

Timsko liječenje bolesnika s defektima mekoga tkiva i kostiju lica

Vedran Uglešić¹
Siniša Varga²
Jakša Grgurević²

¹Klinika za kirurgiju lica i čeljusti, Klinička bolnica "Dubrava"

²Klinički zavod za oralnu kirurgiju, Klinička bolnica "Dubrava"

Sažetak

Rad prikazuje multidisciplinarni pristup u rekonstrukciji defekata lica i glave. Tim koji sudjeluje u rekonstrukciji jesu: onkološki kirurg, plastični i rekonstruktivni kirurg glave i vrata, orlani kirurg i kirurški protetičar. Na primjerima su prikazane se rekonstrukcije orbite, uške, gornje i donje čeljusti te korekcije konture kostiju lica. Za svaki tip rekonstrukcije prikazane su faze liječenja i uloga pojedinog specijalista.

Ključne riječi: *plastična kirurgija, protetsko zbrinjavanje, timski pristup.*

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Adresa za dopisivanje:
Vedran Uglešić
Klinika za kirurgiju lica i čeljusti, Klinička bolnica "Dubrava"
Av. G. Šuška 6
10000 Zagreb

Defekti koji nastaju nakon odstranjenja tumora glave i vrata ili pak nastaju traumom uvijek su bili funkcionalni i psihološki problem bolesniku i njegovoj okolini. Način kirurškog odstranjenja tumora glave i vrata nije se bitno promjenio od sredine ovoga stoljeća (1), ali je rekonstrukcija nastalih defekata doživjela velike promjene. Nove kirurške tehnike i materijali omogućili su da se približimo zadanom cilju - potpunoj funkcionalnoj i socijalnoj rehabilitaciji bolesnika (2). Pristup rehabilitaciji bolesnika je multidisciplinarni i uključuje onkološkoga kirurga, plastičnog i rekonstruktivnoga kirurga glave i vrata, oralnoga kirurga i kirurškoga protetičara. Rehabilitacija bolesnika počinje dolaskom bolesnika u bolnicu i navedeni specijalisti od početka su uključeni u bolesnikovo liječenje.

Svrha je rada na primjerima prikazati iskustvo multidisciplinarnog pristupa rehabilitaciji bolesnika s defektima lica i glave na Klinici za kirurgiju lica čeljusti i usta KB "Dubrava".

Primjeri

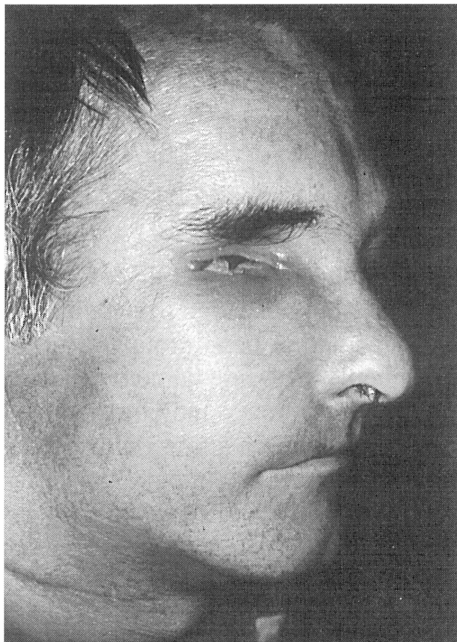
Orbita

Defekti nastali enukleacijom oka najčešće nisu u domeni makilofacijalnoga kirurga i rehabilitacija obično zahtijeva standardnu očnu protezu. Egzeniteracija orbite uključuje odstranjenje očne jabučice s cijelim orbitalnim sadržajem i indicirana je kod malignih tumora orbite, tumora koji prodiru u orbitu (tumori maksilarnoga sinusa, etmoida i kožni tumori) ili ozljeda (ratna trauma). U slučaju traume rehabilitacija ovisi o defektu. Ako su bolesniku očuvane vjeđe, idealna rehabilitacija uključuje izradu individualne proteze. Uloga je plastičnoga kirurga napraviti ležište proteze, tj. postaviti kožni transplantat djelomične debljine kože ili mukoperihondriju tvrdoga nepca na orbitalne zidove. Oblaganjem orbite transplantatom olakšava se postavljanje proteze i toaleta defekta. U drugoj fazi kirurški protetičar uzima otisak defekta. Na osnovi otiska izrađuje

se individualna proteza koja može biti izrađena iz jednoga dijela, tako da uključuje opturator i očnu protezu, ili se, da bi se lakše postavljala i vadila, ona izrađuje iz dva dijela (opturator i očna proteza).

