

PATHOLOGIC CHANGES IN DENTAL FOLLICLE ASSOCIATED WITH THIRD MOLAR IMPACTIONS – A STUDY

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ABSTRACT

The aim of this study was to establish radiographic criteria for early diagnosis of cystic changes in dental follicles associated with impacted third molars and thereby prevent the development of a pathological cyst and its associated complications. This case control study was performed involving 20 cases of impacted third molars with follicle size measuring <2.5mm and 4 controls with follicle size measuring >3mm, as measured on panoramic radiographs, followed by histopathologic evaluation of the follicles for cystic changes. 55% of follicles associated with impacted third molars, with pericoronal radiolucency less than 2.5mm actually showed presence of stratified squamous epithelium consistent with a dentigerous cyst. Thus on the basis of the results obtained in this study, it was concluded that a pericoronal radiolucency associated with impacted third molar and measuring less than 2.5 mm in the greatest dimensions should be considered as a potential source for the development of a dentigerous cyst when seen in an OPG.

Key words: Impaction, Pericoronal radiolucency, Dentigerous cyst

INTRODUCTION

Third molar teeth are of special interest to the dental clinicians and students of human evolution because of their wide range of morphologic variations and the frequency with which the formative organ fails to develop, resulting in complete absence of one or more third molars.¹ The third molars have the greatest incidence of impactions, this being one of the commonest finding among patients seen by the dental practitioners. The term 'impacted' simply describes a tooth, which is not fully exposed in the oral cavity because it is covered by soft tissue or bone.²

Third molar impaction is a major problem in dentistry. Figures ranging from 9.5% to 39% have been quoted in different populations worldwide. In the Asian Indian population the most common position of impacted third molar is vertical (42%) followed by mesioangular (31%), distoangular (27%) and rarely horizontal.³

The development of impacted third molars normally spans several years and, problems often develop gradually. Nevertheless, these gradual changes can cause sudden and severe pain, discomfort, pericoronitis, headache and swelling. Some type of pathologic changes like dentigerous cyst, internal resorption, caries, periodontal ligament damage, bone loss distal to second molar and pressure resorption of second molar can be expected eventually in approximately 12% of impacted third molar population and 1.82% of the general population over sustained period of time.⁴ The pathologic changes are common in mandibular third (8%) compared to maxillary third molars (5.2%). While not every impacted third molar actually causes clinically significant problem, each has a potential.⁵

A normal homogenous radiolucent space known as the follicular space surrounds the crown of all developing teeth. It represents a dense fibrous layer formed from mesodermal tissue that surrounds the epithelial enamel organ. The dental follicle associated with im-

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packed third has potential to undergo cystic degeneration and form a dentigerous cyst. Most authorities have accepted a pericoronal radiolucency of 3mm or more in the greatest dimension on a panoramic radiograph, as a potential source for cystic transformation.^{6,7}

JW Glosser, JH Campbell (1999) evaluated incidence of histological abnormalities in the soft tissue surrounding impacted third molar teeth when there were no pathological conditions apparent on the corresponding radiographs. A diagnosis of dentigerous cyst was made in about 37% of mandibular and 25% of maxillary specimens which showed a follicular space less than 2.4mm when measured on a panoramic radiographs. Based on their findings they concluded that any soft tissue specimen with squamous epithelium spreading along the surface of the follicle should be deemed cystic.⁸ Various other studies conducted revealed that follicular specimens 2 to 3 mm of pericoronal radiolucency as measured on a panoramic radiograph exhibited stratified squamous epithelium, which indicates potential for cystic transformation.^{8,9} Some of the complications associated with the dentigerous cyst include root resorption, tooth displacement, pain and subsequent development of mural ameloblastoma, mucoepidermoid carcinoma while extremely rare, malignant transformation of the squamous epithelium has also been documented.^{10,11,12}

Therefore impacted third molars may cause serious pathological conditions and could be damaging or even life threatening. As the incidence of systemic diseases, pathological conditions, and postsurgical morbidity increases with the age, so is the difficulty and complications of surgery, and the hazards inherent in retaining embedded third molars in older persons. This indicates prophylactic extraction of impacted third early in life, when possible.^{12,13}

Due to the high potential pathologies associated with impacted third molars, this study was done to evaluate the pericoronal radiolucencies associated with impacted third molars seen on panoramic radiograph.^{2,7,10,11}

