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## Protetska rehabilitacija nisko položenih palatofaringealnih reznjeva – prikaz slučaja

### *Prosthetic Intervention for the Management of Low Attached Palatopharyngeal Flaps - A Clinical Report*

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#### Sažetak

U ovom kliničkom prikazu opisuje se zakašnjela protetska rehabilitacija odraslog pacijenta s nazalnim i neadekvatnim govorom zbog rascjepa nepca i niskog hvatišta faringealnih reznjeva. Čini se da je kod takvih pacijenata izrada opturatora terapija izbora nakon što nisu mogući, odbijeni su ili su kontraindicirani daljnji kirurški zahvati.

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#### Ključne riječi

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#### Uvod

Dvojak je uzrok palatofaringealne disfunkcije – mogu je uzrokovati insuficijencija ili inkompetencija (1). Palatofaringealna insuficijencija je disfunkcija palatofaringealnog ventila zbog nedostatka tkiva (2), a palatofaringealna inkompetencija nastaje zbog nepravilne funkcije. Napominjemo da se sintagma palatofaringealna inkompetencija rabi i u opisu neuromuskularnih poremećaja (3,4).

Rječnik protetskih izraza opisuje *palatofaringealnu insuficijenciju* kao *stečeni ili kongenitalni anatomske defekt mekog nepca koji uzrokuje nepravilnosti palatofaringealnog sfinktera* (5). Kongenitalni defekt može biti rascjep usnice i nepca, a stečeni može biti posljedica resekcije palatinalnog tumora. Rascjep nepca najčešći je uzrok za palatofaringealnu insuficijenciju i čini 50 posto svih uzroka (6).

Palatofaringealna insuficijencija može se kirurški ispraviti koristeći se nisko ili visoko položenim reznjevima u odnosu na stražnji zid ždrijela. Visoka insercija reznja omogućuje podizanje i potezanje mekog nepca te normalno zatvaranje nazofarinksa, a niska ograničava pomicanje mekog nepca i uzrokuje nazalni izgovor i teškoće u govoru (7). Dvije su mo-

#### Introduction

Palatopharyngeal dysfunction may take place due to insufficiency or incompetence (1). Palatopharyngeal insufficiency is a dysfunction of the palatopharyngeal valve due to lack of tissue (2), whereas palatopharyngeal incompetence is a dysfunction due to lack of proper movement. Furthermore, the term palatopharyngeal incompetence is used to describe dysfunction due to neuromuscular disorders (3-4).

The Glossary of Prosthodontic Terms defines *palatopharyngeal insufficiency* as “an acquired or congenital anatomic defect of the soft palate that makes the palatopharyngeal sphincter incomplete” (5). The congenital defect can be a cleft lip and palate, whereas the acquired defect can be a palatal tumor resection. Cleft palate is one of the most common causes of palatopharyngeal insufficiency accounting for more than 50% of all cases (6).

Palatopharyngeal insufficiency can be restored surgically either by a high or a low attached flap, based on the location of flap attachment to the posterior pharyngeal wall. The high-based palatal flap will tend to elevate and pull the soft palate toward the area of normal closure in the nasopharynx,

gućnosti za korekciju niske insercije palatofaringealnog reznja – kirurški zahvat ili protetska rehabilitacija opturatorom (8, 9). Kada se postigne zadovoljavajuća funkcionalnost protetskog pomagala, ponovno su potrebne govorne vježbe dok se ne postigne odgovarajuća kvaliteta izgovora (10).

Svrha ovog prikaza jest opisati odgođenu protetsku rehabilitaciju dvostrukim opturatorom kod pacijenta s nisko položenim palatofaringealnim reznjem.