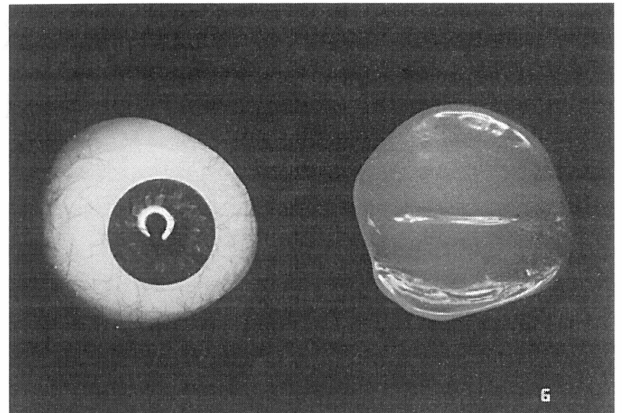
U bolesnika s tumorom ekipa koja sudjeluje pri rehabilitaciji uključena je i u pripremi bolesnika za ablativni zahvat. Na osnovi kliničkoga pregleda i CT nalaza odlučuje se o opsegu zahvata i veličini defekta. Istodobno s planiranjem resekcije planira se režanj kojim će se u operaciji rekonstruirati defekt, kao i postupci koji će slijediti nakon operacije. U slučaju da se bolesniku u resekciji tumora mogu sačuvati vjeđe, ali će doći do resekcije jednog od zida orbite, planira se koštana rekonstrukcija zida najčešće kompozit (režanj koji uključuje koštani dio i kožu ili mišić) mikrovaskularnim režnjem. Nakon završene primarne rekonstrukcije, kirurški protetičar nastavlja rehabilitaciju izradom individualne proteze (Slika 1a, 1b, 1c).

Kada defekt uključuje i vjeđe, primarna rekonstrukcija najčešće zatvara defekt režnjem, a rekonstrukcija se nastavlja izradom epiteze. U izboru režnja za zatvaranje defekta sudjeluje oralni kirurg i



Slika 1a. Bolesnik nakon potpune maksilektomije s egzenteracijom orbite i rekonstrukcije s mikrovaskularnim latissimus dorsi režnjem i režnjem skapule

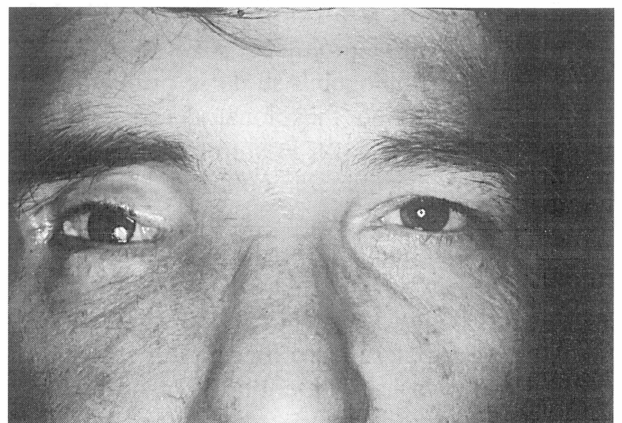
Fig. 1a Patient after total maxillectomy with exenteration of the orbit and reconstruction with microvascular latissimus dorsi flap and scapula flap



Slika 1b. Dvodjelna individualna očna proteza

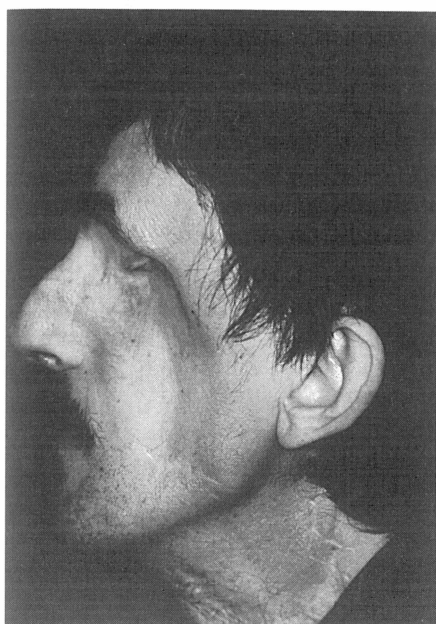
Fig. 1b Bipartite individual eye prosthesis

