Diagnostic Value of Fine-Needle Aspiration from Parotid Gland Lesions

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Abstract

Background: Fine-needle aspiration is a widely accepted method in the preoperative evaluation of head and neck tumors. However, its effectiveness in the interpretation of salivary gland disorders is controversial.

Objectives: To evaluate the effectiveness of FNA as a preoperative diagnostic tool of parotid lesions.

Methods: Reports of 52 FNA from various parotid gland lesions were compared with the final pathologic diagnoses.

Results: We noted 31 true positive, 5 true negative and 16 false negative results. There were no false positive FNA reports. The calculated sensitivity, specificity and accuracy of FNA diagnosis in this study were 66%, 100%, and 69.2% respectively.

Conclusions: The high rate (30.8%) of false negative FNA results was partly explained by sampling errors, therefore specificity of the procedure could be improved by the precise selection of a representative aspiration site.

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Fine-needle aspiration is widely accepted for the preoperative evaluation of head and neck tumors. As early as the 1980s some authors claimed that the technique was accurate, safe and cost-effective [1,2]. However, its effectiveness in the interpretation of disorders of the salivary glands is controversial, so much so that surgeons, particularly in the United States, favor intraoperative frozen section examination over the preoperative FNA [3–5]. High rates of false negative results and, hence, a relatively low sensitivity are distinctive of FNA of parotid gland lesions as compared to a high sensitivity of this method in the cytologic evaluation of head and neck lesions in general [6]. We describe our experience using FNA in the preoperative assessment of intraparotid masses.

Materials and Methods

Fifty-two consecutive parotidean FNA, performed on patients with previously untreated parotid masses, were retrieved from the departmental files. The mean age of the 27 females and 25 males was 49.4 years (range 2–85). The aspirations were carried out with a 23 gauge needle by two otolaryngologists. The material was smeared on glass slides and stained with the Papanicolaou and Giemsa methods. The diagnoses reached at the initial examination of the fine-needle aspirations were compared with the final histopathologic diagnoses.

FNA = fine-needle aspiration

The 52 cases were divided into three groups: non-tumorous lesions, benign tumors, and malignant tumors. In addition, the results were classified into one of four categories: a) true positive – a correct cytologic diagnosis of either a benign or malignant neoplasm; b) true negative – a correct cytologic diagnosis of a non-tumorous condition; c) false positive – an erroneous cytologic evaluation, when a diagnosis of malignant tumor had been made based on the presence of a non-tumorous condition or benign tumor; and d) false negative – an erroneous cytologic evaluation, when a diagnosis of non-tumorous condition or benign tumor had been made based on the presence of a malignant tumor. Non-representative FNA samplings inadequate for evaluation in cases of benign or malignant tumors were also regarded as a false negative result. The sensitivity of the technique was computed as the ratio of the number of true positive cases to the sum total of the true positive plus false negative cases. The specificity was calculated as the ratio of the number of true negative cases to the number of all cases with non-tumorous lesions. The accuracy was computed as the ratio of the number of correctly diagnosed cases to the sum total of examined cases.

Results

The diagnosis of benign tumor was cytologically reached in 27 cases and was confirmed by subsequent histologic examination in all 27 cases. There were 19 pleomorphic adenomas, 2 monomorphic adenomas, and 6 Warthin's tumors. Two acinic cell carcinomas, mucoepidermoid carcinoma and metastatic malignant melanoma were correctly recognized on examination of the cytologic preparations [Figure 1]. The material of 10 aspirations was considered, cytologically, to be consistent with a non-tumorous process. This interpretation was confirmed histologically in five cases (chronic sialadenitis in two, lymphoid hyperplasia in one, and retention cysts in two). The other five misread (false negative) cases were as follows: a lymphoid hyperplasia diagnosed in a patient with follicular lymphoma, an inflammatory process diagnosed in a case of acinic cell carcinoma, normal parotid parenchymal cells found in a patient with acinic cell carcinoma, a patient with carcinoma ex-pleomorphic adenoma, and a patient with polymorphous low grade adenocarcinoma. Eleven benign tumors (5 pleomorphic adenomas, 2 monomorphic adenomas, 2 Warthin's tumors, 1 lipoma and 1 neurilemmoma) were not recognized by the cytologic method because the aspirate was acellular or was represented by blood only. All these 11 cases of technically insufficient or non-representative samplings were attributed to a false negative result.

