

CLINICAL CASE

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Absoanchor® Miniscrews in Non-Extraction Treatment of Class II Malocclusion in Adult – Case Report

Zastosowanie mikroimplantów Absoanchor® w nieekstrakcyjnym leczeniu tyłozgryzu całkowitego u pacjenta dorosłego – opis przypadku

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Abstract

Class II malocclusion is the most frequent abnormality of Polish orthodontic population. Among the most common therapies of class II malocclusion many approaches may be listed according to degree of defect-intensity, patient's age, type of growth, type of profile, arch-length discrepancy, patient's motivation and expectations as well as abilities and experience of the orthodontist. Treatment of adult patients with class II malocclusion often calls for extraction of both upper first premolars followed by retraction of canines and incisors in the gained space to diminish overjet and establish canines class I position. The aim of work was to present the treatment of class II malocclusion in an adult patient, using temporary anchorage device – Absoanchor® miniscrews. Skeletal anchorage enables distalization of whole upper dentition. Distalizing force of the coil-spring attached to the hook between canine and lateral incisor and to the miniscrew implant located between second premolar and first molar, acts on the whole dentition throughout the contact points of all adjacent teeth from canines to terminal molars. This phenomena efficiently resembles domino effect. Due to application of temporary anchorage device, class II malocclusion in adults not only is faster corrected thus shortening total treatment time, but non-extraction method is also possible therapeutic approach (**Dent Med Probl 2009, 46, 4, 513–518**).

Key words: class II malocclusion, non-extraction treatment, miniscrews.

Streszczenie

Tyłozgryz jest najczęściej występującą wadą zgryzu wśród pacjentów leczących się ortodontycznie w populacji polskiej. W zależności od takich czynników, jak: nasilenie wady, wiek pacjenta, typ wzrostu, typ profilu, dyskrepancja zębowo-wyrostkowa, motywacja pacjenta oraz umiejętności lekarza, można wymienić wiele możliwych strategii leczenia. Leczenie tyłozgryzu całkowitego u pacjenta dorosłego często wymaga ekstrakcji obydwu pierwszych zębów przedtrzonowych szczęki. Uzyskana przestrzeń jest wykorzystywana do retrakcji kłów, a następnie zębów siecznych w celu zmniejszenia nagryzu poziomego i uzyskania kontaktu kłów w klasie I. Taka metoda postępowania wiąże się z wydłużeniem czasu terapii oraz może spowodować, że pacjent nie zaakceptuje planu leczenia wymagającego ekstrakcji. Celem pracy był opis leczenia tyłozgryzu całkowitego u pacjenta dorosłego z użyciem tymczasowego zakotwienia szkieletowego – mikroimplantów ortodontycznych Absoanchor®. Zakotwienie absolutne umożliwiło dystalizację całego uzębienia szczęki. Siła dystalizująca jest wywierana przez sprężyny otwarte typu *coil* rozciągnięte od haczyków, wygiętych na łuku ortodontycznym obustronnie między bocznym zębem siecznym a kłem, oraz mikroimplantami ortodontycznymi, umieszczonymi obustronnie, między drugim zębem przedtrzonowym a pierwszym trzonowym. Siła ta działa na wszystkie zęby, przez kontakty w punktach stykowych, od kłów do drugich zębów trzonowych szczęki. Zjawisko to przypomina efekt domina. Dzięki użyciu tymczasowego zakotwienia szkieletowego była możliwa nie tylko szybsza korekta relacji klasy II, ale również bezekstrakcyjna metoda postępowania (**Dent Med Probl 2009, 46, 4, 513–518**).

Słowa kluczowe: tyłozgryz całkowity, leczenie nieekstrakcyjne, mikroimplanty.

Class II malocclusion is the most frequent abnormality of Polish orthodontic population, hence this is an important therapeutic problem. In

Polish nomenclature class II malocclusion is divided into dental and skeletal displacements, thus following abnormalities are distinguished

separately: class II canine relationship, class II canine and molar relationship, pseudo class II canine and molar relationship, functional distal position of the mandible and its skeletal horizontal deficiency. Additionally, these abnormalities may be aggravated by an open bite tendency, depending on value of angle between maxillary and mandibular planes [1].

