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Mogućnosti liječenja mandibulektomiranih pacijenata s temporomandibularnim poremećajem

Treatment Considerations for Mandibulectomy Patients with Temporomandibular Dysfunction

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Sažetak

U radu se opisuje rehabilitacija deformiteta mastikatornog sustava i temporomandibularne disfunkcije (TMD-a) nakon operativnog uklanjanja malignog tumora donje čeljusti i radijacijske terapije regije glave i vrata. Uspješna protetska rehabilitacija i prihvatljivi konačni odnos gornje i donje čeljusti postignuti su zahvaljujući miofunkcionalnoj fizikalnoj terapiji, udlagama za repoziciju, privremenim štitnicima te okluzalnim usklađivanjem ili modifikacijama oblika nadomjestaka. Opisana je protetska opskrba pacijenata s poslijeoperativnim defektima donje čeljusti (nakon hemimandibulektomije) te uloga potporne fizikalne terapije i mioterapije kako bi se ponovno postigla funkcionalna učinkovitost mastikatornog sistema.

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Ključne riječi

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Uvod

Nakon što im se ukloni maligni tumor donje čeljusti, pacijenti mogu imati niz morfoloških tegoba: gubitak facijalnih i čeljusnih struktura te gubitak motoričke i senzoričke inervacije, što može završiti disfunkcijom mastikatornog sistema i poremećajem temporomandibularnoga zgloba.

Učinci onkološke terapije, kirurškoga zahvata i radijacije mogu utjecati na to da se na preostalom tkivima u regiji glave i vrata dogode izrazito jake ireverzibilne promjene. Mogući su poremećaj funkcije mastikatornih i suprahoidnih mišića i ograni-

Introduction

After surgery for malignant tumors of the mandible, patients may exhibit a number of morphological deficiencies: the loss of facial and jaw structures, as well as sensory and motor innervation that may result in dysfunction of the masticatory system and temporomandibular disorders.

The effect of cancer therapy, surgery, and radiation can mean that remaining structures in the head and neck region usually undergo irreversible changes. These permanent changes can be severe. Impairment in the function of the masticatory and su-

čeno pomicanje donje čeljusti, devijacije i svijanja, ili nepovoljan odnos gornje i donje čeljusti uz nedostatak okluzije i kranio-cervikalne pomičnosti ramena (1-5).

Kako raste veličina resekcije, manje je povoljna prognoza za uspješnu protetsku rehabilitaciju pacijenata s mandibulektomijom. Količina preostale kosti i mekog tkiva u području koje nosi protezu utječe izravno na funkcijski nedostatak i probleme u protetskoj opskrbi. Imedijatna ili odgođena rekonstruktivna kirurgija koja se koristi transplantatima kostiju, koštanim nadomjesnim materijalima te implantatima, u velikom broju slučajeva znatno pridonosi poboljšanju kvalitete pacijentova života. (5-7). No, pacijenti sa segmentalnom ili hemimandibulektomijom, bez obzira imaju li ili nemaju kontinuitet kostiju, imaju velika oštećenja u funkciji mastikatornog sustava. Rekonstrukcija kostiju transplantatima ili nadomjesnim materijalom također ne mora uvijek biti uspješna. Oštećenja se, čini se, mogu povezati s rezanjem mišića, njihovim kontrakcijama te ožiljcima nakon zračenja, što dovodi do ipsilateralne funkcije mastikatornih i suprahioidnih mišića. Svi ti čimbenici utječu na nepravilan položaj i pokrete mandibule (5-9). Devijacija i torzija donje čeljusti, zbog poremećenih sila, uglavnom su posljedica djelovanja lateralnog pterigoidnog i suprahioidnog mišića, pa su potrebne specijalne potporne terapije i miofunkcijske vježbe te protetska rehabilitacija (10-13).

Svrha ovog rada je, na dva odabrana slučaja, opisati protetsku terapiju u rehabilitaciji pacijenata s mandibulektomijom te predstaviti potpunu ulogu miofunkcijske rehabilitacije u ponovnom postizanju funkcionalne učinkovitosti mastikatornog sustava.

