

# Fine Needle Aspiration Cytology in the Evaluation of Parotid Gland Tumors

Margita Belušić Gobić<sup>1</sup>, Diana Pedisić<sup>2</sup>, Irena Seili Bekafigo<sup>3</sup>, Robert Cerović<sup>1</sup>, Radan Starčević<sup>2</sup>, David Gobić<sup>4</sup> and Mirna Juretić<sup>1</sup>

<sup>1</sup> Department of Oral and Maxillofacial Surgery, Rijeka University Hospital Center, School of Medicine, Rijeka University, Rijeka, Croatia

<sup>2</sup> Department of Otorhinolaryngology – Head and Neck Surgery, School of Medicine, Rijeka University, Rijeka, Croatia

<sup>3</sup> Department of Cytology, Department of Internal Medicine, Rijeka University Hospital Center, School of Medicine, Rijeka University, Rijeka, Croatia

<sup>4</sup> Department of Internal Medicine, Rijeka University Hospital Center, School of Medicine, Rijeka University, Rijeka, Croatia

## ABSTRACT

*Main objective of this study was to evaluate the usefulness and accuracy of fine needle aspiration cytology (FNAC) diagnosis of parotid masses to distinguish reliably between benign and malignant lesions. In the period of 5 years, 214 parotid glands were resected at the Rijeka University Hospital Center (Croatia), but 176 patients had cytopathological and histopathological diagnoses and therefore fulfilled the criteria for study. The results of the FNAC were analyzed and compared to the corresponding histopathological diagnosis obtained from the surgical specimen. Histological evaluation revealed 17 malignant and 159 benign lesions. There were 13 true positive, 147 true negative, 3 false negative, and 13 false positive. Sensitivity of FNAC was 81%, and specificity was 98%. FNAC results provide useful predictive preoperative information and better preparation the surgeon and patient for surgical procedure.*

**Key words:** parotid tumors, salivary gland tumors, fine needle aspiration cytology (FNAC), histopathologic diagnosis, nonthyroidal neck tumors

## Introduction

Fine needle aspiration cytology (FNAC) technique is well known diagnostic procedure for head and neck masses as well as masses in the other locations through the body<sup>1–3</sup>. There are many studies confirming the reliability of FNAC in the diagnosis of nonthyroidal neck tumors, but FNAC of salivary gland lesions has not been uniformly accepted<sup>4–9</sup>. Batsakis et al. argued that FNAC has little influence on clinical management of parotid tumors. Its application in the parotid tumors is, however, controversial<sup>10</sup>. The aim of this study was to evaluate the usefulness and accuracy of ultrasound guided fine needle aspiration cytology (FNAC) in the diagnosis of parotid gland masses.

## Patients and Methods

This is the retrospective study of 176 patients with parotid gland surgery and preoperative ultrasound gui-

ded FNAC. In the period of 5 years (between 2004 and 2008), 214 parotid glands were resected at the Rijeka University Hospital Center (Croatia) at the Department of Otorhinolaryngology and at the Department of Maxillofacial Surgery. A total of 176 patients had both cytopathological and histopathologic diagnoses and therefore fulfilled the criteria for this study. The results of FNAC were analyzed and compared with the corresponding histopathological diagnosis. The FNAC results were classified into the following categories: true-negative (absence of malignancy correctly diagnosed), true-positive (presence of malignancy correctly diagnosed, included specimens that were interpreted as suspicious for malignancy), false-negative (the cytological specimen failed to diagnose a malignancy) and false-positive (the cytological specimen was incorrectly considered or suspicious for malignancy). Patients with cytological diagnosis where malignancy could not be excluded were classified in the

positive group because they need operation. The study included only previously untreated patients with surgical procedures on the parotid gland that included supra-facial parotidectomy or total parotidectomy with or without preservation of the facial nerve. Fine needle aspiration cytology was performed by surgeons of both departments using a 22 gauge needle attached to a 10 ml syringe. A minimum of two needle passes were made in each case and a minimum of four smears were prepared. The slides were air-dried, stained according to May-Grünwald-Giemsa method, and examined by one cytologist.