Dental class II malocclusion usually results from deficiency of a perimeter of lower alveolar process. Such malocclusion is characterized by either cusp to cusp canine and/or molar relationship or protrusion/retrusion of upper incisors resulting in increased overjet. Deepening of labio-mental fold and distal displacement of lower lip are visible in facial features; in class II/division 1 symptoms of hypotonic oral orbicular muscle and lip incompetence are frequently observed [1, 2].

In the literature, various therapeutic strategies of class II malocclusion can be found. Among the most common therapies of class II malocclusion such approaches may be listed: functional mandibular protrusion during pubertal spurt, modification of maxillary growth using extraoral appliance – headgear or distalization of upper teeth until class I canine and molar relationship is regained [1, 3].

Therapy of patients with class II malocclusion depends on many factors, such as: degree of defect-intensity, patient's age, type of growth, type of profile, arch-length discrepancy, patient's motivation and expectations as well as abilities and experience of the orthodontist that crucially influence the choice of treatment approach.

The aim of work was to present the treatment of class II malocclusion in adult patient, using temporary anchorage device – Absoanchor® miniscrews.

Case Report

The patient M.M., 22 years of age, sought for orthodontic therapy. Her motivation to start the treatment arose from esthetic reasons.

Facial examination revealed: symmetrical face, convex profile, increased labio-nasal angle and competent lips (Figs. 1a, 1b). An intraoral examination showed: bilateral class II molar and canine relationship, retrusion of upper incisors, narrowed maxilla and mandible, minor crowding in upper and lower dental arch. Overbite was 5 mm and overjet 4 mm (Figs. 2a, 2b, 2c). Cephalometric analysis allowed to diagnose skeletal class II with retrusion of upper incisors ($SNA = 76,6$, $SNB = 70,4$, $ANB = 6,2$, $Wits = 6,7$ mm, $1+NA = 12,7$, $1-NB = 24,7$). Manual repositioning of the

mandible in order to achieve class I – functional test – was positive.

Examinations enabled following diagnosis: class II malocclusion with retrusion of upper incisors and functional, distal position of the mandible.

Treatment plan assumed: 1) leveling and aligning of upper and lower teeth with protrusion of upper incisors, 2) widening of lower and upper dental arch, 3) advancement of mandible to cusp – to cusp class II on molars and canines, 4) distalization of all upper teeth to class I on molars and canines, 5) retention.

The therapy began with bonding of fixed appliance in maxilla (Roth system, 0.022 slot). Leveling was obtained with 0.014 then 0.016 × 0.022 thermoactive NiTi archwires. Similar aligning procedure was performed in the lower arch. Subsequently, 0.016 × 0.022 stainless steel archwire with accentuated Spee and 0.019 × 0.025 stainless steel archwire were inserted into the slots of brackets bonded – respectively – in the upper and lower dental arches. Patient was instructed to wear medium class II elastics (3/16 inch) 24 hours per day until cusp to cusp (class II) relationship on molars and canines was obtained, what took 3 months. Thus 0.016 × 0.022 stainless steel archwire with passive bull loops bent to serve as the attachments was inserted in the upper arch. Simultaneously, two microimplants (screw 1312-08) were inserted between teeth second bicuspid and first molar on either sides of maxilla (Fig. 3). After recovery of mucosa in the area of implantation, NiTi closed-coil springs (G&H®, 13 mm-long, light force) were extended between bull – loops and miniscrews bilaterally, to obtain distalization of all upper teeth. After 7 months class I was established on molars and canines. Decreased overbite created iatrogenically due to forced proclination of upper incisors and use of class II elastics was also closed. After insertion of 0.016 × 0.022 TMA and 0.016 × 0.022 stainless steel archwires in the upper and lower dental arches respectively, finishing procedures were performed. Treatment time was limited to 16 months. Hawley plates were used as retention. Patient was satisfied with appearance of dentition obtained in short period of time (Fig. 4a, 4b, 4c, 5a, 5b).

