

# The Role of FNAC in the Diagnosis and Management of Warthin Tumour: Analysis of 74 Cases

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## Abstract

**Introduction** After pleomorphic adenoma, Warthin tumor gets its popularity as the second most common benign neoplasm of the parotid gland. Fine-needle aspiration cytology (FNAC) is the most cost-effective and minimally-invasive way to determine the histological character of a parotid gland tumor.

**Objective** To determine the accuracy of FNAC in the diagnosis of Warthin Tumour.

**Methods** A retrospective study conducted between 2014 and 2018. Out of 243 FNACs performed for parotid lesions, a histopathological correlation was established in 74 cases to reveal the accuracy of FNAC in the diagnosis of Warthin tumor.

**Results** A total of 243 FNACs of parotid lesions were performed, and a histopathological correlation was established in 74 (30.4%) cases. Later on, we confirmed that 16 (21.6%) out of these 74 patients had cases of Warthin tumor. In total, 15 (20.3%) out of those 74 cases were confirmed as Warthin tumors on the initial cytology, which revealed a true positive concordance between the cytology and the final histological diagnosis; 55/74 (74%) were true negative results; on the other hand, 1/74 (1.4%) was a false negative, and 3/74 (4.1%) were false positive results. The sensitivity of the FNAC in the diagnosis of Warthin tumor was of 93%, while the specificity was of 94.8%, and the accuracy, of 94.6%.

**Conclusion** In the present study, FNAC had a high diagnostic accuracy, reaching 94%.

## Keywords

- ▶ warthin tumor
- ▶ papillary cystadenoma lymphomatosum
- ▶ cytology
- ▶ pathology

## Introduction

After pleomorphic adenoma, Warthin tumor (WT) gets its popularity as the second most common benign neoplasm of the parotid gland. It accounts for 15% to 30% of all parotid tumors.<sup>1–10</sup> Among its unique features, especially in the fifth and sixth decades of life, the tumor tends to affect more the population of male smokers.<sup>1–10</sup> It typically presents as an asymptomatic, slow-growing mass, usually located in the tail (inferior) portion of the parotid gland, and multicentric occurrence is observed more often with WT

than with any other salivary-gland tumor.<sup>3</sup> These tumors have a tendency toward multiplicity and bilaterality.<sup>6–11</sup> Recently, many reports<sup>7–10</sup> have presented patients with clinical features that differ from that of the traditional tumors in some way, with an increasing incidence among females, higher rates of tumor multiplicity and bilaterality,<sup>7–9</sup> and superadded differences in the regional, national and racial occurrences.<sup>10</sup> With less than 1% of risk of malignant evolution, WT differs from pleomorphic adenomas.<sup>12</sup> This makes surgery not the first-line treatment when

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the diagnosis is certain preoperatively as it is harboring the risk of facial nerve injury.<sup>13,14</sup>

Warthin tumor was previously called cystadenoma papilliferum, a term coined by Alfred Warthin in 1929. It is a peculiar entity with two distinct cellular components in variable proportions. Its origin is also debatable, with one theory suggesting it originates from epithelial cell rest in the lymph node, and another stating that it is an adenoma with lymphocytic infiltration. Subsequent molecular studies<sup>5,6</sup> have shown that it is not a true neoplasm. The most accepted hypothesis is that it originates from salivary-duct inclusions in the lymph nodes.<sup>15</sup>

Salivary-gland lesions have been fairly accurately diagnosed on fine-needle aspiration cytology (FNAC), with an accuracy ranging from 74% to 97%.<sup>16,18</sup> However, the diagnostic accuracy of FNAC for WT has been a source of concern and a subject of debate.<sup>19–22</sup>

Fine-needle aspiration cytology is the most cost-effective and minimally-invasive way to determine the histological character of a parotid-gland tumor. But it is not always conclusive, because the material may be insufficient. Furthermore, in the case of WT, which contains inflammatory cells, FNAC may be responsible for an inflammatory flare, with pain and an increase in the volume of the lesion.<sup>23</sup>

