Aegean Pathology Journal **1**, 51–56, 2004
Available on line at www.epd.org.tr/apj.php

Fine needle aspiration cytology of the salivary glands: a twelve years' experience

Canan Ersöz[1], Aysun H. Uguz[1], Ülkü Tuncer[2], Levent Soylu[2], Mete Kiroglu[2]
Departments of Pathology[1] and Otorhinolaryngology[2], Çukurova University Faculty of Medicine, Adana, Turkey

Accepted for publication on 10 May 2004

Objective: Fine needle aspiration (FNA) cytology aims to assist the clinician in the management of patients with salivary gland (SG) masses. We aimed to present our twelve-year experience concerning FNA in SG lesions to address the importance of this procedure.
Study Design: Aspirates of 221 cases from SG lesions were reviewed retrospectively. In 151 cases, the FNA diagnosis was consistent with histologic findings.
Results: FNA diagnoses were benign in 72.8%, and malignant in 19.2% of the cases. Eleven cases were reported as suspicious for malignancy. The diagnostic sensitivity was 94% and specificity was 100%. Eight of 43 malignant cases were clinically referred with no evidence for a malignant tumor initially, but FNA was reported as malignant or suspicious for malignancy.
Conclusions: Our study documents that FNA is a highly sensitive and specific procedure. It provides preoperative recognition of benign and malignant tumors. Besides that, it helps to prevent unnecessary surgery in SG swellings. To our knowledge, this article is the largest series in Turkish literature concerning FNA of SG. We think that our results are suggestive for FNA to be a primary diagnostic tool in SG lesions.

Keywords: Fine needle aspiration, salivary gland, cytology

Introduction

The salivary gland (SG) system is composed of major SGs (parotid, submandibular, and sublingual glands) and the minor SGs which are found throughout the submucosa of the oral mucosa and as numerous small glandular tissues. Related to the histologic complexity of SGs, their lesions present with a great variety of morphologic features.[1]

Fine needle aspiration (FNA) cytology of the SG is an accepted, sensitive and specific technique in the diagnosis of both neoplastic and non-neoplastic lesions.[2] It is a relatively painless and safe procedure for a rapid and current diagnosis. Many clinicians believe that FNA as a reliable and useful technique for the management of their patients with SG masses.[3–8] Since FNA of the SGs can distinguish inflammatory lesions from neoplastic conditions, lymphomas from epithelial malignancies and primary tumors from metastatic tumors, FNA provides information for planning the operation.[9] The aim of this study is to present our twelve-year experience and evaluate if FNA is a valuable diagnostic tool for the patients with SG masses.

Materials and methods

FNA was carried out in a total of 221 patients with a SG lesion over a 12 year period. Aspirates of these cases were retrieved from the files of the Pathology Department of Çukurova University Faculty of Medicine, and a private laboratory. FNA was performed with a 26G needle attached to a 10 ml disposable plastic syringe that was mounted on a Cameco syringe holder. All aspirations and microscopic examinations were performed by one cytopathologist.

Aspirates were smeared on clean slides, air dried or wet fixed and stained with May-Grunwald Giemsa (MGG) and Papanicolaou's stain. The lesions were classified as normal, benign, suspicious for malignancy, malignancy positive and inadequate sample.

In 151 cases (68.3%), a biopsy or radical surgical procedures were performed for histopathological examination. The overall diagnostic sensitivity and specificity were also calculated.

Results

Histologic diagnoses were available in 151 cases. Of the 151 cases, 74% were from parotid glands, 24% were from submandibular glands, two cases were from minor salivary glands. There were 83 females and 68 males, with a female: male ratio of 1.2:1. The age range was between 4-80 years with a mean of 47 years. In our series, the overall sensitivity and specificity were 93% and 100%, respectively.

Pleomorphic adenoma was the most common diagnosis (Figure 1). It consisted 42% of all the benign lesions. Table 1 shows the correlation between FNA cytology results and their biopsy confirmation. There was no false-positive result. However, there were three false-negative cases in this series: One case was diagnosed as retention cyst and diagnosed as low-grade mucoepidermoid carcinoma. A second case was considered as a pleomorphic adenoma cytologically, but the histological diagnosis was adenoid cystic carcinoma. The third case was reported as oncocytoma in FNA and frozen section. Subsequent histology revealed an acinic cell carcinoma.

