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INTERDISCIPLINARY TREATMENT OF IMPACTED MAXILLARY INCISORS – CASE REPORT

ИНТЕРДИСЦИПЛИНАРЕН ТРЕТМАН НА ИМПАКТИРАНИ МАКСИЛАРНИ ИНЦИЗИВИ - ПРИКАЗ НА СЛУЧАЈ

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Abstract

Although the frequency of impacted frontal teeth is relatively lower than the impactions of other teeth in dental arch, their localization in the most noticeable part of the face represents a great problem for the patient and a major challenge for the doctor as well. The absence of these frontal teeth plays great role in dental and facial aesthetics, also decreasing self-confidence and self-perception in young patients. The reasons for their occurrence are diverse - from hereditary origin to altered position of the tooth buds, loss of space in the dental arch, or the existence of an obstacle in the eruption path. A crucial part of their treatment is early diagnosis which can ensure the possibility for planning appropriate interventions. Usually, dental history of frontal teeth trauma, clinical and radiographic examination are the main indicators for impactions or delayed eruption of frontal teeth. In this study, we want to present a case of impacted maxillary central incisors as a result of presence of supernumerary teeth in their path of eruptionin an 8-year-old boy. The treatment was preformed with combination of mobile and fixed appliances after surgical procedure and removal of supernumerary teeth. With traction and alignment of the incisors in their place in the dental arch, not only functional and aesthetic results were obtained, but also an increase in the self-confidence and social interaction of the patient. Orthodontic-surgical treatment is the optimal therapeutic approach in the treatment of impactions, in general, and therefore, also of the impactions of the maxillary central incisors. **Key words:** impacted teeth, impaction of maxillary incisors, treatment of impactedanterior teeth

Апстракт

И покрај тоа што зачестеноста на импактирани фронтални заби е релативно помалку застапена од импакциите на другите заби во денталниот лак, нивната локализација во најзабележителниот дел од лицето, претставува голем проблем за пациентот и голем предизвик за терапевтот. Отсуството на овие фронтални заби игра голема улога во денталната и фацијалната естетика, но има ивлијание на самодовербата и самоперцепцијата кај младите пациенти. Причините за нивното појавување се разновидни - од наследен карактер, недоволно простор во денталниот лак; до променета положба на забните зачетоци или постоење на пречка на нивниот пат на ерупција. Клучен дел од нивниот третман е раната дијагноза која дава можност и услови за планирање соодветни интервенции. Вообичаено, историјата на траума на фронталните заби, клиничкиот и радиографскиот преглед се главни показатели за импакциите или одложената ерупција на фронталните заби. Овде сакаме да прикажеме еден случај на импактирани максиларни централни инцизиви, како резултат на присуството на прекубројни заби на нивната патека на ерупција, кај момче на возраст од 8 години. Третманот беше спроведен со примена на комбинација на мобилен и фиксен ортодонтски апарат, по отстранувањето на прекубројните заби од страна на орален хирург. Со извлекувањето и поставувањето на инзицивите на нивното место во забниот лак се добија не само функционални и естетски резултати, туку и зголемување на самодовербата и социјалната интеракција на пациентот. Ортодонтско-хируршкиот третман е оптималниот терапевтски пристап во третманот на импакциите воопшто, а со тоа и на импакцијата на максиларните централни инцизиви. **Клучни зборови:** импактирани заби, импактирани максиларни инцизиви, третман на импактирани антериорни заби.

Introduction

The term "impaction of teeth" is associated with disturbances in eruption at expected timeframe of normal development[1]. Among impacted teeth, the maxillary canine is the most commonly impacted tooth following third molars. Impaction of maxillary central incisor is rare, accounting for around 0.2%–1 % of all cases, and it is usually a result of range of causative factors, including abnormal tooth dilaceration, fusion of tooth roots, disturbances in the normal eruption mechanisms, the presence of tumors, cysts and underlaying systemic conditions such as vitamin deficiencies, hormonal imbalances, or genetic predisposition[2] and in many cases there is a positive family history. But, in

almost 56%- 60% of the cases of impaction of maxillary incisors, the reason for this eruption disturbance is theexistence of a physical barrierin the form of presence of supernumerary teeth[3,4]. There is a diversity among racial and ethics group[5,6], therefore, in the Caucasian population, the prevalence is between 1%-3%; in Asians, is higher than 3%; Hispanics dominate with frequency of 5,6%, whereas Afro-Americans have the smallest prevalence of this condition - only 0,42%. As an obstacle for eruption, supernumerary teeth are most frequent in the male population. Some syndromes also have supernumeraries and some of them are localized in the maxillary incisor region, like cleidocranial dysplasia[6].