**Results**

According to histopathologic diagnosis there were 159 benign tumors and 17 malignant tumors (44% adenoma pleomorpe, 39% Warthin tumor, 10% carcinoma, 7% other diagnosis). After FNAC there were 150 benign tumors and 26 malignant tumors (42% adenoma pleomorpe, 30% Warthin tumor, 15% carcinoma, 13% other diagnosis). The age range for benign tumors was 31 to 77 years with a mean age of 58 years ( $\bar{X}=56.4$ ,  $SD\pm 14.6$  years). For malignant tumors the age range was 23 to 83 years with a mean age of 65 years ( $\bar{X}=60.3$ ,  $SD\pm 17.1$  years). The patients with malignant tumors were not older than patients with benign tumors ( $p=0.230$ ). There were 104 (59.09%) female and 72 (40.9%) male patients without statistical significance regarding gender ( $p=0.288$ ). Malignant tumors occurred more often on the right side with statistical significance ( $p=0.044$ ).

Table 1 shows correlations between FNAC and histopathologic diagnosis. The diagnosis of Warthin tumor, adenoma pleomorpe and carcinoma were the diagnosis with statistical significant concordance in cytologic and histopathologic diagnosis ( $p<0.001$ ,  $\chi^2=125.41$ ).

Table 2 shows frequency of discrepancies between cytologic and histopathologic diagnosis.

Reexamination of 16 specimens that showed discrepancy between cytology and histology reports show that 10 were due to non-representative specimens, 3 specimens were characterized as inadequate or too scanty, because they contained very few cells, or none at all. In the »suspicious« category there were 3 cases, 2 turned out benign, and one malignant.

**TABLE 2**  
DISCREPANCIES BETWEEN FINE NEEDLE ASPIRATION CYTOLOGY (FNAC) AND HISTOPATHOLOGIC DIAGNOSIS

FNAC diagnoses	Histological diagnoses	No.
Carcinoma	Cyst	1
Malignancy could not be excluded	Warthin tumor	10
Carcinoma	Adenoma plomorphe	2
Warthin tumor	Carcinoma	1
Lymphatic cells	Carcinoma	1
Adenoma pleomorpe	Carcinoma	1
	Total	16

One example of this later case is shown in Figures 1 and 2. The case of discordant FNAC and pathologic report was 75 year old female patient, with right parotid mass measuring 34x19 mm, from which 5 ml viscous yellow-greenish fluid was aspirated. Smears showed small squamous epithelial cells lying singly, some with atypia, and numerous neutrophyl granulocytes in the background of cellular debris. Due to scant cellularity, FNAC was repeated, with the same result, and cytological report was: rare atypical squamous cells – suspicious for squamous cell carcinoma, with inflammation. Patient underwent surgery, and pathologic report was: lymphoepithelial cyst with surrounding mononuclear inflammatory infiltrate. There were none lymphatic elements in FNAC specimens. Possible reason is that lesion was missed during FNA, and material for cytology originated from adjacent dilated ducts with squamous metaplasia and inflammation with neutrophils. The cytological diagnosis was true positive in 13 (7.38%) cases and true negative in 147 (83.5%) cases. There were 13 (7.38%) false positive cases and 3 (1.7%) false negative results. Sensitivity of FNAC was 81% and specificity was 98%.

**Discussion**

The main objective of FNAC diagnosis of parotid masses is to distinguish reliably between benign and malignant lesions. In this study the incidence of Warthin tu-

**TABLE 1**  
CORRELATION BETWEEN FINE NEEDLE ASPIRATION CYTOLOGY (FNAC) AND HISTOPATHOLOGIC DIAGNOSIS

Reference Diagnosis	Cytologic diagnoses (No.)	Histologic diagnoses (No.)	Overlap (No.)
Warthin tumor	53	69	51
Adenoma plomorphe	75	76	70
Adenoma monomorphe	0	4	0
Cyst	12	6	1
Carcinoma	26	17	13
Sialoadenitis	2	2	2
Lymph node	8	2	2
Total	176	176	140

