Class II Division 1 malocclusion treatment using TADs – case report

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SUMMARY
Introduction Orthodontic treatment of Class II Division 1 (II/1) malocclusions in adults can be challenging since skeletal effects are limited. Possible treatment options are orthodontic camouflage or orthognatic surgery, in severe cases. The aim of this paper was to present a successful management of Class II malocclusion in an adult patient using temporary anchorage devices (TADs).

Case report After detailed clinical examination, study models and cephalometric analysis, a 26 years old patient was diagnosed with Class II malocclusion, an overjet of 12 mm, congenitally missing tooth 41 and midline shifted to the right in upper dental arch. In prior orthodontic treatment, patient had upper premolars extracted. Posterior teeth in upper left quadrant were shifted mesially. The camouflage treatment was considered, using temporary anchorage devices (TADs) to distalize posterior teeth on the left side, and gain space for incisor retraction and midline correction in upper dental arch.

Results Using TADs as additional anchorage in anterior region and coil spring for molar distalization, the space was made for tooth 23, midline correction and incisor retraction. After 40 months, a satisfactory result was achieved, overjet and midline correction, class I canines occlusion and class II molar occlusion.

Conclusion Class II/1 malocclusion in adults can be successfully treated using TADs. The success depends on the severity of malocclusion and patient cooperation.

Keywords: class II malocclusion division 1; adults; TAD

INTRODUCTION
Class II malocclusion is the most frequent type of malocclusions in Caucasians globally [1, 2]. In Europe the prevalence of Class II malocclusions in permanent dentition is 33.5% [1]. Epidemiological investigations in Serbia show that prevalence varies 23.4% to 54.9% in different regions [3–7]. Treatment considerations depend on patient age and severity of malocclusion [2, 8]. In literature numerous treatment protocols are presented [9, 10, 11], but none of them is accepted as agreement on whether it should be one-phase or two-phase treatment in school children [12, 13, 14].

Orthodontic management of adults with Class II division 1 (II/1) malocclusion is challenging and controversial, since the patient’s growth is over, and skeletal component of malocclusion is difficult to change [2]. The treatment plan of Class II/1 malocclusion in non-growing patients involves orthodontic camouflage or orthognatic surgery [15]. In adult patients fixed functional appliances are also used, although skeletal effects are limited and changes are mostly dental [16]. The treatment plan decision is made upon numerous criteria - subjective and objective. Objective criteria are the severity of skeletal, dental and soft tissue discrepancy, oral health condition, number of permanent teeth present, whereas subjective criteria rely on patient’s personal experience of his appearance with the malocclusion, and cooperation during the treatment.

Orthodontic camouflage is frequently a method of choice in Class II/1 malocclusion treatment. It presents dentoalveolar compensation of skeletal discrepancy. The change of teeth position should mask the sagittal discrepancy between maxilla and mandible. Orthodontic camouflage involves fixed appliances combined with extractions in one or both dental arches, functional fixed appliances or a combination of these methods [17]. In order to avoid unwanted teeth movements, in modern orthodontics temporary anchorage devices (TADs) are used for the purpose of enhancing orthodontic anchorage [18, 19]. In this case report a successful orthodontic camouflage of a severe Class II/1 is presented, using fixed orthodontic appliances and TADs.

CASE REPORT
A 26 years old female patient was diagnosed with Class II/1 malocclusion. She already had orthodontic treatment previously with active appliances in early adolescence combined with extractions of upper premolars. Extraoral examination showed lips incompetence, prominent upper incisors, slightly increased height of lower facial third and convex profile with no signs of face asymmetry. Intraoral examination revealed labial inclination of upper incisors, absence of upper premolars with spaces in upper arch, and
metal ceramic crown on tooth 22. In lower arch, right central incisor was congenitally missing, lower canine was in ectopic position and crowding was present. Overjet was 12 mm, overbite on the left side 2 mm, whereas on the right side there was no vertical overlap of the incisors. In the upper arch midline shift of 2 mm to the right side was noted. Intercuspidation of right molars was 1/2 Class II, on the left Class II, whereas on the right side canines were in 1/2 Class III, and on the left 1/2 Class II (Figure 1).

