

Arrested Eruption of First Permanent Molar – Frequency, Clinical Problems and Analysis

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Abstract: Arrested eruption have these first permanent molar that are not in reached functional position within the oral cavity and come into occlusal contact. The aim of the clinical analysis is to find out the frequency of arrested eruption of first molar, the etiology of this disorder among our clinical cases. From these 212 patients we find out 7 cases (3.30%). All of the cases were observed at patient in age between 7-8 years. Six of the patients were female and one was male (ratio 6:1). The first visit of the patients was with complaints of smoothed aesthetic in frontal area.

Keywords: Arrested eruption, tooth agenesis, first permanent molar, dentition, tooth ankylosis

1. Introduction

Tooth eruption is an innate process in which the forming tooth migrates from its intra-osseous position in the jaw to its functional position within the oral cavity and come into occlusal contact with its antagonist [1]. The first permanent molar normally erupts into the oral cavity at the age of 6 to 7 years. At this time the maturity of the root of first permanent molar is approximately two-thirds completed. The first permanent molars erupt into an area where previously there have no deciduous tooth and it is a physiological stimulus for sagittal growth of the jaw. In some patients, this process has been impaired. Our study covers precisely these clinical disorders observed in our practice.

2. Literature Survey

The eruption activity of the first permanent molar continued during jaw growth [2]. A diversity of eruption disorders arise during the transitional dentition period. Such disorder is the arrested eruption [1]. Arrested eruption is disturbance in which the tooth does not follow its usual course. There are two type of arrested eruption described in literature - reversible ("jump" type) and irreversible ("hold" type). The reversible type is present when the permanent molar spontaneously corrects itself and erupts to occlusion. In the irreversible type, the permanent molar remains in the locked position until treatment is provided or premature exfoliation of the primary second molar occurs spontaneously [3, 4]. When arrested eruption is diagnosed, it is recommended to observe the case from 3 to 6 months. This time is necessary to determine which type of arrested eruption is present - reversible or irreversible. Arrested eruption can classify as primary and secondary. If arrested eruption of the first molar occurs before the tooth penetrates the oral mucosa, the condition is referred to as primary retention. If the continued eruption of a molar arrested before the growth of the jaws is completed, the arrested eruption is referred to as secondary retention [2, 4-6].

The etiology of arrested eruption is multifactorial. Various hypotheses on the etiology of arrested eruption are known, and in most cases it is due to small maxillary size with large primary and permanent molars and with a medial inclination of the permanent first molar germ, combined with formation of too small a dental arch. Another etiological factor can be delayed calcification on permanent first molar or the lengths of the maxilla were significantly smaller than the known standards. Other factors may be the hereditary component of arrested eruption or iatrogenic causes like incorrect restoration of the primary second molar. The arrested eruption of the permanent first molars is associated with other anomalies, such as infra-occlusion of primary molars and cleft palate [7, 8] and other authors state that patients with arrested eruption of the permanent maxillary first molar have a higher risk of arrested eruption of the permanent maxillary canine with root resorption of the permanent maxillary incisors [9]. The children with disturbed eruption presented at least one additional orthodontic malocclusion [10].

The etiological factors can be divided in groups as follows: arrested eruption caused by local factors, by systemic factors or genetic factors [11, 12].

In the group of local factors included cysts, supernumerary teeth, odontogenic or non-odontogenic tumors, cleft anomalies and fibromatous or hyperplastic alterations, scar tissue resulting from trauma or surgery. They may obstruct the eruption of the underlying tooth. Disturbed eruption may be caused by lack of space within the dental arch [1, 2, 11, 13].

There are correlations between dentition and other physical features. These associations are presented in the "dento-somatic correlation". The factors that have influence on growth and development of bones and skeletal system are really important [11, 14].

3. Aim

The aim of the clinical analysis is to find out the frequency of arrested eruption of first permanent molar, the etiology of this disorder among our clinical cases and to present the our treatment protocol and clinical results.

4. Materials and methods

In our research we observe 212 patients (84- male and 128-female) in average age 7.87 years (from 5.5-years-old children to 9-years-old children) that were examined and treated in our practice in period of time – 2 years. The research includes analysis of patients' documentation and clinical observation of treatment course. We made a clinical examination of the patients, investigate their Panoramic X-rays (and CBCT- in the cases where it was necessary), made oral longitudinal photo documentation and periodic observations.

For case with arrested eruption of first permanent molar we accept these cases in which the first permanent molar has not reached functional position within the oral cavity and come into occlusal contact with its antagonist after the deadlines to eruption (fig. 1).



