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Original Research Paper Pathology

FNAC AS A PREOPERATIVE DIAGNOSTIC TOOL IN CASES OF AMELOBLASTOMA: A STUDY OF 16 CASES

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ABSTRACT Application of fine needle aspiration cytology (FNAC) in the diagnosis of odontogenic tumors seems to have received little attention. This non-invasive, economical, consistent, and simple procedure can eliminate the need for open biopsy techniques with its likely cumbersome effects. Ameloblastoma is amongst the most common epithelial odontogenic tumors arising in the jaw bones.

Aim of the study: This study aims to assess the reliability and diagnostic accuracy of fine needle aspiration cytology in the preoperative diagnosis of intraosseous jaw lesions; particularly the ameloblastomas.

Materials and Methods: Study Design: This study is descriptive in nature where sixteen consecutive patients with clinical and radiological diagnosis of ameloblastoma, submitted for FNAC, are included. Exclusion Criteria: Patients who are asymptomatic and patients who refused to undergo the procedure.

Fine needle aspiration was done with a 22-gauge needle that was attached to a 5-milliliter syringe which was supported by a mechanical-syringe holder. Smears were immediately fixed in 95% ether-alcohol and stained with the Papanicolaou stain. Of the 16 cases, adequate material for cytological evaluation was obtained in only 14 cases. Fourteen (87.5%) cases exhibited the cytological features of ameloblastoma. FNAC diagnosis was confirmed by histopathology in 12 of the 14 specimens (75% accuracy), whereas the remainder of the two cases were histologically confirmed as calcifying epithelial odontogenic cyst with ameloblastomatous proliferation.

Overall, the cytologic diagnosis of ameloblastoma correlated positively with its histological findings (12 of the 14 cases) with an accuracy of 75%.

FNAC can therefore be used as a fairly reliable, outpatient procedure for diagnosis of intra-osseous jaw lesions, including the ameloblastomas.

KEYWORDS : FNAC, ameloblastoma, odontogenic tumors, cytology, histopathology

INTRODUCTION

Ameloblastomas, with an annual incidence of 0.6 new cases per one million; constitutes about 1% of all cysts and tumors of the jaws. [1] It is the second most common epithelial odontogenic neoplasm, Existing data on the ameloblastomas of the jaws, reports an average age of occurrence of 36 years. In the developing nations, the ameloblastomas are common in the younger patients. Men and women are found to be equally affected, with the primary occurrence of the tumor being seen earlier in women than in men (4 years earlier). The tumor was larger in females than in males. Predominant clinical manifestations such as the painless swelling and slow growth are unique for this lesion. Mandible was found to be 5 times more frequently affected than the maxilla, manifesting about 12 years earlier than in the maxilla. Ameloblastomas occurred most frequently in the molar-ramus area of the mandible. In the Blacks, the lesion manifested in the anterior region of the jaws. Radiologically, the lesion appeared radiolucent with a sharp delineation in 50% of the cases. Histologically, an equal predominance of the plexiform and follicular types was seen; and the other variants such as acanthomatous ameloblastomas were commonly observed in older patients. Lesions frequently became large, destructive, and multilocular. [2] Diagnosis of ameloblastoma was frequently delayed due to its painless, slow growing nature. [3]

FNAC is the study of a palpable or roentgenographic mass by means of a fine needle, with a negative pressure created by an attached syringe. It is a rapid and relatively non-invasive procedure for the initial evaluation of swellings, including those affecting the jaw bones. The diagnosis of bone lesions by needle biopsy was first introduced by Coley et al in 1931. It provides a provisional diagnosis of these lesions and avoids hasty or unnecessary surgical biopsies. A biopsy done for a preoperative diagnosis of a jaw lesion is both traumatic and worrisome. The primary indication for an FNAC is in the case of a lesion that is palpable or visible by radiographic imaging methods.

