

Pathological Changes in Radiographically Normal Dental Follicle: A CBCT Study

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ABSTRACT

Introduction: Dental follicle arises from odontogenic mesenchyme which result in tooth formation. Study aimed to estimate pathological alteration in follicle of impacted third molar (ITM) in cone beam computer tomography (CBCT) and correlation with patient's age, gender, site and angular position.

Material and Methods: Dental follicle (DF) from 80 ITM were collected from 68 patients with follicular space ≤ 1.5 mm as measured from the CBCT. dental follicle associated with impacted teeth were extracted and sent for histopathological examination. statistical analysis was performed.

Results: In 80 follicles which were evaluated for pathological changes were taken from patients ranging from age of 18 to 50 years with a mean age of 37.5 years out of which 21 were females and 19 were males. Pathological alteration were found associated with 10 (35%) follicles which was statistically significant ($p < 0.001$). Incidence of pathology was slightly more in females and in mandibular jaw. Lesions were most commonly seen in jaws which were distoangularly and horizontally impacted.

Conclusion: it was concluded that radiographically normal appearing impacted teeth may be associated with various pathology. So histopathologic evaluation of all impacted teeth is mandatory.

Keyword: Dental Follicle; Impacted Third Molars, Dentigerous Cyst, Odontogenic Keratocyst, Ameloblastoma

INTRODUCTION

DF surrounds the crown of an unerupted tooth. From DF also arises PDL, cementum and alveolar bone.¹⁻³ In X ray dental follicle appears as thin radiolucency surrounding the crown of the tooth.⁴ In microscopic examination it consisted of remnants of epithelium and connective tissue, which may transform into pathologies later.⁵⁻⁶

There is no universally accepted radiographic criteria to differentiate between normal and abnormal conditions of follicular tissue around impacted third molars.^{7,8} Enlarged follicular space denotes pathology. The choice of removing asymptomatic third molars remains crucial. If the radiographic follicular space was less than 2.5 cm it was assumed to be normal.⁹ National Institute of Health (NIH) suggested that both impacted and erupted mandibular third molars with radiographic evidence of follicular enlargement should be considered for extraction and the associated soft tissue submitted for microscopic examination¹⁰ CBCT showed more accurate representation and manifestation.¹¹ dimensions compared to conventional radiography which has inherent problems like special¹² However, CBCT should be

done only when information provided by it could affect the treatment plan.

One third of the partially erupted third molars were associated with any form of pathology.¹³ Follicular tissue may give rise to various cyst and tumors.¹⁴

Generally tooth along with follicle is discarded after extraction of impacted teeth. Some times these remnant follicle may cause pathologies afterwards. So need was felt to find the incidence of pathologies in radiographically normal dental follicle associated with ITM.

MATERIAL AND METHODS

The study was carried out in Department Of Oral Medicine And Radiology Hazaribagh Dental College, Hazaribagh, on patients who have come to have their ITM removed. The ethical committee approval and consent to be a part of study was taken from all the patients This study included 80 CBCTs with impacted mandibular third molar (IMTM) previously taken for reasons not related to this study. Their age range was 18-55 years (mean age 34 years old).

Images were taken by Cranex 3d (Finland) with 110 kVp, 20 mA and voxel size of $0.3 \times 0.3 \times 0.3$. The CBCT images were taken with fields of view (FOV) (8 x 6) and were used only if they covered the ROI and matched with the inclusion and exclusion criteria.

The CBCT scans of subjects which showed ITM with a follicular space ≤ 1.5 mm in greatest dimension when measured by CBCT were included in the study. And those with partially erupted third molars, ITM with radiographic follicular width more than 1.5 mm and the cases in which follicular tissue were insufficient for histopathological evaluation were excluded from study.

The follicle were carefully curetted and sent for histopathologic examination in 10% formalin. In histopathologic examination usually dental follicle shows fibrocollagenous tissue with absence of any epithelial lining or with a very thin undifferentiated epithelial lining. Whereas

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Histopathology of follicular tissue	Total No of samples (n)	Age in years			
		15-20	21-30	31-40	>40
Fibrous connective tissue	19	5	9	2	3
Chronic non specific inflammation	33	10	18	1	4
Dentigerous cyst	19	3	6	8	2
Odontogenic keratocyst	6	0	3	3	0
Ameloblastoma	3	0	0	2	1
Total	80	18	36	16	10

$\chi^2 = 21.984; p < 0.001$

Table-1: Pathology associated with follicular tissue with <1.5mm radiolucency

Age in years	Number of samples	Male	Female	Pathological alteration in male	Pathological alteration in female
15-20	18	11	7	1	2
21-30	36	14	22	2	5
31-40	16	7	9	6	7
>40	10	5	5	1	2
Total	80	37	43	10	16

$\chi^2 = 0.245; p = 0.625$

Table-2: The association between gender and pathological changes

few of them showing inflammatory cells with hyper plastic epithelium were also not considered.¹⁵ [Figure 2A] The cases which showed connective tissue with stratified squamous epithelium 3-4 cell layers in depth were considered as dentigerous cyst [Figure 2B] and those lined by few layers orthokeratinised stratified squamous epithelium as OKC [Figure 2C].¹⁶ When odontogenic islands and chords were present with cells showing reverse polarity, it was diagnosed as an ameloblastoma.¹⁷ [Figure 2D]

STATISTICAL ANALYSIS

The data thus obtained were tabulated and Chi-square analysis was used to determine the factor of significance ($p < 0.001$).

