

## An Evaluation of Pathologic Changes in the Follicle of Impacted Mandibular Third Molars

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### How to cite the article:

Tambuwala AA, Oswal RG, Desale RS, Oswal NP, Mall PE, Sayed AR, Pujari AT. An evaluation of pathologic changes in the follicle of impacted mandibular third molars. J Int Oral Health 2015;7(4):58-62.

### Abstract:

**Background:** The purpose of this study was to evaluate the early pathologic changes in the follicular tissue of completely impacted mandibular third molar.

**Materials and Methods:** 52 patients, between 18 and 52 years of age of which 25 were males and 27 were females, were selected. They had impacted mandibular third molars, which were indicated for extraction. After extraction, the follicle was sent for a histopathological evaluation to two different oral pathologists.

**Results:** The results showed that 80.8% of the specimen had normal follicles. 11.5% specimen suggested cystic changes while 7.7% suggested infected follicle.

**Conclusion:** It is desirable to consider prophylactic removal of impacted mandibular third molar presenting at a younger age, whereas their removal remains an enigma for the older age group and should only be considered appropriate in those cases where frank causes for its removal are established.

**Key Words:** Follicular tissue, impacted third molar, pathology

### Introduction

In oral and maxillofacial surgery, removal of the third molar is a common procedure. The most common complaint of patients presenting for treatment of third molars is developmental, pathological, medical deformities which is characteristic of a modern civilization. By definition, impacted tooth is a tooth which is completely or partially unerupted and is positioned against another tooth, bone or soft tissue so that its further eruption is unlikely, described according to its anatomic position.<sup>1</sup>

Lower third molar is the most commonly impacted tooth as compared to any other teeth in the oral cavity.

According to Archer the causes are:

Local causes:

1. Irregularity in the position and pressure of an adjacent tooth
2. Density of overlying/surrounding bone
3. Lack of space due to undeveloped jaw
4. Unduly long retention of primary teeth
5. Premature loss of primary teeth
6. Long continued local inflammation result to increase in density of overlying mucous membrane.

Systemic causes:

1. Prenatal causes
  - Hereditary
  - Miscegenation.
2. Post natal causes
  - Rickets
  - Anemia
  - Congenital syphilis
  - Tuberculosis
  - Endocrine dysfunctions
  - Malnutrition.
3. Syndromes
  - Cleft lip/cleft palate
  - Cleidocranial dysostosis
  - Oxycephaly
  - Progeria.

The formation of a tooth occurs inside a developmental sac known as the dental follicle or the dental sac, which surrounds the papillae of the tooth and enamel. In 2001, Damante characterized the follicle as the remnant of tissues that participate in the odontogenesis and remained circum adjacent to the crown of a tooth, which has not erupted normally. Radiographically the pericoronal follicles present as a slight pericoronal radiolucency around the unerupted teeth with a thin radiopaque border. However, enlargement and asymmetry can occur.

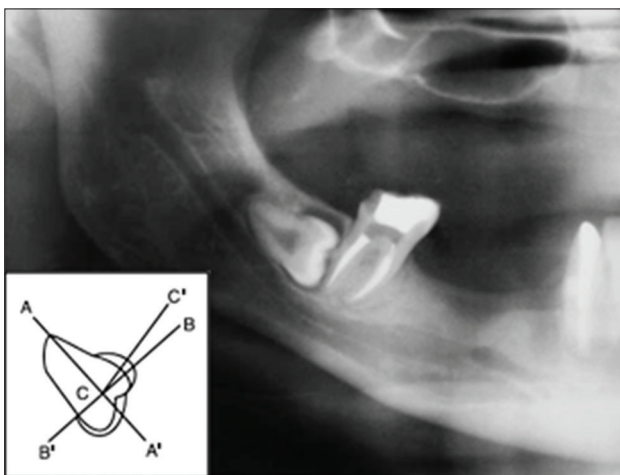
Histologic examination of surgically removed impacted third molar along with dental follicle and its associated pericoronal tissue reveals fibrous connective tissue with remnants of reduced enamel epithelium and the absence of an epithelial lining or chronic inflammatory infiltrate or connective tissue capsule made of collagen fibers and plump fibroblasts.

## Materials and Methods

A prospective study was conducted to know the incidence of pathologic changes in the follicle around the lower third molars with no radiographic or clinical evidence of changes. This study was conducted in the Department of Oral and Maxillofacial surgery. 52 patients with impacted mandibular third molars were considered for the study. These patients did not have any evidence of pathology, clinically or radiographically. The follicle tissue was given for histopathological examination.

