

THIRD MOLARS IN ORTHODONTICS

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ABSTRACT:

The role of the third molars in the oral cavity have been extensively studied throughout the years. Various literatures discuss various aspects of the third molar teeth. But the subject that hasn't been explored much is the influence of third molars on orthodontic treatment. The aim of this review is to throw light on the role of third molars in orthodontic treatment and their influence on late mandibular crowding.

KEYWORDS: *Third molars, late mandibular crowding, orthodontic treatment*

1. INTRODUCTION:

The development of third molars and their influence on the remaining dentition has been a major concern to dentists for quite a while. Third molar shows a great variation in the time of its formation and calcification, its crown and root morphology, its course of eruption and position, presence or absence in the oral cavity ^[1,2]. Third molars begin showing up on the radiographs as early as the age of 5 years and as late as the age of 16 years, generally erupting in the oral cavity between the ages of 18 and 24^[3] and they present with the most highest chances of impaction^[4,5].

Despite not being directly associated with the orthodontic treatment in most of cases, the fact that third molars may affect or get affected by the orthodontic treatment makes it an important factor that has to be considered during treatment planning.

The principle issues, concerning the third molars that are identified with orthodontic treatment are: the chance of their eruption or impaction according to hereditary elements involved, the various repercussion of orthodontic treatment extractions in their position and their impact in orthodontic post-treatment mandibular incisor crowding. These are the various factors that will be discussed in this review.

2. ERUPTION/ IMPACTION OF THIRD MOLARS- FACTORS INVOLVED:

The chances of eruption of third molars is of significant importance in treatment planning and in the upkeep of the dentition and, hence is important to dental specialists and orthodontists ^[6].

The presence or absence of third molars from the oral cavity has been identified with hereditarily involved skeletal as well as dental elements. In 1936, Bowdler et al ^[7] recommended that the individual development pattern is a significant factor for the eruption of the third molar. Broadbent^[8] accepted that the failure of the mandible to accomplish its full development potential might be adding to the impaction of third molar,

though, as per Begg^[9], the impaction of third molars is associated to deficient progress ahead of the teeth of present day man because of the absence of interproximal wearing down that was seen in ancient skulls.

Björk et al^[10], in an early investigation, said that in 90% of third molar impaction cases the retromolar area space was restricted. A couple of years after the fact, in a longitudinal cephalometric study^[11] of 243 cases with the utilization of implants, he distinguished two skeletal and two dental factors that were connected with the impaction of mandibular third molars. These components were: a vertical direction of condylar development, a diminished mandibular length, a backward-directed eruption of the mandibular dentition and a altered development of the third molars. In the same study, it is also stated that, depending on the case, these three factors “may either amplify or neutralize each other”.

Ricketts et al^[12], utilized longitudinal records trying to foresee the amount of mandibular development and to measure the space for forward and upward improvement of the molars. He deduced that, for the third molar to have a half possibility of eruption, half of the crown must lie ahead of the external ridge. In a past study^[13], he also claimed that the direction of tooth eruption also played an important role in impaction.

Kaplan^[14] additionally concluded that cases with affected third molars show a bigger angle of mandibular development in contrast to cases with erupted third molars. The distance from Xi cephalometric point the distal surface of the second lasting molar, was utilized by Schulhof^[15], in an attempt to forecast of third molar impaction. At the point when this length reduced under 25 mm impaction turned out to be almost certain and, alternately, less likely as the length expanded towards 30 mm. Nonetheless, this strategy presupposes impaction being exclusively identified with accessible space.

Richardson^[16], in a longitudinal study of a group of 95 subjects saw that skeletal Class II cases, with a shorter length, narrower in width and more acute angled mandible, were more inclined in third molar impaction. There was likewise a diminished measure of mandibular development in cases with affected third molars, which additionally had an inclination, in spite of the fact that non-noteworthy, to be moderately bigger in size. The developmental mesial angulation of third molars according to the mandibular plane was likewise increased in subjects with affected third molars. Ades et al^[17], in considered the information from cephalometric radiographs and study models from 97 patients, discovered no noteworthy contrasts in mandibular development between the individuals who had affected or completely erupted mandibular third molars.

Capelli^[18], using a sample of 60 patients who had gotten orthodontic treatment, including the extraction of four premolars, expressed that, as per his outcomes, the impaction of third molars is related with a vertical part of mandibular development, high mesial tendency of the lower third molar crown in the ascending ramus and decreased mandibular length. Hattab^[19], in a radiographic investigation of 36 students with a average age of 19.7 years, found that a significant extent of mesially affected mandibular third molars changed their angulation and turned out to be completely erupted when the people arrived at 24 years old. Hence, he presumed that the positional changes and the impacted mandibular third molars are two unusual marvels.

Erdem et al^[20] analyzed the information from lateral cephalograms, orthopantomograms, periapical radiographs and study models of 27 patients and arrived at the conclusion that impaction of lower third molar is unpredictable. They likewise expressed that eruption of for mandibular third molars are more likely in patients with vertical growth pattern and a vertical direction of condylar development, with anterior rotation of the mandible. Furthermore, a more prominent mesial inclination of the affected lower molars was likewise referenced as a potentially contributing component in their event of impaction.