RESULTS

Pathosis was found associated with 26 (31.2%) cases out of 80 PF which were evaluated histopathologically. The majority of cases were fibrocollagenous tissues (23.7%) and chronic non-specific inflammation (41.2%) showing predominant lymphocytic infiltration. Pathological alteration constituted of dentigerous cyst (23.7%) followed by odontogenic keratocyst (7.5%) and ameloblastoma (3.7%). When normal tissue alterations were compared with pathological changes the chi square value obtained were 22.63 with p value < 0.001 thus the result was highly significant. [Table 1]

The mandible was involved in 43(60%) cases while maxilla in 37(40%). Pathological changes were noticed in 27.0% male patients and 37.2% female, with chi square value 0.221 and $p=0.624$ (not significant), thus showing almost equal involvement of both genders. Minimum and maximum age of subjects were 18 and 52 years with a mean of 34 years. Higher incidence of pathosis was noted among females, within mandible and in age range of 20-40 years [Table 2]

DISCUSSION

Impacted teeth is most common reason after dental carries



Figure-1: Marked CBCT showing follicular space of impacted third molar.

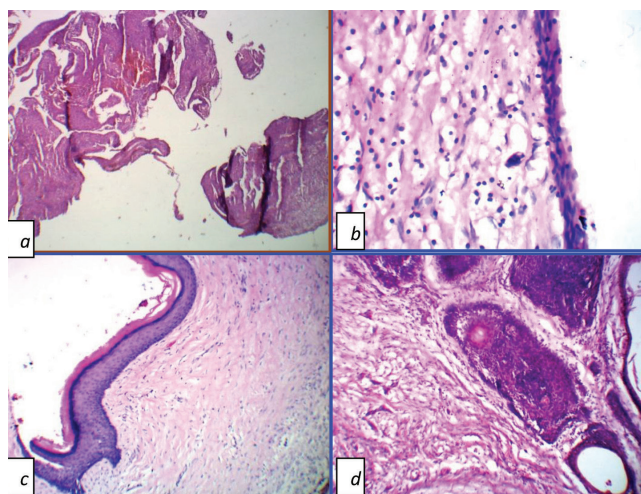


Figure-2: Hematoxylin and Eosin stained section of A) Chronic non specific inflammation (40x), B) Dentigerous cyst (40x), C) Odontogenic keratocyst (10x), D) Connective tissue with islands of ameloblastoma (40x).

for which the patients visits dentist. t Pericoronal pathologies with ITM is one of the commonest reasons for extraction

of impacted tooth. Many reports in literature have discussed the development of cyst and tumor associated with ITM. Therefore recommending extraction of third molar is far easier when the impacted tooth is associated with any pathology, but the judgement for prophylactic extraction always remained controversial.⁵ It may be possible that some of the follicles may regress later with advancing age and thus may not convert into pathological conditions.¹⁸⁻²¹ Risk to benefit ratio of retention or extraction of third molars may be reviewed before hand.¹⁷

The information on changes which may arise in radiographically normal appearing follicles adjoining ITMs are few.^{9,22-24} Majority of pathologic changes associated with epithelial remnants may be cyst and tumors. Among cyst keratocysts and dentigerous cyst are most common and ameloblastoma being most common tumor. Sometimes dentigerous cyst might transform into an ameloblastoma, squamous cell carcinoma, or an intraosseous mucoepidermoid carcinoma which arise mainly from epithelial rests.²⁴ A case of malignant low-grade fibro sarcoma related with ITM was reported by Leither in asymptomatic patient with radiographically normal DF.²⁵ Some suggest prolonged inflammation might be the provoking factor behind the development of intraosseous carcinoma developing within the PF or cyst epithelium of ITMs.²⁶

In the present study pathological alterations were noted in 31.2% of the cases. Numerous studies showed varied incidence of pathological changes in dental follicle. Studies done by Glosser and Adelsperger, who have reported pathological changes as 32% and 34% respectively.^{9,21} In this study dentigerous cyst is the most frequently reported pathosis followed by odontogenic keratocyst and ameloblastoma, Mandibular jaw was found to be associated with pathosis more commonly than maxilla.^{9,22} In this study it was found that pathologies associated with ITM were most commonly seen in females. A number of researches have reported higher incidence of pathologies among males.²⁰⁻²¹ The reason behind this may be prophylactic extraction of third molars in many at an early age might be the rationale behind this.²⁶ The age group in which pathologies associated with ITM was most commonly found was 20-40 years. A similar study reported higher incidence of pathological alterations among patients with age range of 20-30 years.²⁷ Thus age of patients may be considered for prophylactic extraction of ITM, as the possibility of morbidity may rise with increasing age.

Thus clinical and radiographic features alone may not be a reliable indicator of absence of pathology. The dental follicle showing radiographic width ≤ 1.5 mm in CBCT should be tested histopathologically for better treatment outcome.

CONCLUSION

CBCT shows better visualization of structures in 3 dimensions so it should be regularly used for evaluation of impacted teeth. For better treatment outcome and to prevent future morbidity, the clinician may treat all tissues with ITM cautiously

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