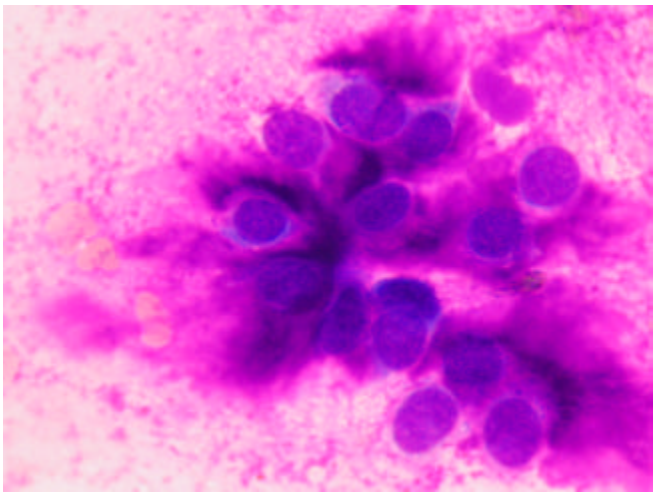

Figure 1. Aspirate from pleomorphic adenoma with loosely cohesive epithelial cells showing pleomorphism (MGG x 400).

Table 1. FNA cytology diagnoses and their histopathological confirmation

FNA Diagnosis	Histological diagnosis	
	Malignant (n=43)	**Benign (n=108)**
Malignant	29	0
Suspicious for malignancy	11	0
Benign	3	107
Unsatisfactory sample	0	1

Histological diagnosis was a different benign condition in six cases of the 108 benign lesions correlated histologically. One of them was diagnosed as mucocele in cytology, whereas histology revealed a Warthin's tumor. The second case was considered as a chronic sialadenitis in FNA, however it was a schwannoma histologically. Two of six cases were interpreted as normal structural elements of SG, but their histologic diagnoses were pleomorphic adenoma. The fifth case was diagnosed as Warthin's tumor and in histology, an oncocytoma was diagnosed subsequently. In the sixth case, chronic sialadenitis was suspected in cytology, however, histology revealed a Warthin's tumor.

Table 2 shows the results of histological confirmation in 151 patients (Figures 2, 3 and 4). The histological diagnoses of "suspicious for malignancy" cases were demonstrated in Table 3 (Figures 5 and 6). Of 29 malignant and 15 cases with suspicious for malignancy in FNA, eight cases were clinically without any evidence for malignancy. These clinically unrecognized patients had no pain, a fixed mass, a facial nerve palsy or a skin lesion. Three of them had low grade mucoepidermoid carcinoma, and the others had acinic cell carcinoma, adenoid cystic carcinoma, epidermoid carcinoma (grade I), ductal carcinoma ex pleomorphic adenoma and adenocarcinoma ex plemorphic adenoma.

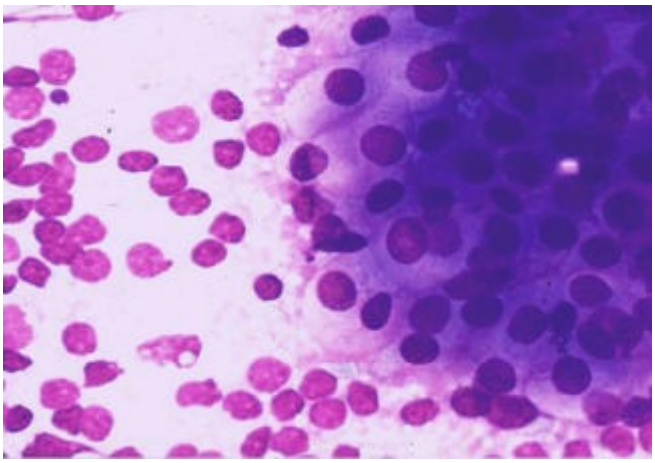

Figure 2. Cytologic smear of Warthin's tumor showing cluster of oncocytic cells and lymphocytes (MGG x400).