Artun et al^[21], trying to identify the risk factors for maxillary third molar impaction, analyzed the radiographs of 132 adolescent patients. As indicated their examinations, the most favourable factors to predict impaction were a mesial angulation and a distal angulation of in excess of 30 degrees of the maxillary third molars

comparative with the occlusal plane, a reduced retromolar space and a small mandibular plane/Sella-Nasion plane (MP/SN) point. In a study published in the same year, Artun et al^[22] retrospectively studied the lateral cephalograms, as well as periapical radiographs and study models of 389 patients who had gotten orthodontic treatment with or without extractions. They inferred that mandibular third molars angulated in excess of 40 degrees mesially comparative with the occlusal plane toward the finish of treatment may likewise be at increased danger of impaction.

Behbehani et al^[23], in a review radiographic investigation of 134 patients, reasoned that increased mesial angulation of the third-molar buds and indications of pronounced forward mandibular rotation increased the danger of impaction. Eruption space and mandibular growth rotation were likewise shown as the most predictive factors of impaction. Breik et al^[24], in the opposite, reported that subjects with horizontal growth pattern showed multiple times lower rate of third-molar impaction than subjects with vertical growth pattern. Legović et al^[25], then again, in the same year, had not discovered any critical contrasts between the situation of lower third molars and kind of growth pattern.

At last, Hassan^[26], in a retrospective cephalometric investigation of 121 Saudi patients, presumed that third molar impaction is bound to happen when the retromolar space is deficient. The latter depended on various skeletal and dental factors, including an increased width of the mandibular ramus and a backward rotation of the posterior teeth.

3. IMPACT OF PERMANENT TEETH EXTRACTIONS ON THIRD MOLARS

Orthodontic treatment, particularly during the time of active growth, may impact the improvement of the dentition. Third molars as well, are influenced by orthodontic treatment in different manners. One of them is the orthodontic extraction treatment, the impact of which on third molars has been comprehensively explored. The teeth that are normally taken out for orthodontic reasons are the premolars, the first and the second permanent molars, either unilaterally or bilaterally upon the individual treatment requisites. With regards to extraction treatment, Kaplan^[14] was one of the primary authors to propose that premolar extractions increased the likelihood of third molar eruption. As indicated by him when eruption doesn't happen in extraction cases, a resorption on the anterior border of ramus is most likely, which is related with vertical growth pattern.

Williams et al^[27], in a study looking at the impact of various extraction sites on orthodontic incisor retraction in 260 instances of patients of a similar age at (mean age 13 years), treated with the Begg method, likewise explored effects of extractions on third molar eruption. As per their outcomes, the change in rate of third molar eruption following premolar extractions was indifferent and interestingly with first molar extractions or a mix of first premolar and first molar extractions, effect was sure

Rindler^[28], in his investigation, analyzed the information from the casts and lateral cephalograms radiographs of 78 patients in the range of 10 and 15 years old, with a Class II malocclusion. The patients were treated with various procedures and had both of their second mandibular molars extracted simultaneously with the initiation of root development of the third molars. In 21 cases no extra orthodontic treatment was included and, in the remainder of the cases, lower first molars were moved distally with the utilization of activators (9 cases) and fixed appliances (48 cases). As they detailed in the synopsis of their investigation, the third molars effectively replaced the second molars much of the time (77%).

Haavikko et al^[29] after the investigation of 110 longitudinal orthopantomograms of patients with a mean age of 13.5 years at the beginning of treatment, 50 of which had two lower premolar extractions, reasoned that the chance of lower third molar eruption increased. Gaumond^[30] utilized 11 patients, with various kinds of malocclusion, who were treated with germectomy of their subsequent molar buds, when the germ of a separate third molar was obvious on a radiograph. As he revealed, 19 of the 22 third molars that were followed-up accomplished satisfactory last angulations. In light of the results of this investigation, the

author's result was that each case with mild or moderate mandibular crowding can be treated by this method instead of four premolar extractions.

Cavanaugh^[31], in a clinical and radiographic assessment of third molars after second molar extractions in 25 patients, proposed that third molars for the most part effectively erupt into the space given by the eliminated second molars. Richardson^[32] led a review investigation of the records (casts and sixty-degree cephalometric radiographs) of 48 subjects that had one-sided or reciprocal mandibular first premolars extractions and of a control group with no mandibular extractions. She reasoned that there was an essentially increased space for third molar eruption in the group of the extraction cases.

Kim et al^[32], in a review investigation of the demonstrative records of 157 patients, 105 of which had four premolar extraction-treatment during their dynamic developing phase of improvement, recommended that there was a clinically huge decrease in the impaction rate of both maxillary and mandibular third molars in these patients in contrast with the non-extraction group.

