Research Article
The Wisdom Behind Third Molar Extraction: A Clinicopathologic Study
Monica Yadav, Meghana SM, Atul Deshmukh, Pournima Godge

Abstract
Objective: The purpose of this study was to examine histopathologically the dental follicular tissues removed along with impacted mandibular third molars in radiographically normal appearing follicular tissues and to assess any pathological changes seen in them. Methods: Retrospective histopathological studies of 45 dental follicles of the impacted mandibular third molars from patients aged between 20-50 years were considered. Four pathologists independently studied the slides and marked them accordingly. Results: The incidence of pathological changes in the follicular tissues was very low (4.44%) Only one each of odontogenic keratocyst and inflammatory cyst was found. Conclusion: Since the incidence of pathological changes occurring in follicular tissue is insignificant, whether we should routinely remove all third molars, needs to be evaluated.

Key words: Tooth Germ; Dental Follicle; Follicular space; Tooth Extraction; Oral Surgical Procedures; Third molar.


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Introduction
Impacted teeth are one of the most prevalent problems in patients examined in the dental office. Dental follicle associated with these unerupted teeth is the remnant of tissue that has participated in odontogenesis and remained circumjacent to the crown of a tooth. Despite its role in eruption physiology, previous studies have reported that dental follicle may undergo cystic degeneration and/or neoplastic transformation. Studies have reported cyst like epithelium in 2-60% of dental follicular tissues. Radiographically, the follicles present as slight semicircular radiolucencies around unerupted teeth; the width of which is of utmost importance in identifying dental follicular pathology. Studies have suggested that pericoronal radiolucency 2.5 mm or larger on panoramic radiograph may indicate an abnormality.

Indications for removal of 3rd molars have generated much discussion in dentistry. Some clinicians advocate removal before pathologic changes develop while others propose observation and periodic monitoring. According to Osaki et al., retained wisdom teeth may cause infection in elderly patients. It was proposed that removing these teeth in younger people might be a preventive measure for probable lesions in adulthood. On the other hand, Stephen stated that the risk of retained impacted third molars is over exaggerated and their removal to be done only in case of definitive pathology. The 12 years follow up study conducted by Alquist and Grondahl revealed minor changes in 15% of the impacted teeth. Also a study done by Khorasini and Samiezadeh did not reveal any pathologic changes in the studied samples. Therefore, numerous studies with conflicting results have been conducted on the potential of follicular tissues to undergo pathological alteration.

Regarding controversies surrounding the histopathologic changes in dental follicles of impacted teeth, the present study was carried out to microscopically evaluate the dental follicular tissues for pathologic changes, in patients associated with radiolucencies less than 2.5 mm.

Materials and method
A retrospective histopathological study of the dental follicles of the impacted third molars was carried out at the Department of Oral Pathology and Microbiology. Patient records of 45 cases were retrieved. The selection criteria of the cases were with age group of 20-50 years having radiographic pericoronal radiolucency < 2.5 mm. These cases had undergone impacted mandibular third molar extraction for orthodontic purposes or for recurrent episodes of pericoronitis or chronic irritation to the overlying mucosa. The specimens taken were without radiographic evidence of any pathology (Fig 1)
"Radiographic pathology" was defined as a pericoronal radiolucency measuring about 2.5 mm or larger in any dimension. Follicular spaces of patients were measured from orthopantomographs by each author independently. Radiographic measurements were taken without regard to the magnification factor reported by the manufacturer. Our exclusion criteria was follicular space >2.5 mm and tissue insufficient for histopathological examination.

