Functional and Aesthetic Rehabilitation of Patients with Oncologic Defects of Lower Oral Cavity. Part Two: Prosthetic Reconstruction

Funkcionalna i estetska rehabilitacija pacijenata s onkološkim defektima donjeg dijela usne šupljine. Drugi dio: protetska rekonstrukcija

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Summary

Prosthetic rehabilitation of patients with defects following lower oral cavity cancer resection is described. Twenty patients underwent preprosthetic corrective surgical intervention, i.e. transplantation of split thickness skin graft, as the construction of an adequate prosthesis in the area of tumor resection was not possible due to unfavorable anatomic conditions. As the main problem encountered during prosthetic reconstruction is the registration of intermaxillary relations, denture fabrication was therefore performed in two stages: the base of the prosthesis was fabricated first, followed by the determination of the vertical dimension in rest position while centric relation was determined manually by guiding the mandible into the most advantageous position to the maxilla. The obtained results were both subjectively and objectively satisfactory, suggesting that in patients in which prosthetic rehabilitation is not possible due to postoperative oncologic defects of the lower oral cavity, a preprosthetic corrective surgical intervention (facilitating tongue mobility and extension of denture bearing area) and a specific prosthetic procedure (determination of optimal intermaxillary relations) are the main prerequisites for effective prosthetic rehabilitation.

Key words: *postoperative oncologic defects, lower oral cavity, preprosthetic split thickness skin grafting, prosthetic rehabilitation*

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Introduction

After resection of lower oral cavity cancer[1] (with or without radical neck dissection), the main characteristics of postoperative defects are fixation of the tongue, reduction of the sulci, bone loss, scars and decreased intraoral space, which compromise the functions of mastication and speech, and make the prosthetic rehabilitation difficult or even impossible. A preprosthetic surgical correction is therefore necessary in some patients (Fig. 1).

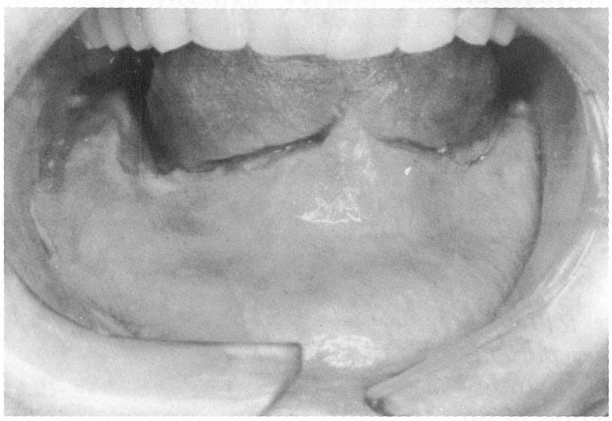


Figure 1. *Lower oral cavity oncologic defect after preprosthetic vestibuloplasty with split thickness skin grafting: tongue mobility and wide denture bearing area are clearly seen*

Slika 1. *Donji dio usne šupljine s onkološkim defektom nakon pretprotetske vestibuloplastike sa slobodnim kožnim transplantatom poludebljine: mobilnost jezika i široko područje ležišta proteze jasno su prikazani*

The problem of prosthetic rehabilitation after resection of lower oral cavity cancer is still actual, because postoperative conditions in the oral cavity differ so that there is no uniform prosthetic method for all patients.

Most cancers of the lower oral cavity are so localized that their extraction requires resection of the tongue, the floor of the mouth and even a part of the mandible. The severity of functional damage and cosmetic disfiguration depends on tumor localization and extent of surgical resection. Apart from facial disfigurement, speech difficulties, problems in chewing and gulping, and damaged sensory and motor innervation of lower lip, main obstacles from the prosthetic standpoint to the prognostically favorable prosthetic rehabilitation are tongue fixation, cicatrization and decrease of intraoral space. (4) In some patients, it is absolutely impossible to consider any prosthetic rehabilitation.

