Radiographical Estimation of the Impacted Third Molar in Relation to the Crowding in the Lower Arch

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Abstract
Aims: To evaluate the relationships between the possibility of crowding of the anterior lower incisors and the impacted third molar according to the bone density among peoples in Baghdad City/Iraq.

Materials and Methods: One hundred person of both genders aged (18-25 years old) were included in this study. Radiographical examinations were involved the measurement of angulation of lower right third molar using OPG. Determination of lower anterior teeth crowding was carried out by index of Little's Irregularity. Bone density was determined using 3D cone-beam computed tomography.

Results: Mesio-angulation, highest significant number of cases was occurred with perfect alignment. Horizontal third molar angulation showed highest number of cases with severe irregularities. High bone density was showed in significant cases with perfect alignment.

Conclusions: It is clear that angulated lower third molar not exert significant effect on crowding of lower anterior teeth in cases with high bone density in the canine region of the jaw.

Key words: impacted, molar, crowding, bone, dentist.

How to cite this article: Al-Hussainy RH, Al-Jaanabi SZ, Al-Rawi BAO (2021): Radiographical estimation of the impacted third molar in relation to the crowding in the lower arch, Ann Trop Med & Public Health; 24(S2): SP24248. DOI: http://doi.org/10.36295/ASRO.2021.24248

Introduction
It is a pathological condition that the third molar can’t or will not erupt normally in functional position. According to some research, the impacted third molar causes many problems such as; weakens the angle of mandible, temporo-mandibular joint disorders and differenetro-facial pain [1]. Many recent researches showed that the prevalence of third molar impaction is higher than other teeth [2-4] and the reason may be because it is the last teeth erupting into the dental arch and there is no sufficient space for it [5]. As well as, more than other teeth, the third molar varies in terms of shape, size, and time of eruption [6].

In dentistry especially for orthodontics, the third molars may be the causative factor of malocclusion or the relapse of the orthodontic treatment. According to the hypothesis that while the third molar is in erupting phase a force could transmit to the anterior teeth areas resulting in tooth malocclusion or ectopic eruption[7, 8]. Meanwhile, several studies did not agree with this hypothesis such as Sidlauskas and Trakiniene [9] stated that crowding was determined according to the discrepancy between the teeth’s
mesiodistal width and the dental arch’s length. As well as, Karasawa et al. [10] mentioned that there was no significant association between the third molars angulations and anterior mandibular teeth crowding. So, in this study the aim was directed to evaluate the relationships between the possibility of crowding of the anterior lower incisors and the impacted third molar according to the bone density among peoples in Baghdad City/ Iraq.

Materials and Methods
The approval of the Institutional Ethics Committee, Ibn Sina University of Medical and Pharmaceutical Sciences, Iraq was gained. One hundred person of both genders aged (18-25 years old) were included in this study in Baghdad City, Iraq. A consent form was signed by each person involved in this study. Exclusion criteria include presence of the followings: extracted teeth or abnormalities, any asymmetries or disorders of the mandible or skeleton, large restorations, artificial teeth, individuals’ with previous orthodontic treatment or maxillofacial surgery and individuals who refused involved in the study.

Radiographical examinations were involved the measurement of angulation of lower right third molar using OPG according to the modification of winter's classification (Figure 1).[11].

Figure (1) Winter’s classification

Lower anterior teeth crowding was determined according to Little's Irregularity Index [12]. The measurement was carried out by using digital Calipers to measure the distances on a mandibular arch plaster model taken of each patient. The scale is as following: (0), (1-3), (4-6), (7-9), (10), represent; perfect alignment; minimal irregularity; moderate irregularity, severe irregularity, very severe irregularity; respectively.

Bone density was determined using 3D cone-beam computed tomography and its software (Carestream Health Inc.)[13]. The measurement was just distally to the lower right canine in the point at the junction of the middle and apical half of the canine root (Figure 2).
Bone density of the anterior region was classified into three groups according to Norton and Gamble bone density scale: High (>700HU), moderate (300-700HU) and low (<300HU) [14].

The relationships of the direction of third molar angulation to the degree of anterior teeth crowding and the amount of bone density were determined.

Data were analyzed using SPSS software, version 16·0 (USA) and using frequencies for categorical variables, as well as, Chi-Square test was used to determine the significances between variables at p≤0.05.

Results

One hundred patients (55 male, 45 female) with mean aged was 18-25yrs were involved in this study.

