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Sudden, Severe, Idiopathic Occlusal Relationship Change Coexisting with Pain-Related Temporomandibular Disorders: A Case Report

Prikaz pacijentice s temporomandibularnom boli i iznenadnom idiopatskom promjenom okluzijskih odnosa

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Abstract

The article presents a case of a young female patient who sought help due to myofascial pain followed by a sudden occlusal change (anterior open bite (AOB)) that occurred shortly after the administration of a soft night guard that had been previously provided by a general dentist. Palpation of the masseter and temporal muscles elicited the presence of familiar pain. After magnetic resonance imaging of temporomandibular joints, which ruled out disc displacement, the final diagnosis was myalgia. Since the patient had myalgia and malocclusion, the therapy included treatment of both conditions. Temporomandibular disorders TMD management included a combination of pharmacotherapy, kinesiotherapy, and a stabilization splint. After TMD symptoms had resolved, the patient underwent an orthodontic evaluation. Cephalometric analysis revealed skeletal class II, retrognathic face, convex profile, and normal vertical growth pattern. Orthodontic treatment included a fixed appliance with vertical intermaxillary elastics. After 19 months of treatment, both sides achieved acceptable occlusion with Class I. Since the patient had myalgia and severe malocclusion, it was important to follow a systematic diagnostic and therapeutic workflow. Although it is impossible to establish a relationship between TMD symptoms and orthodontic therapy, patients who have TMD symptoms should have their pain resolved through a conservative treatment protocol before commencement of orthodontic treatment. The beginning of orthodontic therapy comes into consideration only when the TMD pain resolves.

Received: June 30, 2022

Accepted: October 26, 2022

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Introduction

The role of occlusion in temporomandibular disorders (TMD) has been a controversial issue. In the past, occlusion was frequently stated as one of the major etiological factors for TMD. Many theories, based on this presumed connection, have advocated the use of therapeutic approaches such as occlusal splint, anterior repositioning splint, occlusal adjustment, etc. In contrast, various dental interventions, including orthodontic treatment, have been considered possible causes of TMD without real evidence (1). New scientific research suggests that TMD is a multifactorial disorder with complex etiopathophysiology (2). The idea that some ortho-

Uvod

Okluzija, ponajprije različite okluzijske anomalije, dugo su se smatrale značajnim uzrokom temporomandibularnih poremećaja (TMP). Danas je njihova uloga u etiologiji TMP-a znatno umanjena, no odnos okluzije i TMP-a i dalje je kontroverzna tema. Zagovornici ideje o povezanosti okluzije i TMP-a smatrali su da liječenje TMP-a treba uključivati trajnu promjenu okluzijskih odnosa (okluzijsko usklađivanje, ortodontsko ili protetičko liječenje itd.). Osim navedenoga, različiti stomatološki zahvati koji mijenjaju okluziju, uključujući ortodontsku terapiju, navode se bez pravih dokaza kao moguću uzroci TMP-a (1).

odontic anomalies are associated with a greater risk for TMD onset (anterior open bite, class II malocclusion, and unilateral posterior crossbite) has been tested previously and to this day this connection has not been confirmed by sufficient evidence. Therefore, it is not believed that TMD results from any particular type of malocclusion (3-5).

The available literature suggests that occlusal changes, especially those occurring abruptly, may be secondary to TMD (5). Such abrupt changes in occlusion are often idiopathic without a clear cause or they may represent a reaction to structural changes in the joints that may appear as a result of joint effusion due to inflammation, condylar degenerative changes, condylar degenerative changes combined with disc displacement, condylar fractures, or changes in muscular contractions and tone (6). One of potential changes which is often observed in combination with TMD, is an open bite. The anterior open bite (AOB) refers to a malocclusion characterized by a lack of teeth contacts in the front teeth area and negative overbite (7). Severe AOB, with just a few contacts in the posterior area, can cause speech and chewing difficulties that may affect a patient's oral health-related quality of life. It may be a consequence of internal derangements of the temporomandibular joint (TMJ) associated, or not, with condylar degeneration. Rarely, this malocclusion is also associated with wearing inadequately fabricated or designed occlusal devices. For instance, an occlusal splint that only partially covers the dental arch leads to the supraeruption of uncovered teeth (8). Negative consequences of inadequate occlusal appliances are relatively common in clinical practice, hence it is important that the patient's existing occlusal scheme is always maintained and not violated by the construction of an appliance (8).

In this case report, we described a sudden, severe, and idiopathic AOB that occurred shortly after the administration of a soft night guard that had been provided by a general dentist to manage the TMD symptoms. Our multidisciplinary approach included first TMD pain management (pharmacotherapy, kinesiotherapy, hard acrylic occlusal splint) followed by orthodontic treatment of AOB (fixed orthodontic appliance).

Case report

A young female patient visited the Department of Prosthodontics at the Clinical Hospital Center Zagreb. Her main complaint began at the age of 18, when she noticed significant pain in the masticatory muscle region on both sides of the face, with a score of 7 on the Numerical Pain Rating Scale (NPRS), as well as limitation of mouth opening with accompanying headache in the temporal region and pain in the teeth in the molar region.

Sometime after the appearance of the first symptoms, she started hearing non-specific sounds in both TMJs. When soreness in the region of the masticatory muscles worsened and the opening of the mouth became restricted the patient went to the family general dentist who provided her with a

Novija znanstvena istraživanja sugeriraju da je TMP multifaktorijsko stanje složene etiologije (2). Određene ortodontske anomalije, poput prednjega otvorenog zagrizu (engl. anterior open bite – AOB), anomalije klase II i unilateralnog križnog zagrizu, pokušale su se dovesti u vezu s TMP-om. Međutim, do danas taj međuodnos nije dokazan pa je točnije tvrditi da te malokluzije vrlo vjerojatno nisu uzrok TMP-a (3 – 5).

No u istraživanjima se sugerira da određene promjene okluzijskih odnosa, osobito one koje se iznenada pojave, mogu nastati kao posljedica TMP-a (5). Takve nagle promjene u okluziji uglavnom su idiopatske bez jasnog uzroka. Rjeđe mogu biti reakcija na strukturne promjene u zglobovima koje se mogu pojaviti kao posljedica izljeva u zglobovima zbog upale, degenerativnih promjena kondila samostalno ili u kombinaciji s pomakom zglobne pločice, prijeloma kondila ili promjena u kontrakciji i tonusu mišića (6).

Jedna od mogućih okluzijskih promjena koja se nerijetko opaža u kombinaciji s TMP-om, jest prednji otvoreni zagriz. Riječ je o okluzijskoj anomaliji koju obilježava nedostatak dodira u području prednjih zuba i negativan vertikalni prijelom (7). Težak oblik prednjega otvorenoga zagrizu s vrlo malo dodira na stražnjim zubima može prouzročiti poteškoće u govoru i žvakanju te ozbiljno utjecati na kvalitetu života povezanu s oralnim zdravljem. Smatra se da može nastati kao posljedica poremećaja temporomandibularnog zgloba (TMZ) koja može, ali i ne mora biti degenerativnog podrijetla.

Prednji otvoreni zagriz katkad se povezuje s upotrebom loše oblikovanih i nepravilno izrađenih okluzijskih naprava. Primjerice, okluzijska udloga koja samo djelomično prekriva zubni niz može prouzročiti nicanje zuba nepokrivenih udlogom (8). Kako su negativne posljedice neadekvatnih okluzijskih naprava razmjerno česte u kliničkoj praksi, važno je paziti da oblik okluzijske naprave ne utječe na postojeću okluziju (8).

U ovom radu opisan je slučaj pacijentice s prednjim otvorenim zagrizom koji se pojavio iznenada i neposredno nakon što joj je u drugoj ustanovi izrađena mekana okluzijska udloga. Naš pristup liječenju bio je multidisciplinarni i podrazumijevao je najprije zbrinjavanje simptoma TMP-a, ponajprije ublažavanje boli (farmakoterapijom i kineziterapijom te okluzijskom udlogom), a poslije toga slijedila je ortodontska terapija prednjega otvorenog zagrizu fiksnom ortodontskom napravom.