Therefore, in twenty of our patients corrective preprosthetic interventions were performed to make the tongue mobile and to provide for a wide denture bearing area by transplanting a split thickness skin graft. (3)

Patients and Methods

On tumor resection, continuity of the mandibular arch was maintained and preprosthetic surgical correction needed for prosthetic rehabilitation was performed in all patients. (3) The rehabilitation started two weeks after the preprosthetic correction. Seventeen patients were edentulous and three had several teeth. Eventually, rigid major connectors and occlusal rests were considered to direct the masticatory forces along the longer axis of the teeth. Maximal support from the newly formed attached, immobile surface of transplanted skin was exploited by the lingual and vestibular extension of the prosthesis base bilaterally, especially on the healthy side.

With previous impression, the maximal extension was compromised, and in edentulous patients the objective of master impression was the same as in conventional prosthetics, i.e. to provide retention and stability of prostheses. (2)

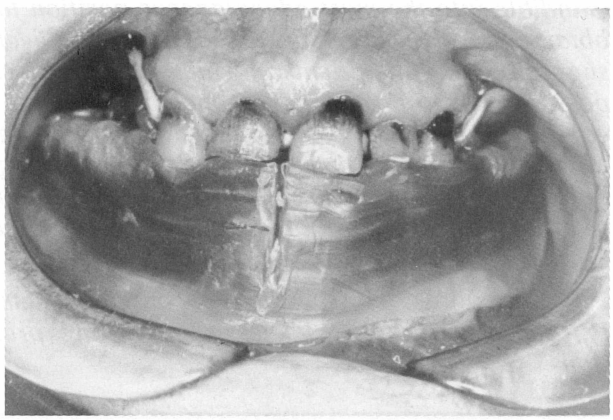


Figure 2. *Determination of vertical intermaxillary relationship and registration of centric relation with wax rims on finished denture base*

Slika 2. *Određivanje vertikalnih intermaksilarnih odnosa i registracija centrične relacije s voštanim grebenom na bazi proteze*

[1] Oncologic defect of lower oral cavity = intraoral defect after resection of a cancer localized under the incisal and occlusal surfaces of lower teeth, including the mandible, the vestibular sulcus, the floor of the mouth and the tongue.

Vertical dimension of the occlusion is difficult to determine due to damaged motor and sensory functions, and disturbed proprioceptive mechanisms and mobility of wax rims. Therefore, the acrylic base of the prosthesis was made before and then after testing the peripheral seal efficiency. The centric relation and vertical dimension of the rest were determined by placing the mandible in the most advantageous position (Fig. 2).

After determination of the horizontal and vertical relations of the upper and lower jaws, the casts were mounted on a SAM articulator[2], as previously described. (6, 7) The anterior and posterior teeth were put in the normal anatomical position (Fig. 3). In case of any mandibular deviation or retrusion, the anterior upper teeth were placed more lingually and the anterior lower teeth more labially than in normal, usual circumstances. (1) When the position of the teeth was defined and ascertained, the prostheses were processed as usual (Fig. 4). Then they were adjusted and delivered to the patients (Fig. 5 and 6).

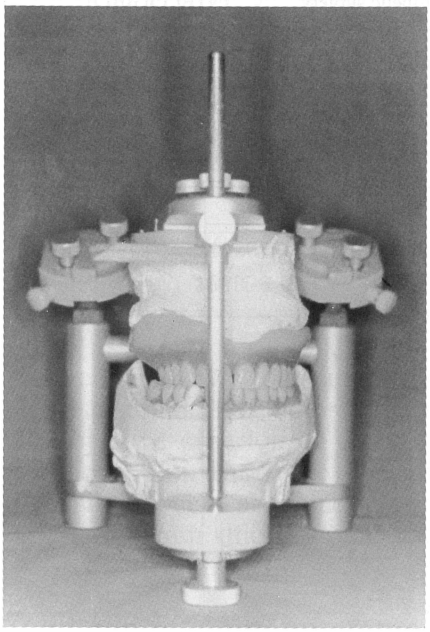


Figure 3. *Tooth positioning in SAM articulator*
Slika 3. *Postav zubi u SAM artikulatoru*

