e-ISSN: 0976-822X, p-ISSN:2961-6042

Available online on http://www.ijcpr.com/

International Journal of Current Pharmaceutical Review and Research 2026; 18(3); 1996-2001

Original Research Article

Diagnostic Utility of Fine Needle Aspiration Cytology in Palpable Cystic Lesions of the Head and Neck

Veeksha V. Gowda[1], S.B. Patil[2], Subhashini H. Bevinakatti[3]

[1]Assistant Professor, Department of Pathology, Kidwai Memorial Institute of Oncology, Bangalore, Karnataka, India

[2]Professor, Department of Pathology, J J M Medical College, Davangere, Karnataka, India

[3]Assistant Professor, Department of Pathology, Hassan Institute of Medical Sciences, Karnataka, India

Received: 01-12-2025 / Revised: 15-01-2026 / Accepted: 21-02-2026

Corresponding author: Dr. Subhashini H. Bevinakatti

Conflict of interest: Nil

Abstract

Background: Cystic lesions of the head and neck encompass a wide spectrum of congenital, inflammatory and neoplastic conditions whose nature often cannot be established on clinical grounds alone. Fine needle aspiration cytology (FNAC) is a rapid, minimally invasive and cost-effective first-line investigation, although cystic change is a recognised source of diagnostic error. This study was undertaken to determine the diagnostic utility of FNAC in palpable cystic lesions of the head and neck and to correlate cytological diagnoses with histopathology wherever possible.

Methods: A prospective study of 90 patients with palpable cystic lesions of the head and neck was conducted in the Department of Pathology, J.J.M. Medical College, Davangere, over two years (June 2018 to May 2020). Aspirates were obtained with a 23-gauge needle, and smears were stained with Haematoxylin and Eosin, Papanicolaou, Giemsa and Ziehl-Neelsen stains. Cyto-histopathological correlation was performed where surgical specimens were available, and sensitivity, specificity, predictive values and diagnostic accuracy were calculated.

Results: Cystic lesions constituted 3.17% of all aspirates. The median age was 36.6 years with a male predominance (M:F = 1.2:1). Non-neoplastic lesions accounted for 83.3% of cases and neoplastic lesions for 15.6%; one aspirate (1.1%) was non-diagnostic. Colloid goitre with cystic degeneration was the most common diagnosis (34.4%), followed by epidermal inclusion cyst (26.6%). Histopathological correlation was possible in 47 cases and was concordant in 41 (87.2%). FNAC showed a sensitivity of 83.3%, specificity of 100%, positive predictive value of 100%, negative predictive value of 97.6% and diagnostic accuracy of 97.8% for malignant lesions.

Conclusion: FNAC is a reliable, safe and accurate first-line diagnostic tool for cystic lesions of the head and neck. Awareness of pitfalls such as paucicellular aspirates and cystic change in malignancy, together with clinico-radiological correlation, further improves diagnostic yield.

Keywords: Fine Needle Aspiration Cytology; Cystic Lesions; Head and Neck; Cyto-Histopathological Correlation; Diagnostic Accuracy.

DOI: 10.25258/ijcpr.18.3.329

Introduction

Cytology as a diagnostic discipline dates back to the nineteenth century, and fine needle aspiration cytology (FNAC) has since evolved into a simple, rapid and cost-effective technique for sampling palpable masses. In the head and neck, FNAC has particular value because of the anatomical crowding of diverse organs and tissue types within a small region, giving rise to remarkably heterogeneous pathology [1,2].

Lesions in this region are encountered by clinicians across all age groups, and the technique offers a means of triaging patients at the first visit, with easy accessibility of target sites, minimal invasiveness and a negligible complication rate [1-3]. Cysts and lesions showing cystic change form an important subset of head and neck masses and pose a genuine clinical dilemma. They range from congenital lesions such as branchial cleft cyst, thyroglossal duct cyst and lymphangioma to acquired non-neoplastic conditions such as epidermal inclusion cyst and lymphoepithelial cyst, and to benign and malignant neoplasms undergoing cystic degeneration [3,4].

