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ORIGINAL ARTICLE

Cyto-histological correlation in parotid gland tumors

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KEYWORDS
Fine needle aspiration biopsy (FNAB);
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Abstract
Objective: To evaluate the usefulness of fine needle aspiration biopsy (FNAB) in the study of parotid gland tumour malignancy in order to plan the most suitable treatment in each case.
Material and method: a retrospective study was made of 41 cases, in which we evaluated the correlation between the FNA and the histopathological findings of the surgical piece of parotid gland tumours, from 2004 to 2008, as well as the epidemiological information of these patients.
Results: The sensitivity of FNA in the detection of malignancy was 71% and the specificity was of 91%, with a positive predictive value of 62.5% and a negative predictive value of 93.7%. The rate of false negatives was 29% whereas that of false positives was of 9%.
Conclusions: The use of the FNA in the study of parotid gland tumours is a useful and simple tool that guides us in the diagnosis and planning of treatment. Nevertheless, it is not exempt from limitations in its diagnostic accuracy.

PALABRAS CLAVE
Punción aspiración con aguja fina;
Glándula parótida;
Correlación citohistológica

Correlación citohistológica en tumores de la glándula parótida

Resumen
Objetivo: Evaluar la eficacia de la citología por punción aspiración con aguja fina (PAAF) en el diagnóstico de malignidad de los tumores de la glándula parótida con el fin de planificar el tratamiento más adecuado para cada caso.
Material y método: Se realiza un estudio retrospectivo en una muestra de 41 pacientes, en el que se evalúa la correlación entre la PAAF y los hallazgos histopatológicos de la pieza quirúrgica de los tumores de la glándula parótida, realizado entre los años 2004 y 2008.

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Resultados: La sensibilidad de la PAAF para detectar malignidad fue de un 71% y la especificidad de un 91%, con un valor predictivo positivo de 62,5% y un valor predictivo negativo de 93,7%. La tasa de falsos negativos fue de 29% mientras que la de falsos positivos de 9%.
Conclusiones: La PAAF es un procedimiento diagnóstico de gran utilidad en el diagnóstico de malignidad de tumores de la glándula parótida, que permite establecer el tratamiento más adecuado e individualizado para cada paciente. No obstante, no está exenta de limitaciones en cuanto a su precisión diagnóstica.

Introduction

Salivary gland tumours represent 3% of head and neck tumours. They are a heterogeneous group of tumours, due to their great variety and because new histological types are progressively incorporated into their classification. Therefore, carrying out an adequate patient study is vital for reaching an accurate diagnosis and setting the best possible treatment.

To do this we use a series of tools such as anamnesis, examination, imaging studies and fine needle aspiration biopsy (FNAB). The definitive diagnosis is provided by the biopsy of the surgical specimen.

Fine needle aspiration (FNA) is often used in the study of neoplastic lesions of the parotid gland, although dispute remains with respect to its diagnostic accuracy.[1] However, there are clinical situations where it can be a useful tool, for example in the diagnosis of lesions suspected of malignancy, the study of metastatic carcinomas and in lymphomas.[2]

This technique has been performed for 150 years, but it was not until the decade of the eighties that it began to be used regularly for the study of masses at the level of the salivary glands.[3] It is a simple, easily-performed, economical technique, with a low complication rate. It presents disadvantages such as its low sensitivity and negative predictive value (NPV), so FNA has limitations as a screening test. In addition, it maintains reasonable correlation with the final histopathological diagnosis of the surgical specimen.[1]

The goal of FNA is, above all, to differentiate between benign and malignant lesions. Various studies show that the sensitivity of this technique in the detection of malignancy ranges from 60%-100%, with a specificity of 85%-100%.[4,5]

Our objective was to evaluate the usefulness of FNA in the study of parotid gland tumours, comparing its results with the final histopathological diagnosis of the surgical specimen.

Material and method

A retrospective study was conducted on a sample of 41 patients with different parotid gland tumour pathologies in which we compared the FNAB findings with the histopathological findings of the surgical specimens. The study was conducted between 1st January 2004 and 31st December 2008.

A preoperative FNA and a subsequent partial resection of the gland were performed for all patients during the time period mentioned above. All FNAs were performed at our hospital and reported by a team composed of two pathologists belonging to the Pathological Anatomy Department of the hospital.