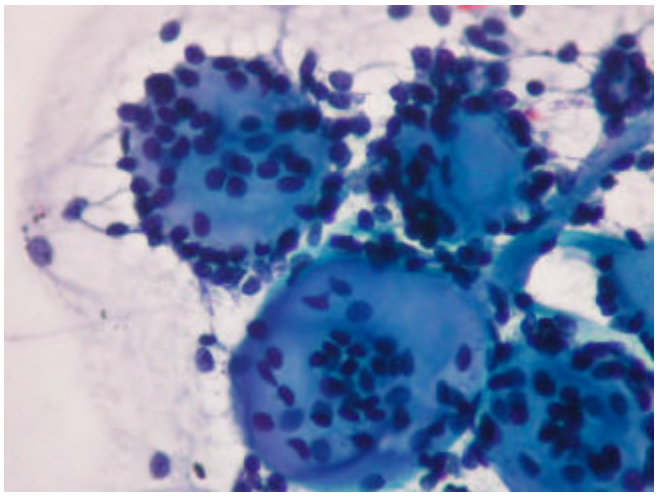

Figure 3. Globule surrounded by monomorphic tumor cells in adenoid cystic carcinoma (MGG x 400).

Table 2. Histopathological diagnoses of 151 patients.

Histopathological diagnosis	Number of cases
Benign	**108**
Normal SG	1
Pleomorphic adenoma	46
Warthin's tumor	23
Chronic sialadenitis	18
Pilomatrixoma	2
Retention cyst*	8
Lymphoepithelial lesion	3
Cystic hygroma	1
Lipoma	2
Schwannoma	2
Vascular neoplasm	2
Malignant & suspicious for malignancy	**43**
Suspicious for malignancy	11
Adenoid cystic carcinoma	6
Acinic cell carcinoma	5
Mucoepidermoid carcinoma	2
Malign mixed tumor	1
Ductal carcinoma ex pleomorphic adenoma	1
Lymphoepithelial carcinoma	1
Metastatic carcinoma	16

* One of these cases was "unsatisfactory sample" in FNA

Discussion

Tumors of the SG comprise 3% to 6% of all head and neck neoplasms in adults with an incidence of 1 to 3 per 100 .000 people per year.[1] FNA cytology has become very popular in Europe and North America for the diagnosis of head and neck masses including SG tumors.[3]

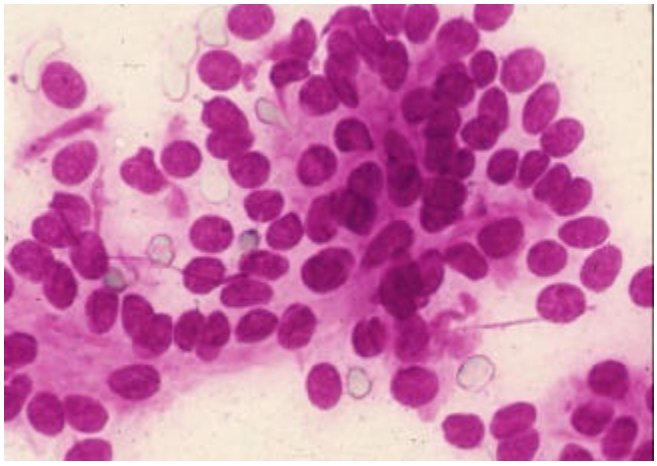

Figure 4. Round to polygonal cells with abundant cytoplasm in acinic cell carcinoma (MGG x 400).

Table 3. Histopathologic diagnoses of the cases with FNA diagnoses as "suspicious for malignancy"

Histopathologic diagnoses	No. of cases
Low-grade mucoepidermoid carcinoma	7
Adenocarcinoma ex plemorphic adenoma	2
Metastatic carcinoma	2

FNA is a safe and relatively non-traumatic procedure that can quickly provide important preoperative information.[1,2,4,6,8,9,11–13] Today, the efficacy of FNA is well documented.[1,2,4,14–20]

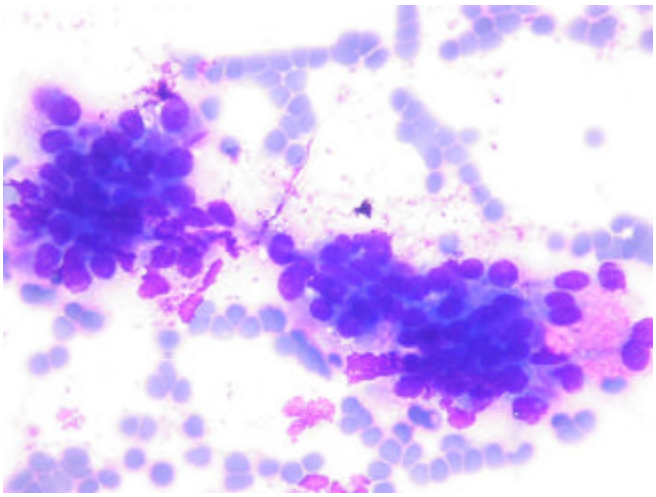

Figure 5. Low grade mucoepidermoid carcinoma showing monotonous cells with pale cytoplasm (MGG x 1000).