Table (1) demonstrated the number of cases of lower right third molar angulations according to different degree of lower anterior teeth irregularities. Concerning mesio-angulation, highest significant number of cases was occurred with perfect alignment (20) of anterior teeth followed by severe (17) and moderate (10) angulations, meanwhile, no recording of minimal and very severe irregularities. Concerning disto-angulation third molar, only two cases with minimal and two with moderate and only one case with perfect alignment and no case recorded severe and very severe irregularities. Horizontal third molar angulation showed highest number of cases with severe irregularities (15), followed by moderate (11), perfect (10), (2) and very severe (1) irregularities and significantly only within severe, moderate and perfect irregularities. Vertical third molar angulation showed only seven cases with perfect alignment and 2 cases with moderate irregularities.

Table (2) demonstrated the frequencies of level of bone density according to different degree of lower anterior teeth irregularities. Concerning high bone density (> 700HU) was showed in significant (29) cases with perfect alignment, significant (17) cases with moderate irregularity and non-significant effect in (4) cases minimal irregularity and (2) cases with severe irregularities. Moderate bone density (300-700HU) was showed in non-significant (9) cases with perfect alignment, (8) cases with severe irregularity, (7) cases moderate irregularity and no cases with minimal and very severe irregularities. Low bone density (<300HU) was showed in significant (22) cases with severe irregularities, non-significant one case with moderate and one case with very severe irregularity, meanwhile no case recoded with perfect and minimal level.
Table (1) Number of cases distributed according to 3rd molar angulations and degree of anterior teeth irregularities.

<table>
<thead>
<tr>
<th>3rd molar angulation (no.)</th>
<th>Lower anterior teeth crowding (no.)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Perfect alignment</td>
<td></td>
</tr>
<tr>
<td>Mesio-angular</td>
<td>20*</td>
<td>47*</td>
</tr>
<tr>
<td>Disto-angular</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Horizontal</td>
<td>10*</td>
<td>39*</td>
</tr>
<tr>
<td>Vertical</td>
<td>7</td>
<td>9</td>
</tr>
</tbody>
</table>

* Significance at p≤0.05.

Table (2) Number of cases distributed according to bone density and degree of teeth irregularities.

<table>
<thead>
<tr>
<th>Bone density</th>
<th>Lower anterior teeth crowding</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Perfect alignment</td>
<td>Minimal irregularity</td>
</tr>
<tr>
<td>High</td>
<td>29*</td>
<td>4</td>
</tr>
<tr>
<td>Moderate</td>
<td>9</td>
<td>0</td>
</tr>
<tr>
<td>Low</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

* Significance at p≤0.05.

Discussion

The prevalence of mal-alignment and impaction of lower third molars considered to be high among different worldwide populations and with the average rate of 24% [15] and them the most frequently impacted teeth because of their particular topography, phylogeny and ontogeny. From direct or indirect ways, they are associated with certain disorders to the other teeth, jaw and facial regions [16].

In this study most cases represented mesial angulation of lower third molar (47/100), meanwhile horizontal angulation represented (39/100) followed by vertical (9/100) and distal angulation (5/100).

That’s aged with Bishara and Andreasen [17] who reported that mesioangular showed (43%), vertical angulation showed (38%), horizontal (3%), distoangular (6%). As well as, Ryalat et al revealed that in
patients older than 20yrs., the prevalence of vertical impaction was significantly higher followed by horizontal impactions. [18]

In the literature, it’s not clear yet that the third molars impaction and angulations may cause dental crowding. Researchers have always been divided between accept or refuse the idea about the effect of third molar eruption may cause anterior teeth crowding. In this study, even in cases with mesial angulation, the majority of anterior teeth showed perfect alignment, meanwhile, concerning horizontal angulation, the majority of cases showed very severe anterior teeth crowding.

First authors group revealed that the abnormal angulated third molar eruption could produce a force pressure toward the anterior teeth [19-21]. Meanwhile, others mentioned that there is no force generated by third molar eruption, and if it generated, its effect not reach and result in anterior teeth mal-occlusion [22-26].

Concerning bone density, this study revealed that the majority of cases showed significant high bone density at the lower canine area and may be this canceled the force transmitted from angulated third molars to exert an effect on the anterior teeth alignment. That’s agreed with other concluded that alveolar bone density has been postulated to have a paramount effect on tooth movement and any increase in alveolar bone density offers more resistance to tooth movement [27]. As well as, Hao et al. concluded that a bone density scale could give the clinicians ideas about the relation of teeth crowding to the very poorest qualities of bone [28].

The limitation of this study extends to the lack of assessment gender differences, maxillofacial factors, habitual factors and others. So need further studies are required to clarify many aspects of the problem.

Conclusions

It is clear that angulated lower third molar not exert significant effect on crowding of lower anterior teeth in cases with high bone density in the canine region of the jaw.

References


Annals of Tropical Medicine & Public Health http://doi.org/10.36295/ASRO.2021.24248