Original Article

# Histopathologic Evaluation of Follicular Tissues Associated with Impacted Third Molars

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## Abstract:

**Objective:** The aim of the present study was to histopathologically evaluate follicular tissues of third molars with pericoronal radiolucencies of less than 2 millimeters.

**Materials and Methods:** In this descriptive analytic study, 100 impacted third molars with normal follicular spaces were removed and their pericoronal tissues submitted for histopathologic examination. Different characteristics of the epithelium and connective tissue were evaluated in all cases. Statistical analysis was performed using chi square and Mann-Whitney tests.

**Results:** In our study sample, 74% of the patients were female and 26% were male, ranging in age from 13 to 54 years (mean, 25.3 years). Lining epithelium was observed in 69% of the specimens of which 31%, 23% and 14% was cuboidal, squamous and columnar, respectively. A significant relationship was found between the presence of squamous epithelium and patient age ($P<0.05$). Nonspecific chronic inflammation was the only pathologic finding observed in 44% of the specimens. Inflammation was significantly associated with age and squamous metaplasia ($P<0.05$).

**Conclusion:** Considering that pathologic lesions were not observed in any of the studied cases, unerupted third molars should not be removed unless there is a clinical indication to do so, or in case the impacted molar shows evidence of pathological changes. Follow-up is suggested for asymptomatic impacted third molars.

**Key Words:** Dental Sac; Molar, Third; pathology

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## INTRODUCTION

Impacted teeth are one of the most prevalent problems in patients examined by oral and maxillofacial surgeons. Histopathologic changes that occur in different stages of dental follicle development may lead to the formation of odontogenic cysts and tumors [1-4]. Previous studies have reported cyst-like epithelium in 2-60% of dental follicular tissues [1,2,5-7].

Rakprasitkul [8] suggested that impacted third molars should be extracted before pathologic changes develop in their pericoronal tissues and be routinely removed in individuals over the age of 20 years [8]. According to Osaki et

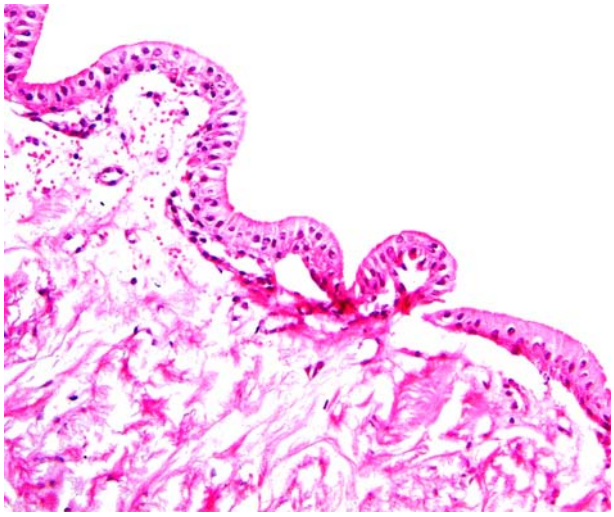

**Fig 1.** Columnar epithelium lining the connective tissue of a dental follicle.

al [9], retained impacted wisdom teeth may sometimes lead to infection in elder patients. It was proposed that removing these teeth in younger people might be considered a preventive measure for probable lesions in adulthood [9].

On the other hand, Stephen [10] stated that the risk of retained impacted third molars has been exaggerated and suggested their extraction only be preformed if a definitive pathologic entity was found. A 12-year follow-up study conducted by Ahlqwist and Grondahl [11] revealed minor changes in only 15% of the studied impacted teeth.

Numerous studies, with conflicting results, have been conducted on the potential of pericoronal tissues to undergo pathologic alterations [1,2,4,8,10,12]. However, the number of investigations in Iran is limited. Regarding to the controversy surrounding histopathologic changes occurring in dental follicles of impacted teeth, the present study was performed to microscopically evaluate the pericoronal tissues of impacted third molars with radiolucencies less than 2 millimeters.

## MATERIALS AND METHODS

The study sample was selected from patients referred to a private clinic specializing in oral and maxillofacial surgery. Inclusion criteria consisted of cases with impacted third molars that were completely surrounded by bone and had an adequate amount of follicular tissue for histopathologic evaluation. Subjects with pericoronal radiolucencies of more than 2mm, multiple impacted teeth due to systemic disorders, and those with clinical symptoms or contraindications for surgery were excluded from the study sample.

The impacted third molars mostly required extraction for orthodontic reasons or close proximity to the roots of second molars. All patients were asked to sign a written consent approved by Qazvin University of Medical Sciences, School of Dentistry. Measurements were performed on panoramic radiographs placed on a negatoscope, using a millimeter-scale ruler. The longest distance from the unerupted crown to the adjacent opaque bone was considered as the width of the pericoronal space. Radiographic impaction types (horizontal, distoangular, vertical, and mesioangular) were also recorded for all cases.

