Fascial Lining of the Abdominal Walls

As mentioned previously, the abdominal walls are lined by one continuous layer of connective tissue that lies between the parietal peritoneum and the muscles (Fig. 4.35). It is continuous below with a similar fascial layer lining the pelvic walls. It is customary to name the fascia according to the structure it overlies. For example, the **diaphragmatic fascia** covers the undersurface of the diaphragm, the **transversalis fascia** lines the transversus abdominis, the **psoas fascia** covers the psoas muscle, the **quadratus lumborum fascia** covers the quadratus lumborum, and the **iliaca fascia** covers the iliacus muscle.

The abdominal blood and lymph vessels lie within this fascial lining, whereas the principal nerves lie outside the fascia. This fact is important in the understanding of the femoral sheath (see Fig. 4.35). This is simply a downward prolongation of the fascial lining around the femoral vessels and lymphatics, for about 1.5 in. (4 cm) into the thigh, behind the inguinal ligament. Because the femoral nerve lies outside the fascial envelope, it has no sheath (see page 463).

In certain areas of the abdominal wall, the fascial lining performs particularly important functions. Inferior to the level of the anterior superior iliac spines, the posterior wall of the rectus sheath is devoid of muscular aponeuroses (see Figs. 4.10 and 4.13) and is formed by the fascia transversalis and peritoneum only (see page 122).

At the midpoint between the anterior superior iliac spine and the symphysis pubis, the spermatic cord pierces the fascia transversalis to form the deep inguinal ring (see Fig. 4.8). From the margins of the ring, the fascia is continued over the cord as a tubular sheath, the internal spermatic fascia (see Fig. 4.4).

Peritoneal Lining of the Abdominal Walls

The walls of the abdomen are lined with parietal peritoneum. This is a thin serous membrane consisting of a layer of mesothelium resting on connective tissue. It is continuous below with the parietal peritoneum lining the pelvis (see Fig. 4.35). For further details, see pages 278 and 296.

Nerve Supply

The central part of the diaphragmatic peritoneum is supplied by the phrenic nerves, and the peripheral part is supplied by the lower intercostal nerves. The peritoneum lining the anterior and posterior abdominal walls is supplied segmentally by intercostal and lumbar nerves, which also supply the overlying muscles and skin.

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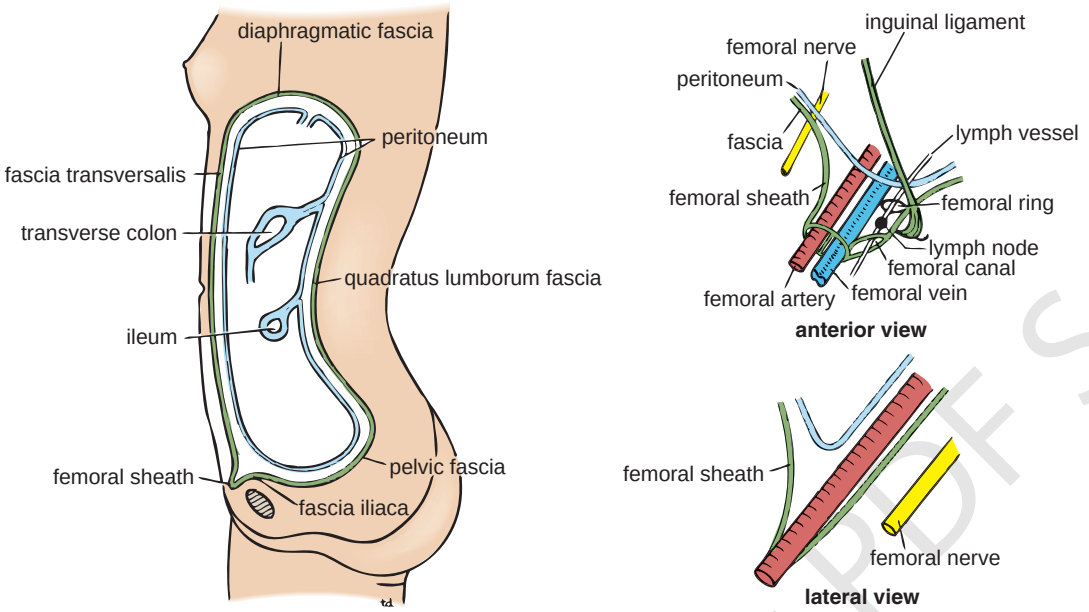

FIGURE 4.35 Sagittal section of the abdomen showing arrangement of the fascial and peritoneal linings of walls. The femoral sheath with its contained vessels is also shown. Note that the femoral nerve is devoid of a fascial sheath.

