

A PROSPECTIVE STUDY OF FINE NEEDLE ASPIRATION CYTOLOGY OF INTRAORAL LESIONS

Harish S. Permi¹, Sunil Kumar Y², Sajitha K³, Kishan Prasad H. L⁴, Teerthanath S⁵, Jayaprakash Shetty K⁶

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ABSTRACT: Fine needle aspiration cytology (FNAC) is an important diagnostic tool for swellings in the thyroid, salivary gland, breast lump and enlarged lymph nodes. Very few studies have been done to explore the potential of FNAC in the diagnoses of intraoral lesions. Hence the present study was done to find out the efficacy of FNAC in the diagnosis of intraoral lesions. **AIMS/OBJECTIVES:** To determine the efficacy of Fine Needle Aspiration Cytology in the diagnosis of intraoral lesions. **MATERIALS & METHODS:** A prospective study on 88 cases presented with intraoral lesions was done from August 2010 to July 2012. Cases of intraoral Cases having both FNACs along with biopsy correlation were included. **OBSERVATIONS/RESULTS:** The age group ranged from 12-83 years with male: female ratio of 1.6:1. The most common sites of aspiration were tongue in 28 cases, followed by buccal mucosa in 24 and other sites 42 cases. The lesions reported on FNAC were malignant tumors in 44(50%), benign lesions 39 (44.31%) and suspicious for malignancy 5(5.69%) cases. False negative and false positive were 6 and 2 cases respectively. Squamous cell carcinoma was the common malignant tumor. Overall sensitivity of 88%, specificity 95.6% and diagnostic accuracy of 91.6% was obtained in our study. **CONCLUSION:** We conclude that FNAC is one of the important diagnostic tool in the diagnosis of intraoral lesions. The results of our study suggest, it should be considered as first line of investigation, especially in clinically suspected malignant tumors.

KEYWORDS: Intraoral Lesions, Fine needle aspiration cytology, Efficacy.

INTRODUCTION: Fine needle aspiration cytology (FNAC) has become a popular tool for diagnosis of wide variety of both superficial lesions which includes thyroid and salivary gland swellings, breast lump and enlarged lymph nodes and deep seated lesions.⁽¹⁾ Its use in the diagnosis of oral lesions is not being commonly practiced. Almost all the oral lesions are subjected to biopsy in many centers.⁽²⁾ A wide variety of non-neoplastic lesions, benign and malignant tumors occur in the oral cavity.⁽³⁾ Oral cancer is a heterogeneous group of cancers arising from different parts of the oral cavity with different predisposing factors, prevalence and treatment outcomes.

It is the sixth most common cancer reported globally with an annual incidence of over 300,000 cases, of which 62% arise in developing countries.⁽⁴⁾ Squamous cell carcinoma is the most common malignancy and pleomorphic adenoma of minor salivary glands is the most frequently encountered benign tumor, which usually involves the palate.⁽³⁾ However there are only few reports about the potential of FNAC for the diagnosis of intraoral lesions.⁽²⁾ Physicians in developing countries have been found to be dependent upon histopathology reports of the neoplasm even though FNAC is comparatively very much cost effective. Biopsy is time taking, expensive, more painful, producing unwanted bleeding at times and needs more time for its processing and reporting leading to delay in the planning of definitive treatment.⁽¹⁾ Hence study of FNAC in the evaluation of intraoral lesions was

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planned to know the efficacy as there are only limited studies available in the diagnosis of intraoral lesions.

AIMS & OBJECTIVES: To determine the efficacy of Fine Needle Aspiration Cytology in the diagnosis of intraoral lesions.

MATERIALS & METHODS: A prospective study was done on 88 cases presented with lesions of oral cavity between from August 2010 to July 2012 at K S Hegde Medical Academy of Nitte University Mangalore, a tertiary referral center. All these cases had adequate FNA material for cytology diagnosis and tissue biopsy for histopathological correlation. The cases which had inadequate FNA material for opinion and unavailability of biopsy for correlation were excluded from the study. FNAC was done in pathology laboratory and in some cases ENT OPD. The procedure was well explained and due consents was taken from the patients.