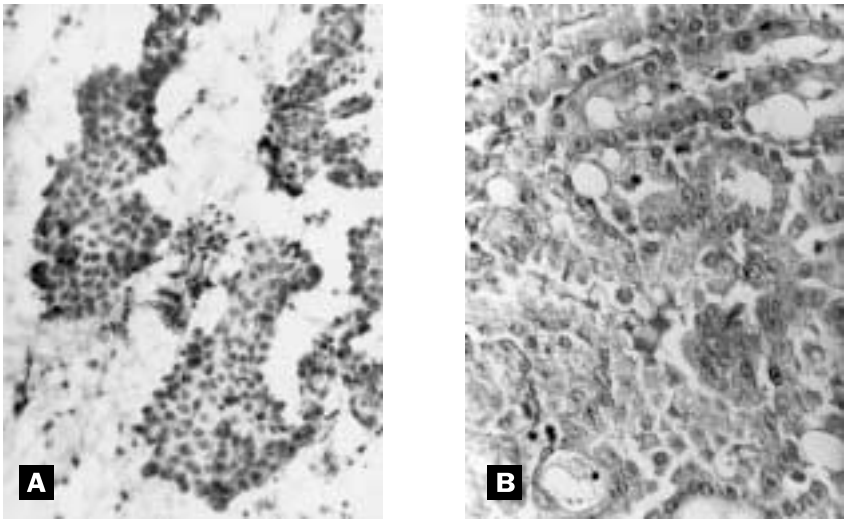

Figure 1. True positive case of acinic cell carcinoma correctly diagnosed by FNA **[A]** and confirmed on final histopathologic examination **[B]**.

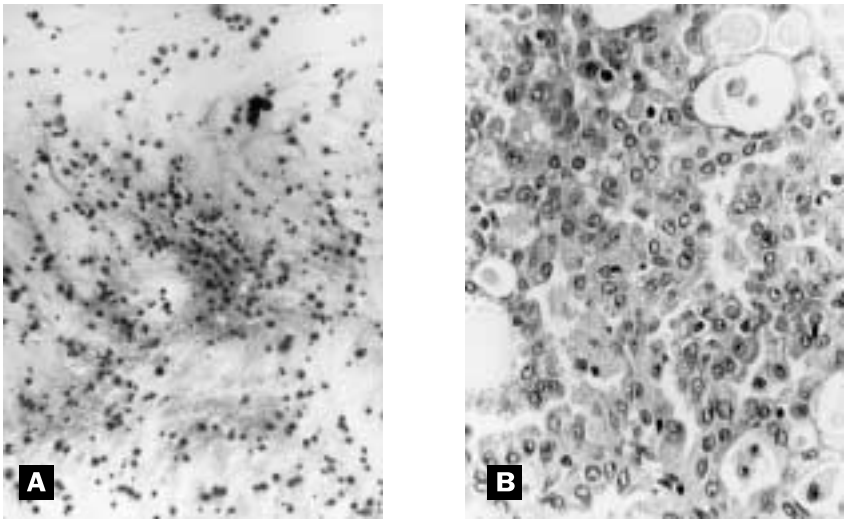

Figure 4. False negative case of acinic cell carcinoma. Normal elements of parotid gland with inflammatory cells in specimen erroneously taken by FNA from peri-lesional zone **[A]**. Acinic cell carcinoma on final histopathologic examination **[B].**

Finally, the correct diagnosis of either a benign or malignant tumor was reached in 31 patients after examination of the fine-needle aspiration specimen. A non-tumorous process was correctly recognized in five patients (true negative results). A false negative diagnosis was made in 16 cases (5 malignant tumors and 11 benign tumors). There were no false positive reports. In this series, the sensitivity of the fine-needle aspiration method was 66%, the specificity 100% and the accuracy 69.2% [Figures 2 and 3].