Prikaz slučaja

Mlada pacijentica javila se u Zavod za stomatološku protetiku Klinike za stomatologiju KBC-a Zagreb. Njezine tegobe počele su u dobi od 18 godina. Tada joj se pojavila obostrana bol žvačnih mišića koju je na numeričkoj ljestvici boli (engl. numerical pain rating scale – NPRS) ocijenila sa 7, te ograničeno otvaranje usta. Uz navedene simptome povremeno je imala glavobolju u temporalnoj regiji i bolove u kutnjacima. Ubrzo nakon pojave prvih simptoma počela je primjećivati i nespecifične zvukove u oba temporomandibularna zgloba. Zbog bolova žvačnih mišića i ograničenog otvaranja usta pacijentica je posjetila obiteljskog stomatologa koji joj je tada izradio mekanu okluzijsku udlogu. Simptomi se nisu povukli, ali pojavio se novi simptom – nagla promjena u oklu-

soft night guard. After the administration of the soft night guard, the symptoms did not subside and a new symptom appeared: a sudden change in the occlusal relationship. Based on the patient's medical history, 2 months after wearing the night guard, a noticeably open bite appeared which was not present before. The patient said that she was unable to meet her anterior teeth. Yet she did not provide any documentation (photos or plaster models), hence there was no evidence of her original occlusion. However, she submitted a photo that she had taken a few months ago, before the appearance of her first symptoms via Snapchat application, possibly distorted by a photo filter, showing her teeth in what appeared to be a correct bite position.

Diagnosis

Clinical examination - diagnosis of temporomandibular disorders

A TMD expert who was trained in TMD diagnosis performed a complete clinical evaluation of the patient. The diagnosis of TMD was made according to the Diagnostic Criteria for Temporomandibular Disorders (DC/TMD) (9).

The clinical examination consisted of palpation of the masticatory muscles, temporomandibular joints, and surrounding structures, measurements of mandibular movements, and assessment of the presence and nature of TMJ sounds. Examination revealed that the pain was largely located in the left and right masseter muscle area, radiating to the temporal areas. The pain-free opening was 20 mm, and the maximum unassisted opening was 27 mm, both measured at an interincisal distance (Figure 1a). During the maximal opening, familiar pain was present in both masseter muscles (Figure 1b). Familiar pain was also confirmed by palpating masseters bilaterally. Additionally, sounds in the joints were not confirmed. An AOB with no occlusal contacts from the left second molar region to the right second molar region was present. The examination also revealed a visceral swallowing pattern (tongue thrusting). According to the Oral Behavioral Checklist (OBC), which assesses the frequency of oral habits, the patient experienced frequent sleep-related oral behaviors and occasional waking-state oral behaviors, with an overall OBC score of 21 representing a milder risk for TMD.

After clinical examination, an assessment of a previously utilized soft night guard was conducted. The night guard had uneven occlusal contacts (only on second molars) indicating that either patients' occlusal contacts had changed or the appliance had not been constructed in the proper occlusal position (Figure 1c).

Anatomical impressions were taken and stone casts were made and transferred into a semi-adjustable dental articulator ARTEX (Amann Girrbach AG, Koblach, Austria) for additional occlusal analysis and planning of occlusal adjustments.

In order to evaluate muscle function and efficiency by directly and objectively detecting their electrical potentials, surface electromyography (EMG) was performed (Figure 2ab). EMG recordings were taken bilaterally from the masseter and anterior temporal muscles during maximum clenching

zijskim odnosima, odnosno nemogućnost da ostvari kontakt prednjim zubima. Iz anamneze se doznaje da se prednji otvoreni zagriz kojeg prije nije bilo, pojavio dva mjeseca od početka nošenja mekane okluzijske udlage. Pacijentica nije dostavila nikakvu službenu dokumentaciju (fotografije ili sadrene modele) tako da nije bilo dokaza o njezinim izvornim okluzijskim odnosima. Međutim, donijela je privatnu fotografiju, možda iskrivljenu fotofiltrom, koju je snimila nekoliko mjeseci prije pojave prvih simptoma putem aplikacije Snapchat, a na kojoj se vide prednji zubi u, čini se, ispravnom okluzijskom odnosu.

Dijagnostika

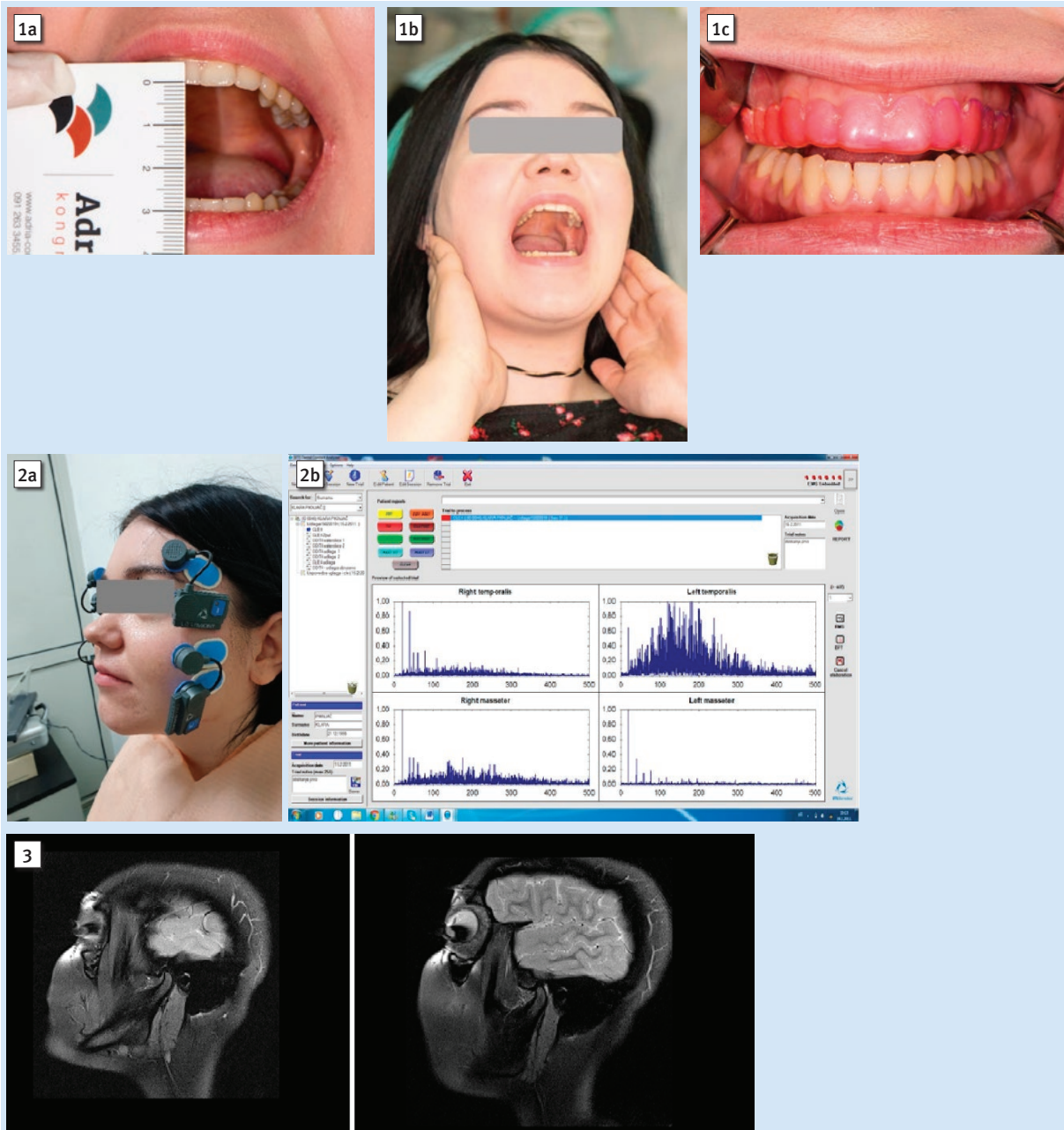
Klinički pregled – postavljanje dijagnoze TMP-a