The aspiration was performed with a 24 gauged needle attached to a 10 ml disposable syringe either in sitting position with proper exposure of the site of lesion. Tongue depressor was used in aspiration from tonsil. The needle was introduced into the lesion and suction applied by retracting the syringe plunger. The needle was moved back & forth four to five times in the same plane to ensure minimal bleeding. The material obtained was put on different slides and were air dried and fixed in absolute alcohol. The smears were stained with Giemsa and Papanicolaou stain. The biopsy from the lesion or surgically excised specimen was fixed in 10% formalin and sent for histopathological examination. FNAC and HPE reports of these patients were correlated to find out the accuracy of FNAC with the histopathology. Data was analyzed using proportions and Chi- square test. Sensitivity, specificity and diagnostic accuracy were calculated.

RESULTS: In our study, 88 patients presenting with lesions of the oral cavity were subjected to fine needle aspiration cytology. There were 55 males and 33 females. Male to female ratio was 1.6:1. The age group ranged from 12-83 years with mean of 46.4 years. The maximum number of cases were seen in the sixth decade (25 cases), followed by 22 cases in the fifth decade, 13 cases each in fourth and seventh decade, 9 in third, 3 in second, 2 in eighth and one case in ninth decade of life. (Table 1) Clinically patients presented with ulcerative lesions, swelling, nodule, irregular growth and cysts. The most common sites of aspiration were tongue in 28 cases (31.9%), followed by buccal mucosa in 24 (27.3%), hard palate in 8 (9.1%), soft palate in 7 (7.9%), tonsil in 7 (7.9%), floor of mouth in 6 (6.9%), alveolus in 4(4.6%), retromolar trigone in 2(2.2%) and lip in 2(2.2%). (Table 2) Squamous cell carcinoma in 32 (36.36%) cases was the commonest FNAC diagnosis followed by benign cystic lesion/mucocele in 19 (21.59%), chronic inflammatory lesion in 12(13.62%), Non-Hodgkin's Lymphoma in 4(4.54%), pleomorphic adenoma in 4(4.54%), adenocarcinoma in 3(3.4%), mucoepidermoid carcinoma in 2(2.8%),adenoid cystic carcinoma in 2(2.8%), schwannoma in 2(2.8%) , sarcoma in 2(2.8%), ameloblastoma in 1(1.14%), benign fibrous tumor in 1(1.14%) and suspicious for malignancy in 5(5.69%) cases.(Table 3) The cases were broadly classified into benign, suspicious for malignancy and malignant lesions on FNACs.

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Age Group	Number of Cases (Total 88)
1-10	00
11-20	03
21-30	09
31-40	13
41-50	22
51-60	25
61-70	13
71-80	02
81-90	01

Table 1: Showing age distribution of no. of cases

Sites of FNAC	No. of Cases (%)
Tongue	28 (31.9%)
Buccal mucosa	24 (27.3%)
Hard Palate	08 (9.1%)
Soft Palate	07(7.9%)
Tonsil	07(7.9%)
Floor of mouth	06(6.9%)
Alveolus	04(4.6%)
Retromolar trigone	02(2.2%)
Lip	02(2.2%)
Total	88 (100%)

Table 2: Showing sites of FNACs

FNAC Diagnosis	No. of cases (%)
Squamous cell carcinoma	32 (36.36%)
Benign cystic lesion/Mucocele	19 (21.59%)
Chronic inflammatory lesion	12 (13.62%)
Suspicious for malignancy	05 (5.69%)
Non Hodgkins Lymphoma	04(4.54%)
Pleomorphic adenoma	04 (4.54%)
Adenocarcinoma	02 (2.28%)
Mucoepidermoid carcinoma	02 (2.28%)
Adenoid cystic carcinoma	02 (2.28%)
Schwanoma	02 (2.28%)
Sarcoma	02 (2.28%)
Ameloblastoma	01 (1.14%)
Benign fibrous tumor	01 (1.14%)
Total	88 (100%)

Table 3: Showing FNAC diagnosis

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Cases	FNAC	Histopathology	Suspicious cases on histopathology	False positive cases	False negative cases
Benign lesions	39	33	02	02	06
Malignant tumors	44	50	03		
Suspicious for malignancy	05	-			
Total	88	83	05		

Table 4: Showing correlation of FNAC with Histopathology

Sites of FNACs	Devesh Singh et al (2008) (49)	Present study (2010-12) (88)	Lee et al, (1998) (44)	Tarak et al, (2012) (157)
Tongue	8 (16.3%)	28 (31.9%)	6	35(22.3%)
Buccal mucosa	4 (8.2%)	24 (27.3%)	1	18(11.5%)
Hard Palate	9 (18.4%)	8 (9.1%)	22	66 (42%)
Soft palate	1 (2%)	7 (7.9%)	-	-
Floor of mouth	7 (14.3%)	6(6.9%)	2	17(10.8%)
Tonsil	11 (22.4%)	7(7.9%)	-	10(6.4%)
Alveolus	4 (8.2%)	4 (4.6%)	-	5(3.2%)
Retromolar Trigone	1 (2%)	2 (2.2%)	-	3(1.9%)
Nasopharynx	3 (6.1%)	--	-	
Lateral Pharyngeal wall	1 (2%)	--	5	3(1.9%)
Lip	-	2 (2.2%)	5	
Others	-	-	3	
Maxillary sinus	-	-	-	

Table 5: Showing comparison of sites of FNAC by various authors.

