

Fine needle aspiration biopsy in a diagnostic workup algorithm of salivary gland tumors

S. IVANOVÁ¹, J. SLOBODNÍKOVÁ¹, E. JANSKÁ¹, J. JOZEFÁKOVÁ²

¹Department of Radiology, e-mail: jslobod@ousa.sk, and ²Department of cytology, St. Elizabeth Cancer Institute, Bratislava 812 50, Slovak Republic

Received July 25, 2002

The ultrasonic diagnosis of salivary gland diseases can give a more accurate information than clinical data alone. In diagnosis of the parotid gland diseases, it is necessary to differentiate clearly tumors from other diseases. When a tumor is suspected, its presence should be confirmed, and determined if it is solitary, multiple, unilateral or bilateral, intra or extraglandular, and benign or malignant. In the period of May 1998 to January 2001 ultrasound examinations were performed in 354 patients, FNAB with ultrasound control were performed in 152 patients with a mean age of 49.7 years. The ultrasound and cytologic findings were correlated with surgical and histologic findings. Results indicate that in patients with solid mass of the salivary gland, ultrasound examination confirmed the finding of salivary gland tumor in all patients (100%). In non-solid diseases of salivary glands the diagnostic accuracy was slightly lower. The use of ultrasound techniques in the study of salivary gland pathology is well justified, due to its capacity to provide high resolution and improving clinical diagnosis. FNAB is a simple quick, accurate and virtually complications free investigative modality. The data on its ability to distinguish between lesions requiring surgery or not are encouraging.

Key words: Fine needle aspiration biopsy, ultrasound, salivary gland tumor.

Retrospective study and recent statistical data show increasing incidence of the salivary gland tumors in Slovakia. A principal problem associated with treatment of salivary gland lesions is the decision of the clinician regarding the type of lesion being treated and its anatomical location in relation to the various associated structures. Neoplasm is considered as an insidious disease with few, if any, clinical manifestations in the early stages. In spite of this, treatment may be effective if the new tumor growth is detected early enough [3]. Numerous pathological processes in the major salivary glands are recognized by palpation, which provides a good orientation during clinical examination. For a precise diagnosis, however, the clinical findings need to be combined with radiography, ultrasonography, computerized tomography, sialography, scintigraphy, fine needle aspiration biopsy (FNAB) and magnetic resonance. These diagnostic methods are expected to determine the exact site of tumors, their size and extension [1]. Moreover, FNAB can be used in cytological evaluation of lesions.

The salivary glands are subject to many pathological processes such as obstruction/inflammation, infection, and neo-

plasia, both benign and malignant. Salivary gland tumors are relatively rare, they represent less than 3% all head and neck tumors [12]. However, in the last years we observe their increasing incidence. In 1980 the number of patients treated at the II. Stomatological Department, University Hospital, Bratislava, was 7–8 per year; in 1998 it was 37 (5 times more). Most salivary gland neoplasia occurs in the parotid, 75% are benign and most of these are pleomorphic adenoma. The most common malignant lesions of the parotid gland are mucoepidermoid carcinoma and the adenoid cystic carcinoma [10]. The submandibular gland is about one tenth frequent site of neoplasia than the parotid gland. Neoplasia of the sublingual gland is even more rare, but when it does occur it is most likely malignant. When minor salivary glands are afflicted, the most common site is the posterior hard palate or upper lip and 50% of them are malignant [16].

The early literature on cytology reported that the cytological evaluation of aspirated material from salivary gland tumors was most challenging because of the wide variety of tumor types and the heterogeneity of cell population in-

dividual tumors [2]. The main subject of this study has been designed to investigate the usefulness, reliability and limitations of sonographically guided FNA, the relationship between cytological diagnosis obtained by FNAB and the histopathological diagnosis of specimen resected during surgery. Using the results of the study helps to establish the indication for FNAB in the algorithm of other diagnostic methods of salivary glands.

Material and methods

In a period from May 1998 to January 2001 the ultrasonography of parotid and submandibular masses was performed in a total of 354 patients. After careful examination by the surgeon FNAB was performed in 152 patients (Tab. 1). 71 of the patients were men and 81 women. They ranged in age from 19 to 85 with an average of 49.7 years. FNAB was performed in 92 cases from parotid gland (61%), 36 (24%) from submandibular gland and the other 24 cases (15%) from lesions of paraglandular regions. A standardized technique was used for all patients after careful examination, and with close cooperation of surgeon, radiologist and cytopathologist.