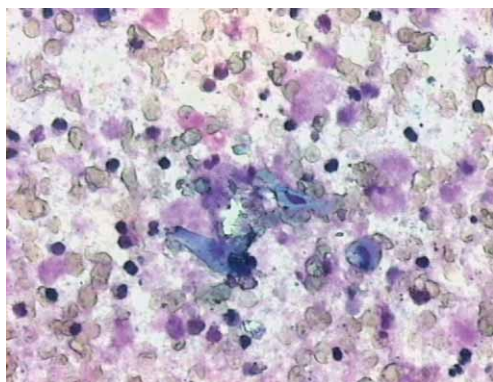


Fig. 1. Atypical squamous cells in the background of neutrophils and cellular debris, May-Grünwald-Giemsa (MGG) staining, x200.

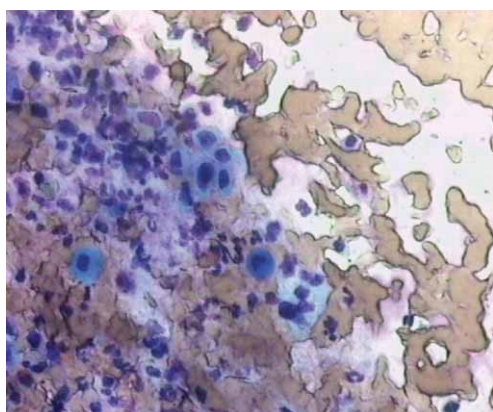


Fig. 2. Atypical squamous cells and neutrophils, May-Grünwald-Giemsa (MGG) staining, x200.

mor of 39% according to histopathologic diagnosis is higher than the literature reports (Barnes report 2–10% of all parotid tumors)<sup>11</sup>. We could not find the explanation for this observation. The discrepancies between cytologic and histopathologic findings in this study were 9.09% (16/176), Mahbod et al.<sup>12</sup> report 7.3%. In our series the main reason for discrepancy between FNA report and definitive pathologic diagnosis was inadequate sampling, so the importance of proper training in performing ultrasound-guided FNAC can not be overemphasized. Reexamination of cytological specimens shows that the main reason for discrepancy between FNA report and de-

finite pathologic diagnosis was non-representative specimens. As non-representative specimens we considered those that contained enough cellular material for analysis, but it turned out that either the lesion was missed during FNA, or that the specimen didn't contain all elements necessary for establishing the right diagnosis – for example, when aspirate of Warthin's tumor contain only lymphatic elements, and no epithelial cells, cytologically it could not be differentiated from lymph node. Also, when aspirate from Warthin's tumor contains only oncocytes, and no lymphatic elements, it could not be differentiated from an oncocytoma. Similar interpretation problems were noted by Hughes et al.<sup>13</sup> and Viguer et al.<sup>14</sup>. Pleomorphic adenoma was correctly recognized cytologically in 92.1% cases, according to the literature which reported ranges from 82% to 94%<sup>15,16</sup>. The false positive rate in the literature ranges from 0–7% in our series was 7.38%<sup>15,17</sup>. The relative high rate of false negative findings is a problem in other studies. Zbaren et al.<sup>1</sup> noted 9.7% of false negative results, but in our study the false negative findings are rare (in our series 1.7%). The data of sensitivity of 81% for making the correct general diagnosis of malignancy in this study is in accordance with others studies were sensitivity ranges from 54% to 95%<sup>15,17–19</sup>. The specificity of 98% for making the correct general diagnosis of benign tumors are similar to those observed in the other studies<sup>15,17–20</sup> where specificity range from 86% to 100%.

## Conclusion

Fine needle aspiration cytology is a valuable adjunct to preoperative assessment of parotid masses as save, noninvasive procedure, almost without contraindications. The high rate of specificity of FNAC presents low possibility that benign cytological diagnosis of parotid tumors become malignant in final histopathological diagnosis (in this study only 2%). Preoperative recognition of malignant tumors may help prepare both the surgeon and patient for appropriate surgical procedure.

## Acknowledgements

We would like to deeply thank to prof. dr. sc. Nives Jonjić, the Chief of Department of Pathology, School of Medicine, Rijeka University, for her help and using histopathologic data base.