Klinički prikaz

Prvi pacijent

Muškarac u dobi od 46 godina upućen je na Zavod za protetiku zbog nove proteze i liječenja TMD-a godinu dana nakon što mu je ablativnim kirurškim postupkom uklonjen karcinom skvamoznih stanica te je zračen.

Provedena je hemimandibulektomija i rekonstruktivna terapija koštanim transplantatom s kreste-ilijake te titanskom rekonstruktivnom mrežicom (Slike 1., 2. i 3.). Imao je disfunkciju lijevoga temporomandibularnog zgloba (TMZ-a) te ipsilateralnu aktivnost mišića s ograničenim pokretima mandibule, devijacijom i otvaranjem prema operiranoj stra-

prahyoid muscles, along with a limited pattern of mandibular movement, mandibular deviation and torque, or an improper maxillomandibular relationship with a lack of occlusion as well as cranial - cervical shoulder girdle deficiency can be seen (1-5).

The prognosis for successful prosthodontic rehabilitation of mandibulectomy patients becomes less favorable as the size of the resection increases. The amount of remaining bone and soft tissue in the prosthetic bearing area is related directly to the functional deficiency and to difficulties in prosthetic management. Immediate or delayed reconstructive surgery, performed with bone grafts and/or bone transplants or reconstruction plate and dental metallic implants, in many situations contributed significantly to the patients' quality of life (5-7). However, segmental or hemimandibulectomy patients with mandible continuity defects after successful reconstruction, and those with mandibular discontinuity (with no reconstruction or with failed bone transplants or bone grafts) still exhibit significant impairment of functioning of the masticatory system. Impairment seems to be associated with dissection of the attached muscles, muscle contractions and post-radiation scars resulting in ipsilateral functioning of the masticatory and suprahyoid muscles. These factors all combine to produce an aberrant pattern of mandibular movement and posture (5,7,8,9). Deviation and torque of the mandible due to the powerful displacing forces exerted mostly by the lateral pterygoid and suprahyoid muscles, indicate the need for special supportive therapy and myofunctional training along with prosthodontics (10-13).

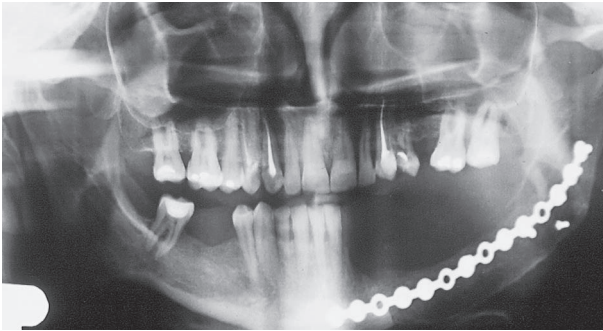
The purpose of the article is to present the role of the prosthodontic therapy in rehabilitation of mandibulectomy patients, and the supporting role of myofunctional training in regaining the functional efficiency of the masticatory system in two selected cases.

Case Report

Patient 1

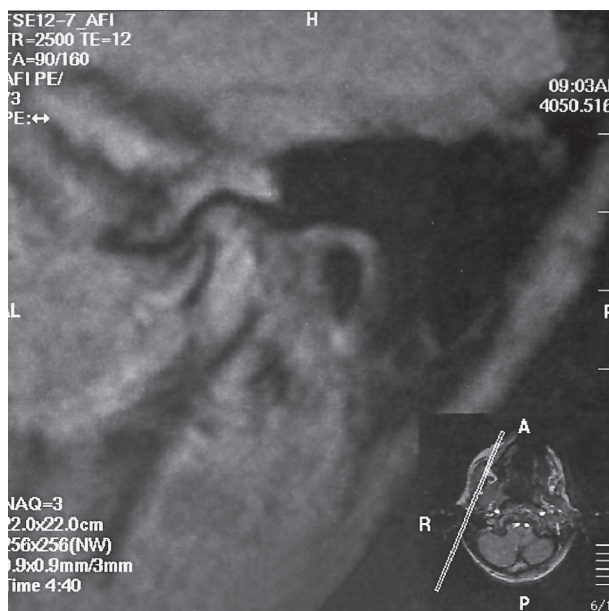
A 46-year-old male one year status-post ablative surgery to remove squamous cell carcinoma and followed by radiotherapy, was referred to Prosthodontic Department for a new denture, and the treatment of temporomandibular disorders.