Orthopantomographs of all the subjects were taken, which had minimum distortions. Using the X-ray viewer tracing was done of the contours of the tooth and the pericoronal space (Figure 1). Using a graduated scale, the widest point of the follicular space was measured. Two perpendicular lines (AA and BB) were drawn on the image of the impacted teeth, of which one line passed through the center of the crown and the other line passed through the long axis of the tooth (Figure 2). From the point where the two lines intersected, a ruler was moved to the widest of the follicular space. The measurements were done with a caliper ruler. Subjects who had a follicular space <2.5 mm were included in the study. According to the inclusion criteria, the patient was taken for surgical removal of impacted lower third molars.<sup>2</sup> Lignocaine hydrochloride with 2% adrenaline 1:100,000 was used as a local anesthetic solution. A mucoperiosteal flap was elevated using a periosteal elevator. If any coronal follicle was encountered after the elevation of the flap, it was carefully dissected out using blunt forceps and preserved. Without damaging the follicular tissue, the tooth was gently elevated from the socket, with the help of an elevator.

The follicle was enucleated from the socket and then cleaned with normal saline. The curettage of socket was done with a small curette. The socket was irrigated, and closure was done with 3-0 black silk interrupted sutures. Follicular tissue was cleaned with normal saline and sent for histopathology in 10% formalin.



**Figure 1:** Tracing done of the contours of the tooth and the pericoronal space.

The excisional biopsy specimens were processed and 5  $\mu$  thick sections were obtained from the blocks embedded in paraffin. This was done using a rotary microtome and stained using hematoxylin and eosin stains. The slides were reviewed by two oral pathologists involved in the routine diagnostic histopathologic investigations. The same set of slides was given to both the oral pathologists in order to reduce the interobserver discrepancy.

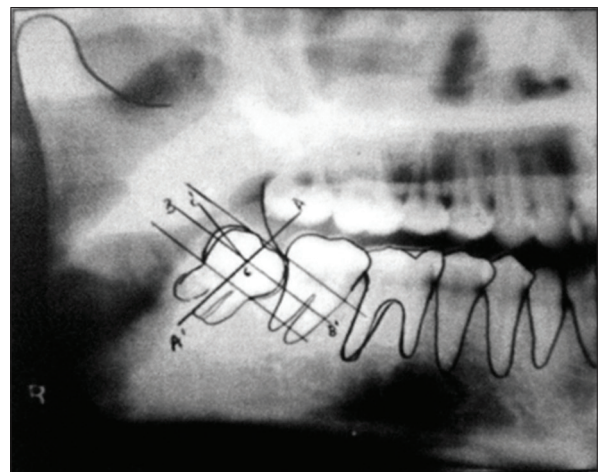
## Results

Excisional biopsy of impacted lower third molars was done, and the tissue sent for histopathologic testing. The subjects were between the age of 18 and 52 years of which 25 (48.1%) were males and 27 (51.9%) were females.

- 42 (80.8%) of the 52 follicles showed histologic changes suggestive of normal follicle (Graph 1a)
- 10 (19.2%) of the 52 follicle showed histologic changes suggestive pathology related to impacted mandibular third molar (Graph 1a)
- 6 (11.5%) of the 52 follicles showed histologic changes suggestive of cystic changes (Graph 1a)
- 4 (7.7%) of the 52 follicles showed histologic changes suggestive of the infected follicle (Graph 1a)
- Out of the 6 follicles which showed histologic changes suggestive of cyst, 4 of them were from mesioangular and 2 vertically impacted teeth (Table 1 and Graph 1b)
- Out of the 4 follicles which showed histologic changes suggestive of the infected follicle, 3 of them were from horizontal and 1 vertically impacted teeth (Table 1 and Graph 1b).