The diagnostic technique is useful in keeping track of recurrences or persisting neoplasms, in confirming a suspected malignancy; in order to differentiate between benign and malignant conditions, document malignancies for untreatable patients; to evaluate metastasis of malignant diseases, to diagnose multiple tumors and to identify infectious organisms.

MATERIALS AND METHODS

Sixteen radiolucent jaw lesions diagnosed clinically and radiologically as ameloblastomas, were selected for the study. Fine needle aspiration was performed on an outpatient basis. In those cases where a palpable swelling was the clinical manifestation, the needle was inserted directly into the lump; and in cases with no visible signs; the needle track was chosen based on the radiographic findings.

Material was aspirated with a 22 gauge needle attached to 5 milliliter disposable syringe. The aspiration was done intraorally in all the cases. The needle was inserted to the desired depth, into the tumor, and a firm suction was applied to create a negative pressure in the syringe. The needle was moved 2 or 3 times in different directions while maintaining the negative pressure. The piston was released, to allow the pressure to equalize, to prevent spattering of cells; and the needle was then withdrawn. The material thus obtained was expressed on one or more glass slides and spread with another slide. The smears were immediately fixed in ether alcohol and stained with Papanicolaou.stain (PAP).

Incisional biopsy and the histopathologic diagnosis of the corresponding lesions were done; and the findings compared with the cytologic findings obtained through FNAC.

Nevertheless, the pathologist must be adept at identifying cells in a

cytological smear; and an adequate cellular sample is mandatory. The greatest benefit of FNAC is the speed with which a diagnosis can be made without countless difficulties, so that the treatment planning or even the final treatment can be initiated at the earliest.

A survey on the studies of fine needle aspiration cytology (FNAC), showed a high diagnostic accuracy for lesions of salivary glands, thyroid, parathyroid, lymph nodes, skin, soft tissues, and bone. [4]

This study was undertaken to confirm the utility of FNAC in the early diagnosis of the bone swellings, predominantly the ameloblastomas. For this study, 16 clinically and radiologically confirmed cases of ameloblastomas were selected. The outlined procedure for FNAC was implemented, followed by a histological study of the cases, to compare with the FNAC findings.

OBSERVATION AND RESULTS

The PAP stained sections showed cluster of basaloid epithelial cells arranged in sheets, with central loose spindled stellate reticulum-like cells; and focal peripheral palisading cells that resembled the ameloblast like cells, thereby, confirming the diagnosis of an ameloblastoma.

Of the 16 cases, 2 cases were eliminated due to inadequate material on microscopic slide; 14 (87.5%) cases showed cytological consistency with benign odontogenic tumor: ameloblastoma. Twelve (85.7%) of the 14 cases showed histological features of ameloblastoma; whereas 2 (14.3%) specimens showed histopathological features of calcifying epithelial odntogenic cyst with ameloblastomatous proliferation.

The 14 PAP stained smears of ameloblastoma showed a variable, yet, characteristic combination of basaloid and stellate or spindle cells in the aspirate. (Figure1). The basaloid cells were found arranged in small or large clusters with poorly defined individual cell borders and minimal to moderate amount of cytoplasm. Portions of the stromal elements with varying cellularity were seen along with inflammatory cells, in 8 cases. No mitotic figures were observed and the nuclei were not hyperchromatic. Under higher magnification, the smear of ameloblastoma showed cells with round or oval nuclei, coarsely granular chromatin and inconspicuous nucleoli. (Figure2). In 12 cases there was a 100% correlation between cytological and histological findings with an accuracy of 100%. Whereas in the remaining 2 cases there was no correlation with the cytological findings as the histological diagnosis was given as a calcifying epithelial odontogenic cyst with ameloblatomatous proliferation.

The age of the patients ranged between 15 and 49 years with maximum number of cases 7(43.75%); in the 31-40 year age group. There were 9 (56.25%) males and 7 (43.75%) females. Most common site was the posterior part of mandible (68.75%).