A hemimandibulectomy and reconstruction with an iliac crest bone graft and with a titanium reconstruction plate was performed (Fig.1, 2, 3). He suffered dysfunction of the left TMJ and exhibited muscles ipsilateral activity limited mandibular movements, deviation on opening toward the operated side. The symptoms included pain, clicking



Slika 1. Pantomogram pacijenta nakon hemimandibulectomije i rekonstrukcije koštanim tranplantatom i titanskom mrežicom. TMD: bol, zvukovi i ograničeni pokreti.

Figure 1 Pantomogram of patient after hemimandibulectomy and reconstruction with bone transplant and titanium plate. Temporomandibular disorders: pain, clicking limited movements.

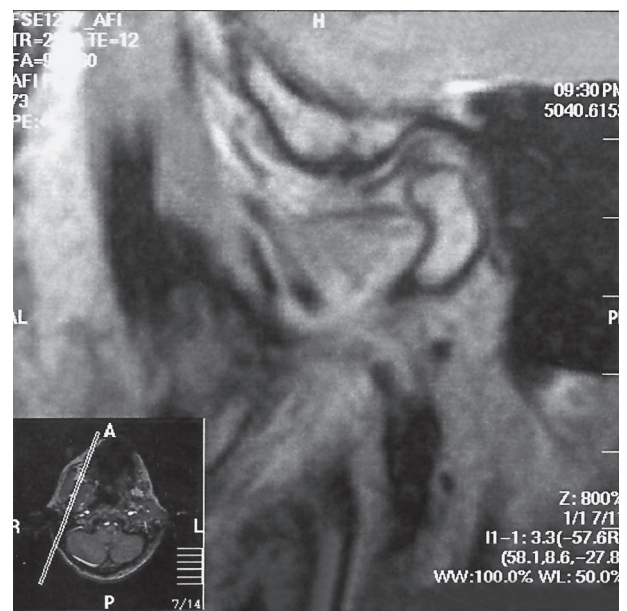


Slika 2. MR snimka u okluziji: erozivne promjene i pomak kondila, traumatski kontakt zglobnih struktura.

Figure 2 MR image in occlusion: erosive changes and displacement of the condyle, traumatic contact of the articular structures.

ni. Simptomi su uključivali bolove, zvukove u zglobovu i trizmus, a klasificirani su kao klasa III prema Helkimovu disfunkcijskom indeksu. Snimanje magnetskom rezonancijom pokazalo je kondilarni pomak, erozivne promjene kondila i traumatski dodir zglobnih struktura.

Kao prva naprava izrađena je repozicijska okluzalna udlaga. Fizikalna terapija i mioterapijski program propisani su kako bi se pomoglo repozicijskoj udlagi da pojača prilagodbu mastikatornog sustava i obnovi okluziju. Pacijent je vježbao tri puta na dan po deset minuta, uz pritisak rukom kako bi olakšao vođenje mandibule i facijalnu simetriju pri otvaranju i zatvaranju. Šest mjeseci kasnije dobio je dje-



Slika 3. Kontrolna MR snimka nakon protetske i fizikalne terapije: nestanak kontakta zglobnih struktura te pravilan odnos kondila i diska.

Figure 3 Control MR after prosthetic and physical treatment: release of articular structures and proper condyle - disk relationship.

and trismus. These symptoms were classified accordingly to Helkimo Dysfunction Index as class III. Magnetic resonance imaging revealed condylar displacement, erosive changes of the condyle and traumatic contact of the articular structures.

The repositioning occlusal splint was made as a first appliance. A physical therapy and myotherapy program was introduced with the help of a repositioning splint to enhance the adaptation of the masticatory system to restored occlusal pattern. A patient exercised muscles (3 times a day for 10 minutes) with hand pressure to help in mandibular guidance and facial symmetry on opening and closing. Six months later a removable partial denture with an occlusal

lomičnu protezu s okluzalnom "rampom" što je, uz vježbe mišića, pomoglo rehabilitaciji pacijenta do funkcionalno prihvatljivoga stanja.