## Discussion

The incidence of impacted teeth accounts for between 14% and 96% of the population. Of which 98% of the impacted teeth are the third molars. Only 50% of the third molars erupt into the oral cavity.<sup>3</sup>

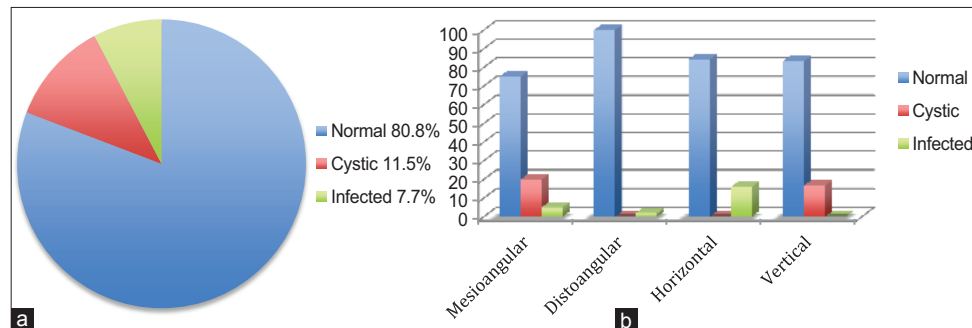


**Figure 2:** Two perpendicular lines (AA and BB) drawn on the image of the impacted teeth, of which one line passes through the center of the crown and the other line passes through the long axis of the tooth.

Table 1: The association between position and pathological change.

Pathological changes	n (%)				Total
	Mesioangular	Distoangular	Horizontal	Vertical	
Normal	15 (75.0)	1 (100.0)	16 (84.2)	10 (83.3)	42 (80.8)
Cystic	4 (20.0)	0	0	2 (16.7)	6 (11.5)
Infected	1 (5.0)	0	3 (15.8)	0	4 (7.7)
Total	20 (100.0)	1 (100.0)	19 (100.0)	12 (100.0)	52 (100.0)

P=0.340 by Chi-square test



Graph 1: (a) The distribution of pathological changes, (b) the association between position and pathological changes.

The mandibular third molar tooth germ is usually radiographically seen by the age of 9 years, and cusp mineralization is completed by 2 years. Crown formation is completed by the age of 14 years, and the roots are approximately 50% formed by 16 years of age and by 18 years the root is completely formed with an open apex. By 24 years of age, 95% of all the molars will complete their eruption.<sup>4</sup> The proximity of the impacted mandibular third molar roots to the mandibular canal can also be assessed using intraoral periapical radiographs and cone beam computed tomography.<sup>5</sup> Changes in the axial inclination of the impacted lower third molar takes place between 16 and 18 years of age when the roots of these teeth move abruptly forward in the bone indicating the approach of the tooth to the adult axial position.

Ledyard studied 375 tracings of the lateral roentgen-graphs of the right and the left side of the jaws of the orthodontic patients. Measurements were made on the tracings from the distal aspect of the lower first molar on the occlusal plane to the anterior border and posterior border of the ramus. These curves leveled off after 14 years of age, and there was little growth after that. Ledyard concluded that, after 15 or 16 years of age, further growth in the retromolar region is negligible and a comparison of the tooth and bone structure at this time would determine if sufficient space is present for the third molar to erupt.<sup>6</sup>

After the formation of enamel, the crown of the tooth is surrounded by reduced enamel epithelium and by ectomesenchyme. These two structures together form the dental follicle, which may be the reason for several types of diseases after enduring odontogenesis.<sup>3</sup>

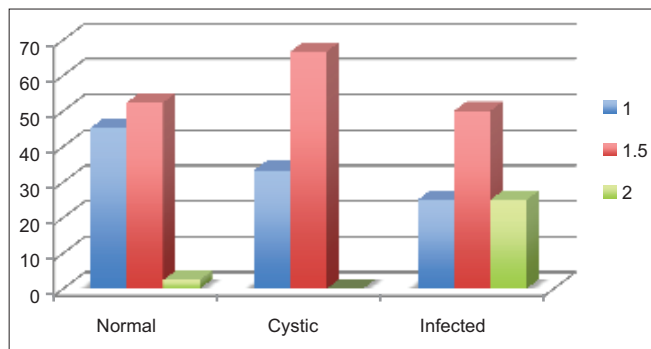
In the impacted third molar that is left intact in the jaw, the follicle may undergo cystic degeneration. The follicular sac

may also develop into odontogenic tumor. These pathological entities usually occur under 40 years of age.<sup>4</sup> Dentigerous cyst is found to be the most common developmental odontogenic cyst of the jaw. It accounts approximately for 20-24% of the jaw cysts which are lined by epithelium. It develops around the crown of the unerupted teeth. These cysts are often asymptomatic but sometimes there may be an acute inflammatory exacerbation - pain, tooth displacement, swelling, sensitivity, and mobility may be present if the cyst becomes larger than 2 cm in size. Radiograph of the dentigerous cyst usually shows a well-defined radiolucent lesion which is unilocular and has a sclerotic border surrounding the crown of the impacted teeth.<sup>7</sup>