Fine-needle aspiration (FNA) is a valuable tool in the diagnosis of head and neck lesions, with a proven high accuracy.<sup>24–26</sup> This is particularly true for salivary-gland neoplasms, because the FNA diagnosis guides the decision of the clinician regarding the management of the patients. In most patients, careful interpretation of the cytomorphologic findings renders an accurate diagnosis, enabling the conservative management of the patients with benign lesions.<sup>25</sup>

Warthin tumor has a cystic appearance, with a double layer of oncocytes surrounding a lymphoid stroma. There are two main cellular components: the epithelial and lymphoid components. The typical features on cytology include oncocytic cells in cohesive, monolayered sheets, background lymphocytes, and amorphous, cystic debris.<sup>25–27</sup>

Despite its well-defined histological appearance, the often variegated cytomorphology of WT may lead to an erroneous cytopathological interpretation. We conducted the study to determine the accuracy of FNAC in the diagnosis of WT.

## Methods

A retrospective study of patient records was performed between 2014 and 2018 after a formal review and waiver by the institutional review board (IRB). A total number of 243

**Table 2** Results of the fine-needle aspiration cytology

Fine-needle aspiration cytology	%
Sensitivity	93
Specificity	94.8
Accuracy	94.6

FNACs were performed for parotid lesions. A histopathological correlation was established in 74 out of these 243 cases to reveal the accuracy of FNAC in the diagnosis of WT tumor.

Fine-needle aspiration biopsy (FNAB) was performed by a cytopathologist using a 23-gauge fine needle attached to a 10-ml plastic syringe and employing a Cameco gun (Precision Dynamics Corporation, Valencia, CA, US). Slides were air-dried for Diff-Quik (MICROPTIC S.L., Barcelona, Spain) staining, and an on-site, provisional cytopathological diagnosis was rendered on all slides. Additional smears were prepared and fixed immediately in 95% ethanol for subsequent Papanicolaou staining. In a few cases, needle rinses with balanced salt solution were used to make paraffin cell blocks, and 4-mm thin sections were stained with hematoxylin and eosin. A histopathological correlation of the result of the FNAB with the surgical specimen was established to confirm the accuracy of the cytological diagnosis.

## Results

A total of 243 FNACs for parotid lesions were performed, and a histopathological correlation was established in 74 (30.4%) cases. Later, we confirmed that 16 (21.6%) out of these 74 operated patients had cases of WT, 15 (20.3%) of which were confirmed on the initial cytology, which revealed a true positive concordance between the cytology and the final histological diagnosis; 55/74 (74%) were true negative results; on the other hand, 1/74 (1.4%) was a false negative result, and 3/74 (4.1%) were false positive results (→ **Table 1**). The sensitivity of the FNAC in the diagnosis of WT was of 93%, while the specificity was of 94.8%, and the accuracy, 94.6% (→ **Table 2**).

## Discussion

Of all salivary-gland tumors present in the patients in the sample, 5% to 10% were WTs.<sup>19</sup> It is an asymptomatic disease, but it may present with pain because of the effects of the pressure exerted due to the rapid growth or because of the superadded inflammation.<sup>15</sup> The group mostly affected is comprised of male patients at an older age, but nowadays,

**Table 1** Fine-needle aspiration cytology and histological diagnosis

Fine-needle aspiration cytology	Histological diagnosis		
	Warthin positive	Warthin negative	Total
Warthin positive	15 (true positive)	3 (false positive)	18
Warthin negative	1 (false negative)	55 (true negative)	56
Total	16	58	74

due to the rise in the habit of smoking, women are also being affected.<sup>15,19</sup> Although the parotid gland is the main site of origin, WT is also found in the submandibular gland.<sup>15,19</sup>

