**Original Research Article**



HISTOLOGIC AND RADIOGRAPHIC STUDY OF PATHOLOGIC CHANGE IN COMPLETE IMPACTED THIRD MOLARS DENTAL FOLLICLES

ABSTRACT

Background: Prophylactic extraction of the asymptomatic impacted third molar is routinely practiced in Europe and the United States. The justification for prophylactic extraction includes the need to reduce the risk of pathologic changes such as cysts and tumors.  Aims (objectives): This study aimed to study the histological and radiological changes in the tooth follicles of upper and lower complete impacted 3rd molars - which appeared radiologically normalMaterial and method: A prospective study included fifty patients aged 20 years and over(above)who were referred to the Oral Surgery Clinic, Faculty of Dentistry, University of Sana'a. Patients had ~~a~~ follicular space between (2.5mm -3mm) as measured by the panoramic X-ray. ~~Then~~ these teeth were removed surgically and the follicle was sent for histopathological examination. Results: Most histopathological changes were in dental follicles with a size of <2.5 mm (86%), and only 14% with 2.5 mm - 3 mm. There was statistical significance between the smallest size of dental follicles with the incidence of pathological histological changes (p = 0.008). and what? Of the 50 follicular patients, 28% showedHistopathological Change(HC), nine (64%) had ameloblastoma, four (29%) had adentigerouscyst, and only one case (7%) had a multi-calcified focus with islands of odontogenic epithelium. While 72% of the samples had normal follicles and non-specific chronic inflammatory cells There is an association between female sex and pathological histological changes (12 females: 2 males, p = 0.008), age group 21-25 years (93% HC), with mandibles (65% HC). Regarding angle and histopathological change, 36% were vertical, 29% mesioangular, 14.2% horizontal and destioangular, and 7.1% buccoangular. Conclusio:~~In conclusion, a~~high incidence of HC occurred in patients with Dental Follicle (DF), and it was associated with smaller dental follicle size, most HC was ameloblastoma, followed by dentigerous cyst, while 72% of samples had normal follicles andnon-specific chronic inflammatory cells. There is a correlation between female gender, younger age group, and jaw position with HC. Prophylactic extraction of the asymptomatic impacted third molar should be routinely practiced in Yemen, to reduce the risk of pathological changes, especially in females and younger age groups.

Keywords: Dental follicle (DF), histopathological changes (HC), Impacted Third Molars,Oralpathology, Radiographic width, Sana’a, Yemen.

INTRODUCTION

The primitive dental sac, or dental follicle, which originates from odontogenic ectomesenchyme, is part of the tooth germ and is physiologically involved in the formation of cementum, periodontal ligament, and alveolar boneThis fibrous connective tissue usually contains odontogenic cell rests, which could be the source of any pathology like ameloblastoma, ameloblastic fibroma etc~~. In~~ radiographically(it) appears as thin pericoronalradiolucenc considered normal by some authors when within 3mm of thickness and by others when it is within 2.5mm of thickness 1,2. Reports in the literature discuss(ed) the prevalence of various cyst and tumor development associated with the asymptomatic follicle of impacted tooth 3. Dental follicle may show various histopathological changes during tooth development which may sometimes lead to the development of odontogenic tumors and cysts. Foci of calcification are seen as a normal finding in the stroma of dental follicles 3. In the WHO classification of odontogenictumours, the hard tissue formation has been considered as a sub-classification; however, this parameter has not been much explored in earlier studies on dental follicle. Epithelial-mesenchymal interactions play an important role in odontogenesis and its associated pathologies, and therefore in the studies of dental follicle, along with epithelial component, emphasis should be laid on mesenchyme as well 2.

To our knowledge and according to the archive of the Library of the National Information Center in Yemen, which contains ~~a~~ database of more than 13,000 scientific papers and ~~a~~few of them were in diseases and disorders of teeth4-13, ~~but~~ there is no study in Yemen that was conducted to investigate the histological and radiological changes in the complete impacted 3rd molars dental follicles. ~~and~~(Thus,) this is the first study in this important topic.This study was carried out to(study) (assess)the histological and radiological changes in dental follicles of the upper and lower complete impacted 3rd molars- which appeared radiographically normal - among Yemeni people, in Sana'a city. ~~In detail to~~(The study determined the incidence of histolopathological changes in soft tissues surrounding impacted third molar teeth (pericoronal tissues) among patients who are 20 years of age and ~~over~~(above) , and also determined~~)(study~~) the need forroutineremoval of complete impacted third molars under the prophylactic indication, the types of HC, size of dental follicle, and other~~s~~ factors that associated with HC in soft tissues in dental follicles as gender, age of the patients, site (Mandible\ Maxilla), side (Right\ Left), and angulation.