Functional analysis showed nasal respiration. Tongue thrust was noticed and sigmatism while talking. Analysis of symmetry of dental arches showed mesial shift of upper posterior teeth on the left side, and lower posterior teeth on the right side. Cephalometric analysis showed bimaxillary retrognathism with class II relation of maxilla and mandible, ANB angle 7, anterior inclination of maxilla and posterior inclination of mandible, with higher value of SpP/MP angle and lower incisors proclination.

After precise orthodontic diagnosis it was decided to start camouflage therapy with fixed appliances in the upper and lower arch. Since prior orthodontic treatment teeth 14 and 24 were already extracted, treatment plan involved gaining space for midline correction and correct intercuspidation by distalization of posterior teeth on the left side. Conventional fixed appliances were used, brackets with Roth prescription for slot 0.018". In the first phase, overjet slowly decreased by upper teeth movements and diastema closure (Figure 2). After alignment and leveling of the arches and canines intercuspidation correction, two TADs were positioned in anterior region for additional anchorage (Figure 3).

Posterior teeth distalization started with helical bulbous loops for tooth 27, and after 27, teeth 26 and 25 were moved distally using coil springs and power chains. TADs were removed (first on the left side, then on the right), teeth were moved one by one to correct midline shift and save the right inclination of upper incisors, while avoiding losing anchorage. After TAD removal, the therapy continued using class II intermaxillary elastics, and elastics for midline correction. During the night the patient wore headgear with intermaxillary elastics, to avoid unwanted extrusion and additional retroinclination of upper incisors. The therapy was finished after 40 months. Class I occlusion on canines and Class II on molars was achieved, with symmetry of the upper arch, overbite and overjet within normal
values and crowding in the lower arch was solved (Figure 4). Retention plan involved lingual retainer in the upper arch and thermoplastic retainers in both dental arches.

**DISCUSSION**

In this report a successful management of Class II/1 malocclusion is presented in a female adult patient. Although it is one of the most common malocclusions, it is still widely investigated, especially in adult patients. Challenges in adult patients are numerous: oral health condition, need for restorative or periodontal treatment, preparation for dental implants or prosthetic solutions and correction of relapse of prior treatments.

In our case report, the patient was young adult with good oral health and great cooperation during treatment, with appropriate oral hygiene. Good cooperation was important for successful outcome. She was motivated and that was important when deciding to use TADs during treatment. Since upper premolars were extracted prior to the treatment, treatment possibilities were limited. Using TADs in this case was in the space of bone apposition in upper jaw. Enlow and Hans considered this as physiologically optimal region to gain space in upper arch [20]. Tooth positioning in the region with bone apposition should ensure stability of the results and prevent relapse.

Anterior inclination of maxilla and posterior inclination of mandible present additional challenge in adult patients, since extrusion of upper posterior teeth worsens sagittal discrepancy. Comparing the effects of orthodontic camouflage in hyperdivergent Class II/1 malocclusions, Ding et al. recommended additional use of intrusive forces to avoid extrusion of posterior teeth [21]. Extractions in camouflage treatment are not enough for correction of vertical dimension, control and avoiding additional extrusion should provide decrease in vertical dimension [22].

While planning a Class II/1 adult treatment, it is important to consider correction of upper incisors inclination and their influence on soft tissue profile changes. Although this patient already had premolars extracted, retroinclination of upper incisors did not worsen the soft tissue profile; on the contrary, it improved the upper lip position and its relation to the lower lip, since the lips were incompetent before the treatment. Considering the influence of extractions to aesthetic appearance of patients with Class II/1 it has also been noticed that adults faces of patients with extractions of 2 premolars were much more attractive than those without extractions, or with 4 premolars extractions [23]. Also, favorable influence of therapy on soft tissues in this case can be explained that in patients with vertical growth pattern, soft tissue fullness improves less developed skeletal tissues [24]. According to this, retroinclination of upper incisors in this case did not worsen soft tissue profile.