Pacijenticu je najprije pregledao stručnjak za dijagnostiku i liječenje TMP-a koristeći se dijagnostičkim kriterijem za temporomandibularne poremećaje (DK/TMP). Klinički pregled obuhvatio je palpaciju žvačnih mišića, temporomandibularnih zglobova i okolnih struktura, mjerenje iznosa kretnji donje čeljusti te procjenu prisutnosti i prirode zvukova TMZ-a. Ustanovljeno je da su bolovi uglavnom zahvaćali područje lijevoga i desnoga masetera te se širili u temporalnu regiju. Bezbolno otvaranje usta (najviše koliko je moguće bez osjećanja boli) iznosilo je 20 mm, mjereno interincizalno između zuba 11 i 41, a maksimalno otvaranje usta (najviše koliko je moguće bez obzira na pojavu boli) iznosilo je 27 mm (slika 1. a). Tijekom maksimalnog otvaranja pacijentica je potvrdila pojavu poznate boli u oba maseterična mišića (slika 1. b). Poznatu bol izazvala je i njihova obostrana palpacija. Zvukovi u čeljusnim zglobovima nisu otkriveni. Pregledom okluzije potvrđen je otvoreni zagriz, bez dodira od drugoga lijevog kutnjaka do drugoga desnog kutnjaka, a zapažen je visceralni (infantilni) oblik gutanja. Prema upitniku Popis oralnih navika (engl. Oral Behavioral Checklist – OBC), kojim se procjenjuje prisutnost i učestalost dnevnih i noćnih oralnih parafunkcija, pacijentica je imala česte noćne i povremene dnevne parafunkcije, s ukupnim rezultatom OBC-a 21, što se smatra blažim rizikom za TMP.

Nakon kliničkoga pregleda pristupilo se procjeni njezine mekane okluzijske udlage. Okluzijski dodiri donjih zuba s udlagom nisu bili ravnomjerno raspoređeni, odnosno dodir s udlagom ostvarivali su samo drugi donji kutnjaci što upozorava ili da su se okluzijski dodiri donjih zuba s udlagom promijenili ili da mekana udlaga nije niti bila prilagođena u odgovarajućim okluzijskim odnosima (slika 1. c).

Pacijentici su tada uzeti alginatni otisci te su izliveni sadrene modeli koji su preneseni u poluprilagodljivi artikulatork ARTEX (Amann Girrbach AG, Koblach, Austrija). U artikulatorku je napravljena analiza okluzije i plan selektivnog ubrušavanja.

Zatim je obavljeno elektromiografsko mjerenje (engl. Surface Electromyography – EMG) sa svrhom procijene aktivnosti žvačnih mišića. Na kožu iznad maseteričnoga mišića i prednjeg dijela temporalnog mišića postavljene su površinske elektrode, paralelno s mišićnim vlaknima, da bi se registrirale



- Figure 1 abc** The maximum unassisted opening was measured as the distance between the maxillary and mandibular central incisors and defined as the largest amount of opening that a patient can achieve regardless of pain and discomfort (a); the patient is pointing to the area of pain during the evaluation of mouth opening (b); soft night guard provided by a general dentist (c)
- Slika 1. a, b, c** Maksimalno neasistirano otvaranje najveće je moguće otvaranje usta koje pacijent može postići bez obzira na bol i nelagodnu, mjereno između maksilarnih i mandibularnih središnjih sjekutića (a); pacijent pokazuje na područje boli tijekom procjene opsega otvaranja usta (b); mekana udloga koju je pacijentici izradio obiteljski stomatolog (c)
- Figure 2 ab** Surface electromyography: the electrodes were applied as parallel as possible to the muscle fibers (a); EMG activities of the masticatory muscles during clenching - the strongest activity was recorded for the left temporalis muscle (b)
- Slika 2. a, b** Površinska elektromiografija: elektrode su postavljene duž smjera mišićnih vlakana (a); mioelektrični signali registrirani tijekom maksimalne voljne izometričke kontrakcije u položaju maksimalne interkuspidacije – najjača aktivnost zabilježena je za lijevi temporalni mišić (b)
- Figure 3** Sagittal MR image of a temporomandibular joint taken in the intercuspal position showed a slightly anteriorly positioned disc (left); at maximum opening condyle movement is decreased and the disc in the normal position in relation to the condyle and the articular eminence (right)
- Slika 3.** Na prikazu čeljustnoga zgloba snimljenoga magnetskom rezonancijom u položaju maksimalne interkuspidacije vidljiva je zglobna pločica u blago anteriornom položaju u odnosu prema kondilu (lijevo); pri maksimalnom otvaranju kondila ne doseže do zglobne kvrčice što upućuje na hipomobilnost zgloba, ali je zglobna pločica u normalnom položaju u odnosu prema kondili i zglobnoj kvrčici (desno)



Figure 4 ab Pre-orthodontic treatment extraoral (a) and intraoral (b) photographs
Slika 4. a, b Ekstraoralne (a) i intraoralne (b) fotografije prije ortodonske terapije

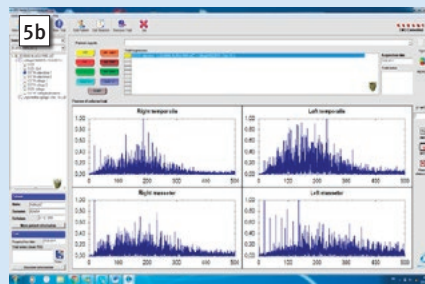


Figure 5 ab Stabilization splint in the patient's mouth (a); EMG activities of the masticatory muscles during clenching with stabilization splint - more balanced activity of the masticatory muscles was observed (b)
Slika 5. a, b Stabilizacijska udloga u ustima pacijentice (a); mioelektrični signali registrirani tijekom maksimalne voljne izometričke kontrakcije u položaju maksimalne interkuspidacije sa stabilizacijskom udlogom u ustima – opaža se uravnoteženija aktivnost žvačnih mišića (b)



Figure 6 ab Progress of orthodontic therapy: 0.016x 0.022" NiTi wire in the upper arch and 0.016" NiTi wire in the lower arch (a); improvement of the anterior open bite due to wearing elastics (b)

Slika 6. a, b Tijek ortodonske terapije: postavljena je 0,016 x 0,022" Ni-Ti žica u gornjem zubnom luku i 0,016" Ni-Ti žica u donjem zubnom luku (a); zahvaljujući intermaksilarnom gumenom vlaklu uspostavljen je odgovarajući prijklop prednjih zuba (b)



Figure 7 ab Post-orthodontic treatment intraoral (a) and extraoral (b) photographs
Slika 7. a, b Intraoralne (a) i ekstraoralne (b) fotografije nakon ortodonske terapije

in the maximum intercuspal position. The electrodes were applied parallel to the muscle fibers. Muscle activity was analyzed during isometric voluntary contractions, with the patient performing maximum-strength occlusion for approximately 5 seconds.

The patient was referred to Magnetic Resonance Imaging (MRI) for further diagnosis. Two experts in MRI diagnosis concluded that the images of the TMJs showed no evidence of bone discontinuity, ruling out the possibility of abrupt degenerative changes in the joint. Both joints showed hypomobility when the mouth was opened. However, a series of slices showed that the disc was in the proper position when the mouth was opened in this manner. Therefore, it was believed that disc displacement was not the cause of limited opening (Figure 3).