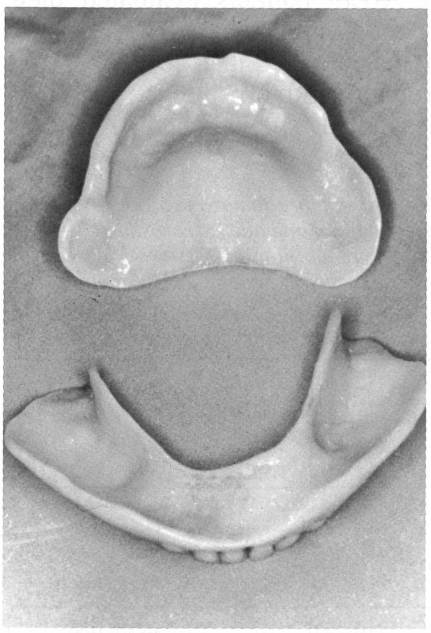


Figure 4. *Finished dentures*
Slika 4. *Završene proteze*

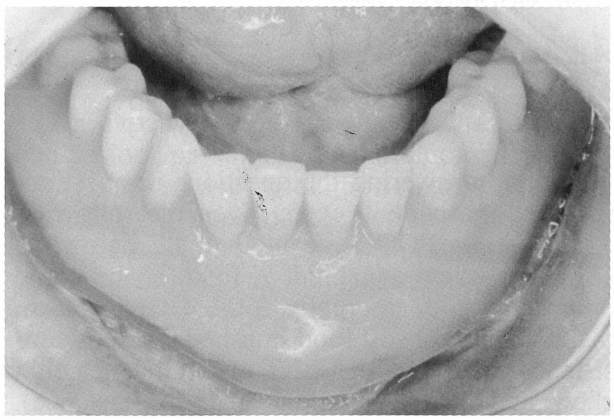


Figure 5. *Dentures in position*
Slika 5. *Proteze u ustima*

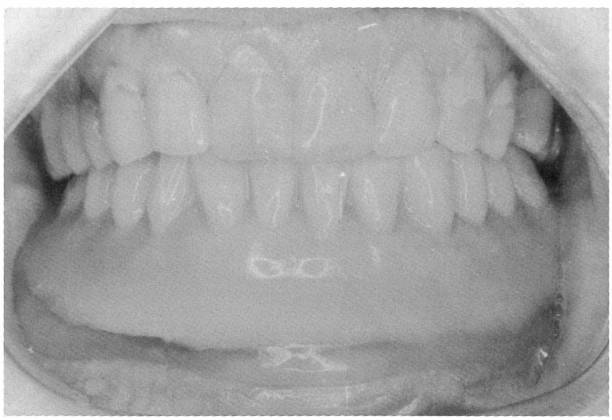


Figure 6. *Dentures in correct occlusion*
Slika 6. *Proteze u pravilnoj okluziji*

[2] SAM articulator, Singer KG, Munich, Germany.

After the preprosthetic surgical correction (3) and prosthetic reconstruction, we tried to evaluate the functional and esthetic advantages of such a treatment. The patients (N = 20) were asked to estimate their chewing ability before and after tumor resection, and after prosthetic rehabilitation, as well as to express their opinion on the esthetic effects of prostheses, using questionnaire A:

Questionare A

1. (A)	Was your chewing ability before tumor resection	POOR GOOD EXCELLENT
(B)	After resection, you find it	POOR GOOD EXCELLENT
(C)	Now, with a new denture, it is	POOR GOOD EXCELLENT
2.	Are you satisfied with the esthetic effects of your denture	SATISFIED UNSATISFIED

Prior to answering the questions in questionnaire A, the patients were given the following explanations: POOR meant that the individual could not chew any kind of food, so he could only eat liquid or gruelly food; GOOD meant that he could eat soft food (mashed potatoes consistency); and EXCELLENT meant that he could chew and eat hard food (meat, for instance). Objectively, we tried to evaluate the quality of prosthetic rehabilitation by estimating the intelligibility of everyday speech and by measuring the intensity of occlusal contacts of the premolars and molars (5) (questionnaire B) (Fig. 7).