FNAC diagnosis	Devesh Singh et al, (2008) (49)	Present study (2010-12) (88)	Nazoora Khan, et al, (2013) (229)
Squamous cell carcinoma	17 (34.17%)	32 (36.36%)	91
Benign cystic lesion / Mucocele	1 (2%)	19 (21.59%)	02
Chronic inflammatory lesion	6(12.2%)	12 (13.62%)	78
Suspicious for malignancy	1(2%)	05 (5.69%)	-
Non Hodgkins Lymphoma	7 (14.3%)	04(4.54%)	-
Pleomorphic adenoma	4(8.2%)	04 (4.54%)	4
Adenocarcinoma/Low grade malignant tumor	1(2%)	03 (3.4%)	2
Mucoepidermoid carcinoma	1(2%)	02 (2.28%)	4

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Adenoid cystic carcinoma	4	02 (2.28%)	2
Schwanoma	-	02 (2.28%)	-
Sarcoma	-	02 (2.28%)	-
Ameloblastoma	1	01 (1.14%)	-
Benign fibrous tumor	-	01 (1.14%)	2
Low grade malignant tumor	1(2%)	-	
Lipoblastoma/ Lipoma	1(2%)	-	2
Papilloma	1(2%)	-	-
Nasopharyngeal carcinoma	1(2%)	-	-
Normal epithelial cells/	1(2%)	-	-
Verrucous carcinoma	-	-	3
Basal cell carcinoma			2
Premalignant lesions	-	-	28
Hemangioma	-	-	8
Basal cell adenoma			1
Total	49(100%)	88 (100%)	229

Table 6: Showing comparison of FNAC diagnosis by various authors.

Authors, Year, No. of cases	Sensitivity	Specificity	Diagnostic accuracy
Devesh Singh, et al, (2008)(49)	97.87%	88.35%	93.75%
Lee H J, et al, (1988) (27)	62.5%	100%	70%
Saleh H A, et al, (2008)	77.7%	100%	-
Munazza, et al, (2012) (40)	100%	88.8%	97.5%
Castelli, et al, (44)	80.6%	96.90%	78%
Tarak, et al, (2012) (157)	71.4%	97.8%	87.7%
Present Study (2010-12) (88)	88%	95.6%	91.6%

Table 7: Showing comparison of sensitivity, specificity and diagnostic accuracy of FNAC in the diagnosis of benign and malignant lesions by various authors.



Fig. 1: Clinical photograph showing growth in the tonsil.

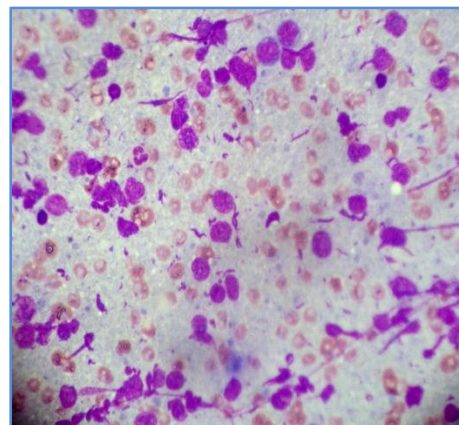


Fig. 2: Smear showing monotonous population of lymphoid cells displaying nuclear pleomorphism. (MGG stain, X100)