Kontrolna snimka magnetske rezonancije pokazala je pravilan odnos diska i kondila te odvajanje zglobnih struktura. Tijekom četverogodišnjeg praćenja nisu se pojavili simptomi TMD-a. Pacijentu su određene redovite kontrole svakih 4 do 6 mjeseci te je vježbe mišića kako bi se spriječile daljnje komplikacije u okluziji te osigurala funkcija TMZ-a.

Drugi pacijent

Žena (54) kojoj je prije dvije godine uklonjen karcinom skvamoznih stanica upućena je na protetsku opskrbu i liječenje TMD-a (Slika 4.). Operativni zahvat uključivao je hemimandibulektomiju, parcijalnu glosektomiju, traheotomiju i rekonstrukciju muskulokutanim slobodnim režnjem. Pacijentica je također primila kemoterapiju te je bila zračena.

Posljedica su bili diskontinuitet mandibule i teško oštećenje mastikatornog sistema te poslijekirurška i poslijeradijacijska mikrostomija, bol pri otvaranju i ograničeni pokreti.

Simptomi TMD-a su prema Helkmovu disfunkcijskom indeksu ocijenjeni kao Di III. Vertikalni prostor između čeljusti te bukolingvalni sulkus bili su reducirani.

Primijenjena je kombinirana miofunkcionalna i protetska terapija. U uvodnoj fazi određene su vježbe s vestibularnom pločom, a pacijentica je jačala kontrakcije labijalnih mišića (Slika 5.). U korektivnoj fazi postupno je modificiranim dodavanjem akrilata postignuta okluzija i vertikalna dimenzija okluzalnim udlagama s ravnim površinama. Pacijentici je preporučeno da ograniči vertikalne kretanje i zadrži interincizalnu udaljenost na onoj koja je dobivena udlagom (Slika 6.). Istodobno je dobila prelaze akrilatne djelomice mobilne protetske nadomjeske.

Nakon završetka endodontske terapije preostali su zubi skraćeni kako bi se poboljšao odnos krana i korjenova te je izrađena prečka (Slika 7.). Na kraju je izrađena gornja proteza retinirana na prečki i donja totalna proteza (Slika 8.). Donja proteza imala je modificirani oblik s obzirom na poslijekirurško stanje. Protetski nadomjesci bili su udobni i funkcionalno su zadovoljavali.

ramp was constructed and together with performed muscle exercises, a prosthetic restoration provided the patient a functioning oral rehabilitation.

A control MR post treatment revealed a proper disc-condyle relationship and release of the articular structures. TMD symptoms including pain, clicking and/or limited movements were absent over a 4 years of observation period. A regular 4-6 month recall appointment schedule was established. The patient was training the masticatory muscles to prevent further complications in occlusion and to provide TMJ function.

Patient 2

A 54-year-old woman who was operated to remove a squamous cell carcinoma (two years earlier) was referred for prosthetic treatment and temporomandibular disorders therapy. (Fig. 4). A hemimandibulectomy, partial glossectomy, tracheotomy and musculocutaneous free flap reconstruction were performed, and the patient also received chemotherapy and radiation.

Discontinuity of mandible and severe impairment of the masticatory system resulted, as well as postsurgical and postradiation microstomia, pain on opening and limitation of movements.

The patient's TMD symptoms accordingly to Helkimo Dysfunction Index were classified Di III. The interarch vertical space as well as the buccolingual sulcus were reduced.

Combined myofunctional and prosthodontic therapy was applied. In the introductory phase exercises were performed with a vestibular plate with holder and a patient was practising contracting labial muscles (Fig. 5). In the corrective phase a restored occlusion and vertical dimension were obtained in measured steps with occlusal splints with flat surfaces modified by addition of the acrylic resin layers. A patient was instructed to restrict vertical range of motion, to attain an interincisal distance equal to that attained with splint. (Fig. 6) Also transitional acrylic partial dentures were provided at that time.