After careful evaluation of signs and symptoms and MRI findings the final diagnosis, according to DC/TMD, was myalgia.

Orthodontic examination - diagnosis of the open bite

Clinical examination revealed a slightly convex profile and facial symmetry with competent lips (Figure 4a). Intraorally, the upper right first molar was in class II while the upper left first molar was in class III. Transversal dental relationships were normal. The only occlusal contacts were at the second molars bilaterally (Figure 4b). Overjet was 3 mm, and due to an open bite, the overbite was measured at -2 mm. Tongue thrusting was also present. A plaster model analysis showed no arch length discrepancy. The values for Bolton analysis were 73.8% in the anterior ratio and 89.3% in the overall ratio, hence the discrepancy in the anterior segment was present.

Cephalometric analysis Zagreb 82 MOD revealed a skeletal class II (ANB=5.9°) retrognathic face (n-s-ar=132.6°) with

promjene mišićnih električnih potencijala (slika 2. a b). Mišićna aktivnost analizirana je u položaju maksimalne interkuspidacije tijekom izometričnih voljnih kontrakcija u trajanju od po pet sekunda.

Pacijentica je zatim upućena na magnetsku rezonanciju (MR) u svrhu daljnje dijagnostike. Dva stručnjaka, specijalista radiologije, zaključila su da na MR snimkama oba TMZ-a nema vidljivog diskontinuiteta kosti te su isključili degenerativne promjene čeljusnih zglobova. Na oba čeljusna zgloba bila je uočljiva hipomobilitet pri otvaranju usta. Međutim, pregledom niza MR presjeka bilo je vidljivo da su zglobne pločice oba TMZ-a kod otvorenih usta u pravilnom položaju u odnosu prema kondilu i zglobnoj kvržici (slika 3.). Stoga je vjerojatno da pomak zglobne pločice nije mogao biti uzrok ograničenog otvaranja usta.

Nakon detaljne analize simptoma i kliničkih znakova te uvida u MR temporomandibularnih zglobova konačna dijagnoza prema DK/TMP-u bila je mijalgija.

Ortodontski pregled – dijagnoza otvorenog zagriža

Kliničkim pregledom utvrđen je blago konveksni profil i simetrično lice s kompetentnim usnama (slika 4. a). Intraoralno je gornji desni prvi kutnjak bio u klasi II, a gornji lijevi prvi kutnjak u klasi III. Transverzalni dentalni odnosi bili su normalni. Jedini okluzijski dodiri bili su oni na drugim kutnjacima obostrano (slika 4. b). Pregriz je iznosio 3 mm, a zbog otvorenoga zagriža izmjeren je prijeklop od -2 mm. Uočen je način gutanja s guranjem jezika prema naprijed (infantilno gutanje). Analiza prostora na sadrenim modelima nije pokazala odstupanja. Vrijednosti Boltonove analize bile su 73,8 % u prednjem omjeru i 89,3 % u ukupnom omjeru, što znači da je diskrepancija bila samo u prednjem segmentu.

Prema rendgenskoj kefalometrijskoj analizi Zagreb 82 MOD, pacijentica je imala skeletnu klasu II (ANB = 5,9°),

Table 1 Cephalometric analysis Zagreb 82 MOD
Tablica 1. Rendgenska kefalometrijska analiza Zagreb 82 MOD

Variable • Varijable		Standard value • Standardne vrijednosti	Value • Iznos
Angle of convexity • Kut konveksiteta osealnih struktura	n-A:A-pg	3° ± 5.5°	10.5°
Maxillary plane angle • Nagib maksile	n-s:sp-pm	9.5° ± 3.5°	5.4°
Maxillary prognathism angle • Sagitalni položaj maksile	SNA	81° ± 3.5°	84.2°
Mandibular prognathism angle • Sagitalni položaj mandibule	SNB	78.5° ± 3°	78.3°
Skeletal class • Skeletna klasa i	ANB	2.5° ± 2°	5.9°
Y-axis angle • Kut Y osi	n-s-gn	66.5° ± 3.5°	68.5°
Basal plane angle • Međučeljusni kut	sp-pm : m-go	25° ± 5°	23.7
Saddle angle • Kut fleksije kranijalne baze	n-s-ar	123° ± 5°	132.6°
Articular angle • Zglobni kut	s-ar-go	139.5° ± 6.5°	130.2°
Gonial angle • Mandibularni kut	m-go-ar	127.5° ± 5°	126.2°
Bjork's polygon • Bjorkov poligon		390° ± 5.5°	389.1°
Lower gonial angle • Donji odsječak mandibularnog kuta	n-go-m	73.5° ± 3.5°	71.6°
Upper gonial angle • Gornji odsječak mandibularnog kuta	n-go-ar	54.5° ± 4°	54.6°
Upper incisor inclination • Kut inklinacije gornjih inciziva na bazu maksile	1 : sp-pm	111° ± 5.5°	113.2°
Lower incisor inclination • Kut inklinacije donjih inciziva na bazu mandibule	1 : m-go	92° ± 6°	108.9°
Interincisal angle • Interincizalni kut	1 : 1	131.5° + 7.5°	114.2°
Upper incisor to NA line • Položaj gornjih inciziva na apikalnu bazu maksile	1 : n-A	4.5mm ± 1.5mm	3.9mm
Lower incisor to NB line • Položaj donjih inciziva na apikalnu bazu mandibule	1 : n-B	4.5mm ± 1.5mm	7.9mm
Wits appraisal • Wits procjena		-1.0mm	3.8mm

a convex profile ($10,5^\circ$) and normal vertical growth pattern (10). The maxillary base was counterclockwise rotated ($5,4^\circ$). Lower incisors were labially inclined by $108,9^\circ$ (Table 1).

Treatment

Although there is currently a lack of evidence of a clear link between malocclusion and TMD, we have to consider that the absence of evidence still does not mean evidence of absence. Whenever the treatment protocol includes occlusal changes, a dental intervention must be performed to address the patient's complaints (5). In this case, the treatment involved a multidisciplinary approach with orofacial pain management experts and orthodontists.

Management of temporomandibular pain

The objectives were: i) to minimize pain and ii) to establish a normal function of the lower jaw. The first aim was to immediately ease the amount of pain that the patient was suffering. A combination of ibuprofen 400 mg and a low dosage of diazepam 2 mg was prescribed for 14 days. The patient was instructed to restrict the jaw movement to within painless limits. Additionally, she was educated to perform kinesiotherapy on an everyday basis at least 2 times a day. The treatment protocol consisted of self-administered exercises that included passive muscle stretching (the patient was encouraged to open on a straight opening pathway by looking herself in the mirror), and assisted muscle stretching (the patient was instructed to apply gentle force to the elevator muscles with the fingers in order to increase the amount of mouth opening). The patient had been instructed to stop wearing the old soft night guard.

During the first two weeks of pharmacotherapy and kinesiotherapy, the initial evaluation of the patient showed that the pain in the teeth and temporal region did not subside, hence it was decided to further analyze the occlusion in the articulator. This showed that it was possible to establish contacts in the area of the first molars. Following the prior plan of occlusal adjustments, selective grinding was performed to achieve the maximum number of contacts and alleviate symptoms. Additionally, a maxillary stabilization splint was fabricated on a plaster cast in an articulator. It was a hard acrylic splint (Resilit-S, Erkodent, Siemensstrasse 3, 72285 Pfalzgrafenweiler, Germany) with a thickness of 2 mm at the level of the first molar. The clinician adjusted the splint so that the opposing teeth occluded evenly and simultaneously with the occluding surface of the splint in a comfortable and reproducible physiological position (Figure 5a).

To ensure that muscle activity was balanced when biting on a stabilization splint, the electromyography was performed with the splint in the patient's mouth (Figure 5b). The patient was instructed to use the splint only during sleep.

