

Parotid Swellings Misdiagnosed by Fine Needle Aspiration Cytology: It's Impact on Patient Management

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ABSTRACT

Background

Fine needle aspiration cytology (FNAC) is an important tool for diagnosis of parotid swellings and the correct diagnosis is key to the appropriate treatment.

Objective

To evaluate the impact of the misdiagnosis of parotid swellings by fine needle aspiration cytology on patient management.

Method

It was a descriptive cross-sectional study carried out by the reviewing the medical record of patients who had undergone parotid surgery from January 2015 to December 2022 in the Department of ENT-Head and Neck Surgery, TU Teaching Hospital, Nepal. Patient demographic data, fine needle aspiration cytology result and histopathological report were collected for evaluation. The study was approved by institute's institutional review committee.

Result

Of the total of 80 patients included in the study, sixteen cases were misdiagnosed by fine needle aspiration cytology compared to the histopathological report. The rate of false positive and false negative cases in the study was 3.75% and 5%. The false positive cases received extensive surgery than would be required. However, due to the use of magnetic resonance imaging for evaluation, false negative cases did not receive under treatment. In general, 5% of the patients had undergone unnecessary surgery due to misdiagnoses.

Conclusion

Fine needle aspiration cytology misdiagnoses about one in five cases of parotid swelling. Misdiagnosis leads to incorrect or inadequate treatment. None of the investigations is very sensitive and specific in identifying the salivary gland swellings. Therefore, clinical awareness, radiological characteristics and pathological information should be taken into account together for final treatment planning.

KEY WORDS

Cytology, Diagnostic error, Histopathology, Neoplasm, Parotid gland

INTRODUCTION

ENT surgeons are often dealing with the parotid swellings in their clinical practice. Parotid swellings can be non-neoplastic, benign or malignant neoplastic lesions.^{1,2} These parotid swellings are investigated by fine needle aspiration cytology (FNAC) and radiological imaging such as ultrasonography (USG), CT or magnetic resonance imaging (MRI).

FNAC is helpful in differentiating the type of parotid pathology and is an accepted investigation tool.^{1,3} It can differentiate non-neoplastic from neoplastic and benign from malignant lesions.⁴ Inflammatory lesions can be separated from neoplastic lesions with FNAC and surgical treatment can be avoided in about one-third of cases.^{2,3} However, the cytological interpretation can be challenging due to the overlapping morphology of parotid lesions.^{4,5} Therefore, the diagnostic accuracy of FNAC for parotid swelling is not ideal and varies widely in the literature.^{4,6-10} There are false positive and false negative results that can lead to inappropriate treatment, especially for malignancy.

There are many of studies on the precision of FNAC in diagnosis but very few focused on the clinical implications of misdiagnoses. Clinicians usually decide on the management of parotid lesions based on clinical information, FNAC, and radiological findings. The aim of this study was to evaluate the impact of misdiagnosis of parotid swellings by FNAC on patient management.

METHODS

This descriptive cross-sectional study was carried out in the Department of ENT-Head and Neck Surgery, TU Teaching Hospital, Institute of Medicine (IOM), Nepal. The study was carried out by reviewing the medical records of patients who had undergone parotid surgery in the department from January 2015 to December 2022. The study was approved by the IOM institutional review committee (IRC) (Ref no.: -525(6-11) E2 078/079). All patients of any age and sex who underwent parotid surgery during the study period were eligible for inclusion in the study. The medical chart was reviewed for age, sex, preoperative diagnosis, FNAC finding, type of surgery performed, and final histopathological examination (HPE) report and were recorded in the performa designed for the study. Those with FNAC or histopathological reports missing from the record were excluded from the study. The data was entered in the MS Excel sheet, and the calculations were made in numbers and percentages.

For the purpose of our study, we divided the parotid swellings into malignant (positive for malignancy) and non-malignant (negative for malignancy) lesions. The findings of both FNAC and HPE were grouped into non-malignant and malignant groups. The histopathological finding was taken as the gold standard for diagnosis. Misdiagnosis

of FNAC compared to histopathology was divided into four groups. When both FNAC and histopathology results were non-malignant, the misdiagnosis was classified as non-malignant misdiagnosis, and when both FNAC and histopathology results were malignant, it was classified as malignant misdiagnosis. When FNAC was malignant and histopathology was nonmalignant, it was a false positive result. Similarly, when FNAC was nonmalignant and histopathology was malignant, it was a false negative result.

RESULTS

During the study period of about eight years, 103 parotid surgeries were performed in our department for various indications. Both FNAC and HPE were available for only 80 patients (Fig. 1). Of these 80 cases, the pathology was correctly diagnosed by FNAC in 64 patients.

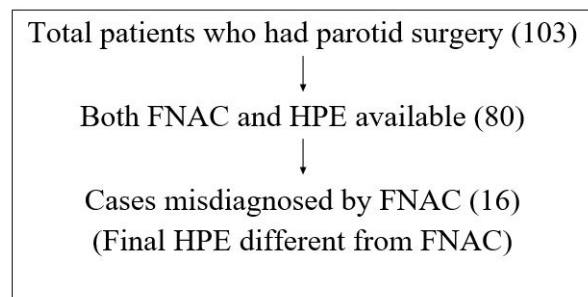


Figure 1. Flow chart showing the number of cases reviewed and included in the study.