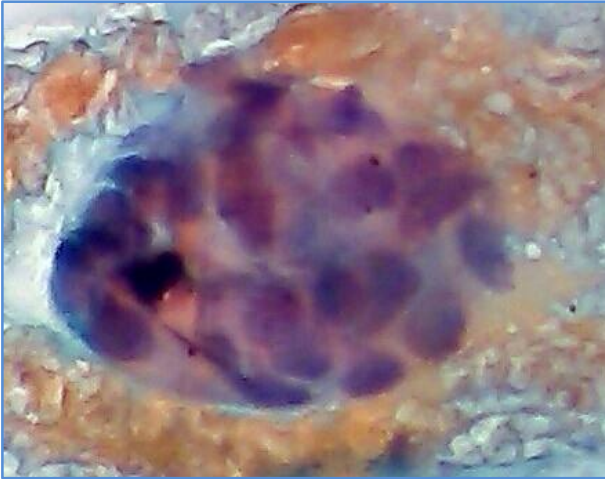


Fig. 3: Smear showing malignant squamous cells arranged in tiny cluster displaying hyperchromatic nucleus with coarse chromatin. (PAP stain, X400)

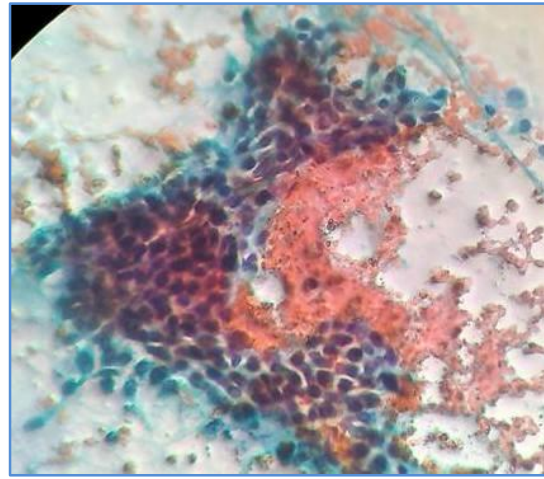


Fig. 4: Smear showing tumor cluster of mucous secreting cells and atypical squamoid cells in a case of mucoepidermoid carcinoma. (PAP stain, X400)

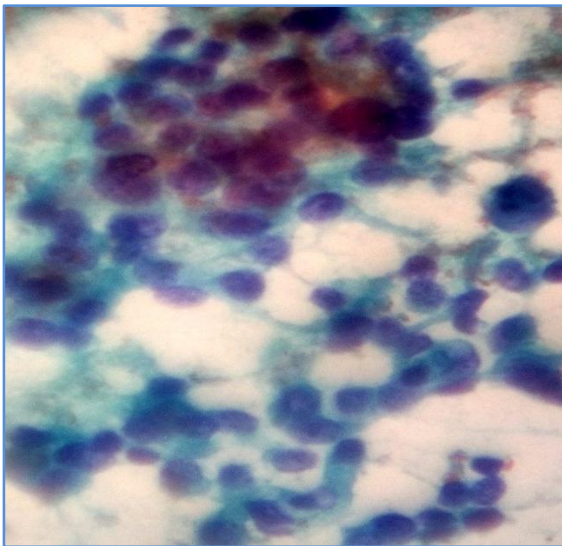


Fig 5: Smear showing tumor cells arranged in acinar pattern in a case of adenocarcinoma. (PAP stain, X400)

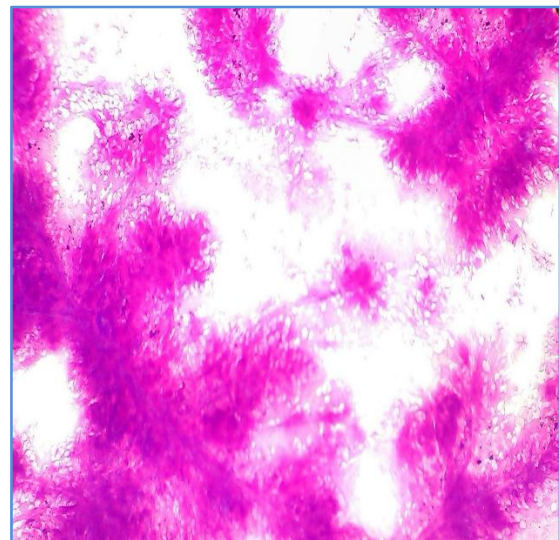


Fig 6: Smear showing stromal myxoid material in a case of pleomorphic adenoma. (MGG stain, X400)

BENIGN LESIONS: The benign lesions encountered in our study were seen in 39 cases, which were further divided into inflammatory (12), cystic (19) and tumors in (8) cases. Inflammatory lesions included 3 acute inflammatory and 9 chronic inflammatory lesions, while cystic lesion included 17 cases of retention cysts, and 2 benign epithelial cysts. Tumors were comprised of pleomorphic adenoma (4), schwannoma (2), ameloblastoma (1), and fibroma (1).