Serial sections of the blocks were taken and stained with hematoxylin and eosin. The slides were independently studied by four pathologists, who were blinded to each other's diagnosis. A diagnosis was registered only when all the pathologists' results were in concordance while in cases with inconsistent outcomes, a consensus diagnosis was arrived at after joint review. A histopathological diagnosis was made by all four pathologists in all the specimens. All specimens were examined by light microscopy. The lining epithelium was classified as either a) stratified squamous epithelium or b) reduced enamel epithelium (Fig 2). Epithelial cell activity was recorded as follows: i) inactive (less than 20 layers of epithelial cells and no epithelial projections into the connective tissue; Fig 3), ii) hyperplasic (more than 20 layers and/or epithelial projections into the connective tissue; Fig 4) or absent (no epithelial cells observed). Connective tissue was classified as dense or loose. Presence or absence of inflammation within the connective tissue was noted. Additional features like giant cells, odontogenic rests, myxoid stroma, calcifications and also existence of cystic or neoplastic transformation were assessed. However, follicles with reduced enamel epithelium were not reported as dentigerous cysts in the current study. Observations were tabulated and percentage was obtained. Associations between the attributes were tested using Pearson chi square test.

Results
A total of 45 dental follicles were histopathologically assessed. The age of these patients ranged from 20-50 years, 25 of them being male patients and 20 females. The 37 cases (82.22%) showed presence of epithelium out of which inactive epithelium
was seen in 25 cases (67.56%) and hyperplastic epithelium seen in 6 cases (16.21%). Chronic inflammation was noted in 34 cases (75.55%). There was indication of cystic changes in only two cases of the studied samples—one section showed inflammatory cyst and the other was odontogenic keratocyst which was confirmed by immunohistochemistry, Ki-67, a proliferation marker (Fig 5). Interestingly, a significant relationship between age and inflammation (P=13.65; P<0.05) was also noted. Also, a significant relationship between age and squamous epithelium (P=16.41; P<0.05) was seen (Table 1).

<table>
<thead>
<tr>
<th>Findings</th>
<th>No. of follicles (n=45)</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Absence of epithelium</td>
<td>8</td>
<td>17.77</td>
</tr>
<tr>
<td>2. Presence of epithelium:</td>
<td>37</td>
<td>82.22</td>
</tr>
<tr>
<td>a. Type of epithelium:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>i. Inactive</td>
<td>25</td>
<td>67.56</td>
</tr>
<tr>
<td>ii. Hyperplastic</td>
<td>06</td>
<td>16.21</td>
</tr>
<tr>
<td>iii. Reduced enamel epithelum</td>
<td>06</td>
<td>16.21</td>
</tr>
<tr>
<td>3. Connective tissue changes:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. Type of connective tissue:</td>
<td>35</td>
<td>77.77</td>
</tr>
<tr>
<td>i. Loose</td>
<td>20</td>
<td>22.22</td>
</tr>
<tr>
<td>ii. Dense</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. Inflammation:</td>
<td>34</td>
<td>75.55</td>
</tr>
<tr>
<td>i. Present</td>
<td>11</td>
<td>24.44</td>
</tr>
<tr>
<td>ii. Absent</td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. Any other findings:</td>
<td>01</td>
<td>2.22</td>
</tr>
<tr>
<td>i. Giant cells</td>
<td>04</td>
<td>8.88</td>
</tr>
<tr>
<td>ii. Odontogenic rests</td>
<td>04</td>
<td>8.88</td>
</tr>
<tr>
<td>iii. Myxoid stroma</td>
<td>02</td>
<td>4.44</td>
</tr>
<tr>
<td>iv. Calcifications</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Cystic changes:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>i. Present</td>
<td>02</td>
<td>4.44</td>
</tr>
<tr>
<td>ii. Absent</td>
<td>43</td>
<td>95.55</td>
</tr>
</tbody>
</table>

Table 1: Histopathological observations in dental follicles

Discussion
Impacted 3rd molars may be considered as one of the most common entities encountered in dental clinics. Data concerning the need for routine extraction of unerupted third molars are limited since most surgeons make clinical judgments on out-patient basis rather than histological diagnosis of pericoronal tissues. Several studies have suggested that the follicular tissue associated with these teeth may have the potential for transforming into cystic and/or neoplastic lesions. Various pathological changes like odontogenic keratocyst, dentigerous cyst, calcifying epithelial odontogenic cyst, odontogenic myxoma etc have been reported. However many of these changes are not detectable during clinical or radiographic examination while they may be found through microscopic analysis.