SUBJECTS AND METHODS

A prospective study was conducted to (determine)~~study~~ the incidence of histological and radiological changes in soft tissue (dental follicles) around the complete impacted 3rd molars (which appeared radiographically normal and no clinical evidence of changes). The study population included patients which(who)had been referred to theclinicof Oral Surgery, Faculty of Dentistry, Sana'a University for extraction of complete impacted 3rd molars in Sana’a City from (between) March 2018 to March 2019.

Inclusion criteria

a) Age of patients were 20 years old and over(above) (b) Complete impacted 3rdmolars (c) Dental follicle space between < 2.5mm) ~~and (2.5mm~~- ≤ 3mm) (d) No ~~any~~pathological evidence in panoramic film (e) No ~~any~~ abnormal soft tissue in mucosa which covering the tooth (impacted 3rd molars).

 Exclusion criteria

a) Partially impacted 3rd molars (b) Medically compromised patients (c) Dental follicles were ruptured and lost through an aggressive work during extraction of the impacted tooth. d) Associated pathology in panoramic film of the impacted 3rd molars. e) Previous operation or fracture in mandible at the site of 3rd molars.

Clinical works and Data collection

All patients had undergone a clinical assessment and all information was collected in a data collect(collection) sheet (case sheet), which~~that~~was designed to have a methodological recording. All the panoramic images were done in (Al- Waleed x – ray). The model of machine is Pax i 3D Green 15 x 15 (PHT – 60 CFO), company VATECH, made in South Korea. After panoramic x- ray was taken to the patients, all impacted 3rd molars were classified based on Winter's classification. On the image of impacted 3rd molars two perpendicular lines (AA and BB) were drawn, one of (the) lines passed through the center of the crown and the other line passed through the long axis of the tooth. From the point where the two lines intersected, a ruler in digital program was moved to the widest (part) of the follicular space and measurement (of) the size of dental follicle of the complete impacted 3rdmolars were obtained. Impacted 3rd molars patients who had ~~a~~follicular space (< 2.5mm) and (2.5mm - ≤ 3 mm) were included in the study.

Reliability of measurement

The observer ~~re-measured~~(repeated the measurement of) the widest space of the follicular space with the same means of measurement mentioned above. A comparison was made between the 1st, 2nd, 3rd measurements to determine the reliability ratiobetweenthe three measurements, the results showed that Cronbach 's Alpha coefficient was (0.910) which means that all readings were reliable.

Surgical procedure

Surgical site of impacted third molars region was irrigated with normal saline and prepared for the surgical procedure. Infiltration was placed in addition to (full meaning) (I.A.N. B). A scalpel with number 15 blade was used to make incision for the creation of a flap (Triangular flap). A full mucoperiosteal flap was elevated by using a periosteal elevator. Then a straight hand- piece with adequate speed and torque was used to remove bone from occlusal aspect of tooth with copious normal saline irrigation. Bone guttering was done up to cervical line, buccal and distal aspect, buccal cortical plate was removed minimally.

In horizontal impaction, crown was sectioned from the roots in vertical plane. In vertically impacted teeth, the distal aspect of the crown was sectioned and removed first. In the case of distoangular impaction, it was sectioned(to)thedistal portion of the crown or complete crown in horizontal plate and then removed. After removal of impacted teeth, a proper and adequate debridement was done. Round bur and bone file were used to smoothen any sharper bony edges.

The follicle was enucleated from the socket by using hemostat and periapical curette and then cleaned with normal saline and closure of the flap was done with 3-0 black silk interrupted sutures. Follicular tissue was cleaned with normal saline and sent for histopathology in 10% formalin.

 Histopathological procedure

The dental follicle specimens were processed and sections were obtained from the blocks embedded in paraffin. This was done using a rotarymicrotome and stained using Hematoxylin and Eosin stains and montage on slides and viewed under microscope by histopathologist.

Statistical analysis:

Data were reported using appropriate descriptive statistics (including frequency, mean, standard deviation, and P(p)-value). All statistical analyzes of the data were performed using the Statistical Package for Social Sciences (SPSS) version 24 and Excel 2007. They were recorded after data were collected and entered into SPSS for analysis. The Chi-square test was used to investigate the significant differences in the incidence of pathological changes in the tooth follicles of the affected third molars with size ranging from (<2.5 mm) to (2.5 mm - 3 mm), gender and location, side and size of the tooth follicle, and 2007 Excels was used in the other variables (age, places, causes of extraction).