MALIGNANT LESIONS: In 44 cases of malignant lesions, squamous cell carcinoma was the most common malignancy encountered in (32) cases, followed by NHL in (4), mucoepidermoid carcinoma in (2), adenoid cystic carcinoma (2), sarcoma (2) and adenocarcinoma in (2) cases. In cases of

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squamous cell carcinoma, smears showed malignant cells arranged in clusters, displaying pleomorphic nucleus. Abnormal mitotic figures were observed. NHL showed monotonous population of lymphoid cells arranged in sheets displaying vesicular nucleus with prominent nucleolus. In mucoepidermoid carcinoma, smears were of variable cellularity with a background of mucus and debris showing clusters and sheets of non-keratinizing squamous epithelial cells with enlarged nuclei.

Adenoid cystic carcinoma showed tumor cells arranged singly and in clusters with hyaline spherical globules of varying sizes, having scant cytoplasm with high nucleo-cytoplasmic ratio, round hyperchromatic nuclei containing coarse chromatin. Adenocarcinoma showed tumor cells arranged in acinar pattern comprising of vesicular nucleus with prominent nucleolus. Sarcoma was diagnosed on FNAC in presence of pleomorphic spindle shaped tumor cells, abnormal mitotic figures and presence of necrosis.

CYTO-HISTOPATHOLOGICAL CORRELATION: Of the total 39 cases of benign lesions diagnosed on FNAC, correlation with histopathology diagnosis was seen in 33 cases thus giving diagnostic accuracy of 95.8%. False negative result was seen in six cases. Among 44 cases of malignant lesions diagnosed on FNAC, correlation with histopathology diagnosis was seen in 42 cases giving diagnostic accuracy of 97%. False positive result was seen in two cases. (Table 4)

Thus among 83 cases of benign and malignant lesions reported on FNAC, Concordant result with histopathology was seen in 75 cases giving diagnostic accuracy of 90.36 % while discordant result was seen in 8 cases (9.64%). There were six false negative cases and two false positive cases, thus giving sensitivity and specificity of cytology in the diagnosis of various intraoral lesions as 88% and 91.6% respectively and diagnostic accuracy of 95.6%.

SUSPICIOUS FOR MALIGNANCY: Suspicious for malignancy was reported on FNAC in 5 cases. Out of which 3 cases turned out to be malignant [Verrucous (1) and squamous cell carcinoma (2)] and 2 cases of leukoplakia on histopathology.

DISCUSSION: Oral cavity lesions presents mainly as an ulcer, mass or growth which are amenable for the surgical biopsy. It is the traditional method but may be inconvenient, painful and breach the overlying epithelium damaging the underlying tissue.⁽⁵⁾ But surgeons do not like to breach the overlying epithelium of the lesions before coming to a probable diagnosis and it takes nearly two weeks to get the histopathology report.⁽³⁾ FNAC plays an important role in the diagnosis of intraoral lesions which is found to be very useful, simple, cost-effective, accurate in assessing and diagnosing various neoplastic and non-neoplastic lesions and report can be obtained within a couple of days which helps in early planning for management especially in malignant tumors.⁽¹⁾ FNAC of intraoral lesions was uneventful except for minimal bleeding and inadequate sampling possibly due to superficial and small sized lesions, difficult locations, lack of proper light, and limited space for needle movement.⁽¹⁾

In our study age group ranged from 12-83 years with mean of 46.4 years and maximum number of cases in the sixth decade comparable with in a study by Devesh Singh et al.⁽²⁾ which ranged from 14 months to 84 years and 30-87 years in a study by Saleh Hussain et al.⁽³⁾ The most common sites of fine needle aspiration were tongue in 28 cases (31.9%), followed by buccal mucosa in 24 (27.3%). It was cheek in 75, tongue in 71 cases and tonsil in 22.4%, hard palate in 18.4% in other studies.^(1, 2) In a study by Lee et al.⁽⁶⁾ and Tarak et al.⁽⁷⁾ common sites of aspiration was hard palate in 22/44 and 66(42%) respectively. (Table 5) Squamous cell carcinoma in 32 (36.36%) cases was the commonest FNAC