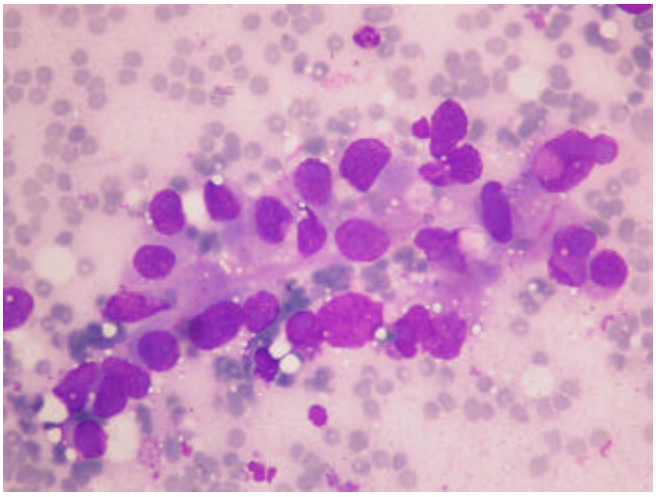

Figure 6. Aspirate from adenocarcinoma ex plemorphic adenoma (MGG x 100).

In SG lesions, an effective therapeutic approach requires the knowledge of whether a tumor is benign or malignant. Ideally, the histologic classification of the tumor should be known. At this point, FNA has many advantages comparing with other diagnostic techniques. Specimens from open biopsy almost always accurately predict the histological features of SG masses, but this method has a high morbidity with a risk of contamination of the operative field with tumor cells. An incision for a biopsy also causes difficulty in subsequent surgical management and probably less likely to succeed.[15] The main goal of FNA is to determine if a mass is inflammatory and/or reactive, benign or malignant neoplasm and if possible, to render a specific diagnosis. The preoperative information concerning the tumor type can be informative to plan the best surgical approach. Close cooperation between the clinician and an experienced cytopathologist provides good outcome in FNA procedure.[3] However, some complications and problems with FNA have also been described. Bleeding, pain, infection, tumor seeding, and tumor necrosis are rarely encountered. These complications almost do not compromise accurate histologic diagnosis, except the infarction sometimes may obscure the diagnosis.[2,7,12,16,21,22] None of these complications occurred in our patients.

Unsatisfactory aspirate is another problem in FNA procedure. Some specimens cannot be assessed because of poor cellularity or poor quality.[3] Among our 151 cases, only one case (0.66%) was reported as unsatisfactory specimen. In all cases, both FNA and histological evaluation were done by the same pathologist. We believe that this approach played an important role in having such a low unsatisfactory rate in this series. Ultrasonic guidance may help to obtain better aspirates and to decrease the number of the unsatisfactory material, especially in small non-palpable or semisolid lesions.[3]

Some authors have reported FNA to be similar to frozen section diagnosis in terms of reliability and accuracy.[3,20,23] In our study, a false-negative case diagnosed according to FNA as “oncocytoma” was also diagnosed wrongly with the frozen-section technique. The final diagnosis of this case was “acinic cell carcinoma” in the resection specimen. There are several advantages of FNA over frozen section. FNA is rapid and inexpensive. It allows to plan the time and type of the surgery, provides opportunity for patient counseling, and obtaining informed patient consent. FNA does not require general anesthesia. Moreover, the smears can be evaluated without being under the pressure of urgent reporting. However, frozen section has a great value providing to evaluate the margins, suspicious lymph nodes (for deciding the neck dissection), and nerve invasion. So, the surgeon can perform adequate tumor resection and avoid from over aggressive surgery.[12] We think that both methods have their own merits in diagnosis and their diagnostic accuracy depends on experience. However, FNA should be used as a first step diagnostic tool.