Congenital cysts are typically slow-growing and become symptomatic only with enlargement or secondary infection, and their nature frequently cannot be determined accurately by clinical history and examination alone. Pre-operative FNAC, supplemented by imaging, is therefore essential to confirm the clinical impression, define the anatomical extent of disease and plan treatment [4,5].

The principal aims of FNAC in this setting are to establish the presence or absence of a neoplasm, to categorise any neoplasm as benign or malignant, and, where possible, to determine its exact type. Certain malignancies, notably metastatic squamous cell carcinoma in cervical lymph nodes and papillary thyroid carcinoma, characteristically undergo cystic degeneration and may closely mimic benign cystic lymphoepithelial lesions or keratinous cysts [3,6,7].

Cystic cervical metastases are a well-documented source of false-negative cytology, with reported diagnostic yields of only 50-73% compared with near-perfect accuracy in solid nodal deposits [7]. Similarly, cystic change is described in up to a quarter of papillary thyroid carcinomas, and the frequency of malignancy in cystic thyroid nodules ranges from 3% to 25%, with an average of about 14% [8,9]. Thyroglossal duct cysts, although classically lesions of childhood, occur in older adults in a substantial proportion of cases and may rarely harbour papillary carcinoma [10,11].

Although FNAC has an appreciable overall diagnostic accuracy in the head and neck, the sensitivity of the technique falls when the aspirated mass is cystic, because aspirates are often paucicellular, diluted by fluid, or dominated by macrophages and debris rather than the diagnostic lining or mural cells [3,6]. There is also a relative paucity of literature devoted specifically to the cytological features of cystic head and neck lesions as a group, in contrast to the extensive literature on solid masses [2,3]. A deliberate effort is therefore needed to establish the precise role of FNAC in the diagnosis of these lesions and in operative decision-making.

The present study was undertaken to analyse the spectrum of palpable cystic lesions of the head and neck on aspiration cytology, to describe their clinical and cytomorphological features, to correlate cytological diagnoses with histopathology wherever surgical specimens were available, and to determine the sensitivity, specificity, predictive values and diagnostic accuracy of FNAC in this setting.

Materials and Methods

This was a prospective study of 90 patients with palpable cystic lesions of the head and neck, conducted over a period of two years from June 2018 to May 2020. Patients were referred from Bapuji Hospital, Chigateri District Hospital and other private hospitals in and around Davangere, and the aspiration procedure was performed in the Department of Pathology, J.J.M. Medical College, Davangere. The study was carried out after institutional approval, and written informed consent was obtained from all patients (or guardians of minors) after explanation of the procedure.

Inclusion and Exclusion Criteria: All palpable cystic lesions of the head and neck region, defined by cystic consistency on palpation and by aspiration of fluid with the presence of cyst macrophages on cytology, were included, irrespective of age and gender. Cases in which frank blood was aspirated (suggesting haemangioma or haematoma), patients with a known bleeding diathesis, vascular malformations of the head and neck, and non-cooperative patients were excluded.

Procedure: All patients were examined in detail before FNAC. Relevant clinical history, examination findings and radiological findings, when available, were recorded. Under aseptic precautions, the area of interest was cleaned with a sterile gauze piece, the palpable lesion was fixed between the index finger and thumb of the left hand, and aspiration was performed with a 23-gauge needle fitted to a 5 ml syringe.

Where a residual mass was palpable after evacuation of the cyst, re-aspiration of the residual solid component was performed. The gross appearance and volume of each aspirate were recorded, and the fluid was centrifuged. The sediment was first examined as a wet-mount preparation, and smears prepared from the sediment were fixed immediately in 95% ethanol and stained with Haematoxylin and Eosin and Papanicolaou stains; air-dried smears were stained with Giemsa, and Ziehl-Neelsen staining was performed to demonstrate acid-fast bacilli where indicated.

Histopathological Correlation: In cases where surgical excision was subsequently carried out and specimens were received in the department, tissues were processed routinely to obtain paraffin sections, which were stained with Haematoxylin and Eosin. Histomorphological features were studied and the final histopathological diagnosis recorded. Cytological and histopathological diagnoses were then compared, and cyto-histopathological correlation was performed in all cases in which both results were available.