The rate of false positive cases in our study was 3.75% (3/80) (Table 1). Two cases underwent total conservative parotidectomy and one underwent total conservative parotidectomy with selective neck dissection. All patients received more extensive treatment than required on the basis of the final diagnosis.

Table 1. Patients with false positive results with FNAC compared to histopathology

Age/Sex	FNAC diagnosis	Surgery	HPE report
65/M	Acinic cell carcinoma	Total conservative pa-rotidectomy	Sialadenosis
64/M	Acinic cell carcinoma	Total conservative pa-rotidectomy	Warthin's tumor
65/M	High-grade malignancy	Total conservative pa-rotidectomy with selective neck dissection	Sialadenitis

The false negative result rate in this study was 5% (4/80). Two cases of acinic cell carcinoma were misdiagnosed as pleomorphic adenoma. Similarly, low-grade mucoepidermoid carcinoma and secretory carcinoma were also misdiagnosed (Table 2). Two cases had adequate parotidectomy, and two had total conservative parotidectomy.

Table 2. Patients with false negative results by FNAC compared to histopathology

Age/Sex	FNAC diagnosis	Surgery	HPE report
22/M	Pleomorphic adenoma	Adequate parotidectomy	Acinic cell carcinoma
50/M	Pleomorphic adenoma	Total conservative parotidectomy	Acinic cell carcinoma
25/F	Warthin's tumor	Total conservative parotidectomy	Mucoepidermoid carcinoma (low grade)
25/F	Cystic lymphangioma	Adequate parotidectomy	Secretory carcinoma

The remaining nine cases were malignant and nonmalignant misdiagnoses and did not have a major impact on the treatment plan. There were seven cases of nonmalignant misdiagnosis (Table 3). All lesions were diagnosed as pleomorphic adenoma by FNAC, while the histopathological report confirmed some other benign lesions. The surgical intervention performed for these nonmalignant lesions is also shown in table 3.

Table 3. The HPE showing nonmalignant pathology different from FNAC (nonmalignant misdiagnosis)

Age/Sex	FNAC Diagnosis	Surgery	HPE report
56/F	Pleomorphic adenoma	Superficial parotidectomy	Chronic granulomatous inflammation (differential diagnosis: Sarcoidosis)
32/F	Pleomorphic adenoma	Superficial parotidectomy	Basal cell adenoma
50/F	Pleomorphic adenoma	Total conservative parotidectomy	Basal cell adenoma
29/M	Pleomorphic adenoma	Superficial parotidectomy	Necrotizing granulomatous lymphadenitis (differential diagnosis Tuberculosis)
66/M	Pleomorphic adenoma	Total conservative parotidectomy	Warthin's tumor
56/M	Pleomorphic adenoma	Adequate parotidectomy	Warthin's tumor
76/F	Pleomorphic adenoma	Adequate parotidectomy	Warthin's tumor

There were two cases in which FNAC could not identify the true type of malignant lesion compared to the HPE result (Table 4). Both of these cases had undergone parotid surgery with neck dissection.

Table 4. The final HPE showing a different malignant lesion from the FNAC results (malignant misdiagnosis)

Age/Sex	FNAC Diagnosis	Surgery	HPE report
19/M	Acinic cell carcinoma with neck node metastasis	Superficial parotidectomy with modified radical neck dissection	Secretory carcinoma
62/F	Adenocarcinoma	Total conservative parotidectomy with selective neck dissection (I-III)	High-grade mucoepidermoid carcinoma

DISCUSSIONS

FNAC is widely used in the evaluation of salivary gland swelling. In conjunction with clinical and radiological evaluation, FNAC would help in decision-making.^{3,4,7} A preoperative diagnosis of a malignant lesion helps the surgeon in deciding the extent and type of surgery, avoiding the risk of under-treatment and the need for revision surgery or other adjuvant treatment.¹¹ For most neoplastic parotid swelling, the treatment is surgical excision. The type of surgery performed for benign and malignant lesions varies; therefore, the FNAC result would be of great help. The accuracy of the FNAC varies from 56% to 98.2% in various studies.^{7,9-16} So there is the possibility that some cases are misdiagnosed by FNAC.