FNA in SG lesions is one of the most difficult areas in cytopathology due to the overlapping morphologic patterns in many benign and malignant SG neoplasms.[1,2] Besides that, histological patterns may show various differences within the same tumor. For example, when the aspirate is composed of only mucinous cystic material which contains a few cells, it could be a challenge for cytopathologist to diagnose a well differantiated mucoepidermoid carcinoma. This diagnosis can also be a problem with the frozen and histologic sections.[6,12] We reviewed seven cases with "mucoepidermoid carcinoma", which were interpreted as "suspicious for malignancy" with FNA.

Despite earlier publications which reported a greater number of false-positive diagnoses than expected, more recent reports indicate greater accuracy and less sampling error. The false-positive rates reported in the literature range from 10% to 0% and the accuracy increases with the experience of the pathologist.[9] In our series, there was not any false-positive case. There are a number of studies indicating unusual or atypical features and pitfalls that may cause difficulties in interpretation.[1–4,9,12,14,15] Stewart et al.[3] reported that their false negative results were caused by sampling errors especially in cystic lesions or were due to misinterpretation of uncommon neoplasms. Qizilbash and co-workers[12] described that eight benign lesions in their series were reported as different benign lesions, and two mucoepidermoid carcinomas were not interpreted accurately in cytologic diagnosis, and three metastatic tumors were evaluated as benign lesions when cytologic interpretation was correlated with the histopathologic findings.

The sensitivity in our study was 93% and the specificity was 100%. Our results were similar to the previous report about SG lesions. In 1983, Qizilbash et al reviewed 160 patients and reported a sensitivity of 87.5% and a specificity of hundred percent[14] In a series of 341 cases, O'Dwyer et al.[15] found a sensitivity of 73% and a specificity of 94%. In a series of Frable et al.[24], FNA was performed on 552 patients and the sensitivity was 93.3% and the specificity was 99%. Young et al. reported[25] a sensitivity of 84% and a specificity of 98% in 1981.

Another important point about the value of FNA is clinically underestimated malignant cases. In our series there are eight patients without prior suspicion of malignancy, and FNA was performed as the initial diagnostic method. In these patients, the decision for surgical approach was planned according to the cytodiagnosis and insufficient surgery was avoided.

Representative, meticulous sampling and careful clinicocytologic correlation, complemented by the use of some cytochemical stains in selected cases, will provide correct diagnosis in the majority of the cases. In the cases where exact typing is not possible, a broad cytologic diagnosis such as malignant, benign, neoplastic or non-neoplastic should be acceptable and would help in determining the therapeutic protocol.[6] Some centers have been able to reduce the number of patients with SG masses undergoing surgery by 30% using FNA as a primary diagnostic tool.[9] On the other hand, if clinically suspicious SG lesions have unsatisfactory or discordant results, the operation should not be excluded.

Ersöz et al.[26] reported 584 FNAC cases from head and neck region and 35 cases of them were SG lesions and Özkara[27] described the correlation between cytologic and histopathologic diagnoses of 39 cases with SG masses. Our series is the one of the study from Turkey which has high accuracy rates for FNAC of the SG masses.

Our twelve-year experience shows that FNA cytology of SG masses is a valuable diagnostic method. Accuracy depends on experience and our results suggest that if the limitations and pitfalls are always kept in mind, this method provides superior advantages for the clinicians and the patients.

References

1. Schindler S, Nayar R, Dutra J, Bedrossian CWM. Diagnostic challenges in aspiration cytology of the salivary glands. Semin Diagn Pathol 2001; 18: 124-146.
2. Cajulis RS, Gokaslan ST, Yu GH, Frias-Hidvegi D. Fine needle aspiration biopsy of the salivary glands, a five year experience with emphasis on diagnostic pitfalls. Acta Cytol 1997; 41: 1412-1420.
3. Shintani S, Matsuura H, Hasegawa Y. Fine needle aspiration of salivary gland tumors Int J Oral Maxillofac Surg 1997; 26: 284-286.
4. Wong DS, Li GK. The role of fine needle aspiration cytology in the management of parotid tumors: a critical clinical appraisal Head Neck 2000; 22: 469-473.
5. Chhieng DC, Cangiarella JF, Cohen JM. Fine needle aspiration cytology of lymphoproliferative lesions involving the major salivary glands. Am J Clin Pathol 2000; 113: 563-571.