## Prikaz slučaja

Tridesetogodišnji pacijent došao je na zahtjev oralnog i maksilofacijalnog kirurga zbog govornih problema nakon kirurške korekcije rascjepa nepca u ranom djetinjstvu. Nazalni izgovor i nerazumljivost zbog nisko položenog faringealnog reznja zahtijevali su protetsku rehabilitaciju, posebice zato što je pacijent odbio kiruršku korekciju. Nazalnost je bila dosta izražena i godinama je utjecala na njegov privatni i profesionalni život. U terapiji nazalnog izgovora sudjelovali su logoped, dva protetičara i jedan stomatolog.

Intraoralnim pregledom ustanovljen je nedostatak prvoga lijevog gornjočeljusnog kutnjaka (maksilarnog molara), drugoga desnog donjočeljusnog pretkutnjaka (mandibularnog premolara), drugoga lijevog pretkutnjaka (premolara) i prvoga lijevog kutnjaka (molara) te nisko položeni ždrijelni (faringealni) rezanj i meko nepce. Dva lateralna otvora za disanje bila su veća nego što bi se očekivalo, uzrokujući nazalnost i nerazumljivost u govoru (slika 1.) Tijekom govora uočena je ograničena pomičnost mekog nepca. Terapija je uključivala djelomičnu maksilarnu protezu s dvostrukim opturatorom te djelomičnu mandibularnu protezu.

Za gornju čeljust uzet je preliminarni dijagnostički otisak ireverzibilnim hidrokoloidom (Blueprint Cremix, Dentsply De Trey GmbH, Konstanz, Njemačka) kako bi se odredila krajnja distalna granica palatinalnog tkiva. Izliven je u sadri tipa III (Whip Mix Corp., Louisville, KY, SAD). Kad se odljev stvrdnuo, na njemu je izrađena individualna žlica od materijala Triad VLC (Dentsply international, Inc., York, PA, SAD) s perforacijama radi bolje retencije otisnog materijala. Na njezinu stražnjem rubu postavljene su dvije žičane petlje na mjestu gdje se nalaze otvori u nepcu. Žičane petlje služe kao nosači termoplastične otisne mase (Sybron/Kerr, Romulus, Michigan, SAD) koja se rabi za otiskivanje otvora u nepcu (slika 2.a). Nakon otiskivanja nepčanog otvora uzet je još jedan otisak maksile ireverzibilnim hidrokoloidom kako bi se proizveo master-model (slika 2.b). Taj je model izliven u sadri tipa IV (Whip Mix Corp., Louisville, KY, SAD). Zadnja trećina svakog palatinalnog produžetka uklonjena je pod kutom od 45° kako bi se poklapali s otiscima nepčanih otvora te tako zatvorili nazofarinks (slika 3.).

Na tom master-modelu izrađena je djelomična proteza koja se sastojala od velike spojke u obliku slova *U* s 18 zavarenih žica u petlji od 45° kojoj je funkcija bila potpora konačnom otisnom materijalu za otvore na nepcu. Retencija je postignuta zahvaljujući Akerovim/Bakerovim obuhvatnim kopčama (slika 4.).

whereas the low-based flap will restrict palatal elevation, and result in hypernasality and speech problems (7). To further restore the low based palatal flap and the resulting hypernasality, two treatment options can be followed: another surgical correction or prosthetic rehabilitation via obturator prosthesis (8, 9). Once functionality is achieved, speech therapy is initiated until acceptable speech is produced (10).

The purpose of this report is to present the delayed prosthetic management of a patient with a low attached palatopharyngeal flap via double obturator prosthesis.

## Case Report

A 30-year-old male patient was referred to the clinic by his oral and maxillofacial surgeon because of speech problems following surgical correction of his cleft palate in early childhood. Specifically, the patient presented with hypernasality, and impaired speech intelligibility due to a low attached pharyngeal flap, and required prosthodontic treatment since he refused another surgical intervention. The hypernasal speech was quite noticeable affecting the patient's personal and professional life for many years. Hypernasality and nasal escape were assessed by perceptual evaluation and involved a speech therapist, two prosthodontists and one dentist.