The shape of supernumerary tooth varies. The form of supernumeraries that is usually accompanied with more severe impaction, and the disturbed eruption is tuberculate or has an invaginated form[7,8,9]. Tay[10] found that vertically oriented supernumerary teeth are the reason for delayed eruption of permanent maxillary incisors.

Maxillary incisors are the most prominent teeth in an individual's smile, they are also the teeth that are on maximum displayin most individuals during speaking and the normal eruption, position and morphology of these teeth are crucial to facial aesthetics and phonetics[11]. The absence of a central incisor not only affects one's appearance but it also has a negative impact on self-esteem, functionality, and social interactions. Therefore, it is very important to diagnose and address this issue at an early stage[11].

Usually, patients visita dentist's office after 8 or 9 years of age, which depends on the eruption pattern of the permanent teeth. Absence of one or, sometimes, two teeth in the midline region is alarming and in many cases, it may result in migration of adjacent teeth, space loss and midline deviation[11,12]. Primary causes of central incisor impaction have been attributed to two causes: trauma to the primary teeth and mechanical obstruction[12]. Trauma to the primary teeth is a common type of traumatic injury in the maxillofacial region, especially in children with protrusion of the maxillary deciduous incisors and prognathism of the maxilla. Usually, about one-third of children have had some injury to their primary dentition[13,14]. Since primary teeth are in close proximity to the tooth buds of the succeeding permanent teeth, any traumatic incident has the potential to negatively affect the eruption of the permanent teeth and be the reason for malformation or dilaceration of the permanent tooth. The degree of that damage depends on the stage of development of the tooth germ, and the type and direction of the trauma[15,16].

Diagnosis and estimation of treatment plan is essentialfor treating impacted teeth Diagnostic procedures, except for anamnestic findings, intraoral examinations, include use of panoramic X-ray which is first and most valuable diagnostic tool. In manycases, there is a necessity for additional intraoral periapical radiograph, cone beam and CBCT evaluation[17]. These methods allow us to estimate the reason for delayed eruption of the frontal teeth and to choose the most appropriate method for placement of impacted teeth in the dental arch.

In addition to radiographic examinations, an intra oral evaluation is also necessary to identify retained deciduous teeth: presence or absence of buccal-palatal swelling and appropriate place for the incisors[18]. The adjacent teeth can be rotated or inclined; elevation of the soft tissue of the palatal or labial mucosa depending on the tooth location; absence of a protuberance in the buccal sulcus at 1–1.5 years before the expected time of tooth eruption[18].

The pathognomic sign which indicates that an impaction of a central incisor is the presence of the both lateral incisors in the dental arch[19]. Namely, by inspection and palpation of the affected area, the presence or absence of lump is determined. The position of the neighboring teeth can also help in locating the impacted tooth; if an impacted tooth is high in the maxillary ridge it will lead to displacement of the neighboring teeth and closure of the space for its placement in the dental arch.

Radiographic assessment includes X-ray, retrolaveolar radiograph, cephalogram, cone beam and CBCT diagnostics.

In order to estimate the best treatment plan, the following information should be obtained: the exact positions of the crown and root apex of the impacted tooth and the 3-dimensional orientation of its long axis; the proximity of the impacted tooth to the roots of the adjacent teeth; the presence of pathology such as supernumerary teeth, odontomes, apical granulomas or cysts, and their spatial relationship with the impacted tooth; root resorption of the neighboring teeth; 3D anatomy of the crown and root of the impacted tooth.

The interceptive treatment consists of surgical removal of supernumerary teeth followed by two phase orthodontic treatment with removable appliance at the beginning of the treatment in order to create space and to position the impacted incisors in the dental arch, and the second one –with fixed appliances, for definitive and proper alignment of all teeth and correction of sagittal malocclusion as well.

