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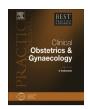
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## Surgical treatment of early-stage ovarian cancer

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The treatment of early-stage (stages I-IIA) ovarian carcinoma is predominantly surgical, and the surgical staging is the most relevant step in the treatment of this disease. The significance of surgical staging is twofold. First, proper staging distinguishes between 'real' early-stage ovarian carcinoma and 'perhaps' earlystage disease. The latter carries an appreciable likelihood of unappreciated residual disease in 16-42% of cases. Second, there is solid proof that proper surgical staging is an independent prognostic factor for improved disease-free and overall survival in early-stage ovarian carcinoma. In this chapter, the relevance of various staging steps is discussed and surgical guidelines are given. The indication for adjuvant chemotherapy after surgery is closely related to the adequacy of surgical staging. Adjuvant chemotherapy only works in patients in whom surgical staging was inadequate and who, thus, remain with a certain risk of unnoticed residual intraperitoneal or retroperitoneal tumour spread. Moreover, there is no indication that adjuvant chemotherapy is of any value after an adequate, comprehensive staging procedure. Controversies and misunderstandings on this important issue are discussed.

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#### Introduction

Early-stage ovarian carcinoma relates to the disease stage with extension not further than the internal gonads in the small pelvis. This concurs with stages I—IIA by the FIGO system [1]. The revised version of the FIGO stages in 2014 describes different sub-stages for stage IC: IC1 = surgical spill;

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IC2 = capsule rupture before surgery or tumour on the ovarian or fallopian tube surface; IC3 = malignant cells in the ascites or peritoneal washings [1].

The global rate of ovarian cancer is assumed to be 6.3 per 100,000 women and approximately 9.3 per 100,000 women in high-resource countries [2]. Early-stage ovarian carcinoma is estimated to account for 25–30% of the total number of cases [2].

By the nature of its location, early-stage ovarian carcinoma should be amenable to complete surgical resection of disease by removing the internal genitals. Unfortunately, this is not the case. The 10-year recurrence-free survival varies from 56% to 78% depending on the type of surgery [3]. The explanation for these sobering low figures is that at the time of primary surgery, unnoticed and subclinical metastases might already be present. These metastases will remain unnoticed unless a comprehensive staging procedure rules out or minimizes the likelyhood of their presence. It has been demonstrated that by doing so in approximately one-quarter to one-third of cases (range 16–42%), proper surgical staging can detect intraperitoneal or retroperitoneal spread that would have been left unnoticed when only removal of the internal genitals had been performed (see also 'History of surgical staging'). Therefore, 'early-stage ovarian carcinoma' without adequate surgical staging cannot be considered real early-stage ovarian carcinoma. It is a blend of two-thirds or less real early-stage ovarian carcinoma and one-third or higher more advanced disease. Thus, surgical staging of early-stage ovarian carcinoma remains the cornerstone of treatment of this disease, and it will be addressed from various angles in this chapter. It is stated here that this chapter is entirely devoted to invasive disease.

#### History of surgical staging

The concept of staging early-stage ovarian carcinoma was developed when more understanding and knowledge of the natural course of the disease was gained in the 1970s and 1980s. At that time, the incidence of occult intraperitoneal and retroperitoneal disease was defined in several studies [4-9]. Piver described microscopic metastasis at different sites such as the right hemidiaphragm in 11% of cases, the omentum in 35% of cases and malignant cells in peritoneal washings in up to 33% of cases [4]. Peritoneal seeding is considered to occur by the fact that peritoneal fluid circulates continuously from the small pelvis along the paracolic gutters and across the omentum to the diaphragm where it is absorbed into small lymph vessels at the peritoneal side of the diaphragm [10,11]. This circulation of peritoneal fluid provides the most common pathway for peritoneal seeding of tumour implants throughout the abdominal cavity.

Another important route for metastasis is through the lymphatic system. Lymphatic vessels run parallel to the ovarian vessel in the infundibulo-pelvic ligament and enter the para-aortic and paracaval nodes, especially in the area between the inferior mesenteric artery and the left renal vein. Another lymphatic pathway enters the obturator and external and common iliac nodes. Infrequently, ovarian lymphatic channels follow the round ligament to drain into the inguinal nodes. Involvement of paraaortic nodes has been reported in 5-24% in early-stage disease [8,9] and involvement of iliac pelvic nodes has been reported in 8–15% of cases [4,8].

These data led to several staging recommendations and guidelines by different organizations such as the FIGO [12], EORTC [13], GOG [13] and the Norwegian Radium Hospital [14]. These guidelines differ in detail, but they all share the most relevant staging steps (Table 1; Figure 1).

#### Fertility-sparing surgery

Early-stage ovarian carcinoma can be found in young premenopausal women. The median age of patients in a large randomized trial was 54, but with a range from 18 to 84 [17]. Zannetta and coworkers have emphasized that it is permittable and safe to leave the uterus and contralateral ovary in situ in stage I early-stage ovarian cancer [18]. This was confirmed by French investigators a few years later [19]. The FIGO staging guideline of 2000 advised to restrict this policy to grade I disease [12]. The EORTC favoured conservative surgery in all grades of stage I early-stage ovarian carcinoma [17]. The latter policy also seems to be the most practical as definite information on tumour grade is sometimes difficult to obtain at the time of surgery because of sampling errors at the frozen section, especially in large (mucinous) cysts. In the past, wedge resection of the contralateral ovary was advised in case of

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