kirurški protetičar. Potrebno je izabrati rješenje koje omogućuje postaviti titanske oseointegrirajuće implantate za njezinu retenciju. Mi najčešće rabimo lateralni rub skapule ili angulus skapule zbog dostatne debljine kortikalisa koji omogućuje primarnu stabilnost implantata. Osim u koštani dio režnja, implantati se postavljaju i u supraorbitalni rub (3). Nakon razdoblja oseointegracije, slijedi treća faza - postavljanje suprastrukture za retenciju epiteze. Četvrta faza uključuje uzimanje otiska lica bolesnika i izradbu gipsanih modela. Peta faza, koja uključuje izradbu epiteze iz silikona, ujedno je i najzahtjevnija. Potrebno je ne samo modelirati epitezu da odgovara obliku lica bolesnika, već formirati obrve i trepavice, te ju prilagoditi i bojom, što zahtijeva prikladni artizam. Ovako izrađena epiteza je lagana, lako se održava i zbog dobre retencije daje sigurnost bole-



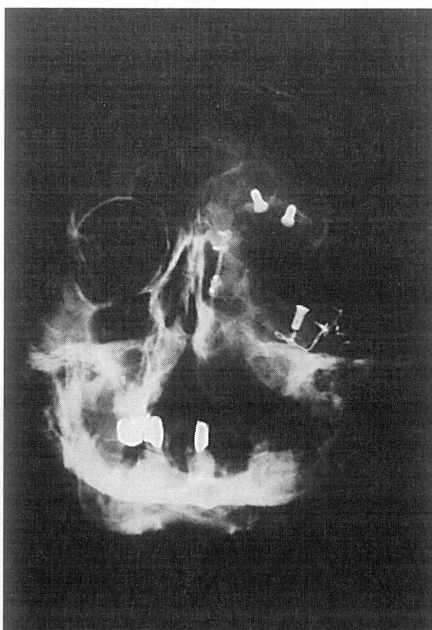
Slika 1c. Rezultat nakon rekonstrukcije

Fig. 1c Result after reconstruction



Slika 2a. Bolesnik nakon potpune maksilektomije s egzenteracijom orbite

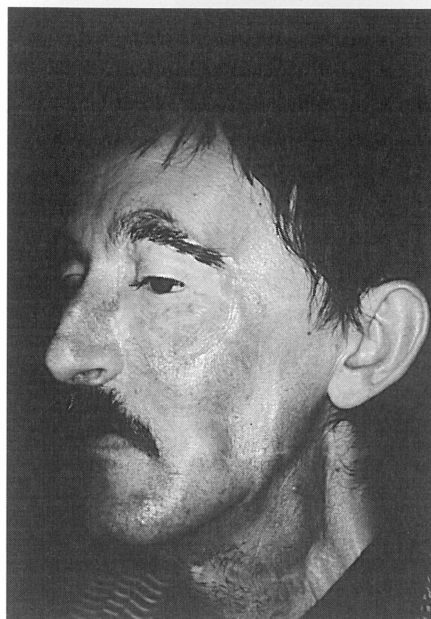
Fig. 2a Patient after total maxillectomy with exenteration of the orbit.



Slika 2b. Stanje nakon rekonstrukcije maksile s mirovaskularnim režnjem skapule. Osteointegrirajući implantati postavljeni u supraorbitalni rub orbite i lateralni rub skapule.

Fig. 2b Condition after reconstruction of the maxilla with microvascular flap of scapula. Osteointegration implants placed in the supraorbital edge of the orbit and lateral edge of the scapula.

sniku (4). Problemi u vezi s izradbom epiteze jesu u tome što ne postoje stručnjaci koji bi se bavili oblikovanjem i bojenjem epiteza tako da je kirurški protetičar uključen i u taj dio rada (Slika 2a, 2b, 2c).