ETHICAL APPROVAL

Ethical approval was obtained from the Medical Research & Ethics Committee of the Faculty of Dentistry, Sana’a University. All data, including patient identification were kept confidential.

RESULTS

 Distribution of histopathological changes in dental follicles: Of the fifty dental follicles of complete impacted 3rd molars that were evaluated, fourteen (28%) showed pathological changes and thirty-six (72%) showed no histological changes and (SD was 0.453?) and there was a significant difference (p= 0.002) (Figure 1).(Between what and what is there significant difference?)Please rephrase

 Types of histopatholgical changes in dental follicles of the complete impacted 3rd molars: According to histopathology results, nine (64 %) were ameloblastoma, four (29%) were dentigerous cyst and only one case (7%) was multi-calcified focus with islands of odontogenic epithelium, (Figure 2).

Distribution of histopatholgical changes with size of dental follicles of the complete impacted 3rd molars:In correlation between the size of the dental follicle of the complete impacted 3rd molars, median size was 2.2 mm with (S.D. was 0.462) and Mode was 3mm. Twelve (86 %) of histopatholgical changes were in dental follicles size (0.5mm- < 2.5 mm), and only two cases ( 14 % ) were in dental follicle size (2.5mm - ≤ 3mm) with significant(significant difference at (p= 0.008) (Table 1). (Present Clearly)

Distribution of histopatholgical changes in dental follicles with site (Mandible \ Maxilla) and side (Right \ Left): Of the fifty dental follicles from complete impacted 3rdmolars,thirty (60%) are dental follicle from themandibleand twenty (40%) are dental follicles from the maxilla. Nine (65%) were histopathological changes in the lower jaw -- five cases were on the right (36%) and four cases were on the left (29%), while the upper jaw was five(35%) - two cases (14%) were on the right. and three cases (21%) ~~are~~ (were)in(on)the left. There were no statistically significant(difference) for site and side (p> 0.05) (Table 2).

The distribution of histopatholgical changes and angulation (Winter's classification):

Five (36 %) of histopathological changes were ~~in~~ vertically complete impacted 3rd molars - three cases (21.4%) in mandible and two cases (14.2%) in maxilla. Four (29 %) were mesioangular – three cases (21.4%) in mandible and only one case (7.1%) in maxilla. While horizontal were two cases and buccoangular was only one case (14.2%) and (7.1%), respectively in mandible only. Destioangular were two cases (14.2%) in maxilla (Figure 3).

Distribution of histopathological changes of dental follicles with gender: A total of the fifty dental follicles of the complete impacted 3rd molars were removed, twelve (86%)of histopathological changes were in female andin male wereonly two(14%), and there was staticallysignificant (difference) (p= 0.008) (Table 3).

 Distribution of histopathological changes in dental follicles with age groups: Of the fifty dental follicles of the complete impacted 3rd molars included in the study with mean age was ( 23 years old ) , thirteen ( 93% ) of histpathological changes ~~was in~~(occurred in) age group ( 21-25 years old) , then only one case (7 %) in age group ( 26 – 30 years old ) . While in other age groups were nil(none) occurred(Figure 4).

Distribution of histopatholgical changes in the dental follicles with reasons of extractions: Eight cases (57.1 %) were extracted for orthodontic needs, followed by three cases (that)had anchorage loss (mesial collapse) (21.4%), then two cases (14.3%) had (full meaning) (T.M.J) pain, and only one case (7.1%) for prophylactic (Figure 6).

DISCUSSION

In the present study, the incidence of histopatholgical changes in dental follicles of complete impacted 3rd molars were fourteen cases (28%) and thirty-six cases (72%) were reported (with) no histopathological changes and chronic non- specific inflammatory cells. Most, 9(x%)of the of histopathological changes were~~nine~~ameloblastoma like-lesion (64%), four (28%) were dentigerous cyst ~~(28%),~~and only one(7%)case was multi-calcified focus withislandsof odontogenic epithelium ~~(7%).~~The result of our studycompared favorably that A ~~similar study~~performed by Shaat ,14 who found that important pathological lesions were diagnosed in (29%) of cases and (71%) were normal follicles, but in his study (57.7%) showed ~~a~~ Dentigerous cyst. , (5%) ameloblastoma and only (0.9%) were odontogenic keratocyst..Yildirm*et al.*15 also noted pathology changes in (23%)of their study groupand the remaining specimens (77%) werediagnosedas normal tissue. Of these pathological specimens 14.1% were dentigerous cysts, 6.6% were (CCOT)(full meaning) and 2.5% were (OKC)(full meaning). Also in the study of Haidry*et al*.16 found cystic changes in (24%) of radiologically normalILTMs(full meaning) and 76% were DF normal. ~~Moreover~~In further agreement is the work byDongel*et al.*17 who in their study of 113 follicle tissue, found 15.9% cystic changes and 84.1% no cystic changes.