TMD treatment progress

Further follow-up appointments were performed after the 1st, 2nd, and 5th month of wearing the splint. At the

retrognato lice ($n-s-ar = 132,6^\circ$) s konveksnim profilom ($10,5^\circ$) i normalan vertikalni obrazac rasta (6). Bila je uočena anteriorna rotacija maksile ($5,4^\circ$), uz protruziju donjih sjekutića ($108,9^\circ$) (tablica 1.).

Liječenje

Iako trenutačno nema dokaza o povezanosti malokluzija i TMP-a, uvijek je potrebno uzeti u obzir činjenicu da to što povezanost nije dokazana ne znači da je nužno i nema. Kod pacijenata koji pokazuju, ili su pokazivali simptome TMP-a, liječenju okluzijskih anomalija potrebno je pristupiti uz povećani oprez, a ono je opravdano isključivo ako okluzija smeta pacijentu. Potrebno je izbjegavati nepotrebne i opsežne stomatološke intervencije (5). U opisanom slučaju primijenjen je multidisciplinarni pristup u liječenju. Orofacijalnu bol liječili su stručnjaci za tempormandibularne poremećaje, a prednji otvoreni zagriz specijalisti ortodontije.

Liječenje tempormandibularne boli

Ciljevi su bili:

- i) smanjiti bol i
- ii) uspostaviti normalnu funkciju donje čeljusti.

Da bi se smanjila bol, pacijentici je propisana kombinacija ibuprofena od 400 mg i diazepam od 2 mg tijekom 14 dana te je dobila upute da ograniči pokrete donje čeljusti kako ne bi izazivala dodatnu bol. Nakon toga je, kako bi se što prije uspostavila normalna funkcija donje čeljusti, dobila upute da svakodnevno, najmanje dva puta, obavlja vježbe koje je naučila. Protokol kineziterapije sastojao se od vježbi koje je radila samostalno, a uključivale su pasivno istezanje mišića (otvaranje usta po ravnoj liniji gledajući se u zrcalo) i potpomognuto istezanje mišića (primjena blage sile na mišiće otvarače s prstima da bi se povećao raspon otvaranja usta). Pacijentici je rečeno da odmah prestane nositi staru mekenu udlagu.

Tijekom prva dva tjedna terapije, na kontrolnome pregledu pacijentica je navela da i dalje osjeća bol u području kutnjaka i temporalnih mišića. Zato je prema prethodnoj analizi u artikulatoru, obavljeno selektivno ubrušavanje u ustima sa svrhom da se postigne što veći broj dodira te da bi se ublažili bolni simptomi u zubima. Pacijentici je zatim izrađena stabilizacijska udloga. Riječ je o tvrdoj akrilatnoj pločici (Resilit-S, Erkodent, Siemensstrasse 3, 72285 Pfalzgrafenweiler, Njemačka) debljine 2 mm u području prvog kutnjaka. Specijalist za liječenje TMP-a udlogu je prilagodio i uskladio u ustima. Dodir donjih zuba s površinom udloge bio je ravnomjeran i istodoban, pri čemu se donja čeljust nalazila u ugodnom i ponovljivom položaju (slika 5. a).

Kako bismo bili sigurni da je s udlogom postignuta uravnoteženija aktivnost mišića, ponovno je obavljeno elektromiografsko mjerenje, sada sa stabilizacijskom udlogom u ustima (slika 5. b).

Pacijentica je dobila upute da stabilizacijsku udlogu nosi samo tijekom spavanja.

Tijek terapije TMP-a

Kontrolni pregledi obavljani su nakon prvog, drugog i petog mjeseca nošenja udloge. Prvo značajnije smanjenje

5-month follow-up, the patient reported improvement in symptoms. Pain-free opening amounted to 27 mm intrinsically, while maximum unassisted opening amounted to 29 mm. Occasional pain was still present only during chewing hard food (NPRS=4). Palpation of the masseter muscles did not provoke familiar pain. During the following three months, the patient experienced no recurrence of TMD pain. At the 8-month follow-up, TMD symptoms were almost completely resolved and the patient was ready to start orthodontic therapy.

Orthodontic management

The orthodontic treatment objectives were to: i) correct the open bite, ii) establish correct overjet and overbite, and iii) provide functional and stable occlusion.

When we took into account the patient's financial situation, the only possible treatment was the one that could be covered by a publicly funded healthcare system. That included orthodontic treatment with fixed appliances without using skeletal anchorage which could give us the possibility of posterior molar intrusion followed by mandible autorotation. In this specific case, AOB could have been treated only by camouflage treatment, which included anterior teeth extrusion. Therefore, vertical intermaxillary elastics were used.

Orthodontic treatment progress

Orthodontic treatment with a preadjusted edgewise appliance (Roth prescription .018") started with the bonding of brackets in the upper arch (0.016" NiTi archwire). Due to the presence of AOB, the brackets of upper incisors were bonded 0.5 mm cervically to the standard (center of clinical crown) bonding height (11).

After two months, the brackets in the lower arch were bonded and posterior bite blocks were placed on the upper molars to enhance the intrusion (Figure 6a).

After 6 weeks, there was a visible decrease in the AOB, which was due to extrusion of the anterior teeth and possibly intrusion by the posterior bite blocks and rotation of the occlusal plane and mandible. In theory, the stretched muscles place an intrusive force on the posterior teeth, which in turn helps control eruption and permits an upward and forward autorotation of the mandible (12). At this point, the posterior bite blocks were removed and a stainless steel archwire was placed in the upper arch.

When 0.016x 0.022 stainless steel wires were placed in both arches, the patient was instructed to wear vertical intermaxillary elastics 113 g and 3.2 mm (upper canine - lower canine and first premolar) bilaterally.

When the proper overbite was established, the patient was instructed to wear vertical intermaxillary elastics only during the night (Figure 6b). Because of the anterior tooth size discrepancy, an interproximal enamel reduction of upper incisors was performed. The patient missed 2 appointments due to the COVID-19 pandemic but she wore the elastics during the whole period.

After 19 months of orthodontic treatment, acceptable occlusion with canines and first molars in class I on both sides was achieved without any TMD symptoms. Brackets were debonded, calculus was removed, and fixed lingual retainers

simptoma uočeno je nakon pet mjeseci. Raspon bezbolnoga otvaranja usta povećao se na 27 mm, a maksimalno otvaranje na 29 mm. Povremeni bolovi pojavljivali su se samo tijekom žvakanja tvrde hrane (NPRS = 4). Palpacija mišića više nije izazivala poznatu bol. Tijekom sljedeća tri mjeseca simptomi se nisu pogoršali, a na kontrolnom pregledu nakon osam mjeseci gotovo su se potpuno povukli pa je bilo moguće početi s ortodontskom terapijom.

Ortodontska terapija

Ciljevi su bili:

- i) ispraviti otvoreni zagriz
- ii) uspostaviti ispravan pregriz i prijeklop i
- iii) osigurati funkcijski zadovoljavajuću i stabilnu okluziju.

Zbog financijske situacije pacijentice odlučeno je primijeniti ortodontsku terapiju koju je plaćao javni zdravstveni sustav, što je uključivalo fiksnu napravu uz vertikalni intermaksilarni vlak koji bi kompenzirao prednji otvoreni zagriz. Kako skeletna sidrišta s kojima bi se mogla postići intruzija molara praćena autorotacijom mandibule nisu bila pokrivena sredstvima javnoga zdravstvenog sustava, u opisanom ih slučaju nismo mogli koristiti.

Tijek ortodontske terapije

Terapija fiksnom ortodontskom napravom (*edgewise* naprava, preskripcija prema Rothu .018") počela je postavljanjem bravica u gornjemu zubnom luku (0,016" Ni-Ti žica). Zbog prednjega otvorenog zagriža bravice gornjih sjekutića bile su postavljene 0,5 mm više cervikalno od standardnog položaja koji je inače u središtu kliničke krune zuba (11).