## REFERENCES

- ZBAREN P, SCHAR C, HOTZ M, LOOSLI H, Laryngoscope, 111 (2001) 1989. — 2. PRVULOVIC I, KARDUM SI, SUSTERCIC D, JAKIC RD, MANOJLOVIC S, Coll Antropol, 34 (2010) 99. — 3. PAUZAR B, STAKLENAC B, LONCAR B, Coll Antropol, 34 (2010) 87. — 4. GJADROV KK, AURER I, RIES S, SUCIC M, MARKOVIC GM, ILIC I, BASIC KS, RADMAN I, LABAR B, Coll Antropol, 34 (2010) 7. — 5. BARDALES RH, BAKER SJ, MUKUNYADZI P, Diagn Cytopathol, 22 (2000) 211. — 6. CARROLL CM, NAZZER U, TIMON CL, Ir J Med Sci, 167 (1998) 149. — 7. FELDMAN PS, KAPLAN MJ, JOHNS ME, Arch Otolaryngol, 109 (1983) 735. — 8. FULCINITI F, CALIFANO L, ZUPI A, J Oral Maxillofac Surg, 55 (1997) 1094. — 9. MOBLEY DL, WAKELY PE JR, FRABLE MA, Laryngoscope, 101 (1991) 469. — 10. BATSAKIS JG, SUEIGE N, EL-NAGGAR AK, Ann Otol Rhinol Laryngol, 101 (1992) 185. — 11. BARNES L, Surgical Pathology of the Head and Neck, (Marcel Dekker, New York, Basel, 2001). — 12. MAHBOD G, KOASRI F, TAFRESHI A, Acta Medica Iranica, 40 (2002) 49. — 13. HUGES J, VOLK E, WILBUR D, Arch Pathol Lab Med, 129 (2005) 26. — 14. VIGUER JM, VICANDI B, JIMENEZ HJA, LOPEZ-FERER P, GONZALEZ-PERAMATO, CASTILLO C, Cytopath-

ology, 9 (2009) 164. — 15. ZURIDA S, ALASIO L, TRADATI N, BARTOLI C, CHIESA F, POLLOTTI S, Cancer, 72 (1993) 2306. — 16. ORELL SR, Cytopathology, 6 (1995) 285. — 17. AL-KHAFAJI BM, NESTOK BR, KATZ LR, Cancer, 84 (1998) 153. — 18. PITS DB, HILSINGER RL, KARRANDY E, ROSS JL, CARO JE, Arch Otolaryngol Head Neck Surg, 118

(1992) 479. — 19. ATULA T, GRENMAN R, LAIPPALA P, KLEMI PJ, Diagn Cytopathol, 15 (1995) 185. — 20. ELAGOZ S, GULLUOGLU M, YILMAZBAYHAN D, OZER H, ARSLAN I, Orl J Otorhinolaryngol Relat Spec, 69 (2007) 51.

*M. Belušić-Gobić*

*Department of Maxillofacial and Oral Surgery, Rijeka University Hospital Center, Tome Stržića 2, 51 000 Rijeka, Croatia*

*E-mail: mfk@kbc-rijeka.hr, kbc-mfk@ri.t-com.hr*

## **CITOLOŠKA PUNKCIJA U DIJAGNOSTICI TUMORA PAROTIDE**

### **S A Ž E T A K**

Cilj ovog rada bio je utvrditi korisnost i sigurnost citološke punkcije u dijagnostici tumora parotide, te njezin značaj u razlikovanju dobroćudnih od zloćudnih tumora. U periodu od 5 godina u KBC-Rijeka učinjeno je 214 operacija parotide, ali je samo 176 pacijenata imalo i citološki i patohistološki nalaz, te je zadovoljavalo kriterije za ulazak u studiju. Nalaz citopunkcije uspoređen je sa patohistološkom dijagnozom kirurškog preparata. Utvrđeno je 13 točno pozitivnih dijagnoza, 147 točno negativnih, 3 lažno negativne i 13 lažno pozitivnih. Senzitivnost citopunkcije bila je 81%, a specifičnost 98%.