

Pathological Changes in Soft Tissue Associated with Impacted Third Molars

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Abstract

Objectives: To determine the pathological changes in soft tissues associated with impacted third molars.

Study Design: Descriptive study

Soft tissue specimens were taken from dental follicle or pericoronal tissue of 100 patients. Gross and microscopic findings were noted.

Results: Mean age of the patients was 27.58 years with male to female ratio being 1.2:1. Common clinical presentations were pain (85%), limited mouth opening (25%), gingival redness and swelling (77%) pericoronitis (74%) and hard swelling in posterior region of mandible (4%). A total of 43% were completely while 57% were partially bony impacted. On radiography, 59% mesioangular, 26% vertical, 9.0% horizontal and 6.0% distoangular impactions were seen. Two patients presented with large radiolucent lesions.

Microscopically, epithelial hyperplasia (62%), basal layer atypia (30%), surface ulceration (22%) and papillomatosis (15%) were seen. Connective tissue changes included inflammation (92%), hyalinization (62%), fibrinoid necrosis (45%) and calcification (14%). Among inflammation 45%, 32% and 15% biopsies showed mild, moderate and severe degree of inflammation respectively. Dentigerous cysts in 3% while 1% cases each of odontogenic keratocyst and plexiform variant of ameloblastoma was found.

Conclusion: Impacted third molar is associated not only with inflammatory changes but also with cystic and neoplastic changes.

Key Words: Impacted Third Molar, Soft Tissue, Dentigerous Cyst.

Introduction

Teeth that are prevented from eruption by an objective within the path of eruption are known as impacted teeth.¹

Lack of space, malposition or other hindrances are responsible for the tooth being impacted.² Eruption period of third molars is arbitrary with a range from age 16 to 24 years.³ The 17 years is mean age for third molar eruption. The wide age series as well as positional changes that occur after third molar eruption are mainly due to nature of the diet, the intensity of the use of the masticatory apparatus, race differences and genetic background.² There is no gender dominance.⁴

Impacted third molar can be classified as bony or soft tissue impactions. Bony impaction is when the tooth is completely

present in the jaw bone while in soft tissue impaction the tooth crown has erupted through bone, but has not yet entirely through the gingiva.¹

The most common system is winters (1926) classification according to which impacted third molars can be divided into mesioangular, distoangular, horizontal and vertical.⁵

The aetiology of impactions can be local and systemic. Tooth germs malposition, lengthened deciduous tooth retention or early loss before time, irregularities in the position of adjacent teeth, bone density, chronic inflammation of the overlying mucosa, arch length deficiency, supernumerary teeth, odontogenic tumours, are the local factors. Systemic causes can be pre or postnatal.²

Common symptoms related to impacted third molar are pain, red and swollen gums, swelling around the jaw, halitosis, an unpleasant taste in the mouth and headache.⁶ Pericoronitis, unrestorable caries, internal or external resorption of tooth or adjacent teeth, and any follicular disease including cyst /

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tumour are the suggested indications for removal of impacted third molar.⁷ Common cystic lesions found in association with impacted third molar are dentigerous cysts⁸, odontogenic keratocysts or calcifying odontogenic cysts.⁹ There are also some neoplastic conditions associated with impacted third molar, these are ameloblastoma¹⁰, myxomas and odontogenic fibromas.¹¹ Microscopically, only epithelial hyperplasia, inflammation and calcification were reported in soft tissue associated with impacted third molars.^{11&12}

Materials and Methods

This descriptive study as approved by the Vice Chancellor of the Advanced Studies & Research Board was conducted in the Department of Morbid Anatomy and Histopathology/Oral Pathology at University of Health Sciences, Lahore Pakistan. Soft tissue specimens were taken through convenient sampling from the dental follicle or pericoronal tissue of n=100 patients in compliance with the Helsinki Declaration. These patients reported to the Oral and Maxillofacial Surgery department of de' Montmorency College of Dentistry, Lahore Pakistan from April to July 2013 with pain, limited mouth opening, halitosis, swelling or for any other dental procedures and each patient in the research signed an informed consent form.

Results

Among n=100 patients the mean age was 27.58 (Range 18 to 53) years. There were n= 55 males and n=45 females with male to female ratio of 1.27:1.

Soft tissues associated with impacted third molar were taken both from mandible and maxilla. Among n =100 of cases, n=51 were from right and n=45 from left side of mandible while three (n=3) cases were from left side and one case (n=1) from the right side of maxilla.