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In a study by Adesperger*et al.*18, they found that (34%) of dental follicles exhibited squamous metaplasia indicating cystic changes equivalent to those found in Dentigerous cysts. However; in a study by Vignewaran andShilpa19 it was shown that (61.4%) were cysts and tumors and (38.6%) cases were normal with chronic inflammatory cells.In this study, twelve (86%) tooth follicles in size (less than 2.5 mm) had histological changes, whilein follicle that measured (2.5 mm - 3 mm) only two (14%)had HC. Similarly,in a study ~~of~~(by)Tambuwala*et al.*20they noted that the incidence of cystic changes was higher in follicle size between (1 mm - 1.5 mm) (33.3% and 66.7%, respectively), and that follicles of 2 mm were had none~~zero~~.~~Additionally~~ (Furthermore), Dongol*et al.,*17observed that cystic changes were more in follicle size of (0.5mm) (25%) and (20%) in size of (2.5mm), and Adelsperger*et al*., 18 showed that (32%) from (34%) of cystic changes were in DF size less than (2.5mm).Frame properly to express correctly)

~~With looking to (~~With regard to)site (mandible \ maxilla) and side (right\ left), the results in this study ~~to fifty~~ showed that dental follicles of the complete impacted 3rd molars were thirty dental follicles from mandible (60%) and twenty from maxilla (40%).Among this study, thirty-one cases (62%) in right-side, and nineteen (38%) in left-side. Nine (65%) of histopathological changes were in mandible, – ~~Five~~5(36%)cases in right-side ~~(36%),~~and four cases in left-side (29%), while in maxilla five cases (35%) – Two cases (14%) in right-side and three cases (21%) in left-side. Similar in a study done by Seyedmajidi*et al.,*21 found that cystic changes were observed in (55%) follicles of madndibular 3rd molar, while (28%) from maxilla and the incidence of pathological changes in mandible was 1.957 times more than maxilla. The findings of this study and previous studies showed that the most histopathological changes were in mandible. This may be due to the fact that lowerthirdmolar is the last tooth~~was~~ erupted in oral cavity, alsomay be due tothe type of lower jaw bone iswhichiscompact bone that makesa physical barrier in the eruption pathway. In addition, the density ~~bone~~ of mandiblebone is more thanthat ofmaxilla bone.

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 With consideration to angulation according to Winter's classification, nineteen cases were (38%) mesioangula, then fourteen cases (28%) vertical, nine (18%) were destioangular, seven (14%) were horizontal, and only one case (2%) was buccoangular. Most of changes in this study were in vertical and mesioangular angulation, five cases (36%) and four cases (29%), respectively,followed by destioangular and horizontal two cases in each one (14.2%) and only one case (7.1%) was buccoangular. Similar study ~~was~~ done by Șimșek – Kaya *et al.,*22showed (that) vertical and mesioangular inclined molars a (have)greater tendency towards pathological changes. Whilea study ~~was done~~byMehrotra andDavid,23 found mesioangular impacted molars were associated with higher incidence of cystic changes. ~~Also, in~~Tambuwala*et al*., 20~~study they~~reported that (20%) ~~was~~mesioangular and (16.7%) vertical impacted 3rd molars were diagnosed as cystic follicle, while other angulation were diagnosed as infected dental follicles.

 The finding in this study (which) showed most of histopatholgical changes in vertical and mesioangular~~that~~may be related to failure of impacted third molars ~~of~~(to) rotation(rotate) from mesioangular to vertical position in their cycle due to external or internal factors. In addition, vertical and mesioangular positions are most common but causes are still unknown.

 With regard to the gender and distribution of histopathological changes, fifty follicular tissues were obtained, and among ~~this study~~ (them)thirty-eight were females (76%) and twelve (24%) were males ~~(24%).~~Yildirm*et al.,*15 reported pathological changes were seen mostly in female (74%) compared to male ~~and (26%) was male~~. Also in a study of Șimșek-Kaya et al.*,*22noted cystic changes were seen in four females (80%) and only one male patient (20%) Our result is in agreement with previous studies, Yildirim et al., and Simsek- Kaya et al., 22, who notated that pathological changes were more in female than the male

On the other hand,Kotrashetti*et al.,*24 found that the pathological changes in follicles were more in males as compared to females, (90%) males and (47.6%) females. The findings in(of)this study, females were more than males duewas attributed to the size of female jaw~~is~~beingsmaller than male’s~~and that makes no~~ (which does not give enough space for eruption of the 3rd molars which leads to ~~impacted~~(impaction)of the tooth or retained in -jaw for a long time, orit may be attributed to gender differences in hormones influencing the growth of the epithelial lining.