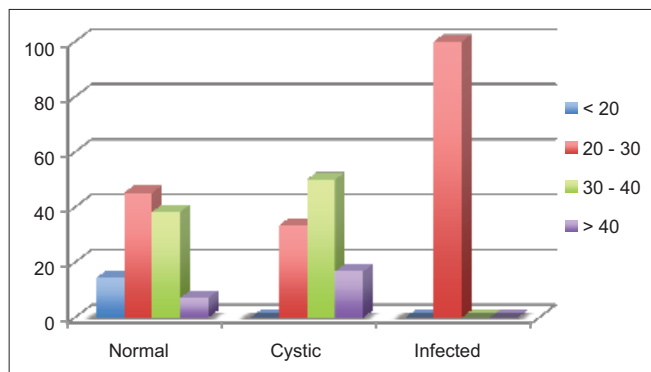
This study was carried out to evaluate the early pathologic changes associated with the dental follicle of impacted lower third molar. 52 follicular tissues were obtained with a maximum follicular space of 2 mm (Graph 2 and Table 2). Among these subjects, 25 male (48.10%) and 27 female (51.9%) subjects had impacted third molars in the ratio of 1:1.1. The subjects were selected randomly. The age group ranged from 18 to 54 years (Graph 3 and Table 3).

The third molars with a pericoronal space of 2.5 or less were considered in this study because a space <2.5 mm is considered nonpathologic.<sup>8</sup> The incidence of cystic changes was high in the follicle space between 0 and 1 mm. Glosser and Campbell defined radiographic pathology as a pericoronal space of more than 2.5 mm or larger.<sup>9</sup>

A study conducted by Baykul *et al.* on radiographically normal impacted teeth, that is with a pericoronal space of <2.5 mm, showed that 50% of them had cystic changes.<sup>10</sup>



**Graph 2:** The association between follicle size and pathological changes.



**Graph 3:** The association between age and pathological changes.

**Table 2: The association between follicle size and pathological changes.**

Follicle size	n (%)			
	Normal	Cystic	Infected	Total
1.0	19 (45.2)	2 (33.3)	1 (25.0)	22 (42.3)
1.5	22 (52.4)	4 (66.7)	2 (50.0)	28 (53.8)
2.0	1 (2.4)	0	1 (25.0)	2 (3.8)
Total	42 (100.0)	6 (100.0)	4 (100.0)	52 (100.0)

P=0.214 by Chi-square test

**Table 3: The association between age and pathological changes.**

Age group	n (%)			
	Normal	Cystic	Infected	Total
<20	6 (14.3)	0	0	6 (11.5)
20-30	19 (45.2)	2 (33.3)	4 (100.0)	25 (48.1)
30-40	14 (33.3)	3 (50.0)	0	17 (32.7)
>40	3 (7.1)	1 (16.7)	0	4 (7.7)
Total	42 (100.0)	6 (100.0)	4	52

P=0.337 by Chi-square test

Hence, the present study was designed to histologically evaluate the pathological changes associated with normal radiographic pericoronal spaces in the impacted mandibular third molars.

The oral pathologists independently analyzed the dental follicles. In 60.3% of the follicles, the presence of the lining epithelium was noted in foci or segments or in a continuous pattern. 16.7% of the follicles showed presence of reduced enamel epithelium.

The present study shows 10 (19.23%) pathological changes in the follicular tissue. Out of these, 6 (11.5%) of the follicles were lined with stratified squamous epithelium and 4 (7.7%) of the follicles show chronic inflammatory infiltrate, which suggests infected follicle.

Curran *et al.* studied histologic changes in non-pathologic follicular tissue. Lesions that suggested pathology were diagnosed in 32.9% of the cases with dentigerous cyst being the highest (77.5%).<sup>11</sup> According to Daley *et al.* (1995) a true cyst will exhibit a fluid filled cavity that allows the surgeon to separate the dentigerous cyst from at least a portion of the enamel surface of the impacted tooth. He has recommended some guidelines for the diagnosis of a dentigerous cyst.

1. Pericoronal radiolucency whose greatest width is larger than 4 mm
2. Histologically non-keratinized stratified squamous epithelium
3. Cystic space between enamel and overlying tissue.

