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Original Article

Utility of aspiration cytology in the evaluation of oral and maxillofacial lesions

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Abstract

Background: Fineneedle aspiration cytology (FNAC) as a cheap diagnostic technique has helped reduce diagnostic turnaround time of pathological entities from different body sites. It is thus also important to evaluate its utility in the diagnosis of maxillofacial lesions in view of heterogeneity of morphological patterns noted for this site.

Methodology: Cytology and corresponding histology reports for lesions from patients where both were available were compared for concordance between specific cytological diagnosis and final histological diagnosis. From these, sensitivity, specificity, positive predictive value and accuracy of FNAC were calculated.

Result: Cytological diagnosis of maxillofacial lesions demonstrated a sensitivity, specificity, positive predictive value and accuracy of 100%, 95.7%, 97% and 98.2%, respectively. The concordance of specific cytological diagnosis with final histological diagnosis was 85.5%.

Conclusion: This study concludes that FNAC is a cheap and diagnostically reliable technique for evaluation of maxillofacial lesions in a resource poor setting.

Key words: Concordance, fine-needle aspiration cytology, maxillofacial, sensitivity

Introduction

Clinical practice in Nigeria, like in other parts of the world, is under ever increasing pressure to not only accurately diagnosing lesions but to do so in shorter time and at lower cost. Even though in recent times justifiable attention is being paid to shortening turnaround time (TAT) for histology on tissue samples, cytology still holds great appeal for clinicians because of its shorter TAT, lesser invasiveness, increasing diagnostic sensitivity and specificity and relatively lower cost. The issue of cost, at the moment, with the institution of health insurance policies in many countries, is poised to become the unspoken primary consideration in patient care in the nearest future.

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Several studies[1-3] have demonstrated the usefulness of this technique in diagnosis of lesions in different organs but there is a paucity of studies on its utility in diagnosis of maxillofacial pathologic conditions.[4] The importance of this stems from the fact that maxillofacial lesions have been noted to pose diagnostic challenges not only because of multiplicity of possible diagnoses but also because lesions, especially those from salivary glands, tend to be diverse with respect to morphology. This study is therefore aimed at evaluating the diagnostic value of fine-needle aspiration cytology (FNAC) in the evaluation of various lesions from this region of the body. This will assist clinicians and surgeons, particularly those working in resource challenged countries, to rapidly assess patients and offer timely intervention at lower cost.

Methodology

FNAC and final histology reports of maxillofacial lesions from random patients who attended the maxillofacial unit of a teaching hospital over an 8-year period were compared for concordance. The lesions were aspirated using size 27-G needles and obtained material smeared on grease-free

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glass slides and stained with Giemsa (Diff Quik) and Papanicolaou stains. Unsatisfactory smears were excluded. Pathologists then classified these into either benign or malignant, and in each case offering specific diagnosis where possible. Ensuing data was managed using simple statistical formulae.

Results

Maxillofacial lesions diagnosed by cytology and for which corresponding histology reports were available were 55 in number and comprised 32 (58.2%) malignant and 23 (41.8%) benign lesions [Table 1]. The sensitivity of cytology was 100% while the specificity was 95.7%. Accuracy and positive predictive value were 98.2% and 97%, respectively. As shown in Table 2, in the cases (47 of 55; 85.5%) where specific diagnosis was rendered based on cytological features, the overall concordance for benign lesions was 78.3% and 87.9% for malignant lesions. For pleomorphic adenoma, tuberculosis and others, which included lipoma and benign lymphoepithelial cyst concordance was 100%, respectively. While concordance for definitive diagnosis of Burkitt's lymphoma was also 100% there was greater variability for maxillofacial sarcomas and carcinomas (67% and 50%, respectively). Even though malignancy was correctly diagnosed in all malignant cases (100% concordance) the specific cytological diagnosis did not tally with that rendered at histology in all cases, especially the carcinomas. The 5 (9.1%) benign cases for which definitive diagnosis was not rendered from cytology were mostly cystic lesions, however all were benign and were simply diagnosed as benign cysts.

Table 1: The distribution of diagnosis by FNAC and histology

	Benign on histology	Malignant on histology	Total
Benign by cytology	22	0	22
Malignant by cytology	1	32	33
Total	23	32	55

FNAC - Fineneedle aspiration cytology

Table 2: The percentage concordance of specific FNAC diagnosis with histology for the different oral and maxillofacial lesions

	No. diagnosed on histology	No. given specific diagnosis on cytology	% concordance
Pleomorphic adenoma	11	11	100
Tuberculosis	4	4	100
Lymphoepithelial cyst	2	2	100
Ameloblastoma	2	0	0
Dentigerous cyst	1	0	0
Odontogenic keratocyst	1	0	0
Lipoma	1	1	100
Leiomyoma	1	0	0
Burkitt's lymphoma	25	25	100
Adenoid cystic carcinoma	2	1	50
Poorly differentiated carcinoma	1	1	100
Malignant Ex PA	1	0	0
Sarcoma	3	2	67
Total	55	47	85.5

FNAC - Fineneedle aspiration cytology, PA - Pleomorphic adenoma

Discussion

Determination of diagnostic value of a technique like FNAC, particularly for oral and maxillofacial lesions, will ultimately serve the purpose of helping in the triage of patients for different therapeutic options. Such determinants as sensitivity, specificity, accuracy and positive predictive values will aid the clinician in determining what weight of reliance can be put on a diagnostic technique.