Case Report

Patient B.I.8 years of age, visited our clinic for orthodontic treatment in order to find a solution for non-erupted maxillary frontal teeth. He had convex profile, deep bite, (Figure 1, 2) skeletal Class II division 2 and, according to the X-ray findings, had supernumerary teeth on both sides along the midline, and retained right and left deciduous central incisors (Figure 3).

Figure 1. *Extraoral photograps at the start of the treatment*

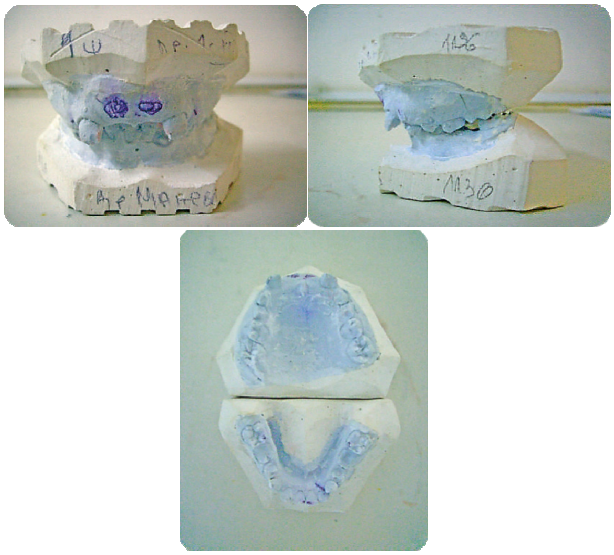


Figure 2. *Dental casts at the start of the treatment*

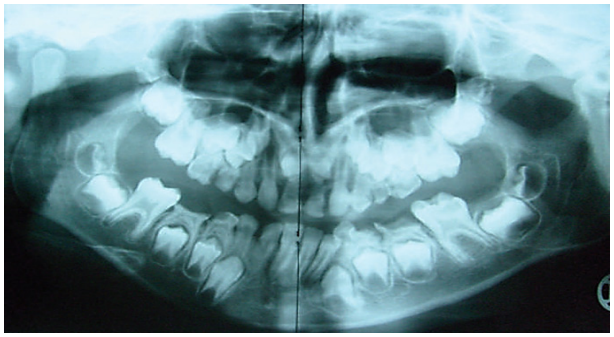
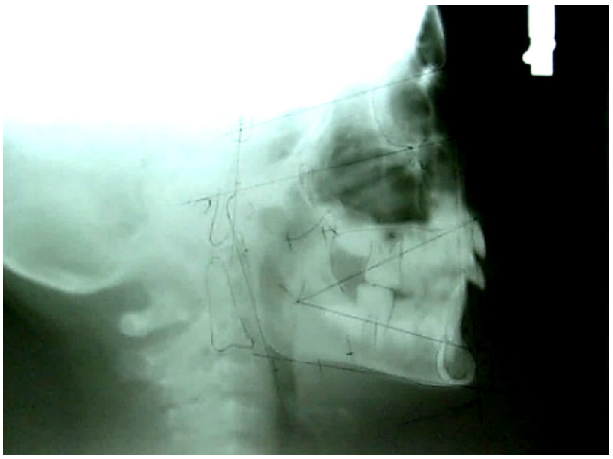


Figure 3. *Orthopantomography at the start of the treatment*

Cephalometric tracings revealed skeletal Class 2 division 2 with normognathism of maxilla and retrognathism of mandibula, retroclined incisors in both jaws, skeletal deep bite and horizontal type of growth.



SNA	81˚(82 ˚)
SNB	75˚ (80 ˚)
ANB	6˚ (2 ˚ -4 ˚)
A – NPg	5 mm (2mm)
1/SN	101˚ (104 ˚)
1/NA	21˚(25 ˚)
1-NA	2 mm (5mm)
1/NB	20˚(22 ˚)
1-NB	3 mm (5mm)
1/1	142 ˚(130 ˚)
N-Gn	120 mm (112mm)
N-Sna	59mm(51mm)
Sna-Gn	61mm (61 mm)
Sna-Xi-Pm	43˚ {47 ˚)
NPg/MPl	65 ˚ (67 ˚)
Bjork : NSAr	119 ˚ (123 ˚)
	SArGo 140 ˚(143 ˚)
ArGoM	121˚(130 ˚)
380˚	(396 ˚)
S-Go/N-Me	80/120
66,5 %	(62%-65%