Statistical Analysis: Data were entered in a Microsoft Excel spreadsheet and analysed using SPSS version 20 (IBM Corp., Armonk, NY, USA).

Descriptive statistics were computed as frequencies and proportions for qualitative variables and as mean and standard deviation for quantitative variables. Using the methodology of Galen and Gambino, and taking histopathology as the gold standard for malignancy, sensitivity was calculated as true positives/ (true positives + false negatives) x 100; specificity as true negatives/(true negatives + false positives) x 100; positive predictive value as true positives/(true positives + false positives) x 100; negative predictive value as true negatives/ (true negatives + false negatives) x 100; and diagnostic accuracy as (true positives + true negatives)/ all correlated cases x 100.

Results

During the study period, 90 patients with palpable cystic lesions of the head and neck underwent FNAC, constituting 3.17% of all aspirations performed.

Patient age ranged from eight days to 75 years, with a median age of 36.6 years; the largest number of cases occurred in the fourth decade, and 12 cases (13.3%) were documented in children below 18 years (Table 1). Males predominated, with 49 cases (54.4%) and a male-to-female ratio of 1.2:1 (Table 2).

Table 1: Age distribution of cystic lesions of the head and neck (n = 90)

Age group (years)	Number	Percent
≤ 10	7	7.8
11-20	9	10.0
21-30	20	22.3
31-40	25	27.7
41-50	11	12.2
51-60	12	13.3
61-70	4	4.5
> 70	2	2.2
Total	90	100.0

Table 2: Gender distribution (n = 90)

Gender	Number	Percent
Male	49	54.4
Female	41	45.6
Total	90	100.0

The muscular triangle of the neck was the most common site of presentation (44 cases, 48.8%), followed by the carotid triangle (27 cases, 30.0%) and the submental triangle (11 cases, 12.2%); less common sites included the posterior triangle, supraclavicular region and suprameatal region. Right-sided lesions predominated (49 cases, 54.4%). All lesions were solitary, most were firm in consistency (61 cases, 67.7%), and the duration of swelling ranged from three days to ten years, with one lesion present since birth. Most patients had no symptoms other than the swelling itself, and the procedure was well tolerated by all patients without complications.

The aspirated volume ranged from 0.5 ml to 10 ml, with 0.5 ml being the most frequent (51.2%). The nature of the aspirate is summarised in Table 3.

Table 3: Nature (gross appearance) of the aspirate (n = 90)

Macroscopy	Number	Percent
Blood-tinged	36	40.0
Colloid	20	22.3
Serous fluid	17	18.9
Pultaceous	7	7.8
Purulent	5	5.5
Grey-white	3	3.3
Turbid fluid	1	1.1
Haemorrhagic	1	1.1
Total	90	100.0

On cytological evaluation, 75 lesions (83.3%) were non-neoplastic, 14 (15.6%) were neoplastic and one aspirate (1.1%) was non-diagnostic. Colloid goitre with cystic degeneration was the single most common diagnosis (31 cases, 34.4%), followed by epidermal inclusion cyst (24 cases, 26.6%). Thyroid cysts as a group constituted the most common category (37 cases, 41.1%), of which 31 were benign colloid goitres with cystic degeneration (Bethesda category II), four were

papillary thyroid carcinoma with cystic change (Bethesda category VI) and two were follicular neoplasms (Bethesda category IV). Salivary gland cysts accounted for 11 cases (12.2%), comprising six lymphoepithelial cysts (Milan category II), three pleomorphic adenomas with cystic change (Milan category IVa) and two low-grade mucoepidermoid carcinomas (Milan category VI). The complete spectrum of cytological diagnoses is presented in Table 4.

