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Assessing the histological type and grade of primary parotid carcinoma by fine-needle aspiration and frozen section

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ABSTRACT

Objective: The aim of this study is to compare preoperative fine needle aspiration cytology (FNAC) and intraoperative frozen section (FS) for the correct identification of malignancy, histological grade, and histological type.
Methods: FNAC was performed on all 105 patients and FS on 71 patients with parotid carcinoma.
Results: The rate of correctly determining the histological grade by FNAC and FS was 32% and 73%, respectively. The correct diagnosis rate for both the histological type and grade by FNAC and FS was 20% and 48%, respectively.
Conclusions: The correct grading of both high and low/intermediate grade carcinoma is possible in 70–80% of patients by FS. If the histological grade is identified correctly, the extent of resection can usually be decided appropriately. Therefore, we should put emphasis on determining the histological grade.

1. Introduction

Stage and histological grade are key prognostic factors for parotid carcinoma [1,2]. Regarding the former, progress in diagnostic imaging has made it possible to determine the stage before surgery with considerable accuracy. On the other hand, it is difficult to diagnose a histological grade of a tumor accurately before surgery because parotid carcinoma has a wide range of histological types and grades of malignancy. According to the 2005 World Health Organization (WHO) classification, parotid carcinoma is divided into 23 histological types and there are subtypes for some histological types [3]. Also, it is known that the histological grade differs considerably depending upon tumor histology and that the grade may also vary among histological subtypes [4–6].

The first-line treatment for parotid carcinoma is surgery [7]. In order to decide the extent of local resection, whether the facial nerve can be preserved, and whether cervical dissection is required, it is necessary to determine the histological type and the grade of the tumor accurately. Most authors have suggested that surgery should be based on tumor histology and tumor grade [8]. It is possible to assess to some extent whether a tumor is benign or malignant by imaging methods such as MRI and CT scanning. However, fine-needle aspiration cytology (FNAC) is the only current method that enables us to determine the histological type and the grade preoperatively. FNAC has gained wide acceptance as a first-line diagnostic procedure for salivary gland lesions [9–11]. In general, the diagnostic yield of FNAC is considered to be low for malignant tumors of the parotid gland, while it is relatively high for the benign tumors [12]. Although examination of frozen sections (FS) is considered to be more reliable than diagnosis by FNAC, the diagnostic yield is still low for parotid carcinoma compared with that for head and neck squamous cell carcinoma, because the histology and the grade of parotid tumors varies so widely. The diagnostic accuracy of intraoperative FS analysis of salivary gland tumors has been evaluated by several authors [13–15].

However, comparison of FNAC and FS findings in the same series of parotid carcinomas has only been performed in a few studies and in small groups of patients [16,17]. Another important point is how to define correct diagnosis by FNAC and FS, i.e., should it be defined as differentiation between benign and malignant tumors, or based on histological type or grade. It is desirable to identify both tumor histology and grade, but even if the histology is unclear, a strategy for performing adequate resection can often be developed by histological grade of a tumor.

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The aim of this study was to compare the value of preoperative FNAC and intraoperative FS for recognizing tumor malignancy, histological grade, and histological type. We also compared the histopathological diagnoses made by FNAC and FS.

2. Patients & methods

2.1. Patients

One hundred and five patients with parotid carcinomas who underwent surgery at our department during the past 25 years, and in whom the histological diagnosis and tumor grade were confirmed, were reviewed in this study. FNAC was performed on all 105 patients and FS was performed on 71 patients. In general, FNAC was performed at one site under ultrasonographic guidance using a 22 gauge needle and 10 ml syringe. For FS, a specimen was obtained from the resected tissues and further resection was performed in some cases if required. Mucoepidermoid carcinoma was the most common tumor, being found in 28 patients (high-grade in 15 patients and low/intermediate grade in 13 patients), followed by carcinoma ex pleomorphic adenoma in 17 patients (high-grade (invasive) in 9 patients and low/intermediate grade (noninvasive) in 8 patients), acinic cell carcinoma in 13 patients, adenoid cystic carcinoma in 11 patients (high-grade (solid type) in 5 patients, and low/intermediate grade (cribriform or tubular type) in 6 patients), salivary duct carcinoma in 6 patients, basal cell adenocarcinoma in 6 patients, unspecified adenocarcinoma in 6 patients, squamous cell carcinoma in 5 patients, epithelial-myoepithelial carcinoma in 5 patients, myoepithelial carcinoma in 5 patients, and cystadenocarcinoma in 1 patient. When the tumors were divided into high grade versus intermediate/low grade, 46 patients had high grade tumors and 59 had low/intermediate grade tumors, and 26 of the 46 patients with high grade tumors and 45 of the 59 patients with intermediate/low grade tumors received FS (Table 1). Nine patients were in stage I, 43 patients were in stage II, 18 patients were in stage III, and 35 patients were in stage IV. When the percentage of high-grade tumors was assessed by stage, it was 22% for stage I, 23% for stage II, 33% for stage III, and 80% for stage IV (Table 2).

