Introduction

The male reproductive system (Fig. 18.1) consists of paired primary sex organs, the testes, and a series of secondary sex organs. The secondary organs are the (paired) rete testis, the ductuli efferentes, vas deferens, seminal vesicle and bulbourethral gland, the (single) prostate gland, and penis. The secondary organs are so called because they are dependent on a hormone (testosterone) from the testes for development and maintenance of their structure and function. In addition, there are secondary sex characters, such as hair and fat distribution, form of the laryngeal cartilages and of the pelvis, and sexual behavior patterns, which are also dependent on testosterone.

The various components of the male reproductive system develop from diverse embryonic tissues in widely separate areas, and, by differential growth and migration, make structural and functional contact with each other. This developmental complexity predisposes to a variety of congenital malformations. The differentiation of the system during intrauterine life is dependent on interaction between the component tissues and on the maternal and fetal hormones. This differentiation is completed only after puberty with the development of hypothalamohypophyseal function. Maturation of the male reproductive system must be coordinated with that of the nervous system. The nervous system is an important target of fetal androgens in order that behavior, years later, will be appropriate for function of the system.
Testis

The testis is a paired, firmly encapsulated, compound tubular gland whose parenchyma is incompletely subdivided by tenuous connective tissue septa into about 250 lobules. It is both an endocrine gland, producing testosterone and possibly other steroids, and an exocrine gland, producing sperm cells (spermatozoa).

Gross Relations

Although the testis originates in the urogenital ridge on the dorsal body wall high in the embryo's abdomen, before birth it has ordinarily shifted into a small outpouching of the peritoneal cavity that has extended into a pouch of skin, the scrotum. Each pocket of peritoneum projecting from the abdominal cavity is a processus vaginalis (Fig. 18.2a). Its connecting channel normally closes to isolate it from the abdominal cavity (Fig. 18.2b). The lining is the tunica vaginalis. Each testis is suspended in its serous cavity in the same fashion as an abdominal organ is suspended in the peritoneal cavity, that is, in a fold of the wall. Thus there is a visceral tunica vaginalis and a parietal tunica vaginalis.

During development the processus vaginalis has carried with it the layers of the abdominal wall that lay in front of it. Therefore, outside of the parietal tunica vaginalis, among other layers, is a thin sheet of striated muscle derived from the internal oblique muscle of the abdominal wall. This sheet is the cremaster muscle (Fig. 18.1 and 18.3). In addition to coating the parietal tunica vaginalis, it forms a muscular investment of the group of testicular blood vessels, lymphatics, nerves, and the ductus deferens, all of which have been carried along by the descending gonad. The cremaster muscles, by lowering the testes or lifting them closer to the abdomen, help to regulate the temperature of the gonads, which is an important determinant of sperm development. Testing of the cremasteric reflex (lifting of the testis on stimulation of the medial surface of the thigh) is a routine part of the physical examination. The cremaster will be seen in histologic sections of the spermatic cord, which includes all of the structures passing to the scrotum through the inguinal canal. In addition to the ductus deferens, the cord contains the testicular artery, which is surrounded by an anastomosing network of testicular veins, the pampiniform plexus. The artery and veins form a countercurrent exchange system that helps to keep the testicular temperature about 2 degrees lower than that of the rest of the body, and also helps to maintain a higher concentration of testosterone in the testis than in the rest of the body.

Stroma

The stroma of the testis consists of a capsule of dense connective tissue (tunica albuginea) underlying the visceral tunica vaginalis. The capsule has a thickened portion (the mediastinum) on the posterior surface of the organ.

Fig. 18.1. Drawing of a portion of the male reproductive system seen from the ventral aspect.

Fig. 18.2. Diagram of development of processus and tunica vaginalis. a: Extension of the peritoneal cavity through the inguinal canal into the scrotum. b: Closure of the upper portion of the processus vaginalis isolates the lower portion from the parent peritoneal cavity.

Fig. 18.3. Cross-section of spermatic cord with ductus deferens (D), spermatic artery (A) in the midst of a group of veins, the pampiniform plexus, and cremaster muscle bundles (C). ×11.

Fig. 18.4. Testis and epididymis. Capsule (C), rete (R), head (H) and body (B) of epididymis, ductus deferens (D) and trabeculae (arrows). ×35.