Discussion

According to the literature, distalization of upper molars may be obtained either by extraoral appliance or with intraoral technique. The latter one requires uni- or bi-maxillary anchorage; more and more often micro- and mini-implants screwed



Fig. 1. Initial photos:
a) profile, b) en face

Ryc. 1. Zdjęcia sprzed leczenia: a) profil, b) *en face*

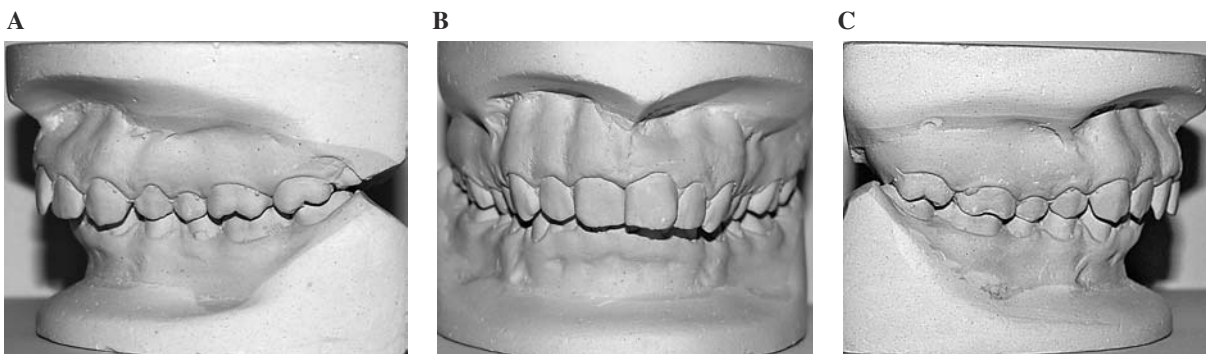


Fig. 2. Pre-treatment casts: a) left side, b) en face, c) right side

Ryc. 2. Modele przed leczeniem: a) strona lewa, b) *en face*, c) strona prawa



Fig. 3. Miniscrew-implant in situ, right side

Ryc. 3. Miniimplant *in situ*, strona prawa

in cortical plate of an alveolar process support maximum resistance against loading force. Many appliances may be used for distalization of lateral teeth. The most common are: headgear, Schwarz plate with distalizing screw, Keles Slider, Jones Jig, MALU, Herbst Appliance, Distal Jet, Wilson appliance or Pendulum one. If unimaxillary anchorage is applied, this is usually followed by protrusion of upper incisors, contrary to cervical traction, where their retrusion may be apparent side effect. Intraoral appliances secure better and

faster distalization; nevertheless present second upper molars have a big influence on either efficiency of first molar distalization or the intensity of anchorage-loss. If these teeth are not yet erupted, the distalization proceeds even twice quicker. Effective distalization, almost or completely without anchorage-loss may be obtained using mini- or micro-implants serving as points of force-application during distalization [3–7].

Lower dental units serving as an anchorage-support for distal movement of upper molars usually result in their mesial displacement that is loss of anchorage subsequently followed (if class II elastics are applied) by protrusion of lower incisors: an adverse effect of treatment with e.g. MALU or Herbst appliances [8–10].

Risk of premature/early lost of miniscrews is unquestionable disadvantage of their use, yet reported by few clinicians dealing mainly with patients of Asian origin [11–18]. However, current research of Antoszevska [19] reporting one of the highest success rates prove the importance of proper procedure of miniscrews-insertion and post-operative management, applied also in the