6. Jayaram G, Verma AK, Sood N, Khurana N. Fine needle aspiration cytology of salivary gland lesions. J Oral Pathol Med 1994; 23: 256-261.
7. Mukunyadzi P, Bardales RH, Palmer HE, Stanley MW. Tissue effects of salivary gland fine needle aspiration. Am J Clin Pathol 2000; 114: 741-745.
8. Ersöz C, Soylu L, Cosar EF, Özsahinoglu C. Diagnostic value of fine needle aspiration cytology in pleomorphic adenoma of the salivary gland (Turkish). Türk Otolarengoloji Arsivi 1993; 31: 188-191.
9. Zakowski MF. Fine needle aspiration cytology of tumors: Diagnostic accuracy and potential pitfalls. Cancer Invest 1994; 12: 505-515.
10. Ersöz C, Çetik F, Aydin Ö, Cosar EF, Talas DÜ. Salivary duct carcinoma ex pleomorphic adenoma; analysis of the findings in fine needle aspiration cytology and histology. Diagn Cytopathol 1998; 19: 201-204.
11. Abad MM, Macias CG, Alonso MJ, et al. Statistical evaluation of the predictive power of fine needle aspiration (FNA) of salivary glands. Path Res Pract 1992; 188: 340-343.
12. Chan MKM, Mc Guire LJ, King W, Li AKC, Lee JCK. Cytodiagnosis of 112 salivary gland lesions, correlation with histologic and frozen section diagnosis. Acta Cytol 1992; 36: 353- 363.
13. Martin H, Ellis EB. Biopsy of needle puncture and aspiration. Ann Surg 1930; 92: 169-182.
14. Qizilbash AH, Sianos J, Young JEM, Archibald ST. Fine needle aspiration biopsy cytology of major salivary glands. Acta Cytologica 1985; 29: 503-512.
15. O'Dwyer P, Farrar WB, James AG, Finkelmeier W, McCabe DP. Needle aspiration biopsy of major salivary gland tumors. Cancer 1986; 57: 554-557.
16. Young JA. Fine needle aspiration cytology of salivary glands. Ear Nose and Throat Journal 1989; 68: 120-129.
17. Weinberger MS, Rosenberg WW, Meurer WT, Robbins KT. Fine needle aspiration of parotid gland lesions. Head Neck 1992; 14: 483- 487.
18. Klijanienko J, Vielh P. Fine needle sampling of salivary gland lesions. Diagn Cytopathol 1996; 14: 195-200.
19. Stanley MW, Bardales RH, Farmer CE, et al. Primary and metastatic high grade carcinomas of the salivary glands: a cytologic-histologic correlation study of twenty cases. Diagn Cytopathol 1995; 13: 37-43.
20. Cross DL, Gansler TS, Morris RC. Fine needle aspiration and frozen section of salivary gland lesions. Southern Med J 1990; 83: 283-286.
21. Rau AR, Pai RR, Nayak S. Infarction of acinic cell carcinoma in a patient infected with HIV: A complication of fine-needle aspiration cytology obscuring definitive diagnosis. Diagn Cytopathol 2001; 24: 301-303.
22. Pabuççuoglu HU, Lebe B, Sarioglu S, Lebe E. Infarction of pleomorphic adenoma: A rare complication of fine-needle aspiration obscuring definitive diagnosis. Diagn Cytopathol 2003; 29: 222-224.
23. Cohen MB, Liung BME, Boles R. Salivary gland tumors. Fine needle aspiration vs. Froz.en section diagnosis. Arch Otolaryngol Head Neck Surg 1986; 112: 867-869.
24. Frable MAS, Frable WJ. Fine needle aspiration biopsy of salivary glands. Laryngoscope 1991; 101: 245-249.
25. Young JEM, Archibald SD. Shier KJ. Needle aspiration cytologic biopsy in head and neck masses. Am J Surg 1981; 142: 484-489.
26. Ersöz C, Gümürdülü D, Aydin Ö, Ergin M, Kayaselçuk F. Fine needle aspiration cytology in head and neck lesions (A series of 584 cases). Bulletin of Pathology 1998; 15.
27. Özkara SK, Yildiz K. Fine needle aspiration cytology of salivary glands (Cyto-histopathologic correlation in 39 cases). The Turkish Journal of Pathology 2002; 18: 35-38.