Table 1. Material and methods

Ultrasonography	-	354 patients	
FNAB/US	-	152 patients	- 49.7 Y.
		81 women	- 47.1 Y.
		71 men	- 52.6 Y.
Localization of biopsy:			
Gl. parotis	-	92 = 61%	
Gl. submandibularis	-	36 = 24%	
Paraglandular region	-	24 = 15%	

Results

One hundred and eight of the total 152 patients (71%) underwent the surgical treatment and the result of histopathological examination was compared with the cytological findings of the fine needle aspiration biopsy (Tab. 2). Histological evaluation revealed 67 tumors (62%). Forty three of them were benign lesions (64%) and 24 (36%) were malignant tumors. Eleven of the malignant tumors were diagnosed as primary salivary gland tumors and 13 as metastatic tumors. Among the remaining 41 patients (38%) the histopathological examination confirmed benign lesions – myoepithelial sialoadenitis (11), inflammations (15), cysts (15). A definitive cytological diagnosis was made for 149 of the 152 patients, cytology was insufficient in 12/152 cases and in 9 of them we had to repeat the biopsy. Benign and malignant tumors of salivary gland presenting in our group are demonstrated in Table 3.

Table 2. Results – correlation with definitive histological findings

Surgical treatment	108
Tumors	67
benign	43
malignant	24
Other benign lesions	41
Conservative treatment	44
Repeated biopsy	9 = 6%
Insufficient biopsy	3 = 2%

Table 3. Types of salivary gland tumors in our group

Benign tumors	43/67
Pleomorphic adenoma	27 (GP – 22, GSM – 5)
Adenolymphoma (Wartin's TU)	7 (GP – 5, GSM – 2)
Monomorphic adenoma	4 (GP – 3, GSM – 1)
Cystadenoma	1 (GP – 1)
Other tumors	4 (GP – 3, GSM – 1)
Malignant tumors	24/67
Primary	11
Mucoepidermoid carcinoma	4
Adenocarcinoma	1
Adenoid cystic carcinoma	1
Ca in pleom. adenoma	1
Lymphoma malignum	2
Other	2
Metastatic	13

There are few cases, in which the results of fine needle aspiration biopsy helped with the choice of proper therapy (surgical or conservative) or in case of the surgical therapy indicated the extension or radicality of the procedure.

Case 1. Patient is a 61-year-old woman, two times surgically treated for pleomorphic adenoma, first time 14 years ago (now suspicious for malignancy).

USG + Doppler + CT examination: Benign tumor of left parotid gland (Fig. 1).

Sonographically guided FNAB: Cytology showed scanty cellularity which is compatible with adenoma.

Histopathological examination: Recurrent pleomorphic adenoma.

Case 2. Patient is 25-year-old man with clinically benign slowly growing tumor of parotid gland, first symptoms occurred 2 years ago.

USG: Benign tumor of parotid gland (Fig. 2).

Sonographically guided FNAB: Microscopic findings show pleomorphic adenoma.

Histopathological examination: Pleomorphic adenoma.



Figure 1. Recurrent pleomorphic adenoma in a 61-year old woman. In the middle of the tumor tip of the needle as a white point is visible.

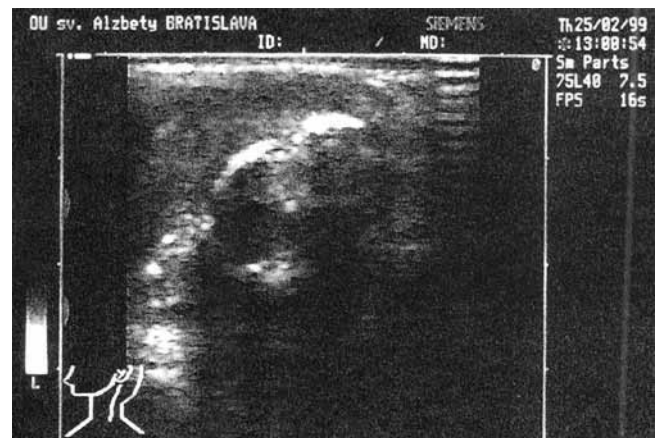


Figure 3. Mucoepidermoid carcinoma of the left parotid gland.