The surgical resections, all of them partial superficial parotidectomies, were carried out by members of the Otolaryngology Department.

The clinical histories were retrospectively reviewed to obtain clinical and pathological data. Demographic (gender, age), clinical, cytological and pathological data were analysed using the statistics program SPSS 11.5.

Cytological and histopathological findings were classified as: benign, malignant or no diagnosis. We calculated the sensitivity, specificity, positive predictive value (PPV), NPV and the FNA rate of false positives and negatives, using the histopathological diagnosis of the surgical specimen as standard.

Cases with cyto-pathohistological disagreement were reviewed by the same pathologist who reported the FNA, to identify the cause of the error.

Results

In the period from 1st January 2004 to 31st December 2008, we carried out 63 surgical procedures on the parotid gland. However, FNA was available prior to surgery for only 41 patients (65%); this group was the basis of our study. With regard to the demographic analysis, 68% (28) of patients were male and 32% (13) were female. The average age was 56 years (range, 16-85 years).

Of the 41 FNAs studied, 40 (97.6%) were satisfactory, that is, they enabled a cytological diagnosis to be made; only in 1 case (2.4%) was it unsatisfactory or non-diagnostic, because the sample extracted was acellular, proteinaceous material.

Cytology results diagnosed 32 benign lesions and 8 malignant. In the histopathological examination of the surgical specimen, 33 benign and 7 malignant lesions were diagnosed (Tables 1-2). We found 5 true positive cases (malignant cytology and histopathology), 30 true negatives (benign cytology and histopathology), 3 false positives (malignant cytology and benign histopathology) and 2 false negatives (benign cytology and malignant histopathology) (Table 3).

With these data we calculated FNA sensitivity for detecting malignancy of 71% and specificity of 91%, PPV of 62.5% and

Table 1 Cytological diagnosis (FNA) in parotid gland tumours

	No.
Benign	
Pleomorphic adenoma	9
Warthin's tumour	9
Monomorphic adenoma	2
Chronic sialadenitis	2
Salivary gland tumour	1
Oncocytic adenoma	2
Normal salivary gland	1
Cyst with acinar arrangement of epithelial cells	1
Simple cyst	1
Granulomatous inflammation	1
Epithelial proliferation	1
Acute inflammatory process	1
Benign cystic lesion	1
Total	32
Malignant	
Carcinoma	2
Acinar tumour	1
Dyskeratotic squamous cells	1
Squamous cell carcinoma	1
Malignant salivary gland tumour	1
Malignant pleomorphic adenoma	1
Dyskeratotic cells suspicious of malignancy	1
Total	8
Non-diagnostic	
Proteinaceous material	1
Total	1

Table 2 Histological diagnosis in parotid gland tumours

	No.
Benign	
Pleomorphic adenoma	11
Warthin's tumour	17
Monomorphic adenoma	1
Canalicular adenoma	1
Cyst with an epithelial lining	1
Non-specific chronic inflammatory changes	1
Warthin's tumour with squamous metaplasia foci	1
Benign lymphoepithelial lesion	1
Total	34
Malignant	
Acinar cell carcinoma	1
Muco-epidermoid carcinoma	1
Carcinoma	1
Low grade pleomorphic adenocarcinoma	1
Pleomorphic adenoma with a central adenocarcinoma area	1
Muco-epidermoid carcinoma	1
Undifferentiated malignant tumour	1
Total	7

Table 3 Cytological and histological diagnoses

		Histological diagnosis		
		Malignant	**Benign**	**Total**
Cytological diagnosis (FNA)	**Malignant**	5 (TP)	3 (FP)	8
	Benign	2 (FN)	30 (TN)	32
	Total	7	33	40

FN indicates false negative; FNA, fine needle aspiration; FP, false positive; TN, true negative; TP, true positive.

NPV of 93.7%. The rate of false negatives was 29%, while the rate of false positives was 9%.

The 3 false positive cases corresponded to Warthin's tumours, which were diagnosed as dyskeratotic cells or squamous cell carcinoma in the FNA (Figure 1). The 2 false negative cases were one muco-epidermoid carcinoma (Figure 2) and one low-grade pleomorphic adenocarcinoma, which were diagnosed in the FNA as adenoma with oncocytic changes and pleomorphic adenoma, respectively (Table 4). The case in which the FNA was not diagnostic because only proteinaceous material was obtained corresponded to a Warthin's tumour.