In the present study, the incidence of pathologic changes in the follicle tissue was compared between the different types of impacted teeth. Four cases of mesioangular impacted, 2 cases of vertically impacted teeth were diagnosed as cystic. While 1 case of mesioangular impacted, 3 cases of horizontally impacted teeth were diagnosed as infected follicle.

Thus, the above data suggest that there is significant (19.23%) incidence of pathological changes in impacted lower third molar, which appears normal radiographically. It also suggests that the absence of the radiographic feature does not indicate the absence of disease. Prophylactic removal, an intervention undertaken to prevent disease has been a subject of controversy for many years. The reason being the imbalance between the advantages and disadvantages associated with the surgical procedure. The follicular sac surrounding the tooth is interpreted in the radiograph as pericoronal radiolucency. The width of this radiolucency is of utmost importance to differentiate between a normal and abnormal dental follicle.

According to Miller and Bean (1994) disease condition may be found in small follicular spaces and in big radiolucent areas there may be histologically normal tissues, so biopsy is imperative. This study evaluated the correlation between radiographic and histomorphologic features of pericoronal follicles of unerupted lower third molars.<sup>12</sup>

All the above-mentioned data suggest that early removal of impacted mandibular third molar when they are asymptomatic should be considered.

**Conclusion**

The present study was carried out to evaluate any pathologic changes associated with normal impacted mandibular third molars.

52 follicular tissues surrounding the radiographically normal impacted lower third molars were given for histopathologic testing. These teeth did not have any clinical or radiographic findings which suggested an associated pathology.

It was found that 10 out of the 52 biopsied follicle tissues had changes suggestive of pathological changes. That accounts to 19.2% which is statistically significant. This proves the importance of careful evaluation of the clinical and radiographic findings along with histopathologic testing which most of the times is neglected.

Looking at the above finding suggestive of a considerably high rate (19.23%) of pathological changes in impacted mandibular third molar follicle, it is desirable to consider prophylactic removal of impacted mandibular third molar in patients presenting at younger age, whereas the removal of impacted mandibular third molars for prophylactic means still remains an enigma for older age group and should be considered appropriate only in those cases where frank causes for its removal are established.

#### References

1. Archer WH. Oral and Maxillofacial Surgery, Vol. 1. Philadelphia: WB Saunders; 1975.
2. Damante JH, Fleury RN. A contribution to the diagnosis of the small dentigerous cyst or the paradental cyst. *Pesqui Odontol Bras* 2001;15(3):238-46.
3. Alling CC, Helfrich JF, Alling RD. Impacted Teeth, 1<sup>st</sup> ed. Philadelphia, W.B. Saunders Company; 1993.
4. Peterson LJ. Principles of Oral and Maxillofacial Surgery, Vol. 1. Philadelphia, PA: J.B. Lippincott Co.; 1992.
5. Sinha P, Pai A. Assessment of proximity of impacted mandibular third molar roots to mandibular canal using intra oral periapical radiography and cone-beam computerized tomography: A comparative study. *Int Dent Med J Adv Res* 2015;1:1-5.
6. Ledyard BC. A study of mandibular third molar area. *Am J Orthod* 1953;39(5):366-73.
7. Kalaskar RR, Tiku A, Damle SG. Dentigerous cysts of anterior maxilla in a young child: A case report. *J Indian Soc Pedod Prev Dent* 2007;25(4):187-90.
8. Adelsperger J, Campbell JH, Coates DB, Summerlin DJ, Tomich CE. Early soft tissue pathosis associated with impacted third molars without pericoronal radiolucency. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 2000;89(4):402-6.
9. Glosser JW, Campbell JH. Pathologic change in soft tissues associated with radiographically 'normal' third molar impactions. *Br J Oral Maxillofac Surg* 1999;37(4):259-60.
10. Baykul T, Saglam AA, Aydin U, Basak K. Incidence of cystic changes in radiographically normal impacted lower third molar follicles. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 2005;99(5):542-5.
11. Curran AE, Damm DD, Drummond JF. Pathologically significant pericoronal lesions in adults: Histopathologic evaluation. *J Oral Maxillofac Surg* 2002;60(6):613-7.
12. Miller CS, Bean LR. Pericoronal radiolucencies with and without radiopacities. *Dent Clin North Am* 1994;38(1):51-61.