In our study, 20% (16/80) of the cases were misdiagnosed by FNAC compared to the histopathological result. The discordant result in our study was comparable to other studies, where it ranged from 4.4% to 44%.^{1,6,7,11-14,17-19} Two studies had a very high discordance rate of 44% and 37.7%.^{7,19} They have not given a specific reason for the higher discordant rate. However, they pointed out the possibility of multiple pathologists involved in the interpretation of cytology reports, sampling error, or lack of dedicated head and neck pathologists as possible reasons for higher discordant results. FNAC has difficulty in certain parotid pathologies such as pleomorphic adenoma, basal cell adenoma, low-grade mucoepidermoid carcinoma, and acinic cell carcinoma.²⁰

The false positive rate for malignancy in our study was comparable to that of various studies, which ranged from 0 to 12.3%.^{2,4,6,10-13,17} The two false positive cases were nonneoplastic (inflammatory) lesions, and one was Warthin's tumor. According to Nagel et al. FNAC is not very helpful in distinguishing inflammatory lesions such as sialadenitis from squamous metaplasia.²¹ If they were correctly diagnosed preoperatively, they would have been conservatively treated to avoid the need for surgery. Similarly, Warthin's tumor was confused with acinic cell carcinoma by FNAC. If it was correctly diagnosed, it could have been treated with adequate parotidectomy instead of total conservative parotidectomy. The extensive surgery in the form of total parotidectomy kept the risk of facial nerve injury and other complications. Also, it leads to stress of malignancy in patients. In cases of inflammatory lesions, the MRI finding was also equivocal; therefore, the FNAC report had to be relied upon. Malignant FNAC results are hard to disregard.

The false negative rate of FNAC was 5% in our study, which varies from 1.1% to 26% in literature.^{2,4,6,10-13,17} The most common cause of false negative FNAC reports is sampling error.¹³ False negative results can lead to incorrect and incomplete treatment of malignant lesions. FNAC misdiagnosed acinic cell carcinoma as pleomorphic adenoma in two cases. Gudmundsson et al. had false negative results for acinic cell carcinoma, as well as

mucoepidermoid carcinoma.¹⁴ As acinic cell carcinoma represents a low-grade malignancy, a tumor together with a cuff of normal tissue would be sufficient for its management and surgeons would try to preserve the facial nerve in all cases except when there is palsy preoperatively due to the tumor.⁸ Hence, it was adequate from the management point of view. Similarly, low-grade mucoepidermoid carcinoma was misdiagnosed as Warthin tumor. Due to suspicious features such as irregular margin and mixed signal intensity on MRI, a total conservative parotidectomy was performed for this case. Therefore, it shows that MRI would be of help in the cases of false negative results rather than in the false positive cases. FNAC interpreted a case of secretory carcinoma as cystic lymphangioma. In this case, all margins were free of tumor and therefore the plan was to continue to follow up regularly. Gudmundsson et al. found false negative results in mucoepidermoid carcinoma, acinic cell carcinoma, and epithelial-myoepithelial carcinoma.¹⁴ Diagnosis of high-grade tumor preoperatively would help with appropriate treatment and better survival results. FNAC frequently misdiagnoses mixed benign tumors, low-grade carcinomas such as acinic cell carcinoma, basal cell adenocarcinoma, and adenoid cystic carcinomas.⁸ Mucoepidermoid carcinoma and acinic cell carcinoma may be confused with pleomorphic adenoma on cytology.¹⁵

In cases where FNAC could not make a correct non-malignant diagnosis, it did not affect the management plan. All were diagnosed as pleomorphic adenoma, but the final results were other different benign lesions. The reason could be due to the overlapping morphology and pleomorphic adenoma being the most common benign lesion. A cellular pleomorphic adenoma can be confused in FNAC with monomorphic adenoma, myoepithelioma, and adenoid cystic carcinoma.²² Two of misdiagnoses were nonneoplastic (inflammatory) lesions, and we could have avoided surgical intervention. The other two cases were basal cell adenoma and three were Warthin tumor. The principle of treatment in these five cases would be surgical intervention. In two cases, due to suspicious findings on MRI, a total conservative parotidectomy was performed. The remaining five cases were treated with adequate or superficial parotidectomy.

When the type of parotid malignancy was not correctly diagnosed, the management plan did not differ again. Secretory carcinoma was misdiagnosed as acinic cell carcinoma and high-grade mucoepidermoid carcinoma was misdiagnosed as adenocarcinoma. Both cases were treated by parotidectomy with neck dissection after considering clinical features and MRI findings. The surgical management did not differ from the oncological point of view in these two cases.

If FNAC had correctly diagnosed the pathology, surgery could have been avoided in 5% (4/80) of the total cases. Two of these were chronic granulomatous lesions, one was sialoadenosis, and one was sialadenitis. They can be treated medically. Similarly, a Warthin tumor patient was treated with total conservative parotidectomy due to false positive results and could have been managed by adequate parotidectomy. None of the false negative cases received under treatment. This could be due to clinical suspicion, as well as to a suspicious feature in the imaging. The other reason could be that the misdiagnosis is usually between benign and low-grade malignancy and that their treatment plan is similar. For benign versus benign and malignant versus malignant, the treatment plan was almost the same. The limitations of this study include the number of pathologists involved in the sampling, FNAC, and HPE and the retrospective nature of the study.

CONCLUSION

Approximately one in five cases of parotid swellings is misdiagnosed by FNAC. Misdiagnosis leads to incorrect or inadequate treatment. In our cases, 5% of patients received unnecessary surgical intervention due to misdiagnosis. However, in most misdiagnosed cases treatment did not differ due to misdiagnosis. None of the investigations are very sensitive and specific in identifying salivary gland swellings. Therefore, clinical awareness, radiological characteristics, and pathological information should be taken into account together for final treatment planning.

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