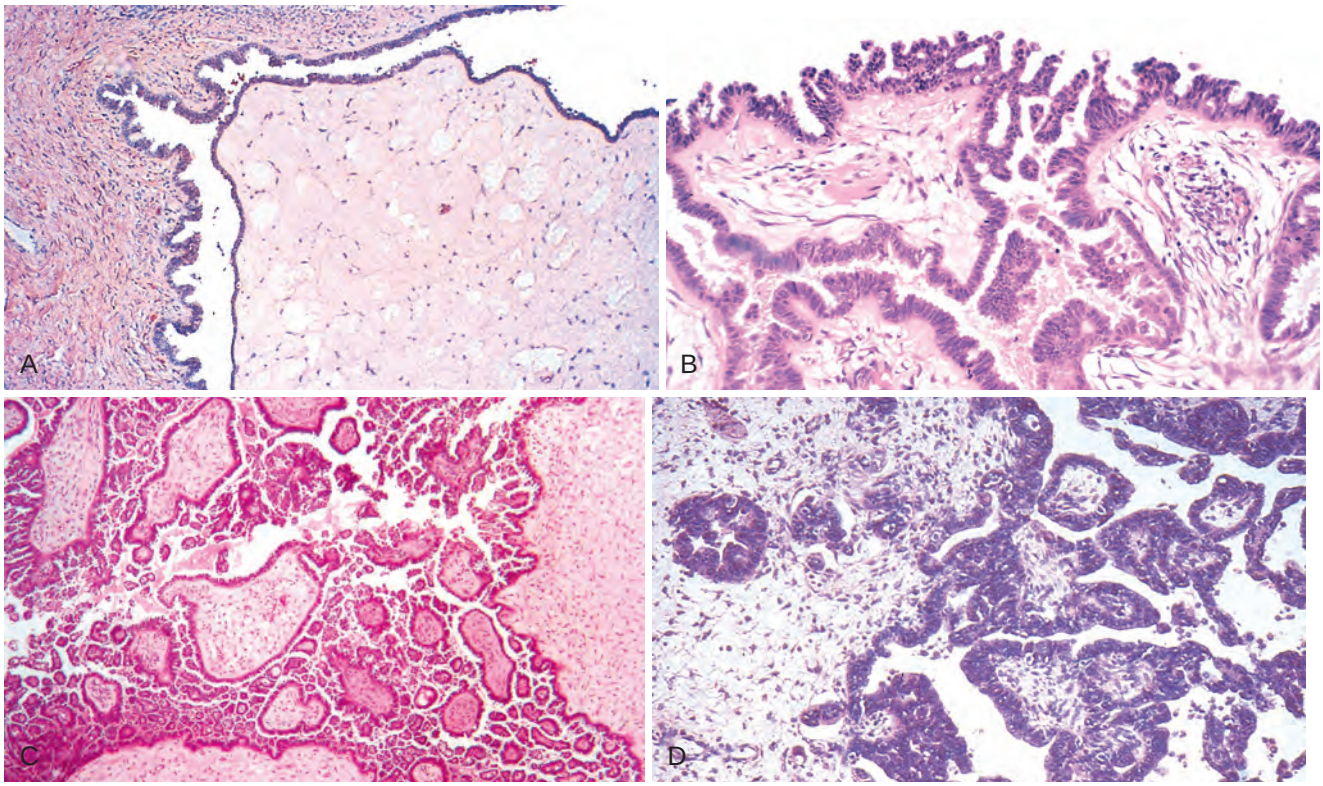

Figure 22-33 Microscopic appearances of serous tumors of the ovary. **A,** Serous cystadenoma revealing stromal papillae with a columnar epithelium. **B,** Borderline serous tumor showing increased architectural complexity and epithelial cell stratification. **C,** Complex micropapillary growth defines a low-grade "micropapillary" serous carcinoma. **D,** High-grade serous carcinoma of the ovary with invasion of underlying stroma.

associated with rapid clinical deterioration. Consequently, pathologic classification of the tumor, even if it has extended to the peritoneum, is relevant to both prognosis and selection of therapy. The 5-year survival rate for borderline and malignant tumors confined to the ovary is, respectively, 100% and 70%, whereas the 5-year survival rate for the same tumors involving the peritoneum is about 90% and 25%, respectively. Because of their protracted course, borderline tumors may recur after many years, and 5-year survival is not synonymous with cure.

Mucinous Tumors

Mucinous tumors account for about 20% to 25% of all ovarian neoplasms. They occur principally in middle adult life and are rare before puberty and after menopause. The vast majority are benign or borderline tumors. Primary ovarian mucinous carcinomas are uncommon and account for approximately 3% of all ovarian cancers.

Pathogenesis. **Mutation of the *KRAS* proto-oncogene is a consistent genetic alteration in mucinous tumors of the ovary**, including the majorities of benign mucinous cystadenomas (58%), mucinous borderline tumors (75% to 86%), and ovarian mucinous carcinomas (85%). Interestingly, one study showed that several tumors with distinct areas of epithelium showing benign, borderline, and carcinoma had identical *KRAS* mutations in each area. Thus, *KRAS* mutations may initiate the development of these neoplasms. The mutations that collaborate with *KRAS* mutations to generate mucinous tumors are largely unknown.

MORPHOLOGY

Mucinous tumors differ from the serous variety in several ways. The surface of the ovary is rarely involved and only 5% of primary mucinous cystadenomas and mucinous carcinomas are bilateral. Mucinous tumors also tend to produce larger cystic masses; some have been recorded with weights of more than 25 kg. They are multiloculated tumors filled with sticky, gelatinous fluid rich in glycoproteins (Fig. 22-34*A*).

Microscopically, benign mucinous tumors are characterized by a lining of tall, columnar epithelial cells with apical mucin that lack cilia. The vast majority demonstrates gastric or intestinal type differentiation, with uncommon tumors showing endocervical type mucinous differentiation instead (Fig. 22-34*B*). Mucinous borderline tumors are distinguished from cystadenomas by epithelial stratification, tufting, and/or papillary intraglandular growth, often producing an appearance strikingly similar to tubular adenomas or villous adenomas of the intestine. **Mucinous carcinomas** characteristically demonstrate confluent glandular growth that is now recognized as a form of "expansile" invasion. Some authors use the term intraepithelial carcinomas for tumors with marked epithelial atypia that lack invasive features. Approximate 10-year survival rates for stage I, noninvasive "intraepithelial carcinomas" and for frankly invasive malignant tumors are greater than 95% and 90%, respectively. Mucinous carcinomas that have spread beyond the ovary are usually fatal, but as previously stated, these tumors are uncommon and must be distinguished from metastatic mucinous adenocarcinomas.