METHODOLOGY

A sample size of 20 patients was included in this study with an age ranging from 15-18 years (Table 1) 10

were males and 10 females (Table 2). These patients were taken from the out patients, attending the department of Oral medicine and radiology and included only those who were referred for the extraction of their impacted third molars for orthodontic treatment. A brief case history and relevant medical history was recorded from the subjects for the study. They were examined under artificial illumination and were radiographed using Trophy Panoramic X-ray unit, which operated at 15mA, the peak kilovoltage ranged from 70-90 depending on the estimate of the subjects jaw size. These panoramic radiographs were examined for the presence of normal pericoronal radiolucency suggestive of a dental follicle associated with the impacted third molar. The size of this pericoronal radiolucency was measured in all the dimensions to the nearest millimetres using vernier calipers. Twenty impacted third molars, 2 maxillary and 18 mandibular (Table 3) associated with pericoronal radiolucency less than 2.5mm served as cases and the four diagnosed cases of dentigerous cyst related to impacted third molars, one maxillary and 3 mandibular (Table 3) with pericoronal radiolucency greater than 3.0mm served as control were included in this study and were subjected for extraction. The age distributions for the controls ranged from 16-26 years (Table 1) with 3 males and one female (Table 2). Following the extraction of the impacted third molars in the case and control groups the dental follicular tissue was carefully removed and sent for histopathologic examination for the presence of cystic changes. Those follicles with a stratified squamous epithelium lining spreading along the surface were deemed to be cystic. Chi-square and Fisher exact tests were used to test the significance of proportion of stratified squamous epithelium between cases and control.

RESULTS

Out of the 20 cases of impacted third molars associated with follicle size less than 2.5mm- 11 exhibited stratified squamous epithelium. (Table 4) Fig 1, 2

4 controls of impacted third molars associated with the follicle size greater than 3mm exhibited presence of stratified squamous epithelium lining the follicle (Table 4).

TABLE 1: AGE DISTRIBUTION OF THE STUDY

Age distribution	Cases	Controls
Number	20	4
Range	15-18	16-26
Mean $\pm$ SD	16.65 $\pm$ 1.09	22.25 $\pm$ 4.25

TABLE 2: SEX DISTRIBUTION

Sex distribution	Cases (n=20)	Controls (n=4)
Male	10(50.0%)	3(75.0%)
Female	10(50.0%)	1(25%)

TABLE 3: MAXILLA AND MANDIBLE DISTRIBUTION

Maxilla /Mandible	Cases (n=20)	Controls (n=4)
Maxilla	2(10.0%)	1(25.0%)
Mandible	18(90.0%)	3(75.0%)

TABLE 4: INCIDENCE OF PRESENCE OF STRATIFIED SQUAMOUS EPITHELIUM

Stratified squamous epithelium	Cases (n=20)	% (95% CI)
Present	11	55.0% (34.21-74.18)
Absent	9	45.1% (25.82-65.79)

TABLE 5: COMPARISON OF THE PRESENCE OF STRATIFIED SQUAMOUS EPITHELIUM

Stratified squamous epithelium	Cases (n=20)	Controls (n=4)
Present	11(55.0%)	4(100.0%)
Absent	9(45.0%)	—
Total	20	4
Inference	Since the difference of proportion of stratified epithelium is not statistically different between the cases and controls, presence of stratified squamous epithelium is equally likely in cases as in control ($P>0.05$)	

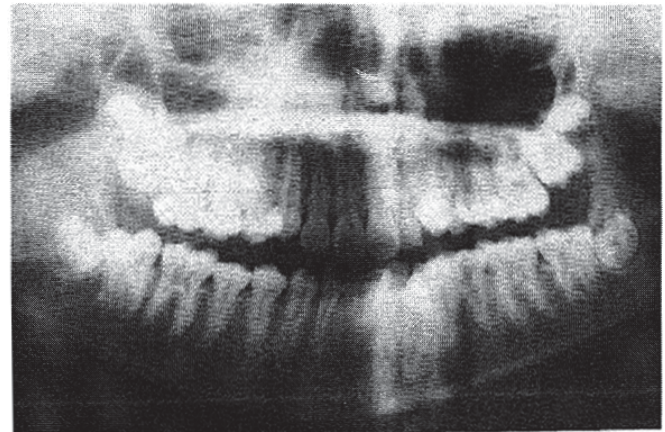


Fig 1: OPG showing dental follicle in relation to 38 measuring 2.24 mm

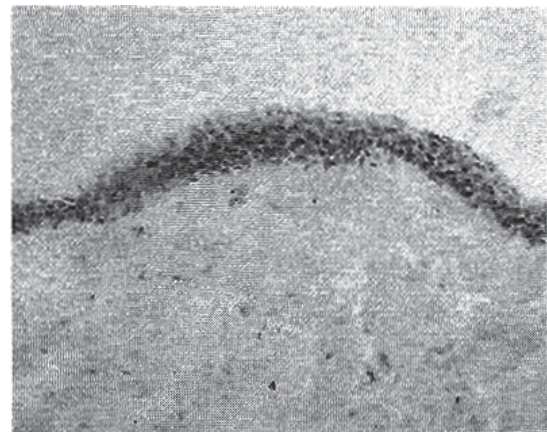


Fig 2: Histologic examination revealing presence of stratified squamous epithelium