Discussion

In view of the prevalence of benign tumors in patient populations with a parotid mass, it is not surprising that pleomorphic adenomas and Warthin's tumors were the most commonly encountered lesions in our series, being present in 24 (46.2%) and 8 (15.4%) patients respectively. The accuracy of cytologic diagnosis was 79.2% in cases of pleomorphic adenoma and 75% in cases of Warthin's tumor. The diagnostic accuracy of all benign neoplasms was 71.1%, which was slightly higher than the overall accuracy of FNA in our series (69.2%). Unfortunately, the diagnostic accuracy of FNA in cases of malignant tumors was considerably lower in our series and even lower than in other authors' experience. We believe that the difference in diagnostic accuracy of benign and malignant tumors in our series was incidental and probably related to the small total number of malignant tumors (only nine cases).

In most of the incorrect diagnoses, normal parenchymal tissue of salivary gland origin was present in the aspirated material [Figure 4]. The low accuracy in diagnosing malignant tumors is

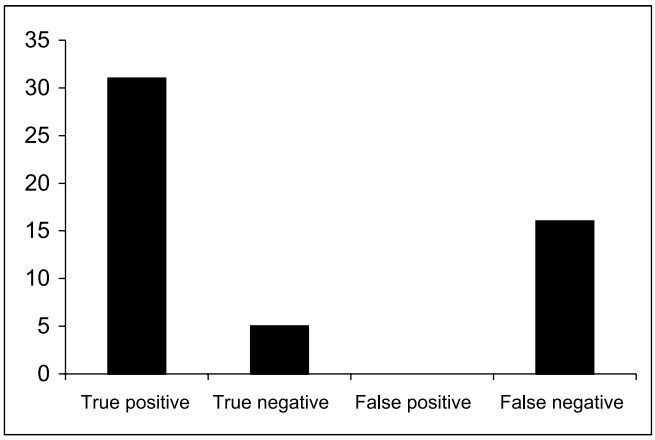

Figure 2. Correlation between FNA and definitive histologic diagnosis in different groups of parotid lesions.

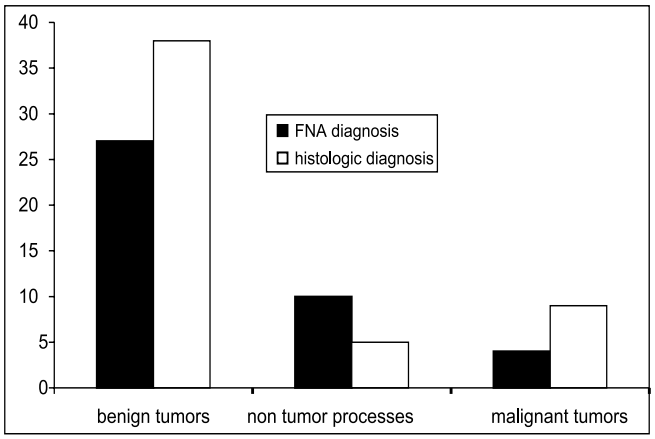

Figure 3. Rate of true positive, true negative, false positive and false negative results.

evidently related to a high incidence of sampling errors [7]. Mistaking a follicular lymphoma for lymphoid hyperplasia is not uncommon, and is apparently due to the difficulties in cytologically distinguishing small neoplastic lymphocytes of a low grade lymphoma from small reactive lymphocytes [5,6]. Notwithstanding the low accuracy rate of identifying malignant parotid tumors, the majority of lesions was correctly diagnosed by fine-needle aspiration. The sensitivity of the technique could likely be improved by ultrasound-guided selection of the aspiration sites, which could reduce the sampling errors.

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