Intraoral examination showed missing maxillary left first molar, mandibular right second premolar, left second premolar, left first molar and a low attached pharyngeal flap with soft palate tethered inferiorly. The two lateral breathing orifices were larger than anticipated causing hypernasality and speech impairment (Figure 1). During speech, palatal mobility and elevation were reduced. The treatment plan included a cast RPD maxillary double obturator prosthesis and a mandibular RPD prosthesis, replacing all missing teeth.

A preliminary diagnostic irreversible hydrocolloid impression (Blueprint Cremix, Dentsply De Trey GmbH, Konstanz, Germany) was taken for the maxillary arch, recording the foremost posterior border of the palatal tissues. Type III stone (Whip Mix Corp., Louisville, KY, USA) was poured into the impression in order to obtain the preliminary diagnostic cast. On this cast, a custom tray was fabricated from Triad VLC resin (Dentsply international, Inc., York, PA, USA) which was perforated for maximum impression material retention. On the posterior borders of the custom tray, two wire loops were attached according to the orifices location, to carry the border molding green stick compound material (Sybron/Kerr, Romulus, Michigan, USA), which would be used for their impression (Figure 2a). After orifices impression was completed, an irreversible hydrocolloid maxillary impression was taken to create the master cast (Figure 2b). The master cast was poured in type IV dental stone (Whip Mix Corp., Louisville, KY, USA) and the last third of each palatal extension was removed in a 45° angle upwards, to extend superiorly with our final orifice impression, creating a normal closure in the nasopharynx (Figure 3).

The cast RPD framework was fabricated on the master cast and consisted of a U-shaped palatal major connector and two 18 gauge wires soldered posteriorly, ending in a 45° loop, which would carry the orifice final impression material. Re-



Slika 1. Intraoralni nalaz

Figure 1 Intraoral view

Slika 2.a Otisci rubova lateralnih otvora kompozicijskim materijalom

Figure 2a Border molding compound impressions of the lateral orifices

Slika 2.b Otisci ireverzibilnim hidrokolooidom

Figure 2b Irreversible hydrocolloid impression

Slika 3. Modifikacije glavnog modela

Figure 3 Master cast modification

Slika 4. Kostur djelomične proteze sa zavarenim retencijskim žicama

Figure 4 RPD obturator framework with retention wires soldered

Slika 5. Konačni otisci otvora

Figure 5 Final orifice impressions

Slika 6.a Promijenjeni otisak

Figure 6a Altered cast

Slika 6.b Sadreni indeks

Figure 6b Plaster index

Slika 7. Završeni akrilatni dvostruki opturator

Figure 7 Finished acrylic resin double obturators

Slika 8. Indikacijska pasta za potisak s ciljem uklanjanja mjesta prekomjeronog pritiska

Figure 8 PIP paste to relieve pressure areas

Slika 9. Proteza s dvostrukim opturatorom postavljena u usta

Figure 9 Final double obturator prosthesis in place



Zadnji otisak nepčanih otvora napravljen je termoplastičnim voskom (Adaptol, J. F. Jelenko & Co. Inc., Armonk, N.Y., SAD) (11) najprije omekšanim u toploj vodi, a zatim nanesenim na protezu. Nakon toga proteza je umetnuta u usta te je pacijentu naredeno da proguta slinu u sljedećih pet minuta izvodi specifične kretnje. Nakon toga proteza je uklonjena i pet minuta hlađena vodom (slika 5.).

Poslije otiskivanja otisci su prilagođeni posebnom tehnikom kako bi se uskladili odnosi mekih (nepčani otvori) i tvrdih tkiva (zuba) (slika 6.a).

Modeli su izliveni u tvrdom gipsu (Moldafix, Heraeus Kultzer GmbH & Co KG, Hanau, Njemačka) u kojem su uspješno reproducirani otisnuti otvori u nazofarinksu. Konačna proteza s dvostrukim opturatorom izrađena je od autoakrilata (Selectaplus, Dentsply international, Inc., York, PA, SAD) (slika 7.). Posebna otisna masa osjetljiva na pritisak korištena je kako bi se otisnula područja pritiska sluznice za vrijeme funkcije i govora (slika 8.).