Histopathology of 8 (56.25%) cases showed the follicular type of ameloblastoma, 4 (25%) cases displayed plexiform ameloblatoma, and 2 (12.5%) cases exhibited calcifying epithelial odontogenic cyst with ameloblastomatous proliferation. Two cases that were eliminated due to inadequate cytological sample (0) presented with a histological diagnosis of follicular ameloblastoma with cystic degeneration in one and unicysticameloblastoma in the other

Figure 1: Smear of ameloblastoma showing clusters of basaloid and spindle cells. (x 400)

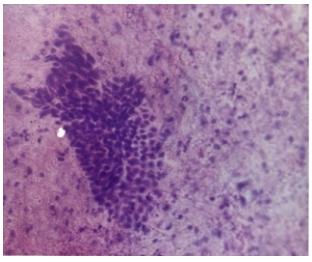


Figure 2. Smear of ameloblastoma showing round or oval nuclei with coarsely granular chromatin and inconspicuous nucleoli. (x1000)

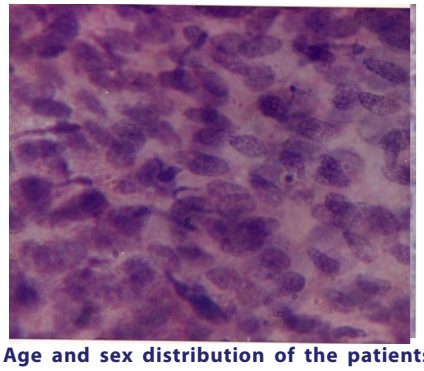


TABLE I: Age and sex distribution of the patients with suspected Ameloblastoma

Age	Males	Females	Total	Percentage
10-20	1	2	3	18.75
21- 30	2	1	3	18.75
31- 40	4	3	7	43.75
41- 50	2	1	3	18.75
Total	9	7	16	

GRAPH I: Age and Sex distribution of the patients with suspected Ameloblastoma

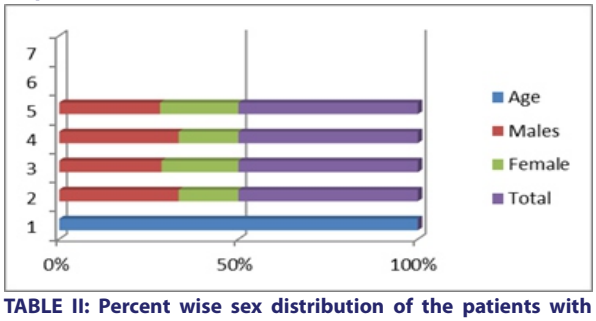


TABLE II: Percent wise sex distribution of the patients with suspected Ameloblastoma

Total 16 patients			
Male	(%)	Female	(%)
9	56.25	7	43.75

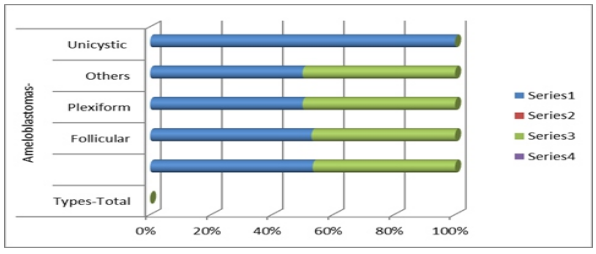
TABLE III: Site distribution of the patients with suspected Ameloblastoma Mandible

Vertical ramus	Right anterior	Right posterior	Left anterior	Left posterior
	1	5	2	6
Total = 14				
(%) = 87.5				

Maxilla

Palate	Right anterior	Right posterior	Left anterior	Left posterior
				2
Total = 2				
(%) = 12.5				

GRAPH 2: Distribution of cases based on the histological and cytological diagnosis of ameloblastomas