Table 4: Cytological diagnoses of cystic lesions of the head and neck (n = 90)

Cytological diagnosis	Number	Percent
Colloid goitre with cystic degeneration	31	34.4
Epidermal inclusion cyst	24	26.7
Lymphoepithelial cyst	6	6.7
Lymphatic cyst	6	6.7
Branchial cleft cyst	5	5.6
Papillary thyroid carcinoma with cystic change	4	4.4
Pleomorphic adenoma with cystic change	3	3.3
Follicular neoplasm with cystic change	2	2.2
Low-grade mucoepidermoid carcinoma	2	2.2
Thyroglossal duct cyst	2	2.2
Metastatic squamous cell carcinoma	2	2.2
Non-Hodgkin lymphoma with cystic change	1	1.1
Sebaceous cyst	1	1.1
Non-diagnostic aspirate	1	1.1
Total	90	100.0

Clinically, only two cases had been suspected to be malignant before aspiration (one metastatic squamous cell carcinoma and one papillary thyroid carcinoma), whereas FNAC identified seven additional malignant lesions, underscoring the value of cytology over clinical assessment alone. Radiological correlation was possible in 15 cases; 12 ultrasonographic diagnoses of colloid goitre were confirmed on FNAC, while in three cases FNAC refined or corrected the radiological impression.

Aspirates of colloid goitre with cystic degeneration typically showed cyst macrophages, abundant colloid, degenerated red blood cells and benign follicular epithelial cells. Papillary thyroid carcinoma smears showed tumour cells in papillae with karyomegaly, anisonucleosis and nuclear grooves, with pseudoinclusions, intranuclear inclusions and psammoma bodies in occasional cases. Epidermal inclusion cysts showed nucleate and anucleate squames with keratin flakes; branchial cleft cysts showed squames, cyst macrophages and neutrophils; lymphoepithelial cysts showed epithelial and lymphoid cells; lymphatic cysts yielded watery fluid containing lymphocytes and endothelial cells against a proteinaceous background; and low-grade mucoepidermoid carcinoma smears showed cuboidal and intermediate cells with muciphages in a mucinous background.

Histopathological correlation was possible in 47 cases, of which the cytological diagnosis was confirmed in 41 (87.2%) and was inconsistent in six (Table 5). The discordant cases comprised one colloid goitre that proved to be nodular goitre with micropapillary carcinoma (the single false negative), one follicular neoplasm reported as colloid nodular goitre on histology (interpreted as an interpretation error/overdiagnosis), one branchial cleft cyst re-classified as bronchial cyst, one thyroglossal duct cyst re-classified as dermoid cyst, one colloid goitre re-classified as follicular adenoma, and one epidermal inclusion cyst reported as a non-specific inflammatory lesion.

Table 5: Cyto-histopathological correlation (n = 47)

Histopathological diagnosis	FNAC consistent	FNAC inconsistent	Total
Nodular colloid goitre	20	2	22
Papillary thyroid carcinoma	3	-	3
Follicular neoplasm	-	1	1
Thyroglossal duct cyst	1	1	2
Pleomorphic adenoma	2	-	2
Mucoepidermoid carcinoma	1	-	1
Metastatic squamous cell carcinoma	1	-	1
Epidermal inclusion cyst	10	1	11
Branchial cleft cyst	3	1	4
Total	41	6	47

For the detection of malignancy among the 47 correlated cases there were five true positives, 41 true negatives, one false negative and no false positives, yielding a sensitivity of 83.3%, specificity of 100%, positive predictive value of 100%, negative predictive value of 97.6% and overall diagnostic accuracy of 97.8% (Table 6).

Table 6: Statistical performance of FNAC for malignant lesions

Statistical parameter	Result
True positive	5
True negative	41
False negative	1
False positive	0
Sensitivity	83.3%
Specificity	100%
Positive predictive value	100%
Negative predictive value	97.6%
Diagnostic accuracy	97.8%

Discussion

FNAC has emerged as a parallel diagnostic modality with both screening and predictive value, and it is a cost-effective means of categorising cystic head and neck lesions as non-neoplastic or neoplastic before definitive treatment [1,2]. In the present study, cystic lesions constituted 3.17% of all aspirations, most patients presented with a painless swelling, and a male predominance (54.4%) was observed. This male predominance concords with Shekhar et al. [1] but differs from Sahni et al. [2], Goyal et al. [4] and Firat et al. [3], who reported female predominance; the discordance is attributable to variation in study populations. Non-neoplastic lesions predominated (83.3%), comparable to 76% reported by Sahni et al. [2] and 96.5% by Francisco et al. [12].

