Surgical anatomy of the interior inguinal region

Consequences for laparoscopic hernia repair

H. van Mameren, P. M. N. Y. H. Go

Department of Anatomy and Embryology, University of Limburg, P.O. Box 616, 6200 MD, Maastricht, The Netherlands

Department of Surgery, University of Limburg, P.O. Box 616, 6200 MD, Maastricht, The Netherlands

Received: 5 November 1993/Accepted: 28 February 1994

Abstract. Exploration and placement of staplers in the internal inguinal region during laparoscopic hernia repair may sever blood vessels or nerves. Lesions of specific structures may be associated with such complications as hematomas and impaired sensibility in defined areas. Therefore, the course and topography of blood vessels and nerves in the preperitoneal tissue in this region were studied. Six human preserved male cadavers were dissected. Unsafe areas for stapling were described. An adjustment of the technique of laparoscopic hernia repair to circumvent these complications is proposed.

Key words: Laparoscopy — Hernia repair — Anatomy — Inguinal region

Within the field of laparoscopic interventions hernia repair seems to be an upcoming procedure. This advanced skill differs from classical repair. It is performed from the interior side instead of from the exterior. During laparoscopic transabdominal hernia repair the parietal peritoneum is incised and released in the surrounding of the internal inguinal ring. A prosthetic mesh is used to reinforce the inner side of the abdominal wall. This mesh covers inguinal or femoral hernias. Usually, the mesh is fixed with staplers on the preperitoneal tissue [1, 2, 8-10]. Thereafter the peritoneum is closed and sutured over the mesh.

Incision and release of the peritoneum as well as stapler placement may lead to complications such as hematomas, pain, and numbness. In a multicenter study Fitzgibbons et al. [3] reported 7.5% local hematomas and 3.9% pain or numbness in the ventrolateral region of the upper leg and 12.9% groin pain after laparoscopic hernia repair. Long-term complications (4.2%) are related to nerve injury, usually resulting in groin pain. As reported by MacFadyen [6, 7], vascular lesions result in scrotal, inguinal canal, anterior abdominal wall, and preperitoneal hematomas. Impaired sensibility and pain are suggested to be related to cutaneous nerve injury [7].

The occurrence of these complications may be reduced by a better understanding of the topographic anatomy of this region [4].

Standard textbooks on anatomy as well as surgical textbooks specializing in laparoscopic operative techniques [8, 9] give incomplete information about the position of vessels and cutaneous nerves in the inguinal region deep to the abdominal wall muscles and their aponeuroses. At that site, indeed they lie outside

Fig. 1. A preserved cadaver in which the inguinal region is dissected from the intra-abdominal side to identify important blood vessels and nerves. The distal half of the upper legs and the lower legs are removed. Metal frame (star) fixing the free margin of the abdominal wall at the umbilical side.
Fig. 2. A right inguinal region from an intra-abdominal point of view. The peritoneum is incised transversely and released. The outlines of blood vessels and nerves are partly visible in the preperitoneal adipose tissue.

Fig. 3. A right inguinal region from an intra-abdominal point of view. Blood vessels and nerves, whose outlines can be distinguished in Fig. 2a, are exposed by blunt dissection.

the classical herniotomy operating field but are situated in the region of the laparoscopic hernia repair. It is obvious that detailed insight into the actual anatomical relations between structures in the internal inguinal region is necessary to prevent, or at least to clarify, possible surgical pitfalls at the preperitoneal side. Therefore, we performed dissections on human cadavers to demonstrate the topography of vessels and nerves, which can easily be injured by release of the peritoneum or blind stapling.

Materials and methods

The inguinal region of six human male cadavers is dissected from the intra-abdominal side to identify important blood vessels and nerves. To achieve a view comparable to that through a laparoscope, preserved cadavers are used in which the entire abdominal wall caudal to the umbilicus has been left intact. First the cadaver is deep frozen. Next, it is sawn with a bandsaw transversely at the level of the umbilicus. After that it is thawed. The free margin of the abdominal wall at the umbilical side is fixed in a metal frame to obtain optimal sight into the abdomen. The remaining parts of the intestines together with their mesenteria up to the peritoneal reflexion of Douglas are removed (Fig. 1).

A transverse incision is made in the parietal peritoneum cranial to the iliopubic tract from the medial umbilical ligament up to the inner side of the anterior superior iliac spine. The peritoneum is released from the preperitoneal adipose tissue by blunt dissection. This is done in cranial and in caudal direction, medial as well as lateral to the deep inguinal ring (Fig. 2). Consequently, blood vessels, nerves, and ductus deferens are exposed by blunt dissection in the preperitoneal adipose tissue overlying the medial part of the superior pubic arch, the external iliac vessels, and the iliopsoas muscle up to their passage below the iliopubic tract. This is also done for the epigastric vessels (Figs. 3, 4).

Results

In the medial part of the operating field of transabdominal laparoscopic hernia repair, superficial to the external iliac vessels, the testicular vessels entering the deep inguinal ring can be distinguished. Near this ring, the genital branch of the genitofemoral nerve and the ductus deferens join into the spermatic cord (Fig. 2). Both the testicular vessels and the ductus deferens are important landmarks. Usually, these structures are already visible through the intact peritoneum. This also holds true for the peritoneal folds over the obliterated umbilical artery (medial umbilical fold) and over the epigastric vessels (lateral umbilical fold). In all dissected specimens we found deep in the adipose tissue a branch of the epigastric artery directly superficial to the inner side of the superior pubic arch and iliopubic tract. It runs to the obturator foramen. It is classically called the pubic or obturator branch (Fig. 3, 4).

In the lateral region of the operating field, bordered by the iliopubic tract and external iliac artery and su-