This study has demonstrated an overall sensitivity of 100%, specificity of 95.7%, and overall accuracy of 98.2%. Though our overall sensitivity is higher than 87.5% documented in the study by Singh *et al.*,[5] their positive predictive value of 100% is higher than ours of 97%.

The overall concordance ratio of 85.5% in this study is comparable to the approximately 90% documented by Baykul *et al.*[4] in a study from Turkey. Our concordance rate for malignant lesions of 87.9% is also comparable to the 88% documented by Postema *et al.*[6]

While diagnostic pitfalls have hampered the reliable distinction of pleomorphic adenoma (PA) from adenoid cystic carcinoma (ACC) as noted by Singh *et al.*[5] and Ustundag *et al.*,[7] we encountered no such difficulties as 100% of the pleomorphic adenomas in our study were confirmed by histology. Similar high concordance rate (99%) was also reported in the study from the Netherlands.[6] Mild nuclear pleomorphism was noted in some of the cases but these were not interpreted as evidences of malignancy. In addition to this, as suggested by Lee *et al.*,[8] the presence of plasmacytoid cells with abundant cytoplasm is also a helpful feature in differentiating PA from ACC.

The ease of diagnosing tuberculosis in the present study may be attributed to the vast experience of cytopathologists with these lesions due to relatively high incidence of the disease in the study population. Highly suggestive histories, clinical features, ease of recognizing multinucleated giant cells, epithelioid histiocytes and background necrotic debris sometimes positive for acid-fast bacilli in the smears are important features seen in our study. Even with low positivity rate for Zeihl Nielson staining, which may be as low as 11.5%,[9] the cytopathologist can still comfortably make a specific diagnosis of TB. An important differential is erroneous aspiration of necrotic material from tumour diathesis. Similar to our observation, Balaji *et al.*[10] in their correlation study of FNAC and histology in the

diagnosis of tuberculosis also recorded 99% accuracy for the technique.

Cystic lesions on the other hand presented more diagnostic challenges, just as noted by Ramzy *et al*.[11] Even though all the cysts in this study were benign at histology and correctly diagnosed by FNAC as benign, specific diagnosis was only rendered in cases of benign lymphoepithelial lesions. These presented mostly as slightly turbid yellowish fluid aspirates grossly and generally show variable proportions of lymphocytes admixed with epithelial cells, usually squamous. Though a bronchial cleft cyst may be a differential, the location and clinical history often help in their differential diagnosis. Others were odontogenic cysts which, even though may show occasional squamous cells, cannot be differentiated from other cysts such as dentigerous cysts, or when inflammed, as noted by Ramzy *et al*.[11] Two cases of ameloblastoma were seen in the present study but were not specifically diagnosed at FNAC. Baykul *et al*.[4] in their study could also not find enough features to render specific diagnosis of their five cystic ameloblastomas by FNAC. The finding of epithelial cells exhibiting peripheral palisading, as described by Singh and colleagues,[5] may not only be absent but when seen are not specific as these may also be seen in basal cell lesions.

Non-Hodgkin's lymphoma (NHL), in the form of Burkitt's lymphoma among our patients, comparable to findings from other studies,[5,12] was also an indication for FNAC in our study. This may be a reflection of the high incidence of this lymphoma in our setting. The superlative value of FNAC in making a diagnosis of this lesion stems from the relatively highly reliable diagnostic features on cytology. These include large numbers of intermediate sized lymphoid cells with 2 to 5 nucleoli, thin rim of vacuolated bluish cytoplasm, frequent mitotic figures, lympho-glandular bodies and variable numbers of background tangible body macrophages. This lends credence to the suggestion by Lilliemark and colleagues[12] that FNAC may even be a more suitable technique for diagnosing the NHLs of this region than histology; more so that immunocytochemistry staining can now be conducted on FNAC smears. Immunocytochemistry staining was however not carried out in this study because the facilities were not available as at the time of the study.

Two cases of ACC were seen but only one had a specific diagnosis on FNAC. The characteristic small cells with hyperchromatic nuclei, nuclear molding, scanty cytoplasm and background hyaline globules as suggested in the literature[13] were present. The other did not have these features and was thus diagnosed simply as carcinoma. Only three sarcomas were seen two of which had specific diagnosis, with the single case simply labeled as malignant on cytology. This was a rare case of osteosarcoma comprised of atypical spindle cells but showed no characteristic osteoid. A case of leiomyoma at histology was inaccurately diagnosed as a sarcoma on cytology while a case of infantile fibrosarcoma of the jaw in a child was diagnosed on histology but was not included in this study because repeated aspirates yielded only blood and was thus unsatisfactory for cytological analysis. This was believed to be due to sampling error. In conclusion, even though maxillofacial lesions may exhibit morphologic heterogeneity, FNAC has demonstrated great diagnostic versatility in their assessment. Its applicability however, relies on good aspiration technique, type of maxillofacial lesion and experience of the cytopathologist. Yet, with an overall concordance with histology of 85.5% and 87.9% for malignant lesions, it is a valuable tool in the assessment of maxillofacial lesions.

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