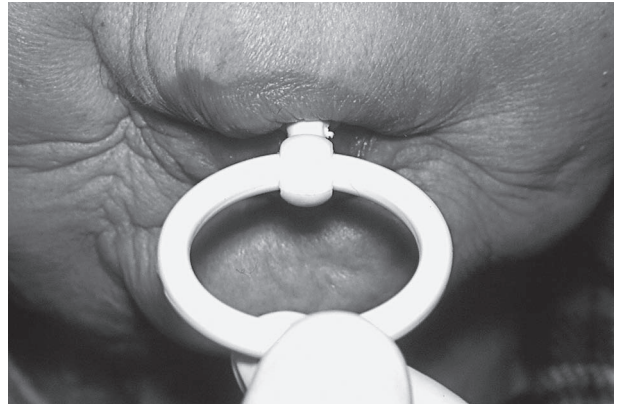
After the completion of endodontics, the remaining teeth were shortened to improve the crown/root ratio and a splinting bar was constructed (Fig. 7). Finally, the bar-retained maxillary overdenture and mandibular complete denture was constructed (Fig. 8). The complete mandibular denture had a modified contour to accommodate the postsurgical anatomic conditions. Prosthetic restorations provided comfort and sufficient function.

The patient was followed up for 5 years on a regular 4-6-month recall appointment schedule. Supportive functional myotherapy was applied after prosthodontic rehabilitation to retrain the muscles and to prevent recurrent contractions.



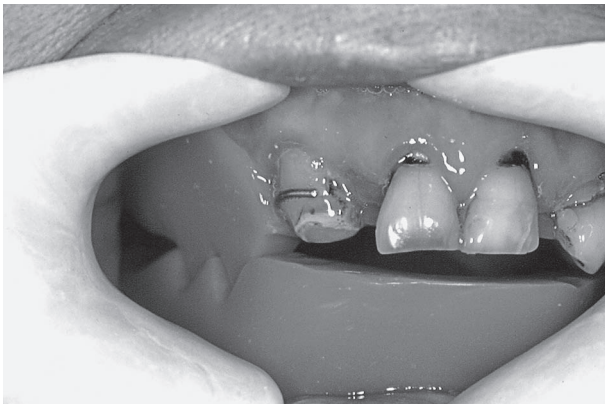
Slika 4. Frontalni pogled na pacijenticu nakon liječenja maligne bolesti: hemimandibulectomija, parcijalna glosektomija, traheotomija i rekonstrukcija muskulokutanim slobodnim režnjem.

Figure 4 Frontal view of patient after cancer treatment: hemimandibulectomy, partial glossectomy, tracheotomy and reconstruction with musculo-cutaneous free flap.



Slika 5. Uvodna faza - vježba uporabe vestibularne naprave s kontrahiranim mišićima.

Figure 5 Introductory phase - practicing using contracted muscles with vestibular device.



Slika 6. Korektivna faza - pacijentica s vestibularnim udlagama; vertikalna se dimenzija polagano povećava.

Figure 6. Corrective phase - patient was provided with occlusal splints, vertical dimension gradually increased,



Slika 7. Pacijentičin status nakon oralne skrbi, endodoncije i osiguranja retencije prečke.

Figure 7 Patient's oral status: after oral care, endodontics, and provision of splint bar with retainers.



Slika 8. Gotovi pričvrsci za prečku, gornji nadomjestak, donja totalna proteza s ograničenom bazom u prihvatljivim okluzijskim odnosima.

Figure 8 Completed bar attachment, maxillary overdenture, and mandibular denture with limited base, in acceptable occlusion.

Rasprava

Protetska rehabilitacija i poboljšanje funkcionalne učinkovitosti mastikatornog sustava kod tih pacijenata rezultirali su ugodnijom funkcijom, nestankom nekih simptoma TMD-a, ljepšim izgledom te boljom kvalitetom života.

No, uspješna rehabilitacija mastikatornog sistema moguća je kod mandibulektomiranih pacijenata samo u određenoj mjeri. Prihvatljivi izgled protetskog nadomjeska i TMD te disfunkcija, osobito su teški u ustima s opsežnom resekcijom kostiju, mišića, susjednih tkiva i struktura TMZ-a (2, 4, 6, 7, 9).