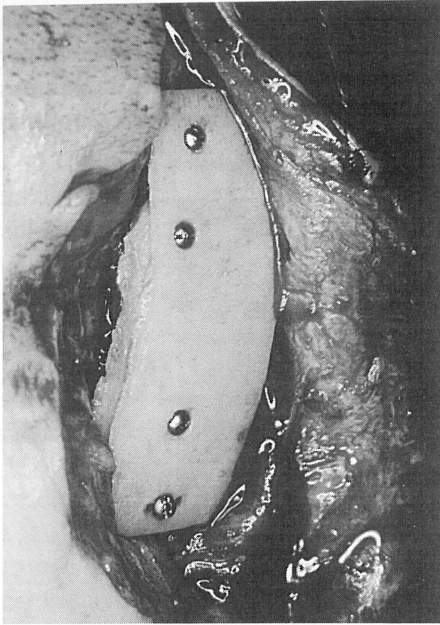


Slika 2c. Rezultat nakon izradbe silikonske epiteze

Fig. 2c Result after construction of a silicone epithesis.

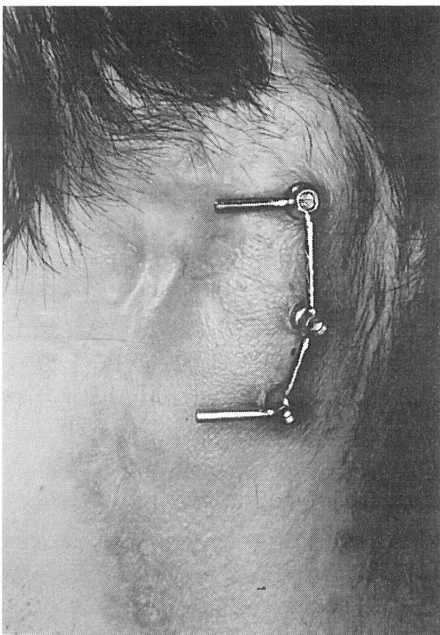
Uška

Manji defekti uške, nastali bilo traumom ili odstranjenjem tumora, mogu se uspješno rekonstruirati lokalnim režnjevima. Veliki defekti uške mogu se također rekonstruirati tkivom iz okoline i hrskavicom rebra, ali ta operacija dolazi u obzir samo kod kongenitalnih malformacija uha i nije moguća u slučajevima kada je vanjski slušni hodnik otvoren. U svim drugim slučajevima odlučujemo se za potpunu epitezu uške. U timu su rekonstruktivni kirurg, koji priprema pristup za postavljanje oseointegrirajućih implantata, oralni kirurg i kirurški protetičar, koji određuju mjesto, i oni postavljaju implantate. U drugoj fazi postavlja se suprastruktura za retenciju epiteze i uzima se otisak suprotne zdrave uške. Nakon izradbe gipsanog modela uške, izradi se silikonska proteza koja bojom i veličinom mora odgovarati suprotnoj zdravoj uški (5). Kod traumatske ablacije uške često postoji i koštani defekt u području mastoida. Tada je potrebno u prvoj fazi nadoknaditi koštani defekt, najčešće transplantatima kor-



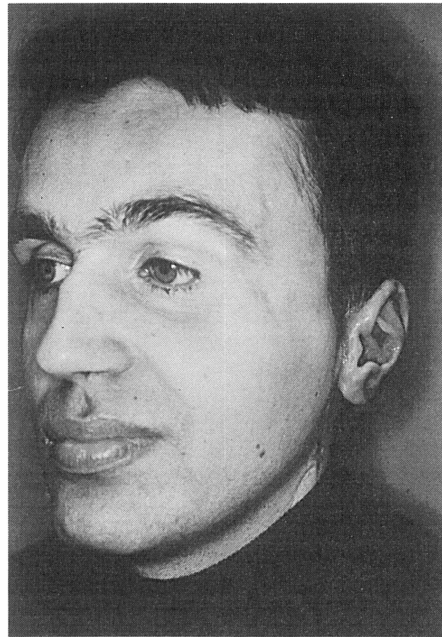
Slika 3a. Kalvarija graftovi postavljeni na defekt baze lubanje nakon ratne eksplozivne ozljede glave i traumatske amputacije uške

Fig. 3a Calvaria grafts placed on a defect at the base of the skull after war injury to the head by explosives and traumatic amputation of the auricle



