Management of Upper Incisors Agenesis – Space Closure. A Case Report

Postępowanie w przypadku hipodoncji bocznych zębów siecznych szczęki – zamykanie przestrzeni. Opis przypadku

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A – concept; B – data collection; C – statistics; D – data interpretation; E – writing/editing the text; F – compiling the bibliography

Abstract

Lateral incisors’ hypodontia may be successfully treated by orthodontic space closure with canines substitution or space opening with prosthetic replacements. Authors describe a hypodontia case of both upper lateral incisors with Class I malocclusion. The orthodontic treatment of a young patient consisted of space closure with canines substitution and lateral upper teeth mesialization with the use of mini-screw implant (MSI). Proper occlusion alongside a fine aesthetic effect without necessitating further prosthodontic restoration was obtained (Dent. Med. Probl. 2013, 50, 2, 244–248).

Key words: orthodontics, hypodontia.

Streszczenie

Hipodoncja górnych zębów siecznych bocznych może być z powodzeniem leczona przez ortodontyczne zamknięcie luk po brakujących zebach z ustawieniem kłów górnych w miejscu zębów siecznych bocznych bądź przez odtrwzenie przestrzeni z następującą odbudową protetyczną. Autorki opisują przypadek pacjentki z hipodoncją bocznych zębów siecznych górnych ze współwystępującą wadą zgryzu klasy I. Leczenie ortodontyczne młodej dziewczyny polegało na zamknięciu luk po brakujących zebach z mezjalizacją kłów górnych i zębów bocznych szczęki z zastosowaniem miniśruby ortodontycznej (MSI). Po zakończonej terapii uzyskano dobrą okluzję i korzystny efekt estetyczny bez konieczności zastosowania uzupełnień protetycznych (Dent. Med. Probl. 2013, 50, 2, 244–248).

Słowa klucze: ortodoncja, hypodoncja.

The prevalence of tooth agenesis is estimated from 2.4% to 6.7% of the population, excluding third molars [1, 2]. In the study of González-Allo et al. [3] and Cantekin K et al. [4] the higher rate of hypodontia was found in females than in males, but those results were of statistic significance.

Most frequently, agenesis affects maxillary lateral incisors, second premolars and mandibular incisors [5]. Including third molars, the percentage of hypodontia reaches circa 30% of the population [2]. An English investigation showing a statistically significant delay of the dental age among patients displaying tooth agenesis with association of the severity of the hypodontia and the delay might be interesting for treatment and orthodontic planning [6]. Also chemotherapy in young children may be associated with microdontia and hypodontia of the lateral teeth [7]. On the other hand, there is an alarming investigation from the University of Pittsburgh revealing a correlation between hypodontia and cancers (due to a common molecular pathway) [8].

The patients with hypodontia require multidisciplinary treatment [9, 10]. Generally, there are two options for the patients with lateral incisor agenesis: space closure or prosthetic replace-
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In the first approach, the upper canines substitute the lateral incisors [11]; in the other protocol, the conventional or adhesive bridges, or dental implants are used to restore missing dentition [14, 15]. Despite the orthodontist and the patient’s personal preferences, the type of malocclusion, the patient’s profile, crowding and morphology of the upper canines play an important role in treatment planning [12, 16]. Currently, the possibility of utilizing mini-screw implants (MSIs) gives therapists a new treatment option, providing the skeletal anchorage for tooth movement previously difficult or even impossible [17, 18].

Case Report

Patient A. M. 14 year old presented for orthodontic treatment with a major complaint: an unattractive smile. Objective extraoral examination revealed facial symmetry, increased naso-labial angle and slightly retruded chin (Fig. 1). Intraoral examination, verified by an orthopantomogram, showed the upper lateral incisors hypodontia.

Class I malocclusion, decreased overjet and overbite, spacing in the upper dental arch, quite well aligned lower dental arch were also diagnosed. The upper canines were rather small and of a light shade (Fig. 2). The proposed treatment approach included upper fixed orthodontic appliance and one MSI in the anterior area to support the skeletal anchorage.

Proper brackets positioning allowed improvement of the overbite and overjet after the aligning phase of the treatment (Fig. 3a, b). After closing the spaces in the anterior region and mesialization of the upper canines, a MSI 6 mm long (Ortho Easy®-pin FORESTADENT, Pforzheim, Germany) was inserted above the roots of the upper central incisors. After insertion the mini-screw implant was immediately connected with the anterior teeth thus producing anchorage for the posterior teeth mesialization (Fig. 3c). During treatment, the upper canines where recontoured to resemble the upper lateral incisors. The first upper premolars were mesially rotated, achieving better interdigitation with the lower teeth. After the treatment, normal overbite and overjet, space clo-

Fig. 1. Pretreatment extraoral view: a) en face, b) en face – smile, c) profile
Ryc. 1. Widok zewnątrzustny przed leczeniem: a) en face, b) en face – uśmiech, c) profil

Fig. 2. Pretreatment intraoral view: a) left side, b) en face, c) right side
Ryc. 2. Warunki zgryzowe przed leczeniem: a) strona lewa, b) en face, c) strona prawa
sure by mesialization of the upper teeth, Class II on molars without the further necessity of the prosthodontic restoration (Fig. 4), as well as aesthetic facial features (Fig. 5) were obtained.