Potporna mioterapijska fizioterapija i električna stimulacija živaca (TENS) te mioterapijski programi trebali bi se uvoditi prije - tijekom protetske opskrbe i nakon nje. Stručnjaci se općenito slažu da suradnja pacijenta tijekom terapije i mišićnih vježbi daje znatan doprinos postizanju prihvatljivih međučeljskih odnosa, nestanku simptoma TMD-a te funkciji (4, 10-13). Protetska rehabilitacija planirana je individualno, no temeljna su načela bila: postupna okluzalna prilagodba, uporaba privremenih ili prolaznih naprava u uvodnoj fazi, a zatim usavršeniji protetski radovi te potrebna dodatna skrb i kontrole (4, 7, 11.). Protetska i fizikalna terapija, mioterapija, vježbe... sve je to bilo potrebno predvidjeti i prilagoditi (u korektivnoj fazi) ovisno o biomehaničkom statusu mišića i morfologije preostalog ili TMZ-a, uz neprestanu procjenu na temelju radioloških pretraga (10, 12).

Zaključak

1. Protetska rehabilitacija s pravodobnim, multidisciplinarnim pristupom važna je u redukciji negativnih posljedica raka povezanih s terapijom malignih bolesti.
2. Potporna terapija i neuromuskularne vježbe u ranoj poslijeoperativnoj fazi olakšavaju protetsku rehabilitaciju te se njima postiže veća terapijska učinkovitost.
3. Individualizirani program fizikalne terapije pomaže da se postignu pravilni međučeljsni odnosi, nestanu simptomi TMD-a te spriječi kontrakcija mišića. Sve to poboljšava proces rehabilitacije pacijenata.

Discussion

Prosthetic rehabilitation and improvement of the functional efficiency of the masticatory system provided the two reported postoperative patients with more comfortable oral function, and release of some TMD symptoms, a better appearance, and an improved quality of life.

However, successful rehabilitation of the masticatory system is reported to obtain in mandibulectomy patients only in limited degree. Acceptable denture fabrication and temporomandibular disorders and dysfunction treatment become extremely difficult in mouth with vast resection of bone, muscles, adjacent tissues and TMJ structures (2, 4, 6, 7, 9).

Supportive physiotherapy, myotherapy and electrical nerve stimulation (TENS) and myotherapy programmes should be introduced before, during and after prosthetic treatment. There is general agreement that patient cooperation in therapy and muscle exercises made a significant contribution to obtaining an acceptable jaw relation, release of TMD symptoms and functioning (4, 10-13). Prosthetic rehabilitative procedures had to be individually planned, but the basic principles were: gradual occlusal rearrangement, using temporary or transitional appliances in the introductory phase, then more elaborate prosthetic constructions, and the necessary after-care therapy and controls (4, 7, 11). Prosthetic and physical therapy, myotherapy, exercises had to be programmed and altered (in the corrective phase) depending on the biomechanical status of the muscles and morphology of the residual (only) or both TMJ, with evaluation on the basis of control radiological examinations (10, 12).

Conclusion

1. Prosthetic rehabilitation with prompt, multidisciplinary management plays an important role in reducing negative consequences of cancer associated with cancer therapy.
2. Supportive therapy and neuromuscular training at an early postoperative stage facilitate prosthetic restoration and make treatment more effective.
3. Individual physical therapy program helps to obtain and maintain proper jaw relationships, to release TMD symptoms and to prevent muscle contraction and enhance the patient's rehabilitative process.

Abstract

This study discusses rehabilitation of masticatory system deformities and temporomandibular dysfunctions (TMD's) following surgery for malignant tumors of the mandible and radiation therapy of the head and neck region. Successful prosthodontic rehabilitation results and acceptable final maxillomandibular relationships were achieved with the help of myofunctional training therapy, repositioning splints, temporary mouth-guard appliances, and occlusal adjustments or modifications of denture design. Prosthodontic treatment of patients with postoperative mandibular defects (following hemi-mandibulectomy) is described, and the role of supporting physiotherapy and myotherapy in regaining functional efficiency of the masticatory system was emphasised.

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Key words

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