A total of 100 impacted third molars were removed under local anesthesia with 2% lidocaine and 1/80000-1/100000 epinephrine. The dental follicles were carefully separated from the tooth and sent to the Department of Pathology, School of Dentistry, Qazvin University of Medical Sciences in 10% formalin solution. Histopathologic evaluation was carried out by an oral pathologist without knowledge of the clinical and radiologic features. The following microscopic parameters were recorded for each case: absence or presence of epithelium and its type (squamous, cuboidal and columnar), connective tissue pattern (fibrous, myxomatous or both), presence of odontogenic epithelial rests and calcifications, chronic nonspecific inflammation, and existence of other cystic or neoplastic lesions. Dentigerous cysts were not reported as pathologic lesions in the current investigation.

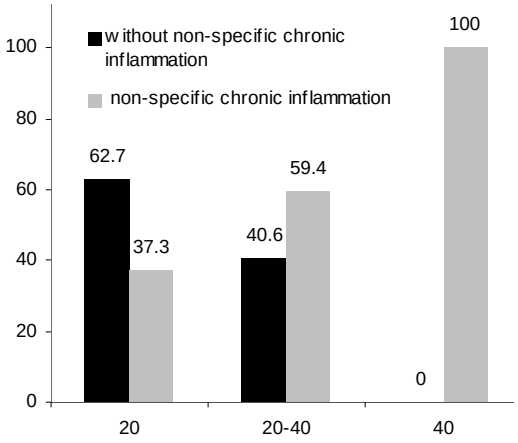


**Fig 2.** Distribution of impacted third molars according to patient age and presence of nonspecific chronic inflammation.

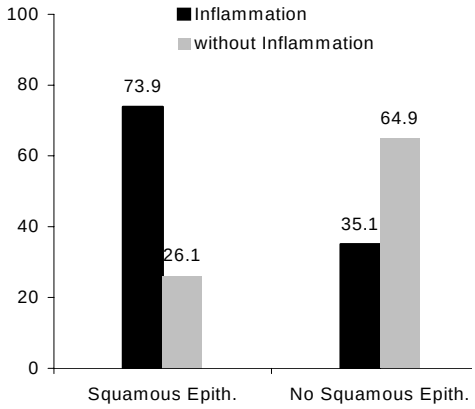


**Fig 3.** Distribution of impacted third molars according to presence of nonspecific chronic inflammation and squamous epithelium (Epith.).

## RESULTS

A total of 100 impacted third molars were removed, of which 74% belonged to women and 26% were observed in male subjects. Patients' ages ranged from 13 to 54 with a mean of 25.3 years. Seventy-two molars were extracted from the mandible and 28 from the maxilla. Radiographic evaluation revealed 7%, 22%, 22% and 48% horizontal, distoangular, vertical, and mesioangular impactions, respectively.

Microscopically, 31% of the dental follicles were devoid of an epithelial lining, while 69% demonstrated cuboidal (31%), squamous (23%), and columnar (14%) epitheliums (Fig 1). Under the age of 20 years, 23.7% of the patients had enamel epithelium and 11.9% demonstrated squamous epithelium. Enamel epithelium was found in 12.5% of the dental follicles in subjects older than 20 years. In patients between 20-40 years, 40.6% of the dental follicles were lined with squamous epithelium. This percentage was 50% in subjects between 40-60 years. A significant relationship ($P<0.05$) was observed between the presence of squamous epithelium and patient age.

The connective tissue showed myxomatous changes in 40%, whereas epithelial odontogenic rests and calcification were found in 48% and 34% of the cases, respectively. Of the 48 samples containing epithelial rests, 72.1% were under 20- and 27.9% were over 20-years of age. No significant relationship was found between the presence of odontogenic epithelial rests and patient age. Among the 40 cases with myxoid areas, 63.2% belonged to patients under 20 years and 38.8% were from subjects over 20 years.

Pathologic changes were observed largely as nonspecific chronic inflammation in 44% of the samples and there was a statistically significant relationship ($P<0.05$) between this inflammatory reaction and patient age (Fig 2). Nonspecific chronic inflammation of the dental follicle was seen in 59.4% of the 20 to 40-year-old patients and in all (100%) subjects between 40 and 60 years of age. A significant relationship ($P=0.002$) was observed between nonspecific chronic inflammation and the presence of squamous epithelium (Fig 3). There was no indication of cystic or neoplastic changes in any of the studied samples.