Pacijent je dobio upute o nošenju i održavanju djelomične proteze kao i svi ostali korisnici takvog pomagala (12).

Vrlo brzo logoped je uočio znatan napredak u govoru, a pacijent je bio zadovoljan protetskim radom (slika 9).

## Rasprava

Najčešći problem kod izrade protetskih radova za pacijente s niskom insercijom faringealnog reznja jest dosegnuti mjesto nazofarinksa kako bi se osiguralo brtvljenje opturatorom (13). Obično se tom pločicom najbolje zatvaraju oba otvora kako bi se osiguralo optimalno pomicanje mekih tkiva. Ponekad je iznimno teško izbjeći doticaj nepokretnih tkiva farinksa s opturatorom, što uzrokuje nazalni izgovor i otežava disanje kroz nos. Takvi opturatori zahtijevaju povremeno prilagođavanje (14).

U literaturi se ističe da 200 protetskih terapija rascjepa nepca opturatorom završava u 95 posto slučajeva uspješnom eliminacijom nazalnog izgovora (15).

U ovom kliničkom prikazu opisuje se izrada opturатора koji seže u nepčane otvore te tako reducira prolazak zraka kroz otvore i sprječava nazalnost.

Smjernice za optimalnu rekonstrukciju funkcije i govora kod palatofaringealne insuficijencije su sljedeće:

- 1.) gornje izbočenje treba biti locirano na mjestu nazofarinksa gdje se nepce prirodno zatvara;
- 2.) donje izbočenje treba biti nastavak nepca i mora biti konkavno kako bi se osiguralo dovoljno mjesta za jezik;
- 3.) donji rub treba biti u području maksimalne faringealne aktivnosti;
- 4.) gornje površine trebaju biti konveksne i polirane kako bi se spriječio cijedenje nosnih iscedaka u orofarinks (16). Prednosti opisanih protetskih mjera su:
  - a) ne zahtijevaju kirurške zahvate, pa nema traume tkiva, cijeljenja i postkirurške psihološke rehabilitacije (17, 18),

attention was provided by Aker's circumferential clasps (Figure 4).

A mouth temperature thermoplastic wax (Adaptol, J. F. Jelenko & Co. Inc., Armonk, N.Y., USA) was used for the orifices final impression (11). The wax was tempered in warm water, and the prosthesis was inserted in the mouth. The patient was instructed to swallow and perform border head movements for 5 minutes. The prosthesis was removed and cooled with cold water (Figure 5).

The altered cast technique was used to accurately relate the soft tissues (orifices) with the hard dental tissues (teeth) (Figure 6a).

A plaster index (Moldafix, Heraeus Kultzer GmbH & Co KG, Hanau, Germany) was used for the fabrication of each obturator extension in the nasopharynx (Figure 6b). The final double obturator prosthesis was made from autopolymerized acrylic resin (Selectaplus, Dentsply international, Inc., York, PA, USA) (Figure 7). Pressure indicator paste (PIP) was used to indicate pressure areas during speech and function (Figure 8).

Post-insertion instructions, which were similar to the instructions given to any RPD wearer, were given to the patient (12).

Speech evaluation from the speech therapist recorded a significant improvement as well as patient's satisfaction with the prosthesis (Figure 9).

## Discussion

The most common problem in case of a low-based pharyngeal flap is to access the area of normal closure in the nasopharynx with the obturator prosthesis (13). Usually the remaining two orifices are closed via obturator extensions superiorly to reach the area of optimal tissue motion. It becomes very difficult to avoid contact with immobile pharyngeal tissues below the level of optimum motion, creating hyponasality and restricting nasal breathing. Periodic adjustments are required for these obturators (14).

The literature reports a review of the outcome management of 200 patients with cleft palate and found that 95% were able to eliminate both hypernasality and nasal emission distortions in speech through prosthetic management (15).

