ORIGINAL ARTICLE

Role of frozen section in the intraoperative management of ovarian masses

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Abstract *Objective:* To evaluate the performance and limitations of FS in the intraoperative evaluation of ovarian masses.

Design: Retrospective descriptive study.

Methods: The case records of patients presenting with ovarian masses who underwent surgery and intraoperative FS assessment between January 2009 and December 2012 were analyzed. Demographic and clinical data were reviewed. Data on FS analysis were compared with the final diagnosis on paraffin section.

Results: Sixty patients with ovarian masses undergoing surgery and FS were included. Four cases had the diagnosis at the time of FS deferred (6.6%). In the remaining 56 patients, the FS diagnoses were benign in 24 (40%), borderline in 9 (15%), and malignant in 23 (38.4%), whereas the final diagnosis was benign in 23 (38.4%), borderline in 11 (18.3%), and malignant in 26 (43.3%). The overall accuracy of intra-operative FS diagnosis was 95.5%. The sensitivity for FS diagnosis was 100% for benign, 72.7% for borderline and 88.4% for malignant category, whereas the specificity was 97.3%, 97.9%, and 100.0%, respectively. There were 4 cases with discordance between the FS diagnoses and the final diagnoses, all of which were under-diagnosed by FS.

Conclusion: Frozen section is a good tool for decision making at the time of ovarian surgery but does not always provide an immediate solution. However a large prospective study is recommended.

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1. Introduction

The clinical diagnosis of ovarian malignancy is problematic, given the nonspecific nature of presentation and the difficulty in obtaining a histological diagnosis prior to definitive treatment. The correct management approach depends on accurate diagnosis and staging. In stage 1 disease, this is even more essential, as accurate staging is required to ensure that stage

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1 disease is not an occult higher stage disease, with 18% being upstaged from FIGO stage 1 to stage 2 (or higher) with accurate surgical and pathological staging (1,2).

When faced intra-operatively with an apparent early-stage ovarian cancer, the surgeon will have two management options: to manage each case as a potential cancer and therefore perform an optimal staging procedure, or to manage the case as benign without staging. The former option will result in unnecessary surgery in about 30% of cases, with its potential significant morbidity, and the latter will result in suboptimal staging in cancer cases requiring either a second surgical staging procedure or empirical chemotherapy. This two-stage approach results in an increased morbidity and risk for the patient, as well as added pressure on theater time and hospital resources (2). A second issue is that the extent of surgical management is based on the histologic diagnosis and the category of tumors. In benign and borderline ovarian tumor, fertility conserving surgery is a preferred approach, whereas, in malignant tumors, complete surgical staging that involves total hysterectomy, bilateral salpingo-oophorectomy, partial omentectomy and retroperitoneal lymph node sampling should be done (3). For borderline tumors, surgical staging should be performed but with a conservative approach and lymph node sampling may be omitted if the node is not grossly abnormal. Intra-operative frozen section (FS) can help clinicians in making an appropriate decision on the surgical management of ovarian neoplasms (4).

The use of intra-operative FS reporting of a tissue taken at surgery is attractive, in that a diagnosis may be achieved intra-operatively. Such a diagnosis can inform the surgeon not only of the malignant nature of the ovarian lesion, but also of the possibility that it may represent a metastasis (2). It has been shown that FS can be of sufficient sensitivity and specificity to be of clinical use in this setting (5). Diagnostic problems can occur due to technical limitations especially in mucinous and borderline tumors (6). A good communication between clinicians and pathologists is necessary to obtain accurate results and to minimize the number of deferred cases (7). This study was conducted to evaluate the performance and limitations of FS in the intraoperative evaluation of ovarian masses.

2. Patients and methods

This retrospective study was conducted in the Department of Obstetrics and Gynecology, Women's Hospital, Hamad Medical Corporation, Qatar after being accepted by the local research committee. The case records of patients presenting with ovarian masses who underwent surgery and intraoperative FS assessment between January 2009 and December 2012 were analyzed in this study. Demographic and clinical data, operative details, FS and histopathology report (HPR) were reviewed.

In our hospital, we have FS service for suspected ovarian cancer cases. The Gyn-Oncology surgical team informs the laboratory in advance of the need for FS. The specimen, once removed, is transported by a hospital porter direct to the laboratory and handed over to the laboratory staff. The pathologist assigned for FS inspects the specimen and, after describing it, takes representative pieces of tissue for FS analysis. These are then processed and, after hand staining, are given to the duty pathologist for reporting. The specific histological diagnosis whenever possible is then telephoned to the surgeon within 30 min. The FS diagnosis was deferred when there were some suspicious pathologic features of borderline or malignant tumor which were considered not definitely diagnostic. After the FS diagnosis was reported, the ovarian specimens were fixed in 10% formalin overnight and sampled for routine histologic sections. The histologic diagnosis of ovarian lesions was based on the WHO Classification (8).

Frozen section diagnoses were compared to the final histologic diagnoses in each case, which were considered as the gold standard. The diagnoses were categorized as benign, borderline and malignant. Agreement of both FS and final diagnoses was considered when both diagnoses were identical or were within the same subgroup of malignancy (i.e. epithelial, sex cord-stromal, germ cell, and metastatic).

Diagnostic parameters including accuracy, sensitivity, specificity, predictive values of FS for the diagnosis were calculated. T-Test statistic was used to compare the mean values. All analyses were performed by using SPSS for Windows version 13. The cases with discordant diagnosis between FS and final histology or the cases with deferred diagnosis were reviewed in detail.

3. Results

Sixty patients with ovarian masses undergoing surgery and FS were included in this study. The mean age was 45 ± 6 years and 46.7% of them were postmenopausal. Demographic and clinical data are reported in Table 1. The majority of patients of ovarian cancers (70%) were preoperatively categorized as stage I disease.

Four cases had the diagnosis at the time of FS deferred (6.6%). In the remaining 56 patients, the FS diagnoses were benign in 24 (40%), borderline in 9 (15%), and malignant in 23 (38.4%), whereas the final diagnosis was benign in 23 (38.4%), borderline in 11 (18.3%), and malignant in 26 (43.3%). Of the 26 malignant neoplasms, 13 were epithelial carcinoma, 7 were sex cord-stromal tumors and 6 were germ cell tumors. In the sex cord stromal category, nearly all the benign tumors were fibromas (fibrothecomas). The borderline tumors reported in this study were 3 serous, 6 mucinous, and 2 endometrioid borderline tumors. The comparison between FS diagnoses and final diagnoses is shown in Table 2.

The overall accuracy of intra-operative FS diagnosis was 95.5%. The sensitivity for FS diagnosis was 100% for benign, 72.7% for borderline and 88.4% for malignant category, whereas the specificity was 97.3%, 97.9%, and 100.0%, respectively. The positive predictive value was 95.8% for benign, 88.8% for borderline, and 100.0% for malignant group, and the negative predictive values were 100%, 94.1%, and 91.8%, respectively (Table 3).

There were 4 cases with discordance between the FS diagnoses and the final diagnoses, all of which were under-diagnosed by FS. Three of four were mucinous tumors and the fourth was sex cord-stromal tumors. Three cases were reported in FS as benign that were ultimately reported as borderline (two cases) or malignant (one case). One case that was reported as borderline was ultimately reported as malignant. The discrepancy between FS and the final diagnosis was explained by sampling errors.

The mean of tumor which is the greatest dimension of the masses in the discordant or deferred cases ($N = 8$) was