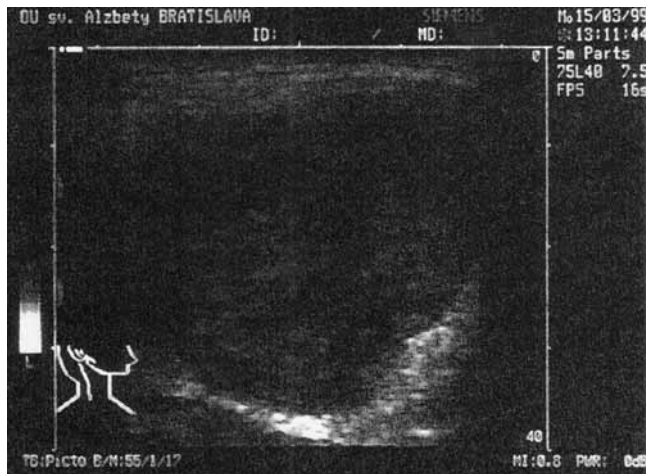


Figure 2. Pleomorphic adenoma in a 25-year old man.



Figure 4. Carcinoma in pleomorphic adenoma.

Case 3. Patient is 41-year-old woman with clinically benign 8-years slowly growing tumor of the left parotid gland, firm, but painless.

USG + CT: The shape, ill-defined borders and heterogeneity of the parotid gland tumor have led to speculation that the biological nature changed to malignant transformation. The imaging revealed the hypervascularisation of the tumor, calcifications and necrotic regions (4.5x2.5 cm) and changes of lymph nodes related to the parotid gland (Fig. 3).

Sonographically guided FNAB: The presence of a variety of cell types and growth patterns was suggestive for mucoepidermoid carcinoma.

Histopathological examination: High-grade mucoepidermoid carcinoma with perineural spreading.

Case 4. Patient is 61-year-old man with parotid gland tumor slowly growing for 30 years. Patient refused pre-

viously suggested surgical treatment. After a period of quiescence he noted accelerated growth, in time of clinical examination the tumor was fixed to the overlying skin, firm, but painless with size 7x8 cm. The numbness of the lower lip caused by facial nerve palsy was present.

USG examination: Large hypoechoic mass with ill-defined borders and increased vascularisation suspicious for malignancy (Fig. 4).

CT examination: Findings revealed large tumor with infiltration to the surrounding muscles, the tongue, the mouth floor, the oropharynx and to the great blood vessels. Lymphadenopathy was also present. The progress of the disease was no longer surgically curable.

Sonographically guided FNAB: Pleomorphic adenoma changed to malignant carcinoma.

Case 5. Patient is 55-year-old man with bilateral enlargement of salivary glands, recently accelerated growth on the

left side. The tumor is well-circumscribed, movable, painless, measuring 4x5 cm.

USG examination: The imaging revealed heterogenic structure of the major salivary glands bilaterally with hypoechoic and anechoic regions.

FNAB: Dif. dg. Wartin's tumor (adenolymphoma).

Discussion

Present data suggest that the imaging-guided FNAB has been useful in a variety of salivary gland disease applications. The detailed description of FNAB shows that this is a safe, easy-to-perform, cost-effective office procedure, which can provide the surgeon with valuable information for the management decision and the type of treatment [5]. It allows for less radical surgery for low-grade tumors, and it avoids surgery for metastatic disease from known primaries. The evaluation of the results indicates the place of FNAB among other diagnostic methods and proves the usefulness of FNAB in the proper indications as a specific and sensitive preoperative diagnostic tool at our institution. According to previous study in our department, we calculated the sensitivity, specificity and accuracy of this method. Sensitivity was calculated on the basis of the ratio of positive and suspicious tumors to all tumors confirmed to be malignant (80%). Specificity was calculated as the ratio of lesions with negative results to all lesions confirmed to be nonmalignant (80%). Accuracy was calculated by dividing the total number of true-positive and true-negative tumors by the total number of tumors (87%) [11]. Among diagnostic limitation of aspirated material are the limited histological architectural features and the absence of the tumor-stroma interface, which are both of critical importance in the diagnosis of many salivary gland neoplasms [4].