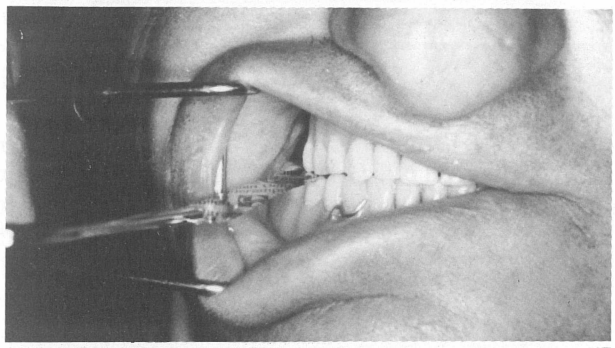
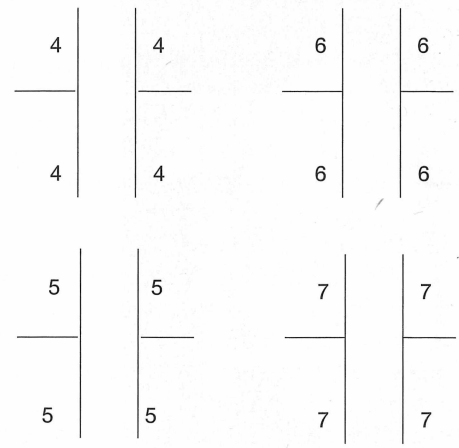


Figure 7. *Measurement of premolar and molar occlusal contact intensity with a Shimstock foil*

Slika 7. *Mjerenje intenziteta okluzalnih kontakata područja premolara i molara posredstvom folije po Shimstocku*

Questionnaire B

3. (A)	Everyday speech before preprosthetic surgery	INTELLIGIBLE UNINTELLIGIBLE
(B)	After preprosthetic surgery	INTELLIGIBLE UNINTELLIGIBLE
(C)	After preprosthetic surgery and prosthetic rehabilitation	INTELLIGIBLE UNINTELLIGIBLE
4.	Clinical findings of occlusal contact intensity	



Results and Discussion

Results are presented in Tables 1 — 4. Table 1 shows that 18 (90%) patients evaluated their chewing ability after tumor resection (B) as poor, but 11 (55%) patients judged it as good after preprosthetic correction and prosthetic rehabilitation (C). Table 2 indicates that 17 (85%) patients

Table 1. *Chewing ability before tumor resection (A); after tumor resection (B); and after preprosthetic surgery and prosthetic rehabilitation (C)*

Tablica 1. *Sposobnost žvakanja prije resekcije tumora (A); nakon resekcije tumora (B); i nakon pretprotetskog kirurškog zahvata i protetske rehabilitacije (C)*

N = 20	A	B	C
Excellent	11 (55%)		3 (15%)
Good	9 (45%)	2 (10%)	11 (55%)
Poor		18 (90%)	6 (30%)

Table 2. *Esthetic effects after prosthetic rehabilitation*

Tablica 2. *Estetski učinak nakon protetske rehabilitacije*

N = 20	Satisfied	Unsatisfied
	17 (85%)	3 (15%)

were satisfied with the esthetic effects of their dentures after prosthetic rehabilitation. Quite interesting results were obtained by evaluation of everyday speech intelligibility (Table 3).