Table 1
Number of FNAC and FS examinations stratified by histological type. MEC: mucoepidermoid carcinoma; Ca ex pleo: carcinoma ex pleomorphic adenoma; SDC: salivary duct carcinoma; AD: adenocarcinoma; ADCC: adenoid cystic carcinoma; SCC: squamous cell carcinoma; ACC: acinic cell carcinoma; BCC: basal cell adenocarcinoma; EMC: epithelial-myoepithelial carcinoma; MC: myoepithelial carcinoma; CAD: cystadenocarcinoma; NOS: not otherwise specified.

Histology/grade	FNAC ($n=105$)	FS ($n=71$)
High grade		
MEC (high)	15	8
Ca ex pleo (invasive)	9	6
SDC	6	4
AD (NOS)	6	4
ADCC (solid)	5	4
SCC	5	0
Total	46	26
Low/intermediate		
ACC	13	12
MEC (low/intermediate)	13	10
Ca ex pleo (noninvasive)	8	5
BCC	6	6
ADCC (cribriform/tubular)	6	4
EMC	5	4
MC	5	1
CAD	1	1
Others	2	2
Total	59	45

2.2. Methods

Categorization of diagnosis: Patients were classified into the following 5 categories based on the diagnoses made by FNAC and FS. Those with a correct diagnosis for both histological type and grade were classified into Category A, while patients without a correct diagnosis for histology who had a correct diagnosis for grade were classified into Category B. In addition, patients without a conclusive diagnosis for grade in whom malignancy was diagnosed correctly were classified into Category C (regardless of the histological types), patients without a diagnosis of histological type or grade who were suspected of having malignancy were classified into Category D, and those who were diagnosed as having a benign tumor or whose specimen was inadequate were classified into Category E. The histological diagnosis of each specimen was reviewed by an experienced staff pathologist and the tumors were classified according to the 2005 WHO Classification System [3].

Diagnostic yield of FNAC and FS in all patients: In all 105 patients, FNAC findings were classified into the above 5 categories (A to E). In the 71 patients who received FS, the findings were classified in the same way.

Comparison of FNAC and FS in patients with high grade or low/intermediate grade tumors: Among the 105 patients with parotid carcinoma, 46 patients had a high grade tumor and 59 had a low/intermediate grade tumor. All 105 patients received FNAC. Based on the findings of FNAC and FS, patients were classified into the above 5 categories (A to E).

3. Results

3.1. Diagnostic yield of FNAC and FS in all patients (Fig. 1)

Of 105 patients who received FNAC, 21 were classified in Category A, while 13 patients were in Category B, 24 patients in C, 18 patients in D, and 29 patients in E. A total of 34 patients (32%) were included in Categories A or B. Of the 71 patients who received FS, 34 were classified in Category A, 18 in B,11 in C, 4 in D, and 4 in E. A total of 52 patients (73%) were included in Categories A or B.

We performed 377 cases of benign parotid tumors in the same period of this study. FNAC was performed in all cases preoperatively. Only three cases (0.8%) were diagnosed as malignant tumor among 377 cases.

3.2. Diagnostic yield of FNAC and FS in patients with high grade or low/intermediate grade tumors (Fig. 2A and B)

Among 46 patients who had a high grade tumor and received FNA, 12 patients were classified in Category A, 7 in B, 16 in C, 6 in D, and 5 in E. Thus, a total of 19 patients (41%) were included in Categories A or B. On the other hand, among 59 patients who had a low/intermediate grade tumor, 9 patients were classified in Category A, 6 in B, 8 in C, 12 in D, and 24 in E.Thus, a total of

Table 2
Relation between stage and histological grade in 105 patients with parotid carcinoma.

Stage	Grade		
	Low/intermediate	High	Total
I	7	2	9
II	33	10	43
III	12	6	18
IV	7	28	35
	59	46	105