MVI from Medline, Embase, Current Contents, and Best Evidence.

Results: There were no deaths, but we had 23 postoperative and eight intraoperative bleedings, including two hepatic vessel lesions during dissection and six vascular lesions (four minor vessels and two aortic) related to trocar insertion. Prevention and treatment options are also discussed.

Conclusions: The incidence of MVI reported in the literature is 0.05%, but the true incidence is difficult to estimate because results are not always comparable and there is a possibility of underreporting. The mortality rates (8–17%) are high. No technique or instrumentation is completely safe; therefore, a high level of alertness must be maintained at all times and precautions must be adopted to avoid major complications.

Key words: Major vascular injuries — Laparoscopy — complications — Iatrogenic lesions — Hemorrhagic events

During the experimental phase and the early years following the introduction of laparoscopic approach into practice, many randomized trials were carried out to compare the validity of minimally invasive and conventional procedures, especially for those that have achieved the greatest acceptance such as video cholecystectomy [9, 12, 15, 18, 38]. The validity of the laparoscopic approach for procedures such as cholecystectomy, adrenalectomy, splenectomy and antigastroesophageal reflux is no longer debated, to the extent that these techniques now represent the so-called laparoscopic gold standard. Despite its popularity, a number of complications specifically related to the laparoscopic approach deserve to be considered with the utmost attention. These complications, such as vascular or visceral injuries that occur while inserting the Veress needle or trocars, are completely unknown in conventional procedures. Injury to the great vessels (aorta, vena cava, iliac arteries, and veins), commonly referred to as major vascular injuries (MVI), are the most severe complications that can occur. Even if the reported incidence is very low (0.05%) [5], the mortality arising from these lesions reportedly ranges between 8% [9] and 17% [5].

Many authors [1, 17, 27, 31, 32, 40] have expressed a degree of perplexity about the reliability of these figures and consider the incidence of MVI—surely the most dramatic event a surgical team can experience—to be underestimated. Therefore, following our personal experience of two aortic lesions [35], we reviewed the literature to study various aspects of these complications. Particular attention was paid to the manner of their occurrence, their prevention, and possible countermeasures that can be adopted.

Materials and methods

From July 1991 to December 2000 in our Department of General Surgery, 3545 laparoscopic operations were performed without operative or postoperative deaths. Among the 65 complications (1.8%) that occurred, the most significant were the hemorrhagic events.
We recorded 31 bleeds, 23 postoperative and eight intraoperative. Of the 23 early postoperative bleeds, four patients healed with conservative treatment and three required ultrasound-guided percutaneous drainage of the collection. The remaining 16 patients underwent redo operation; in 11 cases, the problem was resolved laparoscopically, but the other five patients required laparotomy. In nine cases, the bleeding source could not be identified, but clot removal and thorough rinsing of the cavity eliminated the bleed. Among the remaining patients, the bleeding source was found at the site of port insertion in four cases, whereas in three others, the bleeding originated from small vessels at the hepatic hilum.

Of the eight intraoperative bleeds, two occurred during isolation of the hepatic hilum, and laparotomy was necessary to identify the source of the bleeding. The remaining six bleeds occurred during the introduction of the Veress needle or the trocars. In four patients, the lesion involved omental or mesenteric vessels and was controlled through the same laparoscopic approach in three cases. In the fourth case, an accidental lesion of the middle colic artery produced a conspicuous hematoma; conversion to the open approach was required to control the bleeding with two transfixed stitches.

Finally, we recorded an aortic lesion in two patients during insertion of the trocars. In one case, a sudden fall of arterial pressure and increased heart rate when the operation was almost over prompted exploration of the cavity, which revealed a large mesentery hematoma. An emergency laparotomy was therefore performed. A linear lesion of the infrarenal aorta was discovered and sutured. In the second case, during the final routine exploration of the cavity, when we always look for possible bleeding from the trocar insertion sites, a conspicuous retroperitoneal hematoma with no leakage into the cavity and no alteration of the vital parameters was discovered. Emergency open laparotomy was performed. A punctiform lesion of the aortic carrefour was detected and repaired.

Since 1996, we have used an open technique to gain access to the peritoneal cavity. In this technique, the muscular fascia is incised at the umbilicus; alternatively, the trocar is inserted with an optical introducer, the trocar Optiview (Ethicon—Endo-surgery, Inc., Cincinnati, OH, USA). We have had no further major vascular injuries since that time.

References were searched in the major data banks available on the Internet (Best Evidence, Current Contents, Embase, and Medline). The available literature reports 1600 articles on general complications during laparoscopy, but only 46 of them describe MVI.

**Discussion**

Hemorrhagic complications can occur in laparoscopic surgery during the early maneuvers required to enter the peritoneal cavity, or during the surgical dissection required for the specific procedure. Bleeding from the Veress needle or trocar insertion sites is peculiar to laparoscopic surgery, while bleeding from dissection maneuvers can also occur during conventional surgery. MVI involving the aorta, the vena cava, and the iliac arteries during diagnostic laparoscopy were reported throughout the 1970s and 1980s. Since the advent of laparoscopic surgery, this type of injury is even more relevant and still represents the most fearsome complication [3]. Though rare, the occurrence of MVI is lethal in a high proportion of cases. As early as 1992, an analysis of >77,000 laparoscopic cholecystectomies identified 36 cases of retroperitoneal great vessel lesions (0.05% of all complications) and carried an 8.8% mortality [9]. A later review of different multicentric studies involving 103,852 laparoscopic procedures confirmed the same incidence of MVI (0.05%), but with a higher mortality rate (17%) [5]. In succeeding years, MVI were regularly reported with similar figures (Table 1) [13, 19, 43, 44, 45].

This incidence might seem almost insignificant in view of the considerable number of laparoscopic procedures carried out worldwide. However, a careful analysis of the literature shows that at least five authors believe that the incidence of MVI is seriously underestimated [1, 17, 27, 31, 40]. Besides surgeons who carry out scientific activity or take part in multicentric studies, there are those who do not publicize their experience or do so in local or national papers that are not cited in Index Medicus and are therefore destined to remain unknown. Furthermore, no country actually requires cumulative national records of specific diseases to be kept, and even when such records are kept, only selected centers are allowed to participate [6]. More precise data, again limited to the lethal cases, could be obtained from national statistics centers; however, this option, which is difficult enough to achieve nationwide, is almost unachievable on a worldwide scale.

Another problem derives from the inaccuracy of collected data. Although a historic work [9] reported 36