Poslije dva mjeseca postavljene su bravice u donjem luku i modelirani su kompozitni nagrizni platoi na gornje prve kutnjake radi potencijalne intruzije (slika 6. a).

Poslije šest tjedana nagrizni platoi su uklonjeni, a na gornji zubni luk postavljena je čelična žica. Dogodilo se vidljivo smanjenje prednjega otvorenog zagriža, vjerojatno kao posljedica ekstruzije prednjih zuba. Kompozitni nagrizni platoi dodatno su mogli djelovati na intruziju stražnjih zuba te na rotaciju okluzijske ravnine i mandibule. U teoriji nagrizni platoi mogu prouzročiti istezanje mišića koji tada djeluju kao intruzivna sila i kontroliraju erupciju molara te omogućuju rotaciju mandibule prema gore i naprijed.

Nakon postavljanja čelične žice (0,016 x 0,022) u oba zuba luka, pacijentica je dobila upute kako nositi elastični intermaksilarni gumeni vlak (113 g i 3,2 mm obostrano: gornji očnjak – donji očnjak i prvi pretkutnjak).

Nakon što je uspostavljen odgovarajući prijeklop pacijentica je nastavila nositi vertikalni intermaksilarni gumeni vlak samo noću (slika 6. b). Zbog diskrepancije u veličini zuba u prednjem segmentu učinjena je interproksimalna redukcija cakline gornjih sjekutića.

Zbog pandemije bolesti COVID-19 pacijentica je propustila dva pregleda, ali je cijelo vrijeme nosila intermaksilarni gumeni vlak.

Nakon 19 mjeseci ortodontskog liječenja uspostavljena je prihvatljiva okluzija s očnjacima i prvim kutnjacima u klasi I obostrano i bez ikakvih simptoma TMP-a. Bravice su uklo-

from canine to canine were bonded in both arches (Figure 7a). The patient was also instructed to wear Essix retainers during the night.

Extraorally, the improvement of the slight convex profile of the patient was also visible (Figure 7b).

Follow-up appointments during the next 5-month period showed occlusal stability without TMD symptoms.

Discussion

Open bite, with contacts only on the second molars, is an orthodontic anomaly that can cause major problems to the patient and it is quite unlikely that the patient could function in this way without long-term consequences. Contacts present only on the last molars could affect patients' speech, mastication, and self-esteem. Occlusal forces on such a small area could cause changes in periodontal supportive apparatus and tooth wear (13, 14).

Due to the complexity of the problem presented in this article: i) TMD: pain in the masticatory muscles and restricted opening; ii) abrupt change in occlusion: aesthetic appearance, difficulty eating and pain in the teeth, the treatment plan included a multidisciplinary approach involving dental professionals with two specialties. Even though painful TMD was not caused by an open bite, it is important not to exclude that an open bite contributed to the patient's overall poor mental and physical well-being. Nevertheless, AOB was one of the patient's primary complaints with pain in the molars and esthetic concerns overlapping with the myalgia, therefore it was important to treat both conditions.

Possibilities for AOB treatment in adult patients are maxillary impaction or camouflage therapy by posterior intrusion or anterior teeth extrusion. Since skeletal anchorage was introduced, molar intrusion followed by counterclockwise autorotation of the mandible represents the preferred treatment choice (15). However, Ng et al. concluded that although there are many cases and studies of successfully, non-surgically treated open bites, no evidence-based review has been conducted to determine a better option (16). In some countries including the Republic of Croatia, the usage of temporary anchorage devices (TADs) is not included in the publicly funded healthcare system which is why the only possibility for closing the AOB was anterior teeth extrusion. According to the literature, posterior bite blocks can enhance molar intrusion; therefore we used them in combination with intermaxillary elastics (17).

To date, no causal relationship between open bite and TMD or between TMD and orthodontics has been identified (18, 19). Given that the lack of evidence of the presence of a connection does not always conclude to the absence of that connection entirely, open bite and orthodontic treatment cannot be completely excluded as potential cofactors that might contribute to TMD presence or exacerbation. Dental and medical professionals should always try to calm or eliminate symptoms of TMD before initiating interventions involving irreversible changes in occlusion. It would not be desirable to cause more pain by additional manipulations in the mouth when there are safe, reversible ways to achieve

njene, očišćen je zubni kamenac, a u oba zubna luka lingvalno od očnjaka do očnjaka postavljena je fiksna retencija (slika 7. a). Također su izrađene Essix retencijske naprave za retenciju tijekom noći. Ekstraoralno je bilo vidljivo poboljšanje blago konveksnoga profila pacijentice (slika 7. b).

Na kontrolnim pregledima tijekom sljedećih pet mjeseci pacijentica je imala stabilnu okluziju bez simptoma TMP-a.

Rasprava

Prednji otvoreni zagriz s dodirima samo na kutnjacima, ortodonska je anomalija koja pacijentu može prouzročiti velike probleme i gotovo je nemoguće vjerovati da bi itko mogao tako funkcionirati bez dugoročnih posljedica. Dodiri samo na kutnjacima mogu značajno utjecati na govor, žvakanje i samopouzdanje pacijenata, a okluzijske sile na tako maloj površini mogle bi izazvati promjene u parodontnom potpor- nom aparatu i trošenje zuba (12, 13).

Zbog složenosti problema opisanoga u ovom članku:

- i) TMP-a – bolova u žvačnim mišićima (mijalgija) i ograničenog otvaranja usta te
- ii) nagle promjene okluzije – utjecaja na estetski izgled, poteškoća s jelom i bolova u zubima, plan liječenja uključio je multidisciplinarni pristup koji je obuhvatio stomatologe stručnjake iz oba područja. Iako mijalgija najvjerojatnije nije bila prouzročena otvorenim zagrizom, važno je ne isključiti mogućnost da je otvoreni zagriz pridonio ukupnom lošem psihičkom i tjelesnom stanju pacijentice. U opisanom je slučaju otvoreni zagriz, uz mijalgiju, bio primarna tegoba koja je pacijentici izazivala bolove u kutnjacima i estetske probleme, pa je bilo važno liječiti oba stanja.

Mogućnosti liječenja prednjega otvorenog zagriža kod odraslih pacijenata su impakcija maksile ili kompenzacija intruzijom stražnjih ili ekstruzijom prednjih zuba. Otkako je u ortodonciju uvedena opcija skeletnoga sidrišta, intruzija molara nakon koje slijedi anteriorna autorotacija mandibule, preferirani je izbor liječenja (15). Iako postoji mnogo slučajeva i studija u kojima je prikazan uspješan, konzervativno ispravljen otvoreni zagriz, Ng i suradnici zaključili su da nema dokaza o tome koja je od postojećih terapija uspješnija (16). U nekim zemljama, uključujući i Republiku Hrvatsku, uporabu privremenih skeletnih sidrišta ne financira javni zdravstveni sustav, stoga je jedina mogućnost zatvaranja zagriža bila ekstruzija prednjih zuba. Prema podatcima iz literature, stražnji nagrizni platoi mogu pojačati intruziju kutnjaka, zato smo ih upotrebljavali u kombinaciji s intermaksilarnim vlakom (17).

Do danas nije utvrđena uzročna veza između otvorenog zagriža i TMP-a te povezanost TMP-a i ortodonskog liječenja (18, 19). Međutim, nedostatak dokaza o toj vezi ne potvrđuje da te povezanosti uopće nema. Zato se otvoreni zagriz i ortodonska terapija ne mogu potpuno isključiti kao potencijalni kofaktori koji bi mogli pridonijeti razvoju ili pogoršanju TMP-a. Prije nego što se počne s bilo kakvom intervencijom koja uključuje nepovratne promjene u okluziji, potrebno je najprije pokušati ublažiti ili ukloniti simptome TMP-a, prije svega bol. Dodatna manipulacija u ustima može izazvati još

therapeutic success. It is important to note that TMD patients share certain perceptual characteristics that are manifested in increased susceptibility to various changes in the body and thus in occlusion (20-22). Latter might potentially present a problem during orthodontic therapy by both elastics and TADs, hence it is suggested that orthodontic therapy should be closely monitored and performed with caution. Another important issue in the treatment of AOB is the long-term stability of the occlusion with a lack of evidence regarding the stability of different treatment options. Therefore, post-treatment monitoring of patients is very important regardless of the chosen therapy.