There were 43% completely bony and 57% partially bony impacted in n=100 cases.

On radiography, impacted teeth were classified as follows

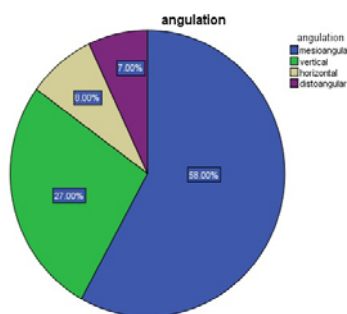


Figure 1: Distribution of angulation of impacted third molars

The pie gram shows the distribution of angulation of impacted third molars thus illustrating the mesioangular and vertical impactions being most frequently found.

Clinically, pain, redness, swelling of gingival tissues, pericoronitis and limited mouth opening were found. There were four patients presented with hard swelling in the posterior region of mandible.

On microscopy epithelial, stromal (connective tissue) and pathological changes were found (Table: 1); (Figure 2-5).

Table 1: The distribution of epithelial, connective tissue and pathological changes in soft tissues associated with impacted third molars.

Histopathological feature	present	absent
Epithelial hyperplasia	62%	38%
Papillomatosis	15%	85%
Basal layer atypia*	30%	70%
Surface ulceration*	22%	78%
Inflammation	92%	8%
Mild inflammation	45%	
Moderate inflammation	32%	
Severe inflammation	15%	
Hyalinization	62%	38%
Fibrinoid necrosis	45%	55%
Calcification	14%	86%
Dentigerous cyst	3%	97%
Odontogenic keratocyst	1%	99%
Ameloblastoma**	1%	99%

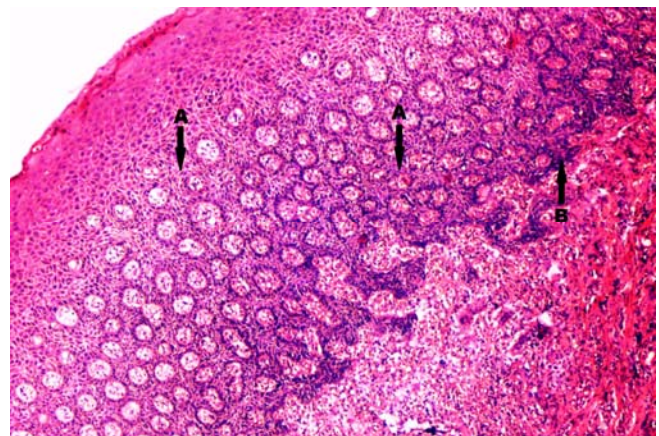


Figure 2: The epithelial hyperplasia leading to (A) papillomatosis. (B) basal layer atypia characterized by pleomorphism. Inflammation in connective tissue can also be seen. (H&E 40).

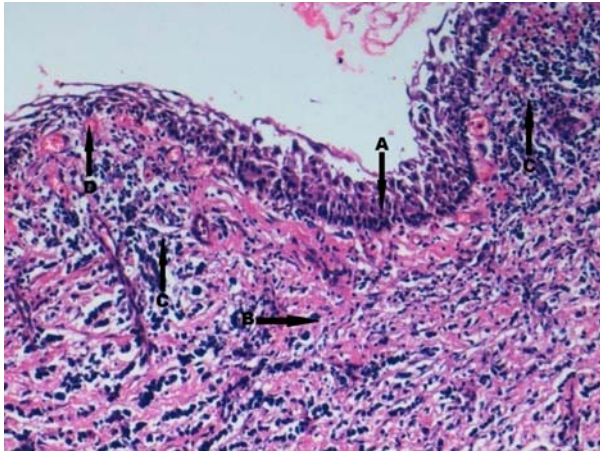


Figure 3: The hematoxylin and eosin stained section shows inflamed dentigerous cyst lined by (A) stratified squamous epithelium and (B) connective tissue, (C) Moderate degree of inflammation and (D) congested blood vessels can also be seen. (H&E X 100).