DISCUSSION

The presence of pericoronal pathosis is generally the common reason for the removal of third molars.

Pericoronal space surrounding the impacted third molar may represent either a normal or an enlarged dental follicle but alternatively may represent a pathologic entity most commonly a dentigerous cyst.¹⁴ For several years pericoronal space surrounding the unerupted third molar measuring 3mm or more on a panoramic radiograph was regarded as suspicious for having cystic changes⁶ associated with the dental follicles, and space less than 3mm was believed to be normal.

The aim of this study was to establish radiographic criteria for early diagnosis of cystic changes in follicular tissues associated with impacted third molars and thereby prevent the development of a pathological cyst and its associated complications.

Reviewing the literature in context to the 'cysts of the oral cavity' by Shear⁶ (1992) and a study conducted by Vallecillo et al¹⁵ (1998) on radiographically normal impacted third molar teeth, pericoronal radiolucencies measuring 3mm or more were considered to be cystic. Conklin and Stafne¹⁰ in a study defined a "radiographic pathology" as a pericoronal radiolucency 2.5mm or larger in any dimension and associated lesions of this size with a higher incidence of dentigerous cysts. Finding in this study correlates with the works of Glosser et al⁸ (1999), Manganaro AM¹¹, with more than half of the follicular samples measuring than 2.5mm in the greatest dimensions exhibited histological features consistent with dentigerous cyst.

In the present study follicular tissue with the impacted third molar was deemed cystic if lined by stratified squamous epithelium. This finding is also consistent with the studies conducted by Alice et al⁹ (2002).

In this study the pericoronal radiolucency associated with impacted third molars was measured on a panoramic radiograph. This is consistent with the studies conducted by Conklin et al¹⁰, ER Mopsic¹⁶ who favoured the routine use of the panoramic radiographs, as they adequately depict the third molar region of the jaws and ensure that pathological condition can be visualized.

In the present study 90% of the impacted third molars associated with a cystic changes were the mandibular impacted third molars, which is in agreement with the findings of Shear⁶ and Glosser et al⁸ who stated that mandibular impacted third molar to be associated with highest incidence of cystic changes.

In this study mesioangular impacted molars were associated with higher incidence of cystic changes. This finding is in contrast to the study conducted by Baykul et al (2005)¹⁷ who found higher probability of cystic changes in vertically positioned impacted third molars.

In the present study 55% of follicles associated with impacted third molars, with pericoronal radiolucency less than 2.5mm actually showed presence of stratified squamous epithelium consistent with a dentigerous cyst. This result correlates with a study done by Baykul et al (2005)¹⁷ who investigated the cystic changes in radiographically normal follicles associated with 94 impacted mandibular impacted third molars, and re-

ported that 50% of the follicular specimens showed cystic changes as the only pathological condition. In another study conducted by Knight et al¹⁸ (1991) 44.7% of 170 impacted third molar teeth examined, had associated dentigerous cysts.

In this study 45% of the follicular specimen's associated with impacted third molars were marked by absence of epithelial lining and were characterized by presence of connective tissue layer. The probable reason for this appears to be that the follicle was separated from its associated tooth and the lining epithelium was of enamel organ type, most of it remained attached to the enamel of the tooth and consequently was not seen in the microscopic section of the dental follicle. However, if the lining had undergone transition to the squamous type, which apparently was not attached to the similar degree, much more lining epithelium have been found in the microscopic section of the dental follicles. Certainly these finding rule out the theory that the absence of the epithelial lining is necessarily due to artefacts of histological technique during either the cutting of the paraffin block or the floating of the section in the water bath, as stated by Stanley et al.¹⁹

Thus radiographically normal impacted third molars with a pericoronal radiolucency measuring less than 2.5mm in the greatest dimensions should be suspected as a probable risk factor for the development of a dentigerous cyst and their prophylactic extraction may be recommended, since frequency of postoperative complications and incidence of pathological conditions increases with age of the patient. This concept of prophylactic removal of impacted third molars early in the life, because of the inherent difficulty, complications of surgery and hazards in retaining embedded third molars in the older persons was also a consistent finding in the study conducted by Rakprasitkul (2000)²⁰.