Figure 4. *Cephalometric findings*

With the collaboration of oral surgeon, an extraction of deciduous central incisors was preformed and we started the treatment in order to create space, to correct deep bite and made settings for traction of both impacted maxillary central incisors. After removing the deciduous teeth, we managed to place the right maxillary central incisor in the dental arch (Figure 4) with elastic traction placed on the button of the tooth to the hook on the appliance. Since the retention on deciduous teeth was not satisfactory, we had to use active functional appliance by Haupl-Andresen. In order to create more space, and due to complexity of the planned surgery, the removal of supernumerary teeth was postponed forseveral months.

Figure 4. *Right maxillary incisor in the dental arch*

The progress of our treatment is revealed in Figure 5a and 5b.

Figure 5a. *OPG after the traction of 11 teeth, and 21 still high in maxilla*

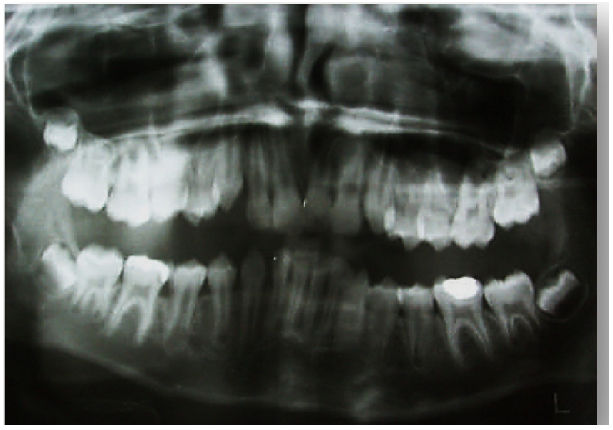


Figure 5b. *X-ray – both maxillary central incisors placed in the dental arch*

The treatment continued with mobile appliance, and after the completion of permanent dentition, fixed appliance was bonded in both jaws (Figure 6).