The success in Class II/1 malocclusion treatment depends on numerous factors. Treatment involves individual planning according to oral health status, number of teeth present, severity of skeletal and dental discrepancies and considering patient’s wishes and expectations in order to achieve satisfactory aesthetic and functional results.

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Terapija malokluzije II klase 1. odeljenja kod odraslih pacijenata primenom mini-implantata – prikaz bolesnika

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UVOD
Malokluzije II klase predstavljaju najzastupljenije ortodontske nepravilnosti u populaciji bele rase na globalnom nivou [1, 2]. Na evropskom kontinentu učestalost malokluzije II klase u stalnoj denticiji iznosi 33,5% [1]. Epidemiološka istraživanja na području naše zemlje pokazuju da učestalost ove nepravilnosti iznosi između 23,4 do 54,9% za različite oblasti [3–7]. U našoj populaciji, u populaciji odraslih se sve više primenjuju mini-implantati [18, 19]. U ovom prikazu bolesnika predstavljena je uspešna ortodontska terapija u odnosu na malokluzije II klase kod odraslih pacijenata uz primenu mini-implantata.

PRIKAZ BOLESNIKA
Pacijentkinji starosti 26 godina, nakon kliničkog pregleda, analize studijskih modela i profilnog telerendgena, postavljena je dijagnoza malokluzije II/1 klase, sa incizalnim razmakom od 12 mm. Kliničko prikazivanje predstavljeno je uspešna ortodontska terapija malokluzije II/1 klase kod odrasle pacijentkinje uz primenu mini-implantata. Jezički elemenati uključuju labijalnu inklinaciju gornjih zubnih rijetaka, mnoštvo prskalnog rastka sa kožne površine, glavnu inkompetentnost usana sa prominentnim gornjim zubnim rijetkama. Uočena je hipodoncija u regiji gornjih zubnih rijetaka, a u regiji donjih zubnih rijetaka očito je unutrašnja labijalna inklinacija.

Labijalna inklinacija gornjih zubnih rijetaka sa desne strane i umeđe u regiji gornjih zubnih rijetaka. Glavna inkompetentnost usana sa prominentnim gornjim zubnim rijetkama.

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desne strane je bila ½ II klase, sa leve strane u hiper II klasi, dok je interkuspiracijom očnjaka sa desne strane bila ⅔ III klase, a sa leve strane u ½ II klase (Slika 1).

Funkcionalnim ispitivanjima ustanovljena je nazalna respiracija. Uočeno je tiskanje jezika prilikom gutanja, dok je tokom govorba bio prisutan sitizam. Analizom simetričnosti zubnih nizova ustanovljena je mežijalna pomerena gornjih bočnih zuba, a u levom kvadrantu i donjim bočnih zuba u desnom kvadrantu. Na profilnom telerendgenskom snimku glave postavljena je dijagnoza bimaksilarnog retrognatizma sa međuviličnim odnosom II klase i vrednosti u glavne ANB 7º, antienklinačka maksiile, retinoklinacija mandibuile, sa povećanjem vrednosti uglja SpP/MP i sa proklinačijom donjih sekutića.

Nakon donošenja precizne ortodontske dijagnoze, u dogovoru sa pacijentom odlučeno je da se primeni terapija kamuflaže gornjim i donjim fiškima aparatom. Kako su u prethodnoj terapiji već izvađeni zubi 14 i 24, plan terapije je podrazumijeva da se prvo potrebi za korekciju sredine zubnog niza, a zatim korekcije sagitalne nepravilnosti.

Kontrolnim ispitivanjima očajno bilo je da se postoji veća nestabilnost primljene terapije, a kako je primenjena dijagnoza, u dogovoru sa pacijentom odlučeno je da se primeni terapija kamuflaže gornjim i donjim fiškima aparatom. Kako su u prethodnoj terapiji već izvađeni zubi 14 i 24, plan terapije je podrazumijeva da se prvo potrebi za korekciju sredine zubnog niza, a zatim korekcije sagitalne nepravilnosti.

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