Thus the incidence of dentigerous cysts associated with impacted third molar teeth seems to be much higher than reported from radiographic studies. Therefore radiographically impacted third molars with a pericoronal radiolucency measuring less than 2.5mm in greatest demensin should be suspected as a potential source for development of a dentigerous cyst.

CONCLUSION

It was concluded that the application of histological and radiographic criteria provides more accurate diag-

nosis than does the use of one criterion alone. Thus on the basis of the results obtained in this study, it is concluded that radiographically normal impacted third molars with a pericoronal radiolucency measuring less than 2.5mm in the greatest dimensions should be considered a potential source for the development of a dentigerous cyst and their prophylactic removal may be recommended to prevent the development of future complications. Further studies with a larger sample size and long term follow up are required.

BIBLIOGRAPHY

- 1 Mwaniki D, Guthua S.W "Indience of impacted third molars among the dental patients in Nairobi, Kenya". *Tropical Dental Journal* 1996;74:17-19.
- 2 John A Svirsky, Laurie C Carter "Dentigerous cyst" Oral and Maxillofacial Pathology Diagnostic Service, June 1994.
- 3 Sandhu S, Kaur T "Radiographic evaluation of the status of third molars in the Asian Indian students", *J of Oral Maxillofac Surg* 2005;63(5):640-345.
- 4 Stanley HR, Alattar M, Collett WK, Stringfellow HR Jr, Spiegel EH "Pathologic sequelae of 'neglected' impacted third molars". *J Oral Pathol* 1988;17:113-17.
- 5 Eliasson S, Hemdahl A, Nordenran A "Pathologic changes related to long term impaction of third molars. A radiographic study. *Int J Oral Maxillofac Surg* 1989;18(4): 210-12.
- 6 Shear M Dentigerous (follicular) cyst. In "Cysts of the oral region", 2nd endition. Bristol:Wright PSG 1983:56-75.
- 7 CS Farah NW Savage "Pericoronal radiolucencies and the significance of early detection". *Aust Dent J* 2002;47(3): 262-65.
- 8 JW Glosser, JH Campbell "Pathologic changes in soft tissues associated with Radiographically 'normal' third molar impactions". *British J Oral Maxillofac Surg* 1999.
- 9 Alice E, Curran, Douglas D, Damm, James F, Drummond, "Pathoogically significant Pericoronal lesions in adults: Histopathologic evaluation", *J Oral Maxillofac Surg* 2002;60: 613-17.
- 10 Conklin WW, Stafine EC "A study of odontogenic epithelium in the dental follicle". *JAMA* 1949;39:143:37:259-60.
- 11 Manganaro AM "The likelihood of finding occult histopathology in routine third molar extractions". *Gen Dent* 1998;46:200.
- 12 Slootweg PJ "Carcinomia arising from reduced enamel". *J Oral Pathol* 1987; 16: 479-82.
- 13 Edward C. Hinds, Karl F. Frey "Hazards of retained third molars in older persons: report of 15 cases". *JADA* 1980; 101: 246-50.
- 14 Tom D Daley, George P. Wysocki "The small Dentigerous cyst-A diagnostic dilemma". *Oral Surg Oral Med Oral Pathol* 1995; 79: 77-81.
- 15 Vallecillo M "Quistes de los maxilares" En: Vascones A. *Tratado de odontologia*. Madrid: Trigo Ediciones SL, 1998; 3761.
- 16 Edward E. Mopsik "The necessity to adequately visualize maxillary third molars-report of three cases". *JADA* 1989; 118: 721-23.
- 17 Baykul T, Ali S, Ulkem A, Kayhan B. Incidence of cystic changes in radiographically normal impacted lower third molar follicles. *Oral Surg Oral Med Oral Pathol* 2005; 99(5); 542-45.
- 18 Knight EM, Browkav WC, and Kessel HI "The incidence of Dentigerous cysts associated with a random sampling of unerupted third molars. *Gen Dent* 1991; 39: 96.
- 19 Harold R. Stanley, Harold Krogh, Everett Pannkuk "Age changes in the epithelial components of the follicles (dental sacs) associated with impacted third molars". *Oral Surg Oral Med Oral Pathol* 1965; 19(1): 128-39.
- 20 Rakprasitkul "Pathologic changes in the pericoronal tissue of unerupted third molars". *Quintessence Int.* 2001; 38(8): 633-38.