Table 3. *Speech intelligibility before preprosthetic surgery (A); after preprosthetic surgery (B); and after preprosthetic surgery and prosthetic rehabilitation (C)*

Tablica 3. *Jasnoća govora prije pretprotetske kirurgije (A); nakon pretprotetske kirurgije (B); i nakon pretprotetskog kirurškog zahvata i protetske rehabilitacije (C)*

N = 20	A	B	C
Intelligible	4 (20%)	13 (65%)	12 (60%)
Unintelligible	16 (80%)	7 (35%)	8 (40%)

Eventually, we measured the intensity of occlusal contacts of the premolars and molars as an objective criterion of the optimal occlusion reconstruction. The high values of the first grade intensity of occlusal contacts (when a 5 mm wide and 0.008 mm thick ribbon[3] cannot be pulled between the two sets of teeth) are a proof of the optimal reconstruction of occlusion, which is an important factor for the prosthesis stability (Fig. 7). These results are shown in Table 4.

Table 4. *Clinical registration of premolar and molar occlusal contact intensity*

Tablica 4. *Klinička registracija intenziteta okluzalnih kontakata pretkutnjaka i kutnjaka*

N = 160	4|4 / 4|4 N (%)	5|5 / 5|5 N (%)	6|6 / 6|6 N (%)	7|7 / 7|7 N (%)
First grade	128 (80)	142 (88.7)	140 (87.5)	136 (85)
Second grade	16 (10)	4 (2.6)	12 (7.5)	18 (11.2)
Third grade	16 (10)	14 (8.7)	8 (5)	6 (3.8)

Conclusion

The results obtained suggested the following conclusion: prosthetic rehabilitation in patients with postoperative oncologic defects of the lower oral cavity is questionable and in some patients impossible. In these patients, a preprosthetic surgical correction is an indispensable precondition to allow effective prosthetic rehabilitation.

[3] Shimstock foil 8 μ, Hanle-GHM-Dental GmbH, Nurtingen, Germany.

FUNKCIONALNA I ESTETSKA REHABILITACIJA PACIJENATA S ONKOLOŠKIM DEFEKTIMA DONJEG DIJELA USNE ŠUPLJINE. DRUGI DIO: PROTETSKA REKONSTRUKCIJA

Sažetak

Opisana je protetska rehabilitacija bolesnika s defektima nakon resekcije u donjem dijelu usne šupljine zbog karcinoma. Dvadeset bolesnika podvrgnuto je pretprotetskoj korektivnoj kirurškoj intervenciji tj. transplantaciji slobodnog kožnog režnja poludebljine jer su zbog resekcije tumora nastali nepovoljni anatomski uvjeti da bi se mogle izraditi adekvatne proteze u tom području.

Osnovni problem koji se ukazao za vrijeme protetske rehabilitacije bio je u rekonstrukciji i registraciji intermaksilarnih odnosa, pa je izrada proteze obavljena u dvije faze: najprije je izrađena baza proteze, nakon čega je uslijedilo određivanje vertikalne dimenzije u stanju fiziološkog mirovanja, dok je centrična relacija utvrđena ručnim vođenjem mandibule maksimalno prema naprijed u odnosu na maksilu. Postignuti rezultati su subjektivno i objektivno zadovoljavajući. Oni pokazuju da se bolesnici kod kojih nije

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moguća protetska rehabilitacija zbog postoperativnih onkoloških defekata u području donjeg dijela usne šupljine trebaju podvrgnuti pretprotetskom kirurškom korektivnom zahvatu (olakšanje pokreta jezika i ekstenzija područja protezne baze), kao i specifičnoj protetskoj proceduri (utvrđivanje optimalnih intermaksilarnih odnosa) što su glavni preduvjeti za učinkovitu protetsku rehabilitaciju.

Ključne riječi: *postoperativni onkološki defekti, donji dio usne šupljine, pretprotetski slobodni kožni režanj poludebljine, protetska rehabilitacija*

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