DISCUSSION

Ameloblastoma is an intraosseous, locally invasive jaw neoplasm that often causes sufficient expansion of the cortical plates of the jaw bones; thereby permitting an easy penetration of the aspiration needle. Though incisional biopsy is considered as a prime diagnostic tool for preoperative diagnosis of these lesions, they pose some difficulty, as in procuring a sufficient representative biopsy sample. These lesions do not normally grow as a uniform solid mass, but are rather made up of multiple solid bodies (multilocular). This multilocularity is advantageous for FNAC sampling, as it can be done at multiple sites, including the deeper aspects of the tumor, especially when the incisional biopsy is insufficiently deep, for interpretation. [5]

Clinically, the ameloblastomas often manifest as a painless swelling. Its location and the radiological findings are the key factors in the provisional diagnosis. Findings such as the expansion of cortical plates with scalloped margins, multiloculations or soap bubble appearance with root resorptions may be seen [6]

Out of the 14 cases in our study, 12 cases were cytologically diagnosed as ameloblastoma and were in accordance with the histologic findings. But in 2 cases there was no co-ordination between the cytological findings and histology; diagnosis being calcifying epithelial odontogenic cyst with ameloblastomatous proliferation. Overall, the cytological diagnosis was concomitant with the histologic findings in 12 out of 16 cases; with an accuracy of 75%. Kaliamoorthy et al. [5], in their diagnosis of ameloblastoma using FNAC, observed a sensitivity of 86.6% and specificity of 100%. Whereas, similar studies by Günhan [7] and Uçok et al. [8], showed a sensitivity of 100% and 93.5%, respectively. Cytologic diagnosis correlated with histologic findings of ameloblastoma in 7 of 12 cases with an accuracy of 58.3%, when studied by Vidyadevi et al [9]. The cytological findings in our study were found to correlate with the FNAC case series reported by Ramzy et al [10] and Gunhan [7]. Ramzy et al [10] suggested that a combination of basaloid, stellate and sometimes squamous cells as characteristic features of ameloblastomas. All the 12 cases in our study showed predominantly basaloid and spindle cells. Stellate cells and squamous cells were scanty.

Cytological smears with tightly packed cluster of basaloid epithelial cells resembling odontogenic tissue was reported by Vidyadevi et al [9] in their study of 12 cases of ameloblastomas. Radhika et al. [11] reported tightly packed cluster of palisading basaloid epithelial cells.

Kaliamoorthy et al [5], in their FNAC smears of ameloblastomas, showed basaloid epithelial cell clusters with peripheral tall columnar cells exhibiting reversed polarity of nuclei.

Mathew et al. (12) reported a distinct, two-cell population consisting of small, hyperchromatic, basaloid-type cells and scattered larger cells with more open chromatin; Choudhary et al(13) described cytological findings of ameloblastoma: as tightly packed groups of basaloid cells arranged in nests. A somewhat similar observation was made by Gausia et al. (14)

The two negative cytology samples in our study were due to the complete cystic degeneration of the lesion that limited the procurement of adequate sample during aspiration. This makes it mandatory to correlate the cytological diagnosis with the clinical history; and if clinical suspicion exists after negative FNAC, further investigations should be carried out. False negative diagnosis in our study was due to cystic degenerations which is in accord with previous studies [5,9]

FNAC was found to be very effective in accurate preoperative diagnosis in relation to the remainder of our cases.

CONCLUSION

Probably, due to the lack of awareness of cytology in the diagnosis of odontogenic tumors, this method is not given its due by the dental surgeons. But, it has been confirmed that if a good amount of cytological sample is obtained, it could be used as effectively as histopathology, in the confirmation of the clinical and radiological findings of ameloblastomas.

FNAC is a minimally invasive, safe, fast and inexpensive method for diagnosing odontogenic tumors, which ensures that patients receive speedy treatment. This case highlights the distinctive cytological features of ameloblastomas, which makes their diagnosis by FNAC, possible.

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