Figure 1: Normal eruption of first permanent molar and arrested eruption

5. Results

From these 212 patients we find out 7 cases (3.30%) with arrested eruption of first permanent molar. All of the cases with arrested eruption of first permanent molar were observed at patient in age between 7-8 years (4 patients were 8 –years-old and 3 were 7-years-old). Six of the patients were female and one was male (ratio 6:1 or 85.72% females against 14.28% male). The first visit of the patients was with complaints of smoothed aesthetic in frontal area at the time of eruption of permanent maxillary and mandibular incisors.

We observed arrested eruption on first permanent molar only in the maxilla in 5 cases and we have two cases with arrested eruption in both maxilla and mandible. In two of our cases the arrested eruption was bilateral in the maxilla, in four cases there were unilateral in the maxilla and one case was with arrested eruption in all quadrants. From patients with unilateral arrested eruption in maxilla three were with arrested eruption of right first permanent molar and one was with problems with eruption on left maxillary first permanent molar. We didn't find the case with arrested eruption of permanent first molars only in mandible. Two patients have problems in both jaws and one of them has arrested first permanent molar in right side both in maxilla and mandible.

According to our results arrested eruption is observed more often in female than male, maxilla more often affected than mandible also the right arrested first permanent molars in both jaws is more often diagnosed then arrested first permanent molars on left side.

In three of cases with unilateral form of arrested eruption we find out a vertical resorption of distal surface of crown and root of the tooth. In the fourth unilateral case there is first permanent molar with bigger size and with medial -vestibular rotation (it was observed on CBCT).

There were tooth agenesis of two maxillary second premolars in cases with bilateral form of retention. The unilateral hypodontia on maxillary second premolar was combined with retention of first molar at the same side.

In two cases of bilateral ectopy of maxillary first molar, we clinically observed the extrusion of antagonist. The antagonists almost make a contact with oral mucosa that covered the place where the first permanent molar is arrested into the bone. The oral mucosa in this place is hyperkeratosis and is an additional barrier in first permanent molar path of eruption.

6. Discussion

According to statistical data in literary sources studied by us, the arrested eruption of the first permanent molars has values ranging from less than 1% to nearly 5% depending from investigated population. We found a frequency of 3.30%, which is in the range of frequencies determined by other authors.

It has been reported frequency of 0.75% and Chintakanon et al. observes that the arrested eruption and root resorption of the deciduous second molar were more common in maxilla than in the mandible [2].

Mendoza has found that prevalence of arrested eruption in population is 6.7% (among 34 patients of the 505 studied). There is very similar proportion as regards to gender: 52.9% males and 47.1% females [4]. This is significantly different from the gender ratio that we find 6:1 or 85.72% females against 14.28% male. They establish unilateral form of arrested eruption 67.6% and bilateral form 32.4%. In our survey we found the same result - unilateral form of arrested eruption 66.7% and bilateral form 33.3%.

Some authors observe that the permanent first molar is more often arrested in maxilla (88%) than in mandible (12%)[10]. We observed arrested eruption in the maxilla in 57.14%, arrested eruption in both maxilla and mandible in 28.57% and in mandible 14.29%.

Other authors report that arrested eruption was diagnosed most often in 6- and 7- year-old children, although the 8- year- old children presented 20% of patients with eruption disorder. Furthermore, 72.6% of the children with arrested eruption presented at least one additional orthodontic

malocclusion [10]. Our clinical experience has shown that the arrested eruption is found in 7-8 year old children.

Barberia et al. by examining growing Spanish diagnosed with arrested eruption of maxillary first permanent molar of 4.3% of studied patients. As regards to the gender, distribution that was observed for males and females: 59% (13 patients were boys) versus 41% (9 patients were females) [6]. The results for gender distribution in our study are 85.72% females and 14.28% male.

There was no predominance of one side of the dental arch of the problem. The higher prevalence of the right side has also been reported in other studies[2, 16]. We found patients with unilateral arrested eruption higher on the right than the left.

We find out the main reason for arrested eruption. Our thesis is based on the evidence from anamnesis, X-rays and clinical status. We came to conclusion that the main etiological reason for arrested eruption of first permanent molar is caries and resorption processes on distal surface of second deciduous molar, which is passing without symptoms and under the gingival sulcus level. This is the reason for medial inclination of erupting maxillary first permanent molar. It's erupting foresees, which resorbed bone structures during the erupting process can't resorbed more density structures as email and dentin of crown and root surface of second deciduous molar and this lead to arrested eruption. At this time the period of active eruption and development of root of first permanent molar have passed and it stayed arrested in the bone.

Another reason is tooth agenesis of second permanent premolar. Missing tooth germ of second permanent premolars lead to more medial location of first permanent molar and eruption path is with more medial inclination. The roots of second deciduous molar, which stay not resorbed and widely divergent in cranial direction, are the barrier for first permanent molar germ.

