Introduction

The overwhelming majority of all hernias in humans occur in the area of the inguinal canal and the femoral canal. Approximately 750,000 inguinal hernias are repaired annually in the United States. In the past, most were repaired by an anterior approach. Consequently, most surgeons are familiar with the inguinal anatomy from the anterior perspective. As laparoscopic techniques were applied to inguinal hernia repair, it became important to understand the inguinal anatomy from a new and largely unfamiliar preperitoneal perspective. The recent literature on laparoscopy describes the musculoaponeurotic, vascular, and nervous structures of the inguinal area from a transabdominal or preperitoneal vantage point. However, there remains significant confusion regarding the transversalis fascia and the multilayered preperitoneal fascia. The etiology of inguinal hernia involves the transversalis fascia, the peritoneum, and the preperitoneal fascia. The latter two structures are especially important in the case of congenital indirect hernias that develop as a consequence of a patent processus vaginalis. There is also a general misunderstanding regarding the presence of the posterior rectus sheath below the level of the arcuate line.

The purpose of this chapter is to describe the peritoneum and its landmarks, the preperitoneal fascial layers, and the importance of the posterior rectus space and posterior rectus sheath. The fact that the posterior rectus space is distinct from the true preperitoneal space is a key anatomic concept. The focus of this chapter will be to maintain clinical relevance for the practicing surgeon by using photographs taken at the time of laparoscopic surgery to illustrate important aspects of the inguinal anatomy.

Surface Characteristics of the Peritoneum in the Inguinal Region

The peritoneal surface of the anterior abdominal wall in the lower abdomen has several prominent landmarks. These include the median umbilical ligament which is the obliterated embryonic urachus connecting the fundus of the bladder to the umbilicus, the paired medial umbilical ligaments which are the obliterated umbilical arteries, and the paired lateral umbilical ligaments which represent the prominence created by the inferior epigastric vessels and accompanying fat (Fig. 8.1). Just lateral to the epigastric vessels is the true internal ring which is identified by the convergence of the vas deferens and the spermatic vessels as they penetrate the transversalis fascia. The transverse vesicular fold can be seen superomedially to the internal ring and is a thickened band of peritoneum and subperitoneal fibrosis that extends from the posterior aspect of the bladder to the lateral abdominal wall (Fig. 8.2).

Between the median and medial umbilical ligaments lies the supravesical fossa in which the infrequent supravesical hernia may occur. A direct hernia is located between the medial umbilical fold and the lateral umbilical fold or epigastric vessels. The indirect hernia is located lateral to the inferior epigastric vessels at the site of the internal ring. A patent processus vaginalis is often seen as a dimpling of the peritoneum just anterior to the site of convergence of the vas deferens and the spermatic vessels. Occasionally, an indirect hernia will be identified lateral to the epigastric vessels, but medial to the internal ring. We have named this defect an acquired indirect hernia. The etiology of an acquired indirect hernia is from a weakness in the lateral aspect of the transversalis fascia (Fig. 8.3). This is in contradistinction to a congenital indirect hernia that develops because of a patent processus vaginalis.

The magnified laparoscopic view of the anterior abdominal wall offers an excellent view of the peritoneal lining, its rich blood supply, and the shallow fossae created by the embryonic ligaments mentioned above. The vasculature of the peritoneum and the vas deferens is derived from the internal iliac artery, whereas the blood...
supply to the anterior abdominal wall originates from the inferior epigastric vessels (Fig. 8.4). This fact is important to consider when developing the preperitoneal space during a laparoscopic extraperitoneal hernia repair, as this is a relatively avascular plane between the posterior rectus sheath and the umbilical prevesical fascia (Fig. 8.5).

At the inferior aspect of the umbilicus, the umbilical ligaments converge and penetrate the transversalis fascia. In an identical manner, the falciform ligament exits the transversalis fascia at the superior aspect of the umbilicus. There is a condensation of transverse fibers that reinforce the umbilicus. These fibers have been called the umbilical fascia. If these fibers are absent or attenuated, then an umbilical hernia can develop.

In the lower quarter of the abdominal wall there is a point of transition as the aponeuroses of the three flat muscles pass primarily anterior to the rectus muscle. However, this point of transition is not complete. There is a continuation of the posterior rectus sheath into the pelvis to the level of the pubis and Cooper’s ligament. The point at which some of the aponeurotic fibers alter their course anteriorly is the arcuate line or the linea semicircularis. This line is clearly visible with the laparoscopic perspective. It is well demarcated if the change is abrupt, while it is less defined if there is a gradual change (Fig. 8.6A and B). Externally, the linea semicircularis corresponds to a line roughly 2 cm inferior to the transverse plane created by the umbilicus.

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**Figure 8.1.** Laparoscopic view of the right groin in an elderly female. The small peritoneal indentation lateral to the inferior epigastric vessels is the site of the internal ring where the round ligament enters the inguinal canal: MUL = medial umbilical ligament; OU = obliterated urachus or median umbilical ligament; IE = inferior epigastric vessels or lateral umbilical ligament; TVF = transverse vesicular fold; BL = bladder; CL = Cooper’s ligament; IR = internal ring; RL = round ligament. (Reprinted from Annibali R., et al. Anatomical Considerations for Laparoscopic Inguinal Herniorrhaphy, in: *Principles of Laparoscopic Surgery.* New York: Springer-Verlag; 1995, with permission.)

**Figure 8.2.** Laparoscopic view of the right groin in a male. There is a small patent processus vaginalis (arrow) that marks the site of the true internal ring: MUL = medial umbilical ligament; IE = inferior epigastric vessels or lateral umbilical ligament; TVF = transverse vesicular fold; VD = vas deferens; SV = spermatic vessels. (Reprinted from Annibali R., et al. Anatomical Considerations for Laparoscopic Inguinal Herniorrhaphy, in: *Principles of Laparoscopic Surgery.* New York: Springer-Verlag; 1995, with permission.)

**Figure 8.3.** An acquired indirect hernia. The etiology of this hernia is from a weakness in the lateral transversalis fascia rather than from a congenitally patent processus vaginalis. MUL = medial umbilical ligament; IE = inferior epigastric vessels; IR = internal ring.

**Figure 8.4.** The rich vasculature of the peritoneum. These are branches of the vesical arteries originating from the internal iliac artery. A Foley catheter is in the bladder. (Reprinted from Annibali R., et al. Anatomical Considerations for Laparoscopic Inguinal Herniorrhaphy, in: *Principles of Laparoscopic Surgery.* New York: Springer-Verlag; 1995, with permission.)