**Discussion**

Treatment planning is always crucial in orthodontic therapy. Decisions whether to close the spaces after congenitally missing lateral incisors or to substitute canines should be made very carefully with understanding the limitations and long-term consequences of the different treatment options. Opening the spaces always requires prosthetic replacements with the dental implants or tooth supported restorations, which should be precisely explained to the patient and their family. Conventional bridges do not seem to be a viable option in young patients due to the necessity of the tooth preparation. Bonded bridges may be an interesting alternative, leading to good aesthetic effects [14]. However, long-term observations of Williams et al. [19] showed a relatively high risk of debonding. Finally, treatment with the single implants – a frequently described method of one-tooth replacement should be mentioned [15]. Many investigations showed that more than 90% of the patients are satisfied with the effects of implant supported single tooth restoration in the

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**Fig. 3.** Intraoral view: a) before treatment, b) after levelling phase, c) after MSI insertion
Ryc. 3. Zdjęcia wewnątrzustne: a) przed leczeniem, b) po uszeregowaniu zębów, c) po umieszczeniu miniśruby

**Fig. 4.** Posttreatment intraoral view: a) left side, b) en face, c) right side
Ryc. 4. Warunki zgryzowe po leczeniu: a) strona lewa, b) en face, c) strona prawa

**Fig. 5.** Posttreatment extraoral view: a) en face, b) en face – smile, c) profile
Ryc. 5. Widok zewnątrzustny po leczeniu: a) en face, b) en face – uśmiech, c) profil
aesthetic zone [20, 21]. Nonetheless, the long-term observations proved many negative alterations. The periodontal problems such as marginal bone loss around the adjacent teeth, connected with a larger loss and reduction of the distance between the implant and the tooth were mentioned in contemporary literature [22]. A Swedish article regarding implant insertion in the aesthetic zone showed other unfavorable aspects: atrophy of the distal papillas, increased frequency of bleeding or mucositis when compared to the contralateral natural teeth [20]. Discoloration of the mucosa around the fixed prosthodontic replacements was found in more than 50% of the treated patients [21]. Iseri and Solow [23] examined radiograms of the patients aged 9–25 years and proved continuous eruption of the natural teeth, which allowed the conclusion that dental implants should not be used in childhood, adolescence or young adulthood. This observation showed the need for temporary reconstruction of the spaces opened for the prosthodontic restorations in the young patients. Some of the disadvantages of single-tooth replacements with the dental implants may be reduced by proper orthodontic treatment with the gaining of adequate space for the screws. Also, the correct timing of implant insertion – after completed dental and skeletal development – may lead to an improvement of the results [22]. Better alveolar bone created by orthodontic movement – canine distalization [24] – or bone grafts may result in a reduction of horizontal resorption [25].

Orthodontic space closure is the further treatment option in case of the lateral incisors agenesis. The greatest advantage of such a method is that there is no requirement for prosthodontic reconstruction. However, one important question should be posted: does orthodontic therapy with canine substitution lead to an acceptable aesthetic result? In the described case, fine aesthetic effect was achieved with this kind of procedure. Czochrowska et al. [11] highlighted that canine substitution is a valid therapeutic option, giving satisfying aesthetics. Morphology, width and color of the upper canines serving as the “new lateral incisors”, are the major factors influencing good treatment effects. Brighter than normal and rather small canines are favorable in achieving an attractive smile after closure of the spaces [16]. The substituted canines often need recontouring. Thordarson et al. [26] showed that this procedure is safe and painless to the patient.

In the cases of Angle Class I malocclusion the treatment of lateral incisors agenesis may require space opening with the subsequent prosthodontic substitution of the missing teeth or compensative extractions in the lower dental arch [27]. The other method calls for the upper canine and premolar mesialization and opening spaces for the fixed dentures in the posterior region. Moving the spaces for implants or bridges laterally, out of the aesthetic zone is a remarkable benefit of such protocol [28]. This approach would probably have been used in the presented case if the absolute anchorage could not be applied. However, the authors utilized different treatment options: canine substitution with mesialization of the lateral upper teeth in the patient with Class I malocclusion. Due to the application of MSI our patient avoided prosthodontic treatment; the whole dentition forward movement ended up with good and stable occlusion.

Summing up, usage of absolute anchorage counteracts the undesired distal movement of the anterior teeth during protraction of the lateral ones and allows mesial displacement of the teeth – the movement previously considered difficult or even impossible.

References


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