This clinical report presented the fabrication of an obturator prosthesis that extends superiorly into the orifice area, reducing air escape and therefore hypernasality.

The guidelines for optimal restoration of function and speech in palatopharyngeal insufficiency cases are the following: 1) Superior extension should be located in the nasopharynx at the level of normal palatal closure. 2) Inferior extension should be a continuation of the palatal plane and should be concave to provide adequate space for tongue movement. 3) Inferior margin should be placed at the region of maximum pharyngeal activity. 4) Superior surface should be convex and polished to deflect nasal secretions into the oropharynx (16).

The advantages of the described prosthetic management are as follows: a) it involves no surgical procedure, therefore, no trauma, no healing time and postsurgical psychological

- b) protetski tretman je jednostavan, neinvazivan i ima mnogo opcija,
- c) rješenje je brzo i ekonomično,
- d) palatofaringealni opturator rješava problem nazalnog izgovora i nedostatka zuba u gornjoj čeljusti s pomoću djelomične proteze.

U literaturi je spomenuto da uspjeh tretmana opturatorom ovisi i o broju maksilarnih zuba jer pridonose boljoj retenciji djelomične proteze (19, 20).

Treba istaknuti da je za takve pacijente potrebna procjena govora zato što se trebaju priviknuti na svakodnevno korištenje opturatora. Zadaća te pločice jest jačati posteriorni faringealni zid kako bi što bolje prijanjala i kako bi se protok zraka sveo na minimum (7).

## Zaključak

Specijalist protetičar vrlo je važan u liječenju simptoma palatofaringealne insuficijencije. Ako je proteza pravilno napravljena, pacijentu se mogu poboljšati funkcije mastikacije, gutanja i govora. Palatofaringealni opturator smanjuje protok zraka, povećava pritisak i poboljšava kvalitetu glasa i govora. I što je najvažnije – poboljšava pacijentovo samopouzdanje. Odabir pacijenata za palatofaringealnu rehabilitaciju ključ je uspjeha terapije. Protetski kriteriji za uspješnu terapiju uključuju zdrava oralna tkiva, adekvatnu retenciju i stabilizaciju proteze i suglasnost pacijenta, ali ne smije se pojavljivati ni pretjerani refleks na povraćanje.

rehabilitation (17, 18), b) the prosthodontic treatment is simple, noninvasive and versatile, c) offers a quick, and economical solution to the problem and d) the palatopharyngeal obturator addresses both hypernasality and edentulousness problems serving as partial denture replacing maxillary missing teeth. It has been supported that treatment success when using these appliances depends on the number of maxillary teeth present that can provide retention for the prosthesis (19, 20).

Nevertheless, it should be emphasized, that speech evaluation and probable therapy is required for these patients, since they have to adapt the obturator into their speech and language pattern. More specifically, the task is to strengthen the posterior pharyngeal walls in order to better adapt to the obturator prosthesis and minimize air escape (7).

## Conclusion

The prosthodontist plays a vital role in the management of palatopharyngeal disorders as vital functions of mastication, deglutition, and speech production can be restored with the help of prosthesis. The palatopharyngeal obturator prosthesis decreases nasal air flow, increases oral pressure for consonant articulation and improves voice quality. Above all, it contributes to improving the patient's self-esteem. Patient selection is the key to success in prosthodontic management of palatopharyngeal disorders. The prosthodontic criteria of patient selection are healthy oral tissues, adequate retention and stability of the prosthesis, patient compliance, and no excessive gag reflex.

### Abstract

This clinical report describes a delayed prosthetic management of an adult cleft palate patient, in order to treat hypernasality and inadequate speech pattern associated with the employment of low attached pharyngeal flap. Obturator construction seems to be the treatment of choice for this group of cleft palate patients when further pharyngeal surgery is contraindicated or denied.

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### Key words

Palatopharyngeal Flaps; Prosthetic Intervention; Obturator

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