Discussion

The experience we have gained in the study of parotid gland tumours tells us that FNA is a highly-accurate diagnostic test in differentiating malignant from benign tumours, with a sensitivity and specificity of 71% and 91%, respectively. In our study, PPV was 62.5%, implying that in almost 37.5% of cases, a FNA reported as malignant was a benign lesion. On the other hand, NPV was 93.7%.

Reviewing similar studies published in the medical literature, we found that Cohen[2] obtained a PPV of 84% and a NPV of 77%, from a total of 126 parotid lesions. In Spain, Gete[4] described a PPV of 86.6% and a NPV of 93.9%. In larger samples, with 382 patients, FNA achieved a sensitivity of 83% and a specificity of 99%, with a PPV of 98% and a NPV of 97%.[6] The other studies show specificity between 85%-100% and sensitivity between 54%-98%,[5-7] indicating that parotid gland FNA is more accurate for benign tumours than for malignant ones.[5]

The reason for this ample difference in values is related to technical factors such as insufficient material obtained, puncture site error, performing the technique with the aid of ultrasound and especially to the experience of the pathologist who reported the FNAB. In our case, the pathologist who performed the puncture was not always the same as the one who reported it.

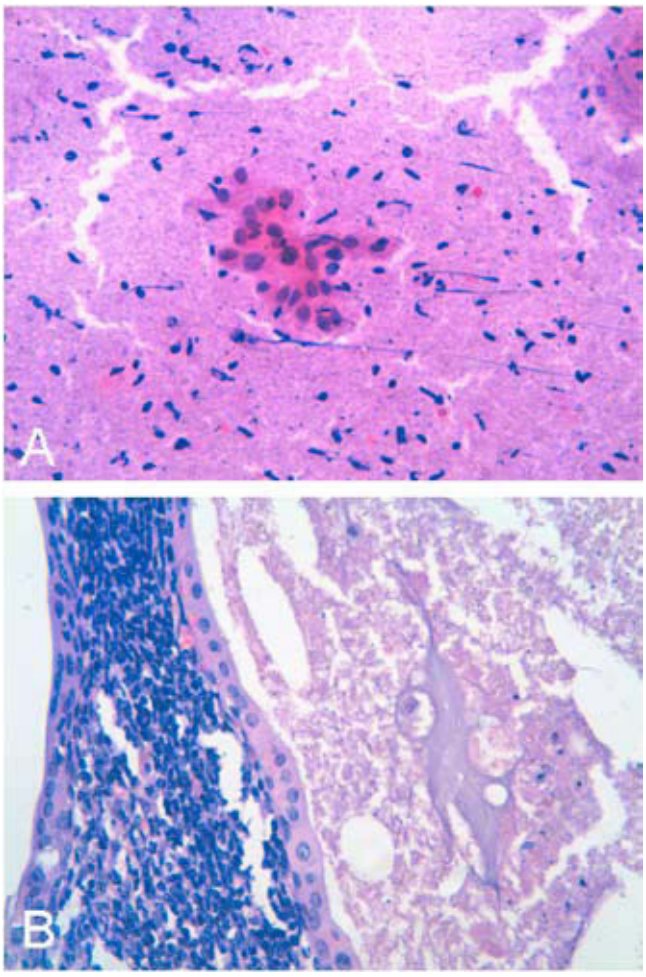

Figure 1 A) Fine needle aspiration presenting necrotic base and epithelial cells with dense cytoplasm and polymorphic nuclei (HE 400x). B) Histological section of parotid lesion, showing at high magnification the histology typical of Warthin's tumour with cystic cavities lined by cuboidal epithelium with oncocytic appearance and lymphoid stroma. The epithelium shows squamous metaplasia and variable cellular atypia (HE 400x).