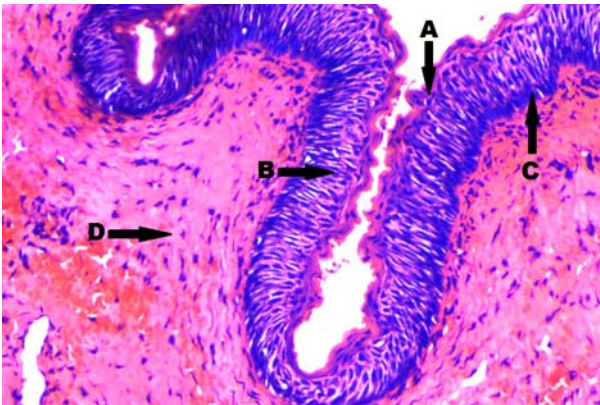


Figure 4: Odontogenic keratocyst lined by (A) parakeratinized (B) stratified squamous epithelium, (C) palisaded basal layer and (D) connective tissue. (H&E X 100).

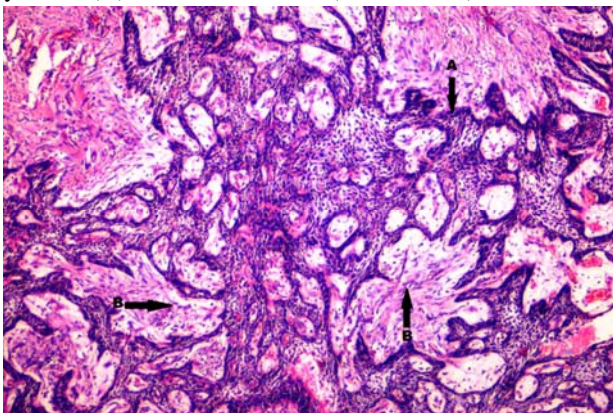


Figure 5: Plexiform variant of ameloblastoma characterized by anastomosing cords of (A) ameloblastic cells showing the reverse polarization and (B) stellate reticulum surrounded by these cords. ((H&E X 100)

Statistically, chi-square and fisher's exact test was applied to determine the association between age, gender, type and angulation of impacted third molar with other histological variables like epithelial hyperplasia, surface ulceration, basal layer atypia, inflammation, hyalinization, fibrinoid necrosis, calcification, dentigerous cyst, odontogenic keratocyst and ameloblastoma. No significant association was found between these variables as $p > 0.05$. However a significant association was found between type of impaction and basal layer atypia ($p=0.029$). Basal layer atypia was found mostly in soft tissue of completely bony impacted teeth than partially bony impacted teeth.

Discussion

To date no such study is reported from Pakistan and hence the present study may add data to the existing literature. In the present study, clinical, epithelial, connective tissues, cystic and neoplastic changes were discussed.

In the present study, 56% of the patients were male and 44% were females. In a similar study 58% of the patients were males and 42% were females thus indicating the male predominance which is consistent with the results reported in the present study.¹³ (Tegginamani and Prasad., 2013) whereas 74% female and 26% male have been reported in the study done by Khorasani and Samiezadeh.¹⁴

The mean age of patients was 27.58 ± 6.45 years and age range was 18 to 53 years in present study. In another study done by Kaya mean age reported was 24.71 ± 6.32 (16-45) years and 26.59 ± 9.95 (16-59) years for females and males respectively.¹² These findings are almost consistent with the results reported in present study. Similarly in another study, age range was reported from 20 to 50 years.¹⁵ (Monica et al., 2011). These findings are almost consistent with the results reported in present study. Whereas the mean age of 21.1 (Range 15 to 45) years and the age range of 15 to 68 years has been reported in the studies done by Baykul et al and Yildirim et al respectively.^{8,9} This age difference can be due to various reasons like rational differences, or late report by the patients at clinics or hospitals. As in our society third molar and its related pain is usually ignored or tolerated by the patients.

Clinically, the most frequent symptoms were pain (80%), swelling and redness of gingiva around the eruption site of impacted third molar (77%), pericoronitis (74%) and limited mouth opening with or without pain (25%) thereby consistent with the symptomolgy reported in a study done by Dogan et al.¹⁶

In the present study there were 6%, 9%, 26% and 59% distoangular, horizontal, vertical and mesioangular impactions respectively thus reporting mesioangular and vertical impactions were most common. Similarly, in other studies radiographic evaluation revealed mesioangular and vertical impactions were most common.^{14,17}

On microscopy, epithelial hyperplasia was seen in 62% cases in the present study which is quite concordant (58%) with the findings of Kaya in another study.¹²

Basal layer atypia, surface ulceration and papillomatosis were reported in 30%, 22 % and 15% of cases in the present study respectively. None of other similar study reported these findings.