## DISCUSSION

Dental follicles are normal odontogenic structures composed of immature tissues that ultimately form the periodontal ligaments and attachments. They may be considered as one of

the most common entities encountered in oral pathology services or in dental clinics during radiographic evaluation of patients [13]. Several studies have suggested that this tissue may have the potential for creating cystic and/or neoplastic lesions [1-3,7,13]; however many of these changes are not detectable during clinical or radiographic examination while they may be found through microscopic analysis [14]. Other investigations have reported the risk of pathologic transformation to be overestimated [10] and have proposed that at least a number of dental follicles may have been misdiagnosed as other odontogenic lesions [13]. According to the results obtained in the present study, none of the 100 examined dental follicles contained a pathologic entity, which confirmed the latter reports. However, dentigerous cysts were not considered as a definitive diagnosis in the current investigation. This was mainly because differentiation between a small dentigerous cyst and a large dental follicle may be impossible, even if radiographic and pathologic data are accessible [5]. In addition, the epithelial lining of a dental follicle can be microscopically indistinguishable from a dentigerous cyst. Furthermore, it has been suggested that in order to diagnose a dentigerous cyst on radiographs, the lucency should have a minimum diameter of 3 to 4 mm [15].

Histologically dental follicles are identified as fibrous connective tissue elements with different quantities of myxomatous change, calcification, odontogenic epithelial rests, and lining epithelium [13]. The incidence of epithelial lining on dental follicles has been reported as 46% to 70% of the cases [13,16]. We found different types of epithelium in 69% of the studied specimens, which falls in the upper end of the range. It was also observed that enamel epithelium was mostly seen in younger patients, while the incidence of squamous epithelium increased with age. This was in accordance with the results obtained in previous reports [12,14].

Furthermore, we found a significant relationship between the presence of squamous epithelium and patient age. This increase in squamous metaplasia with advancing age may be due to factors such as chronic inflammation or other age-induced effects on dental follicular tissues [13].

Our results indicated a significant relationship between increase in patient age and inflammation of the dental follicle ($P<0.05$). It seems that the longer these structures remain in the bone, the larger the possibility of an inflammatory reaction within the connective tissue. Various factors including a previous periodontal abscess, second molar pericoronitis or physiologic alveolar bone resorption may be responsible for this event. Additionally with increasing age, physiologic alveolar bone resorption occurs, which can gradually expose the once completely impacted third molar to the oral cavity and subsequently lead to an increased risk of infection. In cases where the second molar is involved with periodontitis, microorganisms may invade the pericoronal space of the impacted third molar and cause pericoronitis or osteomyelitis. It has been proposed that pericoronitis, osteomyelitis and abscess formation in older patients may be produced by retained impacted third molars [17]. In the present study, we also found a significant relationship between nonspecific chronic inflammation and presence of squamous epithelium ($P<0.05$), which was in agreement with previous investigations [2,4,8,18]. It could be 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. This metaplasia might be considered an adaptive reaction in cells vulnerable to stress, improving their tolerance to unsuitable environmental conditions [19].

According to the results obtained in the present study, 48% of the samples demonstrated

odontogenic epithelial rests in their connective tissue. This was less than the 79% reported by Kim and Ellis [13]. It has been previously stated that the number of odontogenic rests in dental follicles decrease with age [12]. A similar reduction of these epithelial islands with increasing age was also observed in the current investigation; however, the relation was not significant.

In the present study 40% of the dental follicles demonstrated myxomatous areas, but no significant relationship was found between the myxoid changes and patients' age. This was similar to the results obtained by Conklin and Stafne who found myxoid areas in 36% of their study sample and did not observe a relationship with patient age [20].

In summary, we did not detect any type of odontogenic or non-odontogenic lesion in our study sample. The only pathological change observed in the present investigation was non-specific chronic inflammation that showed a significant relationship with both squamous metaplasia and age. Squamous metaplasia was also significantly associated with age. Some studies suggest that squamous metaplasia in pericoronal tissues of impacted teeth is related to normal changes that occur during aging while others believe this metaplasia to be an early pathologic event in dental follicles, possibly leading to cyst formation [2]. Due to the increased surgical complications that may occur in older patients, some investigations have suggested extraction of impacted third molars in elderly individuals [4,18,21], especially before receiving treatment with partial or complete dentures [9].

## CONCLUSION

Considering the absence of significant pathologic lesions in the studied dental follicles, it seems that impacted third molars in young individuals should be extracted only in symptomatic subjects or when there is strong evidence of pathologic processes that can influence the well-being of the patient. However until further studies with larger sample sizes confirm these findings, clinical and radiographic follow-up of impacted third molars is recommended.

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