Thyroid cysts were the most common category (41.1%), with colloid goitre with cystic degeneration as the most frequent single diagnosis (34.4%), in keeping with Shekhar et al. [1], Sahni et al. [2] and Firat et al. [3]; Goyal et al. [4] found thyroglossal duct cyst most common because thyroid lesions were excluded from their series. Malignancy accounted for 16.2% of thyroid cysts in our series, in agreement with Cusick et al. [9], who noted malignancy in 14% of cystic thyroid swellings, and within the 3-25% range (average 14%) reported by de los Santos et al. [8].

Cystic papillary thyroid carcinoma formed 10.2% of thyroid cysts, and our single false-negative case (micropapillary carcinoma in a nodular goitre) reflects the sampling error that most authors identify as the principal cause of false-negative cytology in cystic thyroid nodules rather than misinterpretation [8]. Conversely, one follicular neoplasm proved to be a colloid nodular goitre on histology; Zhu et al. [13] and Malheiros et al. [14] similarly emphasised interpretation errors and suboptimal specimens as causes of false-positive cytology, cautioning that atypia in a paucicellular cystic background should be interpreted conservatively to avoid unnecessary surgery. Epidermal inclusion cyst was the second most common lesion (26.6%), close to the 25% of Goyal et al. [4] but higher than the 13.3% and 11% of Armon et al. [15] and Al-Khateeb et al. [5], likely reflecting ethnic and population differences. Branchial cleft cysts (5.5%) showed cytological and clinical features similar to earlier reports [5,16], with one case re-classified as bronchial cyst on histology owing to paucicellularity. Both thyroglossal duct cysts occurred in the midline, one in a patient older than 50 years, consistent with Katz and Hachigian [10] and Allard [11]. Among salivary gland cysts, cystic malignant change (18%) approximated the 12.82% of Valiya et al. [17]; low-grade mucoepidermoid carcinoma (2.2%) was comparable to Firat et al. (3.17%) [3] and Sahni et al. (1.8%) [2], and remains a well-recognised source of false-negative diagnoses when aspirates are mucinous and hypocellular [2,3]. Cystic metastatic squamous cell carcinoma (2.2%) reaffirms that cervical metastases are frequently squamous and cystic [3], where FNAC is diagnostic in only 50-73% of cases [7].

Cyto-histopathological concordance of 87.2% in our study compares favourably with Baykul et al. (89.8%) [18] and Sahni et al. (96.5%) [2], and exceeds Firat et al. (57.1%) [3]. Our sensitivity (83.3%) and specificity (100%) concord with Saraf et al. [19], Kapoor et al. [20] and Sahni et al. [2], and the diagnostic accuracy of 97.8% is in keeping with these series and with Layfield et al. [6]. These findings substantiate FNAC, combined with clinical history and radiology, as a trustworthy, complication-free first-line investigation for cystic head and neck lesions.

Conclusion

FNAC is a safe, simple, rapid and highly accurate first-line diagnostic tool for palpable cystic lesions of the head and neck, achieving a diagnostic accuracy of 97.8% with no false positives and no procedural complications in the present series. It

reliably separates non-neoplastic from neoplastic lesions and detects clinically unsuspected malignancy. Its principal limitations are sampling error in paucicellular cystic aspirates, false negatives in cystic malignancies such as micropapillary/papillary thyroid carcinoma, low-grade mucoepidermoid carcinoma and cystic nodal metastases, and the inherent inability of cytology to assess capsular and vascular invasion in follicular neoplasms.

Re-aspiration of any residual mass, careful attention to nuclear detail, conservative interpretation of atypia in paucicellular smears, and correlation with clinical and radiological findings — with histopathological confirmation in equivocal cases — will minimise these pitfalls.