Among the connective tissue changes, inflammation was seen in 92 % of cases while it was found in 44% of the specimens in another study.¹³ Hyalinization and fibrinoid necrosis were reported in 62% and 45% cases the in present study respectively. No other similar study reported these changes.

Calcification was seen in 14% cases in the present study while it was seen in two cases in a study by Tegginamani, and Prasad¹³, 34% cases in the study of Khorasani and Samiezadeh¹⁴ and 31% cases in the study of Kotrashetti.¹¹

Many reports in the literature affirm the presence of cysts and tumour development with impacted teeth. The overall consensus seems to be that pericoronal cyst and tumour development is rare.¹⁸

Dentigerous cysts are the most frequent non inflammatory odontogenic cysts. These develop within the normal dental follicle around an unerupted tooth as a result of the presence of fluid between the follicular epithelium and the crown of the tooth.¹⁹

The following guidelines are recommended for the diagnosis of a DC that are the presence of a pericoronal radiolucency larger than 4 mm in the greatest width on a panoramic radiograph, non-keratinized stratified squamous epithelium lining the fibrous tissue, and a cystic space between enamel and overlying tissue demonstratable on surgery.²⁰

Histologically, the cyst has non-specific features lined by variable thickness of stratified squamous epithelium and supported by connective tissue. Clusters of mucous cells are frequently present, especially in the mandibular third molar areas.²¹

Among the results obtained in the present study, n=3 of the 100 examined soft tissues showed the features of dentigerous cyst. However a similar study discovered no cystic change in dental follicle associated with impacted third molar whereas in various studies histopathological analysis

showed cystic changes in 10%, 14.1% and 50% of patients respectively.^{12,8,9}

Philipsen first described the Odontogenic Keratocyst (OKC) in 1956. The cell rests of dental lamina are the main source. It can occur anywhere in the jaw, but usually seen in the posterior mandible.²² The radiographic appearance of OKC can be a small unilocular to a large multilocular radiolucency. Hence it may mimic ameloblastoma, dentigerous cyst, lateral periodontal cyst, or a radicular cyst.²³ These radiographic features are also noticed in n=2 cases in the present study with a unilocular radiolucency in the posterior region of mandible extending up to the ramus of mandible.

In the present study 1% cases showed a cyst like cavity lined by parakeratinized stratified squamous epithelium with palisaded basal layer hence diagnosed as odontogenic keratocyst. While Kotrashetti reported two cases of odontogenic keratocyst¹¹ and Adaki, reported only one such case.²⁴

Ameloblastomas may come up from different sources of odontogenic epithelium, including dental follicle lining. Approximately 50% develop from the epithelial lining of a dentigerous cyst.¹⁹

On conventional radiographs it may present as a unilocular or multilocular corticated radiolucency. Bony septae may lead to a honeycomb appearance. Roots resorption may or may not be present. The radiographic differential diagnosis includes a variety of odontogenic cysts and tumours, mainly the keratocystic odontogenic tumour, as well as non-odontogenic cysts and tumours, such as a central giant cell lesion, fibro-osseous lesions and simple bone cyst.²⁵ In the present study similar well corticated unilocular radiolucency was seen involving the ramus of mandible, hence histology led us to a confirmatory diagnosis.

Clinically, ameloblastoma often presents as an asymptomatic swelling.²⁵ These findings are also reported in the present study with asymptomatic swelling in posterior region of mandible around the impacted third molar.

Histopathologically the plexiform variant of ameloblastoma contains basal cells set in the form of anastomosing strands with a little stellate reticulum. The stroma is usually delicate, often with cyst like degeneration²⁵ The present study also reported similar microscopic features and thus the diagnosis of ameloblastoma was made.

The percentage of ameloblastoma associated with impacted third molars has been reported as 0.49 %²⁶. Rukprasitkul, in his study discovered one case of ameloblastoma out of 104 which is consistent with the results of present study.²⁷

Conclusion

The present study reported that impacted third molar is associated not only with inflammatory changes but also leads to the development of cystic and neoplastic changes. These changes include dentigerous cysts, odontogenic keratocyst and ameloblastoma. So this study warrants cystic (preneoplastic) as well as neoplastic potential in these patients. Therefore, this study may help in suggesting preventive as well as earlier curative appropriate measures to be taken by the dental surgeons for the well being of patient.

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