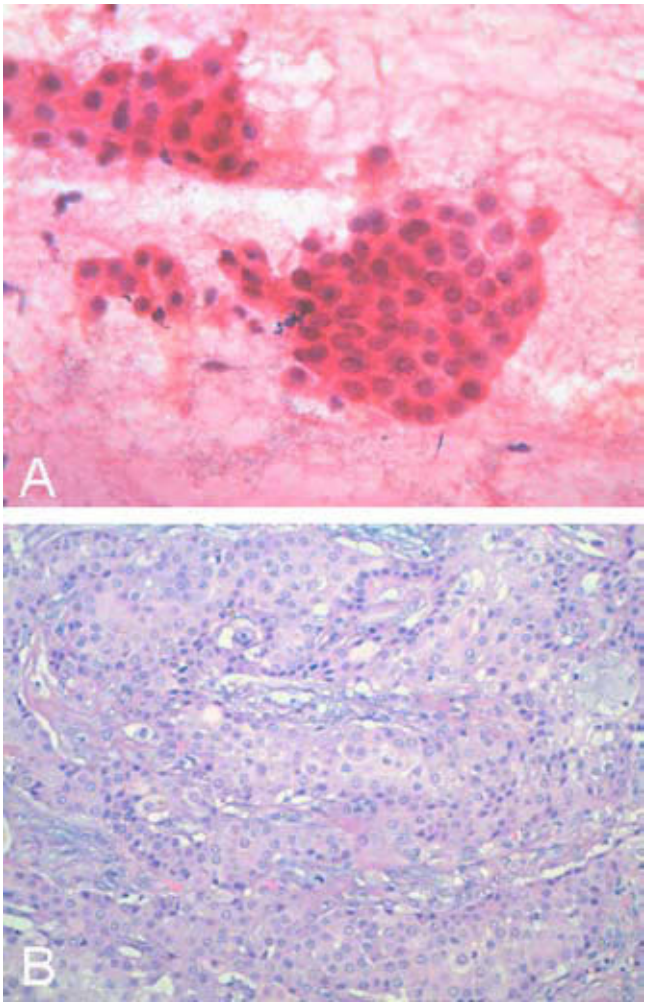

Figure 2 A) Fine needle aspiration showing epithelial-like cells, loose and in one-dimensional groups, with very wide cytoplasm and fine chromatin nuclei with evident nucleoli (HE 400x). B) Histological section showing epithelial cell nests with squamous covering, with occasional mucosal cells compatible with a diagnosis of muco-epidermoid carcinoma. Cytological atypia is variable (HE 200x).

We observed a total of 29% false negatives. It is common for this error to occur, mostly in malignant mixed tumours and low-grade muco-epidermoid carcinomas due to their heterogeneous cellularity, such as the one observed in our study. This is because muco-epidermoid carcinoma is a malignant neoplasm composed by squamous, mucous and intermediate cells that present varying degrees of cytological atypia. Low-grade lesions with minimal cytological atypia may therefore be confused with benign lesions (Table 4).

In our series, the cause of false positives was in all cases due to Warthin's tumour. This is a benign lesion that usually presents metaplastic changes in the epithelium. This squamous metaplasia, when accompanied by cytological atypia, may lead the pathologist to a false diagnosis of squamous cell carcinoma.

It has been reported that acinar cell carcinoma is often erroneously interpreted as a benign lesion in cytology.[8] Only 52% of malignant lesions were diagnosed by FNAB and among those which were not diagnosed were squamous cell, muco-epidermoid and cystic adenoid carcinomas and lymphomas.[9] False negatives are frequently seen in malignant parotid gland tumours, as described in 13%-29% of some series, especially with squamous cell, muco-epidermoid, cystic adenoid and myoepithelial carcinomas and mixed pleomorphic adenocarcinomas.[10,11] In our environment, the rate of false negatives is around 19%, identifying similar histopathological strains such as muco-epidermoid, cystic adenoid and acinar cell carcinomas and lymphomas.[4]

Conclusions

A simple, useful tool in the study of parotid gland tumours, FNA can guide us in the diagnosis and individualised planning

Table 4 False positives and negatives in the FNA of salivary glands

False positives	
Cytological diagnosis (FNA)	**Histological diagnosis**
Dyskeratotic squamous cells	Warthin's tumour
Squamous cell carcinoma	Warthin's tumour
Dyskeratotic cells suspicious of malignancy	Warthin's tumour
False negatives	
Cytological diagnosis (FNA)	**Histological diagnosis**
Adenoma with oncocytic changes	Muco-epidermoid carcinoma
Pleomorphic adenoma	Low-grade pleomorphic adenocarcinoma

FNA indicates fine needle aspiration.

for each patient. However, it is not without limitations in its diagnostic accuracy, being more accurate for benign tumours than for malignant.

Conflict of interests

The authors declare no conflict of interests.

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