Slika 3b. Postavljena suprastruktura za retenciju epiteze nakon osteointegracije implantata u kalvarija graftove

Fig. 3b Placed suprastructure for retention of the epithesis after osteointegration of the implant in calvaria grafts



Slika 3c. Silikonska epiteza uške

Fig. 3c Silicone epithesis of the auricle

ikalne kosti s lubanje. Koštani implantati mogu se postaviti istodobno s rekonstrukcijom koštanog defekta ili, što je sigurnije, pošto je već nastala integracija koštanog transplantata (Slika 3a, 3b, 3c).

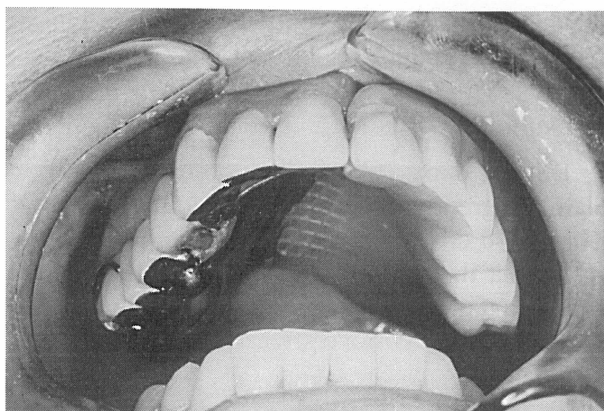
Gornja čeljust

Defekte gornje čeljusti možemo podijeliti na djelomične, kada nedostaje dio čeljusti, ili potpune, kada nedostaje cijela čeljust.

Djelomični defekti uglavnom su u vezi s alveolarnim grebenom, tvrdim i mekim nepcem. Nastaju kao posljedica traume, resekcijom intraoralnih tumora ili malignih tumora malih slinovnica. Mogućnost rekonstrukcije takvih defekata je dvojaka. Na našoj klinici te defekte rekonstruiramo najčešće protetski. Ako je rekonstrukcija u vezi s tumorom, ona počinje prije nego što se on odstrani. Otisak se uzima prije operacije i onkološki kirurg i kirurški protetičar na modelu simuliraju odstranjenje tumora. Na osnovi modela kirurški protetičar izrađuje imedijatnu resekcijsku protezu koja se postavlja na kraju operacije. Kirurg na kraju operacije oblaže resekcijsku šupljinu kožnim transplantatom djelomične debljine kože kojim se omogućuje bolja retencija definitivne proteze. Postavljanjem imedijatne resekcijske proteze omogućuje se uredan govor i prehrana

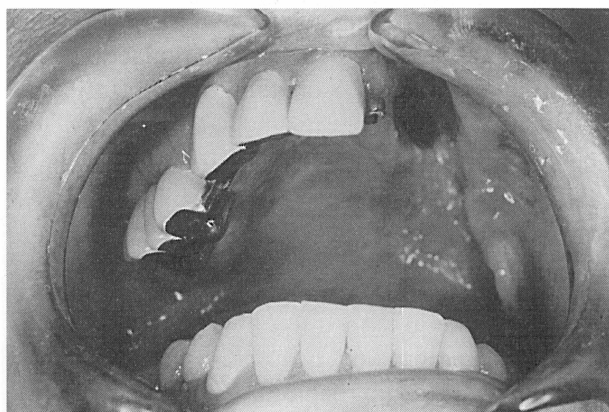
postoperativno. Tjedan dana nakon operacije skida se imedijatna resekcijska proteza i uzima se za nju nov otisak s opturatorom kojom se zatvara defekt. Ta proteza uključuje i zube. Mjesecima nakon odstranjenja tumora resekcijska šupljina mijenja svoj oblik tako da je resekcijsku protezu potrebno prilagoditi, a često je potrebno izraditi i novu protezu (4) (Slika 4a, 4b, 4c).

Defekti alveolarnoga grebena i nepca mogu se rekonstruirati i mikrovaskularnim režnjevima. U obzir dolaze fibula režanj i režanj kriste ilijake. Za rekonstrukciju mikrovaskularnim režnjem na našoj se klinici odlučujemo u mlađih bolesnika koji lakše podnose defekte davajuće regije.