Early eruption of first permanent molar in mandible and arrested eruption of first permanent molar in maxilla due to extrusion of mandible first molar and it became in occlusion with maxillary gingiva that covered the place where first permanent molar will erupt. In maxilla the gingiva is modify and transformed into hyperkeratosis type due to its participation in the chewing process. This is an additional barrier that prevents normal eruption of upper first permanent molar.

In one of our patients we find out hypodontia of teeth 15, 35, 45 and 47, which is signal that there is general disturbance in development and formation of permanent teeth. In the case with unilateral form of arrested eruption we observed ankylosis of second deciduous molar in mandible at the same side as retention of permanent first molar. In this clinical case the organism shows differences in bone and tooth development.

As for treatment timing, the therapy adopted should coincide with the active phase of tooth eruption of the first permanent molar. The therapeutic attitude varies from follow-up of

suspected cases of reversible ectopic eruption to the extraction of the resorpted deciduous second molar [15, 16, 17, 18].

We show two of our clinical cases with unilateral and bilateral arrested eruption of the first upper permanent molars.

Case report 1

We presented clinical case of a patient with unilateral form of arrested eruption on permanent first molar. A 7-years-old female patient came to the clinic with compliances of deep bite and rotated teeth in frontal area. During the clinical examination we find out that on the left side of maxilla the first permanent molar is under the occlusal plate comparing with adjacent second deciduous molar. The tooth is partly erupted as its medial part is lower than its distal surface. The medial marginal edge is partly covered from the distal part of adjacent deciduous second molar. The X-ray (fig. 2) confirmed the medial inclination of maxillary first permanent molar and its insertion into distal resorbed surface of maxillary left second deciduous molar.



Figure 2: The X-Ray survey of the patient

We recommended to the patient an early extraction of maxillary second left deciduous molar followed by orthodontic treatment. The treatment plan (fig. 3) contains – eruption of left maxillary first permanent molar in released space in dental arch, correction of its medial inclination and distal movement until it is with normal position in dental arch.



Figure 3: The patient's treatment process

The result that we achieved with orthodontic treatment was: first class teeth relation between permanent molars in the left segment and sufficiently space for second permanent molar,

on the same side, to erupt. Considering the type of dentition – early mixed dentition, we use the removable appliances for treatment in this clinical case. The patient was really cooperative and the result was achieved for 9 months. The same appliance was used for retention until the end of mixed dentition period.

Case report 2

We presented clinical case of the patient with bilateral form of arrested eruption of first permanent molar.



Figure 4: The initial status of patient

We show the clinical case of an 8-years-old female patient, which looked for an orthodontic treatment in conjunction with rotated teeth and smoothed aesthetics in frontal area (fig. 4). During clinical examination we established that maxillary first permanent molars weren't erupted yet.

We prescribe X-ray, and establish retention on first permanent molars on it. Another problem of development of dentition is hypodontia of maxillary second premolars and complete lack of resorption of second deciduous molars roots.



Figure 5: Clinical examination of the patient

Second deciduous molar roots length was the same as the length of roots of permanent molars (fig. 5). The distal roots of second deciduous molar change the trajectory of eruption of first permanent molars. In mother's interview there is no evidence for heredity in the family or severe infection disease during early childhood. We observed the missing tooth germ of right second permanent premolar and left permanent second premolar germ was in early phase of development. We suspect that the arrested eruption of first permanent molar is due to system disturbance with correlation with teeth development. There are reduced number of teeth germs of permanent teeth and disturbances of eruptive ability in distal area of maxilla (there are tooth agenesis of teeth 17, 15 and 25 and arrested eruption of 16 and 26).

7. Conclusion

The first permanent molars are most important area for adequate masticatory function. Their eruption is related with rapid alveolar and bone growth. Development of teeth germs of first permanent molars and teeth eruption lead to growth in sagittal and vertical dimensions of maxilla. This is related with vertical face development. Teeth eruption reflected on maxillary teeth arch by rapid divergent growth and development in distal direction. This is transversal change in size of maxillary dental arch. So the maxillary dental arch increases in transversal direction. If eruption of first permanent molar is smoothed it lead to changes in dimension of the jaw. Severe medial inclination of maxillary first molars and its semi-retention lead to curtailment of dental arch and lack of space for eruption of premolars and canine. The occlusion contacts with antagonist are incorrect and this lead to smoothed occlusion and smoothed masticatory efficiency. The early diagnosis and strictly observation by dentist for the right time for teeth to erupt is really important.

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Author Profile



Assoc. Prof. Dr. Greta Yordanova has completed her master's degree in dentistry in 1991. She has post-graduated in Orthodontics and developed dissertation entitled "Clinical results in treatments with Pendulum" and obtained PhD degree. Her research interests are in the area of Non-extraction treatment and problems of ectopic and impacted teeth and working with 3D technology.



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