 In the current study, of the total fifty dental follicles of the complete impacted 3rd molars, thirty nine (76%) were within in age group (21-25yrs), then age group (26-30yr) and (31-35yr) were four (8%) to each one, two cases (4%) in age group (36-40yr), and only one (2%) in age group (41-45y) (frame properly). Among them, thirteen (93%) of histopathological changes were in age group (21-25 y). This result is similar to study by Vignesaaran andShilpa19~~(study~~) where theyfound that peak incidence of pathologies occurred between the age group (20-30yr) and lowest incidence of pathology (10%) occurred in the oldest age group.

 With regard to the reasons of extraction, we found twenty-one (42%) were due to~~for~~ orthodontic treatment, twelve (24%) due to pain in T.M.J., nine (18%) due to anchorage loss (mesial collapse), and eight (16%) for prophylacticreasons. Among this study histopathological changes were found in eight orthodontic patients (57.1%), then three cases (21.4%) and two cases (14.3%) in patients whohad anchorage loss (mesial collapse) and T.M.J pain, respectively, and only one case (7.1%) for prophylactic(prophylaxis).Shaat ,14~~found~~(reported) that the reasons for removal were orthodontic treatment, pain and destruction of adjacent tooth, whileNaves *et al.,*25, and Palma et al.*,*26~~in their study~~ identified the most common reasons ~~for~~to be for orthodontic treatment. Meanwhile,Dongel*et al .,*17 in their study, reported that the most common cause of extraction of the impacted mandibular third molars was recurrent pericoronitis (84.1%), followed by carious second molar (6.2%) and prophylactic (prophylaxis (3.5%). Whereas Kotrashetti*et al.,*24 for prophylactic and orthodontic needs (before treatment, after treatment and during the course of orthodontic treatment). (express clearly)

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CONCLUSION

In conclusion, a high incidence of HC occurred in patients with DF, and it was associated with smaller dental follicle size, most HC was ameloblastoma, followed by dentigerous cyst, while 72% of samples had normal follicles and non-specific chronic inflammatory cells. There is a correlation between female gender, younger age group, and jaw position with HC. Prophylactic extraction of the asymptomatic impacted third molar should be routinely practiced in Yemen, to reduce the risk of pathological changes, especially in females and younger age groups.

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AUTHOR CONTRIBUTION

 This study was carried out by Shafiqa Mohammed HaidraMasdoose for Oral and Maxillofacial SurgeryMSc degreeunder the supervision of AssistantProfessor Dr.AkramThabetNasher, Oral and MAxillofacial Surgery department , Faculty of Dentistry, Sana'a University. Other authors analyzed the data and wrote the manuscript, and reviewed it.

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CONFLICT OF INTEREST

"No conflict of interest associated with this work”.

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Figure ( 1) : The distribution of histopatholgical changes in dental follicles of the complete impacted 3rd molars.

Figure ( 2 ) : Types of histopathological changes in dental follicles of the complete impacted 3rd molars

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| Table (1) : The distribution of histopathological changes in dental follicles with size  |
| Size  | < 2.5mm | 2.5mm - ≤ 3 mm  | P – value |
| No. | % | No. | % |
| Pathological changes  | 12 | 86 % | 2 | 14 % | 0.008 |
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| --- |
| Table (2) : The distribution of histopathological changes in site (Mandible \ Maxilla) and side (Right \ Left )  |
| P- value | Total  | Maxilla  | Mandible | Pathological changes  |
| % | No. | % | No. | % | No. |  |
| 0.3 | 100% | 14 | 35 % | 5 | 65% | 9 |
| 1 | 50% | 7 | 14% | 2 | 36% | 5 | Right |
| 50% | 7 | 21% | 3 | 29% | 4 | Left  |

Figure (3 ) : The distribution of histopatholgical changes and angulation of impacted 3rd molars ( Winter's classification ) in both jaws

|  |
| --- |
| Table ( 3 ) : The distribution of histopathological changes in dental follicles of the complete impacted 3rdmolars with gender : |
| Gender | Histopathological changes  |
| Number | % | P- value  |
| Females | 12 | 86 % | 0.008 |
| Males | 2 | 12 % |
| Total  | 14 | 100 % |

Figure ( 4 ) : The distribution of histopatholgical changes in dental follicles with age groups

Figure (6 ) : Distribution of histopathogical changes in dental follicles with reasons of extractions