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diagnosis followed by benign cystic lesion/Mucocele in 19 (21.59%) which was comparable in a study by Devesh Singh et al.⁽²⁾ where squamous cell carcinoma in 17 (34.75%) and Non-Hodgkin's Lymphoma in 7(14.3%). (Table 6) In our study diagnostic accuracy of benign and malignant lesions diagnosed on FNAC was 95.8% and 97% respectively. Günhan et al.⁽⁸⁾ reported diagnostic accuracy of 92% for malignant lesions and 97% for benign lesions of the oral cavity. Overall diagnostic accuracy of 91.6% in our study was comparable with 94.9% diagnostic accuracy of FNAC for various intraoral lesions in a study by Nazoora Khan et al.⁽¹⁾ which was much higher than the values of 86.8% and 77.8% obtained by other authors.^(3,9) Dejmek et al.⁽¹⁰⁾ reported 85% diagnostic accuracy of FNAC for cystic and solid lesions of the oral cavity. In our study, cytological diagnosis of intraoral lesions showed sensitivity of 88 % and specificity of 95.6%. Nazoora Khan et al.⁽¹⁾ Castelli et al.⁽¹¹⁾ Shah et al.⁽¹²⁾ and Munazza, et al.⁽¹³⁾ reported sensitivity and specificity 93.2% & 96.8% , 80.6% & 96.9%, 93% & 86%, and 100% & 88.8% in their studies respectively. (Table 7) The benign lesions encountered in our study were seen in 39/88 cases, which were further divided into inflammatory (12), cystic (19) and tumors in (8) cases. Inflammatory lesions included 3 acute inflammatory and 9 chronic inflammatory lesions, while cystic lesion included 17 cases of retention cysts, and 3 benign epithelial cysts. Tumors were comprised of pleomorphic adenoma (4), schwannoma (2), ameloblastoma (1), and fibroma (1). In 44/88 cases of malignant lesions, squamous cell carcinoma was the most common malignancy encountered (32), followed by NHL (4), mucoepidermoid carcinoma (2), adenoid cystic carcinoma (2), sarcoma (2) and adenocarcinoma (2). There were six false negative and two false positive cases where it was seven false negative and three false positive cases in a study by Nazoora Khan.⁽¹⁾ In a study by Das et al.⁽¹⁴⁾, seven of nine cases with adequate cytology (77.88%) showed complete agreement with histology. There were 6 false negative and 2 false positive cases. Two cases of pleomorphic adenoma diagnosed on FNAC were polymorphous low grade adenocarcinoma on histopathology. Three cases reported as inflammatory lesions were amelanotic melanoma, squamous cell carcinoma and adenocarcinoma and one reported as inflammatory cystic lesion turned adenoid cystic carcinoma on histopathology. False negative cytologic diagnosis may be due to low cellularity or non-representative sample of the actual lesion. False positive were two cases of squamous cell carcinomas reported on FNACs but histopathology showed verruciform and pseudoepitheliomatous hyperplasia. The epithelial hyperplasia yielded high cellularity with dysplasia, minimal inflammatory cell infiltration and drying artefact displayed enlarged nuclear pleomorphism on FNAC which led to diagnostic pitfall and false positivity. On histopathology there was dense lymphocytic infiltration and mild inflammatory dysplastic changes in the epithelium. Immediate fixation of smears, repeat aspirations in cases of mild dysplasia and inflammatory cells would prevent the diagnostic pitfalls of false positivity.

CONCLUSION: We conclude that FNAC is an important diagnostic tool in the diagnosis of intraoral lesions. It should be considered as first line of investigation avoiding biopsy, especially in clinically suspected malignant tumors where planning for management can be done as early as possible in the same visit.

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AUTHORS:

1. Harish S. Permi
2. Sunil Kumar Y.
3. Sajitha K.
4. Kishan Prasad H. L.
5. Teerthanath S.
6. Jayaprakash Shetty K.

PARTICULARS OF CONTRIBUTORS:

1. Associate Professor, Department of Pathology, K. S. Hegde Medical Academy.
2. Associate Professor, Department of Pathology, K. S. Hegde Medical Academy
3. Assistant Professor, Department of Pathology, K. S. Hegde Medical Academy.

FINANCIAL OR OTHER

COMPETING INTERESTS: None

4. Associate Professor, Department of Pathology, K. S. Hegde Medical Academy.
5. Professor, Department of Pathology, K. S. Hegde Medical Academy.
6. Professor and HOD, Department of Pathology, K. S. Hegde Medical Academy.

NAME ADDRESS EMAIL ID OF THE CORRESPONDING AUTHOR:

Dr. Harish S. Permi,
No. 203, C Block,
Kshema Staff Quarters,
Mangalore-575018.
E-mail: drharish01@gmail.com

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