A study was carried out to determine the pathologic changes in follicular tissues where radiographic pericoronal radiolucency is less than 2.5 mm. This study also examines the need for routine removal of unerupted third molars as advocated by some investigators. Unlike previous studies which were done on cases which did not show any clinical signs and symptoms like pericoronitis (asymptomatic), in the present study we analyzed the pathologic changes in both asymptomatic as well as symptomatic cases (showing pericoronitis/chronic irritation).

This study showed the incidence of pathologic changes in follicular tissues to be relatively lower (4.44%) than those reported by other investigators (Table 2). In the present study only two cases contained a pathologic entity, which is in confirmation with the study done by M. Khorasani, F. Samiezadeh, one being odontogenic keratocyst and the other inflammatory cyst. OKC was diagnosed based on the presence of a cyst like lesion lined by parakeratinized stratified squamous epithelium. The basal cell layer showed tomb stone like appearance. The inflammatory cyst showed many layers of stratified squamous epithelium arcading at many places, dense connective tissue with chronic inflammation. Both the cysts were positive for proliferative marker Ki-67. However dentigerous cysts were not considered a definitive diagnosis in the present study mainly because differentiation between a small dentigerous cyst and a large dental follicle may be impossible even when radiographic and pathologic data is available. Microscopically the epithelial lining of dentigerous cyst can be indistinguishable from dental follicle. Daley and Wysocki and Olivera et al suggested that the presence of stratified squamous epithelium cannot be diagnosed as a dentigerous cyst but rather as follicular tissue with squamous differentiation. Further it has been suggested that, to diagnose a dentigerous cyst radiographically, the radiolucency should be minimum 3-4 mm. Also, some of the pathological conditions may involute and therefore, not progress to clinically important lesions.
Our results indicated a significant relationship between increase in patient's age and inflammation of the dental follicle (P<0.05). It seems that the longer the follicular tissues remain in the bone, the larger the possibility of an inflammatory reaction within the connective tissue (Graph 1). Various factors including a previous periodontal abscess, second molar periodontitis or physiologic alveolar bone resorption may be responsible for this event. Also with increasing age, bone resorption occurs which gradually exposes the third molar to the oral cavity and subsequently to increased risk of infection. A significant relationship between inflammation and the presence of stratified squamous epithelium was noted (Graph 2). This increase in the presence of stratified squamous epithelium with advancing age maybe due to factors such as chronic inflammation or other age-induced effects on dental follicular tissues. These findings are in agreement with previous investigators. It is postulated that inflammation may act as a stimulator on the lining epithelium of the dental follicle and change it from its normal cuboidal or columnar form to a squamous type, which is more resistant to external stresses. Studies suggest that change from follicular epithelium to stratified squamous in follicular tissues of impacted teeth is related to normal changes that occur during aging while others believe this change/metaplasia to be an early pathologic event in dental follicles, possibly leading to cyst formation.
In summary, we detected a very low percentage of pathological transformation (4.44%) in our study sample. Present investigation revealed that with increasing age, an increase in nonspecific chronic inflammation was noted, as did the presence of stratified squamous epithelium. Due to the increased surgical complications that may occur in older patients, some investigations have suggested prophylactic extraction of impacted third molars in elderly individuals, especially before receiving treatment with partial or complete dentures.3

Conclusion
Considering the insignificant incidence of pathologic changes in the dental follicle of impacted third molars, we feel the studies on the pathological changes in dental follicular tissues are highly exaggerated. Hence removal of impacted third molars should be done only when pathologic lesions are strongly evident like there are recurrent episodes of pericoronitis and also when other treatment of pericoronitis like operculectomy has not been successful. This will be especially true in younger age group when chances of eruption of third molar are high. Since a positive correlation was found between age and inflammation in the dental follicle these teeth need to be evaluated periodically in the elderly to prevent complications. However further clinical studies are required on larger sample size to confirm these findings. Till then, clinical and radiographic follow up of impacted third molars is recommended. This paper therefore endeavors to encourage and stimulate clinicians to re-evaluate their views on third molar extractions.

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