Introduction to ovarian cancer

Epithelial ovarian cancer is the most lethal of the gynecologic malignancies. After cancer of the lung, breast, colon, and uterus, it is the fifth most common cancer among women in the United States, and the fourth most common cause of cancer death in women. The American Cancer Society and National Cancer Institute estimate that in 2014 there will be approximately 21,980 new cases of ovarian cancer and 14,270 women will die of this disease. The lifetime risk for epithelial ovarian cancer is 1.38%, or one in every 72 women. The risk is even higher among women with familial and known genetic predisposition to this disease [1–3].

Anatomy

The disease arises in the adnexae, which consist of the ovaries, fallopian tubes, broad ligament, and embryologic rests within the broad ligament. Unfortunately, because there are no validated screening tests for ovarian cancer that can be used in the general population and due to an absence of early symptoms, most cases of epithelial ovarian cancer do not come to clinical attention with a solitary adnexal mass. Typically, patients present with widespread intraperitoneal (IP) disease inclusive of an adnexal mass, involvement of other pelvic structures, omental and upper abdominal disease, and intra-abdominal ascites. This constellation of findings is described as carcinomatosis. Many patients will also be found to have a malignant pleural effusion at the time of initial presentation.
Before discussing the epidemiology and risk factors of epithelial ovarian cancer in detail, it is important to recognize that classification of ovarian pathology can be confusing because there is a significant variation in histologic structure and biologic behavior. Although epithelial ovarian cancer constitutes 85% of malignant ovarian pathology, it is important to consider the other main types as their epidemiology and management are distinct.

**Pathology**

There are four major stages of histogenesis of the normal ovary. During the first stage, undifferentiated germ cells (primordial germ cells) are segregated and migrate from their sites of origin to settle in the genital ridges comprised of bilateral thickening of coelomic epithelium. The second stage is marked by proliferation of the coelomic epithelium and underlying mesenchyme. In the third stage, the ovary becomes divided into a peripheral cortex and a central medulla. Development of this cortex and involution of the medulla characterizes the fourth stage. Thus, the three main types of ovarian cancer include the epithelial cancers, malignant germ cell tumors that arise from the primordial germ cells or oocytes, and the sex cord stromal tumors, which are derived from the steroid-producing cells responsible for nourishing the germ cells and oocytes [4]. Nonspecific cancers of the ovary also occur in cell types that are not specific to the ovary and include lymphomas (from lymphocytes) and sarcomas (from fibroblasts). Finally, cancers can secondarily involve the ovaries through direct extension and/or hematologic metastases and lymphatic permeation. Among the most common cancers to spread to the ovary are fallopian tubal carcinomas, endometrial carcinoma, cervical carcinoma, appendiceal cancers, breast cancer, and Krukenberg tumors from the stomach and other parts of the gastrointestinal tract. Interestingly, the specific malignant histologic type of ovarian cancer has less prognostic significance than the International Federation of Gynecology and Obstetrics (FIGO) stage, extent of residual disease, and histologic grade. Particularly in the case of epithelial ovarian cancer, histologic grade is an important independent prognostic factor [4]. The World Health Organization (WHO) Histologic Classification of Ovarian Tumors appears in Table 1.1.