When considering the reasons for the sudden opening of the bite in our patient's case it was not possible to confirm the root cause. Since we are not fully aware of the patient's occlusal situation prior to our examination, the initial suspicion was that the bite opened due to the construction of an old soft night guard. Given the splint covered all the teeth, supraeruption of the posterior molars was ruled out. However, the initial data regarding the contacts of lower teeth with the night guard were not recorded, hence we cannot rule out that one of the possible factors that might have contributed to the bite opening was an uneven and unbalanced occlusion. Moreover, there was no control over how much time during the day the patient wore the old night guard. Bereznicki et al. concluded that occlusal changes resulting from inadequately fitted splints are quite common in practice. In their article, they presented guidelines for the treatment of patients fitted with occlusal splints. One of the guidelines states that patients should be regularly monitored and checked for bite changes (8).

Etiologic factors that could cause AOB include sucking habits, mouth breathing, and tongue posture (8). In the case of our patient, the first two factors were excluded. If we eliminate the possibility that the patient just noticed AOB that had existed in her mouth for a longer period of time, because she was more focused on the painful area, the reason for the sudden opening of the bite is probably due to a combination of several complex factors among which could be as follows: old night guard design, tongue thrusting or tongue posture during the rest (23-25). In theory, an unfavorable habit of holding the tongue between the anterior teeth might lead to a constant lack of occlusal contact between the posterior teeth which could possibly lead to posterior teeth supraeruption. However, this theory is based on speculation and is only an idea that may stimulate clinician interest in further research activities.

Conclusion

In this case, we presented a sudden acute open bite of unknown etiology that occurred after the administration of a soft night guard for the treatment of TMD symptoms. Since the patient presented bilateral myalgia and severe malocclusion it was important to follow a systematic diagnostic and therapeutic workflow. The patient was first treated with combined TMD treatment (pharmacotherapy, kinesiotherapy, and stabilization splint). Once the TMD pain has been re-

veću bol. Važno je napomenuti da pacijenti s TMP-om dijele određene perceptivne karakteristike koje se očituju u povećanoj osjetljivosti na različite promjene u tijelu, a time i u okluziji (20 – 22). To posljednje moglo bi biti problem tijekom ortodontske terapije intermaksilarnim vlakom i privremenim skeletnim sidrištima pa se predlaže da se ortodontska terapija pažljivo prati i provodi s oprezom. Bez obzira na vrstu provedene terapije, u liječenju otvorenog zagrizu problem je dugoročna stabilnost okluzije pa ju je važno pratiti nakon provedene terapije.

Razlozi za naglu promjenu okluzije u opisanom slučaju nisu bili jasni. Prvotna ideja bila je da se zagriz otvorio zbog neadekvatnog oblika mekane udlage. No kako je ta udloga pokrivala sve zube, isključena je supraerupcija stražnjih kutnjaka. Nažalost, stomatolog koji je izradio prvu udlogu nije dostavio dokaz o inicijalnim dodirima donjih zuba s mekanom udlogom, kao ni podatak o tome koliko je dugo pacijentica nosila udlogu tijekom dana. Iz tog razloga ne možemo isključiti da su mogući čimbenici koji su pridonijeli otvaranju zagrizu bili neravnomjerna i neuravnotežena okluzija pri nošenju mekane udlage te manjak kontrolnih pregleda tijekom kojih bi se te promjene mogle uočiti i zaustaviti na vrijeme. Bereznicki i suradnici zaključili su da su okluzijske promjene koje nastaju zbog neadekvatno izrađenih udloga u kliničkoj praksi dosta česte. U svojem članku predstavili su smjernice za praćenje pacijenata liječenih okluzijskim udlogama. Jedna od njih jest da pacijente treba redovito pratiti i kontrolirati (20).

Etiološki čimbenici koji mogu prouzročiti pojavu prednjega otvorenog zagrizu jesu navika sisanja, disanje na usta i položaj jezika (20). U opisanom slučaju prva dva čimbenika isključena su na temelju anamneze. Isključimo li mogućnost da je pacijentica samo primijetila nešto što je već dulje postojalo u njezinim ustima jer je bila više usredotočena na bolno područje, taj iznenadni otvoreni zagriz vjerojatno je posljedica kombinacije više složenih čimbenika, ponajprije dizajna stare udlage i infantilnog gutanja te položaja jezika tijekom fiziološkog mirovanja (22, 23). U teoriji, zbog loše navike držanja jezika između prednjih zuba, postoji nedostatak okluzijskih dodira između stražnjih zuba što bi moglo rezultirati supraerupcijom stražnjih zuba. Međutim, ta se teorija temelji na nagađanjima i samo je ideja koja bi mogla potaknuti zanimanje za daljnja istraživanja.

Zaključak

U ovom članku prikazan je slučaj pacijentice s prednjim otvorenim zagrizom nepoznate etiologije koji se pojavio iznenada te neposredno nakon što joj je u drugoj instituciji izrađena mekana udloga. Budući da je pacijentica u trenutku kada se javila nama imala obostranu mijalgiju, tešku malokluziju i glavobolje, bilo je važno slijediti sustavni dijagnostički i terapijski plan rada. Temporomandibularni bolovi liječeni su kombinacijom farmakoterapije i kinezitera-

solved, the commencement of fixed orthodontic therapy to treat AOB was considered. The entire treatment lasted for 2 years and 3 months. A 5-month follow-up showed occlusal stability and only occasional and negligible masticatory muscle pain and headaches.

Funding

This study has been fully supported by the Croatian Science Foundation Project "Genetic polymorphisms and their association with temporomandibular disorders" (No. IP2019-04-6211) and "Young Researchers' Career Development Project – Training of Doctoral Students".

Acknowledgments

The authors thank assistant professor Davor Illeš for providing an electromyographic evaluation of the patient and professor Dijana Zadravec for MRI performance and evaluation.

Conflict of interest

None declared.

Authors' contribution: I.Z.A. – diagnosed and treated temporomandibular pain, coordinated among the teams, wrote and edited the manuscript; S.M. – led orthodontic treatment, participated in writing and editing the manuscript; M.Z. – participated in collecting documentation and writing the manuscript; M.T.Z. – helped with the implementation of orthodontic therapy and participated in the collection of documentation; E.V. – participated in the TMD treatment, participated in the collection of documentation, and wrote the manuscript.

pije te stabilizacijskom udlagom, a nakon što su simptomi TMP-a ublaženi i gotovo potpuno nestali slijedilo je liječenje prednjega otvorenog zagriža fiksnom ortodontskom napravom. Cjelokupna terapija trajala je dvije godine i tri mjeseca. Na kontrolnom pregledu pet mjeseci poslije završetka liječenja ustanovljeno je da su stabilni okluzijski dodiri prisutni na svim zubima te da se bolovi u žvačnim mišićima i glavobolja pojavljuju tek povremeno i zanemarivo su intenziteta.

Financiranje

Studija je u cijelosti financirana u sklopu projekta Hrvatske zaklade za znanost "Genetski polimorfizmi i njihova povezanost s temporomandibularnim poremećajima" (br. IP2019-04-6211) i "Projekta razvoja karijera mladih istraživača – izobrazba doktora znanosti".

Zahvala

Autori zahvaljuju docentu Davoru Illešu na elektromiografskoj evaluaciji pacijentice i prof. Dijani Zadravec na snimanju i nalazu MR-a.