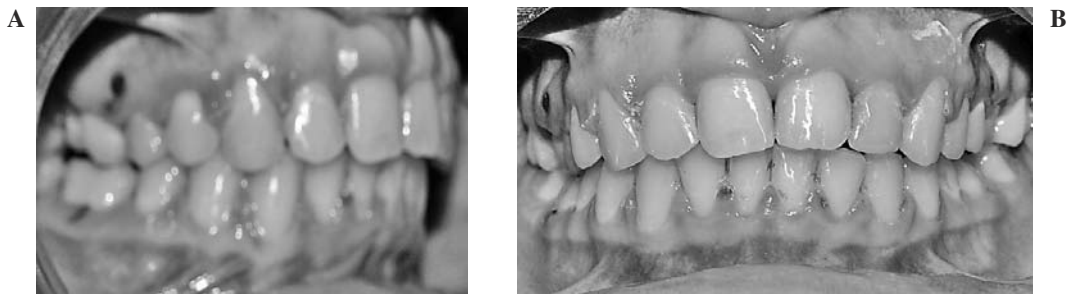


Fig. 4. Final intraoral pictures: a) right side, b) en face, c) left side
Ryc. 4. Końcowe zdjęcia wewnątrzustne: a) strona prawa, b) *en face*, c) strona lewa



Fig. 5. Final photo: a) profile, b) en face
Ryc. 5. Końcowe zdjęcia zewnętrzne: a) profil, b) *en face*



Fig. 6. Angulation of the hole for the miniscrew-implant in maxilla
Ryc. 6. Nachylenie kanału miniimplantu w szczęce

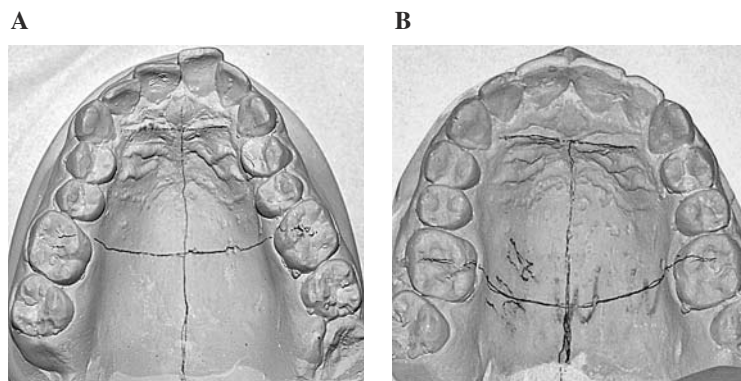


Fig. 7. Palatal side of casts: a) pre-treatment, b) post-treatment

Ryc. 7. Modele łuku górnego pacjentki od strony podniebiennej: a) przed leczeniem, b) po leczeniu

presented case; both miniscrews were retained till debonding of fixed appliances and then removed.

In order to diminish the risk of root injury, one always recommends angulation of Absoanchor miniscrew-implants towards alveolar process of maxilla (Fig. 6). This 30–40-degree angulation allows undisturbed movement of the teeth, along the alveolar process. Distalizing force of the coil-spring attached to the hook between canine and lateral incisor and to the miniscrew implant located between second premolar and first molar, acts on the whole dentition throughout the contact points of all adjacent teeth from canines to terminal molars. This phenomena efficiently resembles domino effect [19].

The current case displayed border-line features, however due to the patient's age, values of lateral cephalogram, profile evaluation and patient's motivation, authors decided to perform non-extraction therapy. Treatment plan assumed functional treatment following either elimination of factors potentially blocking mandible in the dis-

tal position or distalizing all upper teeth using temporary skeletal anchorage – Absoanchor® miniscrews. Rate of distalization was measured on pretreatment and posttreatment casts as difference in distance between incisal papilla and perpendicular projection of Pont measurement point of first molar on palatal raphe. Gained distalization was 3 mm on both first upper molars (Fig. 7a, 7b). Establishing of proper occlusion by correction of total class II malocclusion in adult patient was gained without any extractions in the upper dental arch. Use of temporary skeletal anchorage enabled to distalize all upper teeth, thus non extraction treatment was possible, securing reduced treatment time.

Temporary anchorage device is the efficient tool facilitating orthodontic treatment. Due to application of Absoanchor® miniscrews, class II malocclusion in adults not only is faster corrected thus shortening total treatment time, but non-extraction method is also possible therapeutic approach.

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