Fine-needle aspiration cytology of the salivary-gland lesions has been shown to reduce the number of patients undergoing surgery by ~ 30%.<sup>28,29</sup> For this reason, FNAC is a widely-used procedure. Through FNA, a salivary gland lesion can be classified into one of two categories:<sup>1</sup> inflammatory or non-neoplastic, and<sup>2</sup> neoplastic. This simple triage approach is often appropriate, and may determine the medical or surgical therapy. However, further diagnostic accuracy is desirable, and can be achieved with knowledge of the pitfalls and limitations.<sup>30</sup>

There are few case reports<sup>20,22,30</sup> demonstrating a malignant tumor adjacent to a benign Warthin lesion. Most of these cases were associated with previous radiotherapy.<sup>31</sup> Obviously, misdiagnosis of a malignant tumor in patients with preoperative benign cytological examination falsely interpreted as a WT is the error that must be avoided. The question is whether this error is of practical concern in a large hospital with experienced cytopathologists. This concern has not been specifically addressed.<sup>32</sup>

In a study by Parwani and Ali,<sup>21</sup> 74% (31) of the patients with a histologically-confirmed WT had the same preoperative cytological diagnosis. Similar findings were presented by Ballo et al,<sup>19</sup> who analyzed 16 patients; in their study, the cytological accuracy was of 81% (3 cases were submitted to preoperative FNAs, which suggested a malignant tumor).<sup>19</sup> In the study by Flezar and Pogacnik,<sup>33</sup> 37 (79%) out of 47 patients had a correct FNA diagnosis confirmed by histology.<sup>33</sup> Nir et al<sup>32</sup> described an accuracy of the FNAC of 78.7% in 48 out of 61 patients who had diagnoses of WT, and Lewis et al<sup>34</sup> reported that 21 (65%) out of 32 patients had a preoperative diagnosis of WT tumor. In the present study, 15 (93.8%) out of 16 cases operated for WT had a preoperative correlation established by FNAC, while 1 (6.2%) out of these 16 cases (6.2%) was FNAC as pleomorphic preoperatively. As results, we had a sensitivity of 93%, a specificity of 94.8%, and an accuracy of 94.6%; this was incompatible with the results obtained by Dong et al.<sup>35</sup> sensitivity of 60.2%, specificity of 0%, and accuracy of 60.2%, while Neelam and Borah<sup>30</sup> obtained an accuracy of 79%. Based on multiple previous studies,<sup>19,21,34,36</sup> the sensitivity, specificity and diagnostic accuracy of FNAC in diagnosing WT ranges from 74% to 100%. The two main sources of error include failure to obtain a representative sample and the variable cytological appearance of WT.<sup>21,34,37</sup> The former can be minimized by recruiting a cytopathologist to perform the procedure. This has the added advantage of limiting histological alterations after biopsy, another major operator-related problem.<sup>37</sup>

In the present study, there were four cases with revision of the results, two by core biopsy and two by FNAC, which confirmed the diagnosis of WT before proceeding to surgery. The need for preoperative FNA is a debatable issue. It is considered an acceptable surgical practice to excise parotid masses without a preoperative FNA. We are of the opinion that this practice may be outmoded, as a preoperative FNA

may obviate the need for surgery of a WT, which is the second most common benign parotid tumor. In any case, cytological interpretations should be considered in the context of the history, physical examination findings, and imaging exams. In any case in which the clinical judgment is of suspicion of a malignant lesion, surgical excision is mandatory, regardless of the result of the FNA.<sup>32</sup>

## Conclusion

In the present study, the diagnostic accuracy of the FNAC was high, reaching 94%. In addition, the accuracy increased with the increase in sample size with a multicenter comprehensive study. Revision of the results assists in the diagnostic accuracy and makes it possible to avoid unnecessary operations.

## Summary

- Warthin tumor is the second most common benign parotid tumor.
- In any case, cytological interpretations should be considered in the context of the history, physical examination findings, and imaging exams.
- In any case in which the clinical judgment is of suspicion of a malignant lesion, surgical excision is mandatory, regardless of the result of the FNA.
- The diagnostic accuracy of the FNAC was high, reaching 94%.
- In addition, the accuracy increased with the increase in the sample size with a multicenter comprehensive study.

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