EMBRYOLOGIC NOTES

Development of the Abdominal Wall

Following segmentation of the mesoderm, the lateral mesoderm (see page 33) splits into a somatic and a splanchnic layer associated with ectoderm and entoderm, respectively (Fig. 4.36). The muscles of the anterior abdominal wall are derived from the somatopleuric mesoderm and retain their segmental innervation from the anterior rami of the spinal nerves. Unlike the thorax, the segmental arrangement becomes lost due to the absence of ribs, and the mesenchyme fuses to form large sheets of muscle. The rectus abdominis retains indications of its segmental origin, as seen by the presence of the tendinous intersections. The somatopleuric mesoderm becomes split tangentially into three layers, which form the external oblique, internal oblique, and transversus abdominis muscles. The anterior body wall finally closes in the midline at 3 months, when the right and left sides meet in the midline and fuse. The line of fusion of the mesenchyme forms the linea alba, and on either side of this, the rectus muscles come to lie within their rectus sheaths.

Development of the Umbilical Cord and the Umbilicus

As the tail fold of the embryo develops, the embryonic attachment of the body stalk to the caudal end of the embryonic disc comes to lie on the anterior surface of the embryo, close to the remains of the yolk sac (Fig. 4.37). The amnion and chorion now fuse, so that the amnion encloses the body stalk and the yolk sac with their blood vessels to form the tubular umbilical cord. The mesenchymal core of the cord forms the loose connective tissue called **Wharton's jelly.** Embedded in this are the remains of the yolk sac, the vitelline duct, the remains of the allantois, and the umbilical blood vessels.

The umbilical vessels consist of two arteries that carry deoxygenated blood from the fetus to the chorion (later the placenta). The two umbilical veins convey oxygenated blood from the placenta to the fetus. The right vein soon disappears (see Fig. 4.37).

The umbilical cord is a twisted tortuous structure that measures about 0.75 in. (2 cm) in diameter. It increases in length until, at the end of pregnancy, it is about 20 in. (50 cm) long—that is, about the same length as the child.

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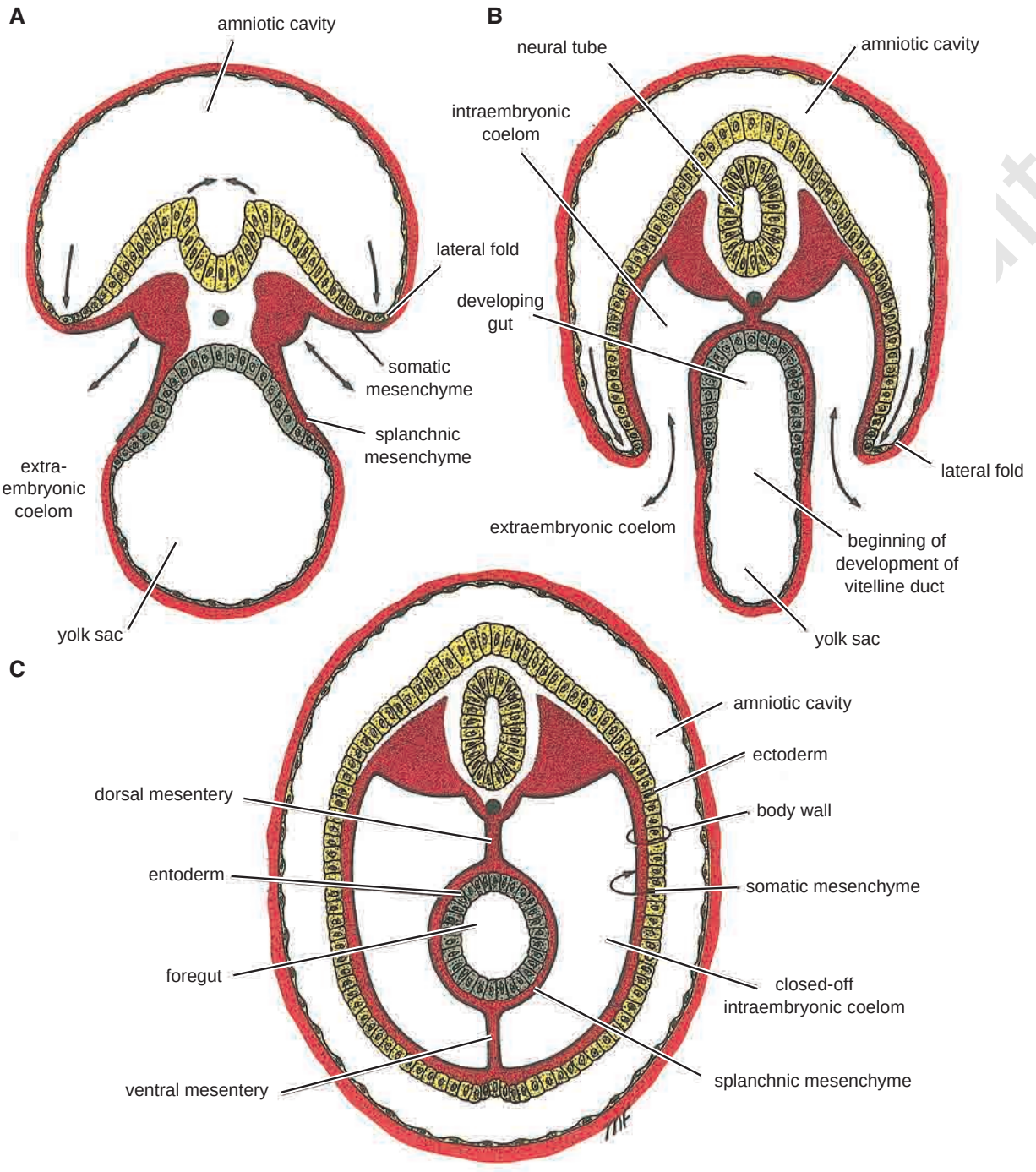