References

1. Shekhar H, Kaur A, Agrawal P, Pancharia A, Jadeja P. Fine needle aspiration cytology in head and neck swellings: a diagnostic and therapeutic procedure. Int J Res Med Sci. 2014;2(4):1667-71.
2. Sahni S, Ahluwalia C, Khetrapal S. Diagnostic efficacy of fine needle aspiration cytology in cystic lesions of head and neck region. Trop J Pathol Microbiol. 2019;5(9):693-9.
3. Firat P, Ersoz C, Uguz A, Onder S. Cystic lesions of the head and neck: cytohistological correlation in 63 cases. Cytopathology. 2007; 18(3): 184-90.
4. Goyal D, Bhagat S, Singh D, Kaur J. Cystic lesions of head and neck region: a clinicopathological study. Int J Otorhinolaryngol Head Neck Surg. 2018; 4(3): 664-8.
5. Al-Khateeb TH, Al Zoubi F. Congenital neck masses: a descriptive retrospective study of 252 cases. J Oral Maxillofac Surg. 2007; 65(11): 2242-7.
6. Layfield LJ. Fine-needle aspiration in the diagnosis of head and neck lesions: a review and discussion of problems in differential diagnosis. Diagn Cytopathol. 2007;35(12):798-805.
7. Sheahan P, O'Leary G, Lee G, Fitzgibbon J. Cystic cervical metastases: incidence and diagnosis using fine needle aspiration biopsy. Otolaryngol Head Neck Surg. 2002;127(4): 294-8.
8. de los Santos ET, Keyhani-Rofagha S, Cunningham JJ, Mazzaferri EL. Cystic thyroid nodules: the dilemma of malignant lesions. Arch Intern Med. 1990;150(7):1422-7.
9. Cusick EL, MacIntosh CA, Krukowski ZH, Matheson NA. Cystic change and neoplasia in isolated thyroid swellings. Br J Surg. 1988; 75(10): 982-3.
10. Katz AD, Hachigian M. Thyroglossal duct cysts: a thirty year experience with emphasis on occurrence in older patients. Am J Surg. 1988;155(6):741-4.
11. Allard RH. The thyroglossal cyst. Head Neck Surg. 1982;5(2):134-46.
12. Francisco AL, Correr WR, Azevedo LH, et al. Fine needle aspiration cytology in the diagnosis of cystic lesions of the head and neck. Braz J Otorhinolaryngol. 2015; 81(6): 642-6.
13. Zhu W, Michael CW. How important is on-site adequacy assessment for thyroid FNA? An evaluation of false negative and false positive results. Diagn Cytopathol. 2007;35(3):183-6.
14. Malheiros DC, Canberk S, Poller DN, Schmitt F. Thyroid FNAC: causes of false-positive results. Cytopathology. 2018;29(5):407-17.
15. Armon N, Shamay S, Maly A, Margulis A. Occurrence and characteristics of head cysts in children. Eplasty. 2010;10:e37.
16. Singh ID, Sahai K, Verma R. Branchial cleft cysts: a case series. Med J Armed Forces India. 2015;71(Suppl 1):S26-8.
17. Valiya LG, Shah SN, Prajapati DJ. Cytological evaluation of salivary gland lesions with histopathological correlation. Int J Med Sci Public Health. 2015;4(9):1216-21.
18. Baykul T, Yilmaz HH, Aydin U, Aydin MA, Aksoy MC, Yildirim D. Aspiration cytology of cystic lesions of the maxillofacial region. J Contemp Dent Pract. 2010;11(2):17-24.
19. Saraf A, Kaur H, Narang S. Role of fine needle aspiration cytology in evaluation of head and neck lesions with cyto-histopathological correlation. Ann Pathol Lab Med. 2017; 4(4):A386-92.
20. Kapoor K, Singla G, Kundal RK, Kaur M. Fine needle aspiration cytology of head and neck lesions and its histopathological correlation: a two year prospective study. Ann Int Med Dent Res. 2017;3(4):PT01-6.
21. Note: Bibliographic details of the references have been reconstructed from the citations in the dissertation; please verify each entry against the original source (PubMed/journal website) before submission.