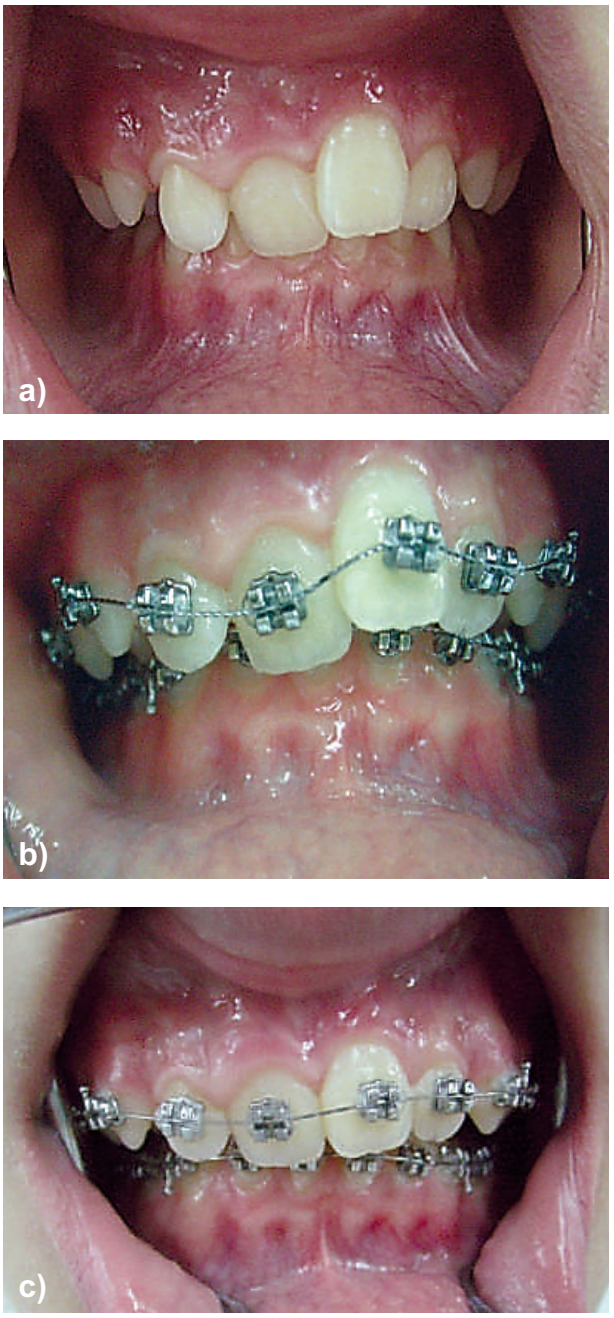


Figure 6. *a) before and b) after the bondingof the fixed appliance; c) phase of the treatment*

During the treatment with fixed appliances, we used intermaxillary traction Class II which allowed us to correct the anteroposterior relation of the jaw bases. Following the debonding of the appliance, a retention phase followed and we gained stabile occlusal relations, good function and good aesthetics (Figure 7).

Figure 6. *Intraoral photos one year after debonding of the fixed appliances*

Discussion

Impaction of maxillary incisors, although rare, always presents a big challenge for everyone involved - parents, patients, orthodontist, oral surgeons. The negative effect is even more pronounced because the absence of the frontal teeth has a great influence on facial aesthetics and it plays a big role in the social interaction of the affected individuals.

Several factors could cause the failure of the eruption of the impacted incisors, such as their excessive proximity to the adjacent teeth in the dental arch, the overlap of the crown on their roots, big distance from the occlusal plane, ankilosis, and abnormal morphology of the crown. Their repositioning in the dental arch may be accompanied with risk of necrosis, root resorption, alveolar bone loss, injury to adjacent teeth, gingival recession and increase in clinical crown length, aesthetic problems and tooth loss.

After the diagnostic procedures, a treatment plan is estimated and it usually involves oral surgeon too, because in most cases there is an obstacle in the eruption path of permanent incisors: cyst, odontoma or supernumerary tooth. Surgical exposure of impacted teeth can be done with open or closed method. The findings by Becker[20] suggest that closed method is a better approach because it doesn't interfere with the periodontal status of the tooth, the width of the attached gingiva and the crown length. In our case, the closed method was favored since the maxillary central incisors were very high in the alveolar bone, near the nasal spine[21].

In order to apply the orthodontic traction, the anchorage must be reinforced with a heavy rectangular arch wire on the fixed orthodontic appliance or a removable appliance. Factors such as dental age, compliance, and oral hygiene may influence the selection of the treatment.

In our case, traction of impacted teeth was performed with modified mobile appliance in the first phase of the treatment. The majority of patients with incisor impaction are usually in mixed dentition with only the first molars, and incisors present which are available for bonding, so the force that is produced with fixed appliances may impact the anchored teeth and may lead to root resorption. Application of a removable appliance allows forthe reaction force to be anchored by posterior teeth and palatal area, so there is no side effect to the adjacent teeth. Another issue with applying fixed appliance is the oral hygiene, which ischallenging in mixed-dentition patients, because there is a greater potential for decalcification and gingival inflammation if the oral hygiene is not proper. On the other hand, orthodontic traction with removable appliance shortens the length of further fixed orthodontics treatment and decreases the risk ofcomplications. Cooperation of the patient is the most important part, andmost of them are highly motivated to fill the gap in the frontal region and are satisfied when they see the results of their effort. Nonetheless, since all the movements cannot be done with the removable appliance, the additional alignment- the second phase of the treatment, has to be carried out with fixed orthodontic appliance.

Conclusions

Impacted maxillary central incisors represent relatively infrequent finding in everyday practice, but their characteristics and localization make them very important because they interfere with many functions like mastication, swallowing, speech and they affect the aesthetic appearance as well, causing low self-esteem and low confidence in the affected children.

Surgical orthodontic interventions can play a crucial role in guiding impacted teeth into their right position within a normal occlusion. At the end of the treatment, satisfactory functional and aesthetic results were obtained, gingival attachment was maintained and the integrity of the dental arch was restored.

As a conclusion, it is crucial that each case is treated independently in order to formulate the proper treatment plan and to achieve the best possible outcome with the collaboration of a team of specialists.

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