Because many head and neck abnormalities seen on MRI and CT are not palpable, sonographically guided biopsy of salivary gland masses is a logical tool to improve diagnosis. Sonographic guidance is critical to assuring that the mass being biopsied correlates with other imaging findings. Sonographically guided biopsy allows for the reliable identification of the needle tip within the mass. Even when submandibular and parotid masses are palpable, it might not be possible to clinically distinguish an enlarged regional lymph node from a true salivary gland mass [15].

Conclusion

To resume, the data of this paper allow to conclude that sonographically guided biopsy has three advantages over FNAB that is not guided by imaging:

- 1) it allows for confident biopsy of masses seen on other cross-sectional imaging studies,
- 2) it is usually able to distinguish perisalivary lymph nodes from true intrasalivary gland masses,
- 3) it avoids the pitfall of nondiagnostic aspiration of the cystic component of masses.

References

- [1] AL-KHAFAJI B, NOSTOK B, KATZ R. FNA of 154 Parotid masses with histologic correlation. *Cancer (Cancer Cytopathology)* 1998; 84(3): 153–159.
- [2] CAJULIS RS, GOKASLAN ST, YU GH, FRIAS-HIDVEGY D. Fine needle aspiration biopsy of salivary glands. A five-year experience with emphasis on diagnostic pitfalls. *Acta cytol* 1997; 41(5): 1412–1420.
- [3] CASTELIJNS JA, VANDER BREKEL MWM. Imaging of lymphadenopathy in the neck. *Eur Radiol* 2002; 12: 727–738.
- [4] CRISALLINI EG, ASCANI S, FARABI R. Fine needle aspiration biopsy of salivary gland, 1985-1995. *Acta cytol* 1997; 41(5): 1421–1426.
- [5] FULCINITI F, CALIFANO L, ZUPI A, VETRANI A. Accuracy of FNAB in head and neck tumors. *J Oral Maxillofac Surg* 1997; 55: 1094–1097.
- [6] GIBBONS D, SABBORIAN MH, VUITCH F, GOKASLAN ST, ASHFAG R. Fine-needle aspiration findings in patients with polymorphous low grade adenocarcinoma of salivary glands. *Cancer* 1999; 87: 31–36.
- [7] HUVOS AG. Salivary glands. In: *Diagnostic Surgical Pathology*. New York: Raven Press, Ltd. 1989, p. 655.
- [8] MARTINOLI C, DERCHI L, SOLBIATI L. Color Doppler sonography of salivary glands. *Am Roentgen J* 1994; 163: 933–941.
- [9] SEIFERT G. Diagnose und Prognose der Speicheldrüsentumoren. *Mund Kiefer Gesichts Chir* 1997; 1: 252–267.
- [10] SCHIK S, STEINER E, GAHLEITNER A, BOHM P. Differentiation of benign and malignant tumors of the parotid gland: value of pulsed Doppler and color Doppler sonography. *Eur Radiol* 1998; 8: 1462–1467.
- [11] SHINTANI S, MATSUURA H, HASEGAWA Y. Fine needle aspiration of salivary gland tumors. *Int J Oral Maxillofac Surg* 1997; 26: 284–286.
- [12] STÁREK I, VOMÁČKA J. Ultrasound diagnostic of the major salivary gland's inflammations. *Head and Neck Diseases* 1997; 3–4: 10–14 (In Czech).
- [13] SUMI M, IZUMI M, YONETSU K, NAKAMURA T. Sublingual gland: MR features of normal and diseased states. *AJR* 1999; 172: 717–722.
- [14] TONAMI H, HIGASHI K, MATOBA M, YOKOTA H. A comparative study between MR sialography and salivary gland scintigraphy in the diagnosis of Sjögren syndrome. *J Comput Assist Tomogr* 2001; 25: 262–268.
- [15] VOMÁČKA J, STÁREK I, MICHÁLKOVÁ K, HOUSERKOVÁ D, BROŽ M. Ultrasound diagnosis of the neck lymphadenopathy. *Ces Radiol* 1999; 53(2): 82–87 (In Czech).
- [16] YOUSEM DM, KRAUT MA, CHALIAN AA. Major salivary gland imaging. *Radiology* 2000; 216: 19–29.