Sukob interesa

Autori izjavljuju da nisu bili u sukobu interesa.

Doprinos autora: I.Z. A. – dijagnosticirala je i liječila temporomandibularnu bol, koordinirala timove te napisala i uredila članak; S. M. – vodila je ortodontsku terapiju te sudjelovala u pisanju i uređivanju članka; M. Z. – sudjelovao je u prikupljanju dokumentacije i pisanju članka; M. T. Z. – pomogla je pri provođenju ortodontske terapije te sudjelovala u prikupljanju dokumentacije; E. V. – sudjelovala je u postupku liječenja TMP-a i prikupljanju dokumentacije te je napisala članak.

Sažetak

Opisan je slučaj mlade pacijentice upućene u Kliniku za stomatologiju Kliničkoga bolničkoga centra Zagreb zbog boli u žvačnim mišićima i iznenadne promjene u okluziji (prednji otvoreni zagriz). Simptomi su se pojavili neposredno nakon što joj je u drugoj zdravstvenoj ustanovi izrađena mekana okluzijska udlaga. Palpacija maseteričnoga i temporalnoga mišića izazvala je pojavu poznate boli, a poslije uvida u nalaz magnetske rezonancije temporomandibularnih zglobova, koja je isključila pomak zglobne pločice, konačna dijagnoza bila je mialgija. Budući da je pacijentica imala i mialgiju i izraženu malokluziju bilo je potrebno liječiti oba stanja. Temporomandibularni bolovi tretirani su kombinacijom farmakoterapije i kineziterapije te stabilizacijskom udlagom. Nakon što su se simptomi smanjili pacijentica je upućena na ortodontski pregled. Rendgenskom kefalometrijskom analizom potvrđena je skeletna klasa II, uz konveksni profil i normalan vertikalni obrazac rasta. Za korekciju prednjega otvorenog zagriža korištena je fiksna ortodontska naprava s intermaksilarnim vertikalnim gumenim vlakom. Nakon 19 mjeseci ortodontske terapije okluzijski odnosi obostrano su bili u Angleovoj klasi I. Iako trenutačno nema dokaza o povezanosti TMP-a i ortodontske terapije, pacijentima koji imaju simptome TMP-a i potrebu za ortodontskim ispravljanjem zagriža potrebno je najprije ublažiti bolove slijedeći konzervativni protokol liječenja. Početak ortodontske terapije dolazi u obzir tek nakon što se bolovi smanje ili nestanu.

Zaprimljen: 30. lipnja 2022.

Prihvaćen: 26. listopada 2022.

Adresa za dopisivanje

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MeSH pojmovi: sindrom temporomandibularne disfunkcije; malokluzija; otvoreni zagriz; mialgija; planiranje zdravstvene skrbi

References

- Greene CS. The etiology of temporomandibular disorders: implications for treatment. *J Orofac Pain*. 2001 Spring;15(2):93-105; discussion 106-16.
- Vrbanović E, Dešković K, Zlendić M, Alajbeg IZ. Profiling of Patients with Temporomandibular Disorders: Experience of One Tertiary Care Center. *Acta Stomatol Croat*. 2021 Jun;55(2):147-158.
- Magnusson T, Egermark I, Carlsson GE. A prospective investigation over two decades on signs and symptoms of temporomandibular disorders and associated variables. A final summary. *Acta Odontol Scand*. 2005 Apr;63(2):99-109.
- Pullinger AG, Seligman DA, Gornbein JA. A multiple logistic regression analysis of the risk and relative odds of temporomandibular disorders as a function of common occlusal features. *J Dent Res*. 1993;72:968-979.
- Michelotti A, Iodice G. The role of orthodontics in temporomandibular disorders. *J Oral Rehabil*. 2010 May;37(6):411-29.
- Chen YJ, Shih TT, Wang JS, Wang HY, Shiau YY. Magnetic resonance images of the temporomandibular joints of patients with acquired open bite. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod*. 2005 Jun;99(6):734-42.

7. Cangialosi TJ. Skeletal morphologic features of anterior open bite. *Am J Orthod.* 1984;85(1):28-36.
8. Bereznicki T, Barry E, Wilson NHF. Unintended changes to the occlusion following the provision of night guards. *Br Dent J.* 2018 Oct 26;225(8):715-722.
9. Schiffman E, Ohrbach R, Truelove E, Look J, Anderson G, et al. Diagnostic Criteria for Temporomandibular Disorders (DC/TMD) for Clinical and Research Applications: recommendations of the International RDC/TMD Consortium Network* and Orofacial Pain Special Interest Group†. *J Oral Facial Pain Headache.* 2014 Winter;28(1):6-27.
10. Muretić Ž. Prijedlog kvantitativnih i kvalitativnih parametara za zagrebačku rentgenkefalometrijsku analizu. *Acta Stomatol Croat.* 1984;18(3):159-176.
11. McLaughlin RP, Bennett JC, Trevisi HJ. Systemized orthodontic treatment mechanics. 1st ed. Edinburgh: Mosby; 2002.
12. Ngan P, Fields HW. Open bite: a review of etiology and management. *Pediatr Dent.* 1997 Mar-Apr;19(2):91-8.
13. Fan J, Caton JG. Occlusal trauma and excessive occlusal forces: Narrative review, case definitions, and diagnostic considerations. *J Periodontol.* 2018 Jun;89 Suppl 1:S214-S222.
14. Passanezi E, Sant'Ana ACP. Role of occlusion in periodontal disease. *Periodontol 2000.* 2019 Feb;79(1):129-150.
15. Park HS, Kwon TG, Kwon OW. Treatment of open bite with microcrew implant anchorage. *Am J Orthod Dentofacial Orthop.* 2004;126(5):627-636.
16. Ng CS, Wong WK, Hagg U. Orthodontic treatment of anterior open bite. *Int J Paediatr Dent.* 2008 Mar;18(2):78-83. Ngan P, Fields HW. Open bite: a review of etiology and management. *Pediatr Dent.* 1997;19(2):91-8.
17. Kim MR, Graber TM, Viana MA. Orthodontics and temporomandibular disorder: a meta-analysis. *Am J Orthod Dentofacial Orthop.* 2002 May;121(5):438-46.
18. Manfredini D, Stellini E, Gracco A, Lombardo L, Nardini LG, Siciliani G. Orthodontics is temporomandibular disorder-neutral. *Angle Orthod.* 2016 Jul;86(4):649-54.
19. Bucci R, Koutris M, Palla S, Sepúlveda Rebaudo GF, Lobbezoo F, Michelotti A. Occlusal tactile acuity in temporomandibular disorder pain patients: A case-control study. *J Oral Rehabil.* 2020 Aug;47(8):923-929.
20. Le Bell Y, Jämsä T, Korri S, Niemi PM, Alanen P. Effect of artificial occlusal interferences depends on previous experience of temporomandibular disorders. *Acta Odontol Scand.* 2002 Aug;60(4):219-22.
21. Le Bell Y, Niemi PM, Jämsä T, Kylmälä M, Alanen P. Subjective reactions to intervention with artificial interferences in subjects with and without a history of temporomandibular disorders. *Acta Odontol Scand.* 2006 Feb;64(1):59-63.
22. Rijpstra C, Lisson JA. Etiology of anterior open bite: a review. *J Orofac Orthop.* 2016 Jul;77(4):281-6.
23. Choi JW, Kim HJ, Moon JW, Kang SH, Tak HJ, Lee SH. Compensatory dentoalveolar supraeruption and occlusal plane cant after botulinum-induced hypotrophy of masticatory closing muscles in juvenile rats. *Arch Oral Biol.* 2019 May;101:34-42.
24. Bresin A. Effects of masticatory muscle function and bite-raising on mandibular morphology in the growing rat. *Swed Dent J Suppl.* 2001;(150):1-49.