FIGURE 4.36 Transverse sections through the embryo at different stages of development showing the formation of the abdominal wall and peritoneal cavity. **A.** The intraembryonic coelom in free communication with the extraembryonic coelom (*double-headed arrows*). **B.** The development of the lateral folds of the embryo and the beginning of the closing off of the intraembryonic coelom. **C.** The lateral folds of the embryo finally fused in the midline and closing off the intraembryonic coelom or future peritoneal cavity. Most of the ventral mesentery will break down and disappear.

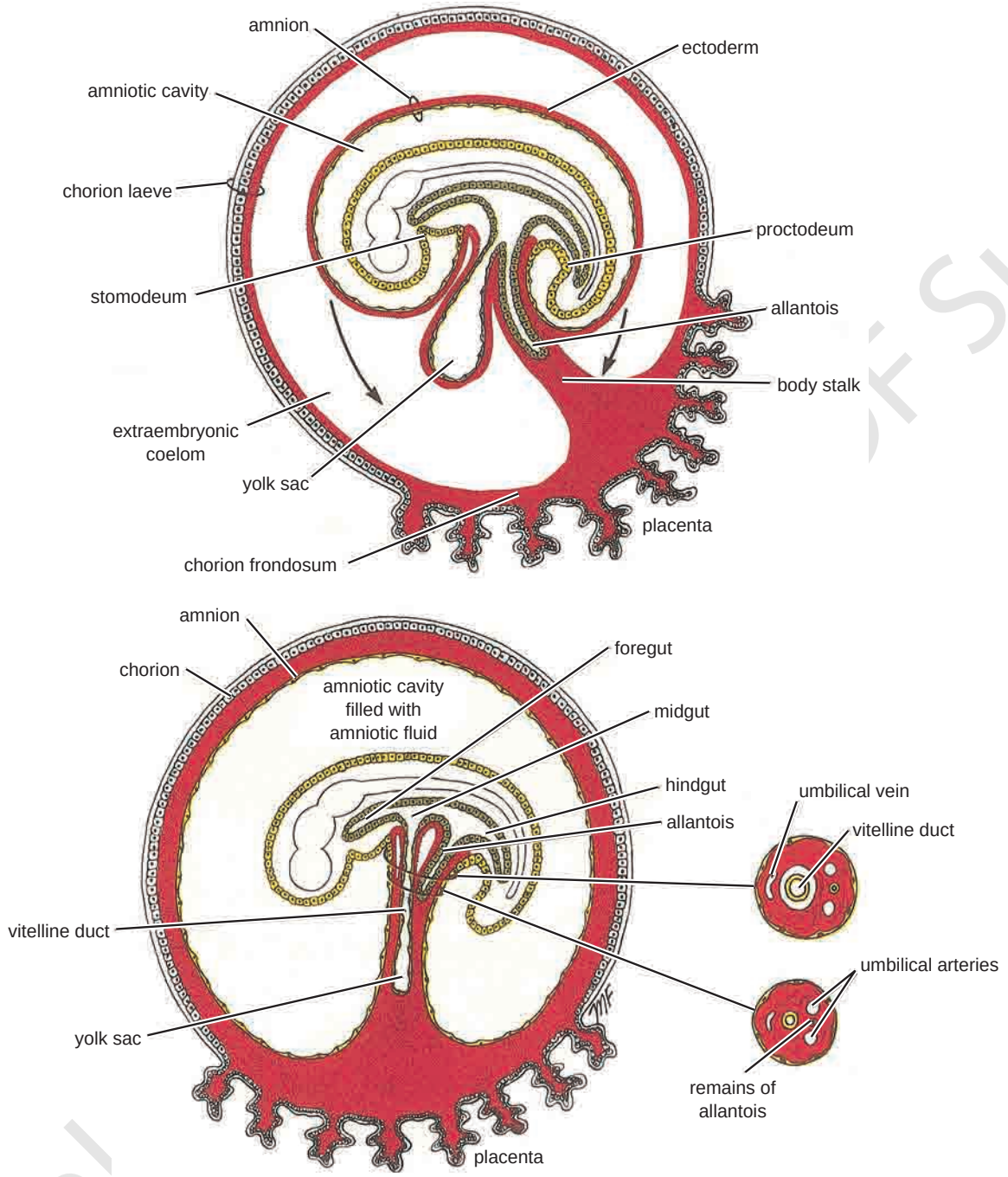

FIGURE 4.37 The formation of the umbilical cord. Note the expansion of the amniotic cavity (*arrows*) so that the cord becomes covered with amnion. Note also that the umbilical vessels have been reduced to one vein and two arteries.