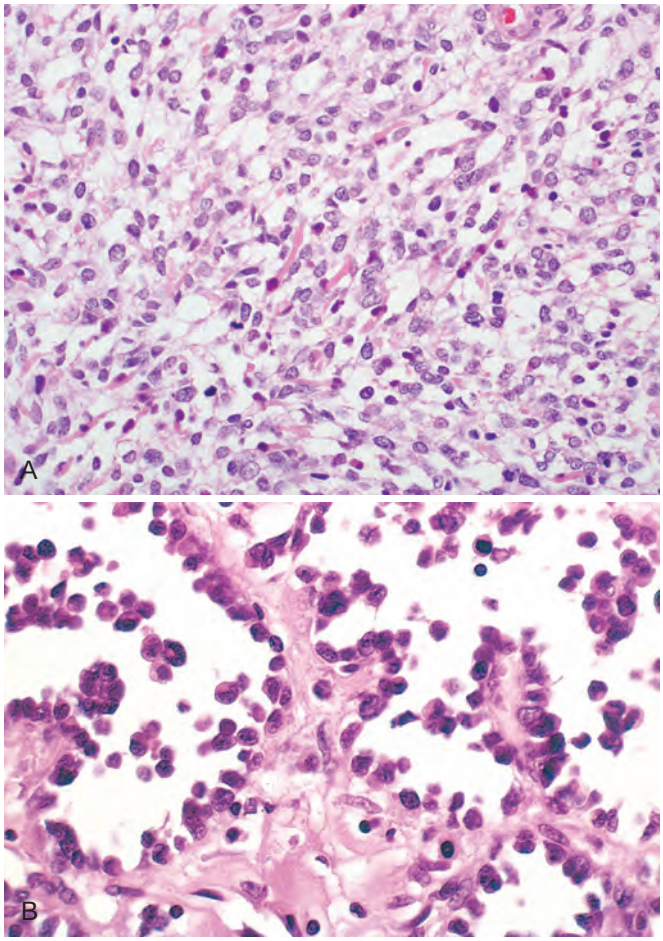

Figure 26-53 Rhabdomyosarcoma. **A,** Embryonal subtype composed of malignant cells ranging from primitive and round to densely eosinophilic with skeletal muscle differentiation. **B,** Alveolar rhabdomyosarcoma with numerous spaces lined by discohesive, uniform round tumor cells.

Smooth Muscle Tumors

Leiomyoma

Leiomyoma, a benign tumor of smooth muscle, often arises in the uterus; in fact, uterine leiomyomas are the most common neoplasm in women (Chapter 22). They develop in 77% of women and, depending on their number, size, and location, may cause a variety of symptoms including infertility. Leiomyomas may also arise from the erector pili muscles *(pilar leiomyomas)* found in the skin, nipples, scrotum, and labia and rarely in the deep soft tissues and the muscularis of the gut. Pilar leiomyomas may be multiple and painful. The phenotype of multiple cutaneous leiomyomas may be transmitted as an autosomal dominant trait that is also associated with uterine leiomyomas and renal cell carcinoma—*hereditary leiomyomatosis and renal cell cancer syndrome*. This disorder is associated with a germline loss-of-function mutation in the fumarate hydratase gene located on chromosome 1q42.3. Fumarate hydratase is an enzyme that participates in the Krebs cycle, and this association thus constitutes another intriguing example of the link between metabolic abnormalities and certain forms of neoplasia.

Soft tissue leiomyomas are usually 1 to 2 cm and are composed of fascicles of densely eosinophilic spindle cells that tend to intersect each other at right angles. The tumor cells have blunt-ended, elongated nuclei and show minimal atypia and few mitotic figures. Solitary lesions are easily cured. However, multiple tumors may be so numerous that complete surgical removal is impractical.

Leiomyosarcoma

Leiomyosarcoma accounts for 10% to 20% of soft tissue sarcomas. They occur in adults and afflict women more frequently than men. Most develop in the deep soft tissues of the extremities and retroperitoneum. A particularly deadly form arises from the great vessels, especially the inferior vena cava. Leiomyosarcomas have complex genotypes that stem from underlying defects that lead to profound genomic instability.

MORPHOLOGY

Leiomyosarcomas present as painless firm masses. Retroperitoneal tumors may be large and bulky and cause abdominal symptoms. They consist of eosinophilic spindle cells with blunt-ended, hyperchromatic nuclei arranged in interweaving fascicles. Ultrastructurally, the tumor cells contain bundles of thin filaments with dense bodies and pinocytic vesicles, and individual cells are surrounded by basal lamina. Immunohistochemically, they stain with antibodies to smooth muscle actin and desmin.

Treatment depends on tumor size, location, and grade. Superficial or cutaneous leiomyosarcomas are usually small and have a good prognosis, whereas those of the retroperitoneum are large, cannot be entirely excised, and cause death by both local extension and metastatic spread, especially to the lungs.

Tumors of Uncertain Origin

Although many soft tissue tumors can be assigned to recognizable histological types, a large proportion of tumors do not recapitulate any known mesenchymal lineage. This group includes examples with simple and complex karyotypes; one of each type is described later.

Synovial Sarcoma

Synovial sarcoma was so-named because the first described cases arose in the soft tissues near the knee joint and a morphologic relationship to synovium was postulated. However, this name is a misnomer, as these tumors can present in locations (chest wall, head and neck) that lack synovium and their morphologic features are inconsistent with an origin from synoviocytes. Synovial sarcomas account for approximately 10% of all soft tissue sarcomas and rank as the fourth most common sarcoma. Most occur in people in their 20s to 40s. Patients usually present with a deep-seated mass that has been present for several years. Most synovial sarcomas show a characteristic chromosomal translocation t(x;18)(p11;q11) producing *SS18-SSX1*,