Salehi et al^[33], surveyed the impact of first premolar extractions on third molar eruption assessed the clinical records of three groups of subjects: a group with first premolar extractions, a group without any extractions that had gotten orthodontic treatment and a control group with neither extractions nor orthodontic treatment. As per their outcomes, there was a noteworthy distinction in the third molar eruption rates in the extraction (42%), non-extraction (12%) and control (20%) groups. These discoveries show that first premolar extractions may build the chance of third molar eruption.

Al Kuwari et al^[34] led a cross-sectional radiographic investigation, utilizing 40 arrangements of patient records from a college facility. Half of these patients were orthodontically treated with first premolar extractions. As indicated by their outcomes, orthodontic treatment premolars extraction treatment appears to have improved the angulation of affected third molars much of the time.

4. THIRD MOLARS AND MANDIBULAR INCISOR CROWDING

The impact of third molar position and eruption stage on the remaining of the dentition has additionally been the subject of numerous examinations and is likewise of extraordinary worry to the orthodontists. Particularly the function of third molars in the improvement of an auxiliary mandibular incisor crowding has been an object of discussion for a long time.

As early as 1917 Dewey^[35], inspecting the part of third molars in malocclusion, recommended that, at ages, the mandibular third molars need to make space in the dental arch so as to erupt, causing crowding of the anterior teeth. From that point forward, various examinations have been led trying to dispassionately recognize a potential connection between third molars and mandibular incisor crowding. Vego^[36] likewise found a more prominent level of dental crowding in subjects with erupting third molars in contrast with subjects with innately missing third molars.

Lindqvist et al^[37], in their examination, analyzed a group of 52 patients with bilateral third molar impactions. It was a "split mouth" study, with extraction of the affected molars on one side and utilization of the contralateral quadrant as a control side. Their information demonstrated the presence of less crowding on the extraction side, in 70% of the patients.

Southard et al^[38] endeavored to identify the presence of a mesial force applied by the unerupted third molars on the remaining of the dentition, by estimating and looking at proximal contact when reciprocal third molar extractions in 20 patients. The creators presumed that the extraction of third molars for the relief of "interdental pressure" for the anticipation of mandibular incisor crowding couldn't be confirmed from the study.

van der Schoot et al^[39] directed an examination with the intended to decide the connection between dental crowding and the presence of third molars. Their example included 99 orthodontically treated patients. As

indicated by their outcomes the presence of third molars didn't have a clinically critical relationship with the development of post-treatment crowding.

Sidlauskas et al^[40] examined in their investigation the impact of lower third molars in lower incisor crowding, by contemplating the records (study models and all radiographs) of 91 patients, who had not gotten orthodontic treatment before the assortment of the records. The examination bunch included patients with present, taken out or hereditarily missing third molars. They inferred that the third molars in their investigation bunch were not answerable for any significant contrast in the advancement of lower foremost dental arch crowding.

Costa et al^[41] examined whether the prophylactic evacuation of third molars is advocated as a treatment alternative. Subsequent to examinations with the utilization of explicit measures, just 4 papers of medium (3) and low (1) quality and insufficient example estimates in the end contributed in the investigation. As expressed by the analysts, the as of now accessible information is deficient which could be utilized in clinical treatment choices. Nonetheless, their outcomes point towards the conclusion that prophylactic third molar extraction is baseless.

5. DISCUSSION:

With respect to the chance of third molar eruption, it appears to be that most specialists concur on the way that there is a relationship between third molar impaction and certain skeletal characteristics^[7-9,10,12-16,18,20-24,26], in spite of the fact that not every person has the same opinion^[17,19,25]. The basic related factor is the deficiency of the eruption space, because of distally coordinated eruption of the dentition and additionally absence of sufficient resorption of the foremost fringe of the mandibular ramus or compensatory periosteal bone juxtaposition at the back layout of the maxillary tuberosity. Another factor that is connected with third molar impaction is the presence of a vertical facial development pattern, with a vertical condylar development. Also expanded third molar angulation is viewed as connected to third molar impactions.

Numerous creators additionally accept that orthodontic extraction cases with ideal initial third molar angulations could profit by extraction therapy^[14,16,21].

Further, concerning the function of third molars in mandibular incisor crowding, it is exceptionally fascinating to take note of the differences between the authors convictions and results before the after the 1990's. In the sequentially more seasoned studies^[35-42] third molars appear to be all the more altogether connected with the event of crowding in the lower arch. Interestingly, later studies^[37,38,41,42] will in general absolve third molars and portray their prophylactic extraction as unnecessary.

The reality despite everything is that, as of now, there is no stable examination proof supporting the prophylactic extraction of unaffected third molars. In any case, in situations where extraction is demonstrated, it is ideal third molars to be eliminated before adulthood so as to diminish the danger of incisor crowding.

6. CONCLUSION:

In spite of the third molars being subjected to lot of research, investigations and clinical interest, there is still lack of high quality clinical evidence to arrive at a definite conclusion. The information obtained from the studies mentioned in this review contributes to knowledge regarding the issues discussed.

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