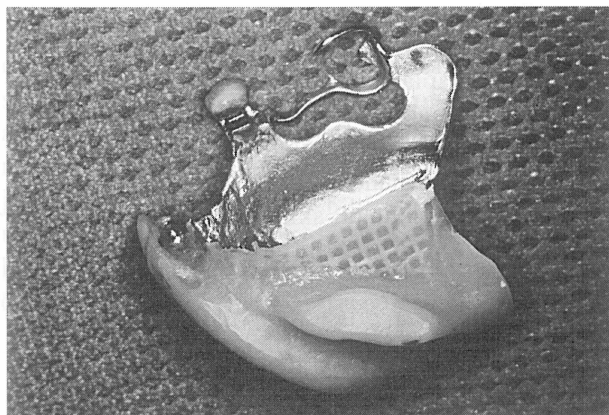
Slika 4c. Stanje nakon rekonstrukcije

Fig. 4c Condition after reconstruction



Slika 4a. Defekt alveolarnoga grebena i tvrdoga nepca nakon parcijalne maksilektomije zbog malignoga tumora male slinovnice

Fig. 4a Defect of the alveolar ridge and hard palate after partial maxillectomy due to a malignant tumour of the minor salivary gland



Slika 4b. Resekcijska proteza s opturatorom

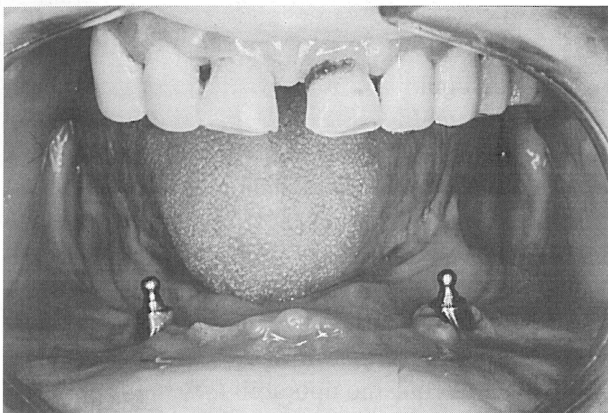
Fig. 4b Resection prosthesis with obturator

Defekti cijele gornje čeljusti vezani su za odstranjivanje malignih tumora maksilarnog sinusa. Rekonstrukcija je moguća resekcijom protezom s opturatorom kao kod djelomičnog defekta gornje čeljusti, ali je njezina uspješnost ovdje slabija. Zbog težine retencija proteze je otežana, a opturator nikada ne daje dostatnu punoću mekim tkivima obraza. Posljednjih 7 godina za rekonstrukciju cijele maksile upotrebljavamo mikrovaskularne režnjeve. Za rekonstrukciju smo uporabili *latissimus dorsi* režanj i skapularni režanj. Iskustvom smo utvrdili da nam kombinacija tih dvaju režnjeva na zajedničkoj peteljci daju najbolju mogućnost potpune rekonstrukcije mekog i koštanog tkiva maksile. Pošto se preoperativno utvrdi opseg resekcije, odluči se, da li će se kost uzeti s lateralnoga ruba ili angulusa skapule. Kost se u defekt postavlja okomito tako da se s istim koštanim režnjem rekonstruira alveolarni greben i prednja stijenka maksile. Koštani dio fiksira se u području medijalnog i lateralnog dijela ostatka orbite te u području kontralateralnog alveolarnoga grebena. Pošto se kost fiksira, na orbitalnom dijelu režnja učini se osteotomija kojom formiramo novo dno orbite. Mišićnim dijelom režnja služimo se za odvajanje usne šupljine od nosa te za oblaganje obraza mekim tkivom. Kod fiksiranja koštanoga režnja mora se voditi računa da se on postavi u anatomske relacije kako kod kasnije protetske rehabilitacije ne bi bio beskoristan. Mišić u ustima nije potrebno pokrivati kožom jer se nakon dva tjedna on potpuno epitelizira s rubova. U kasnijoj fazi, nakon atrofije mišića, uzima se otisak za protetsku rehabilitaciju. Za retenciju proteze služe zubi u suprotnoj strani čeljusti, a ako oni ne postoje, postavljaju se

implantati u područje alveolarnoga grebena i u sam koštani dio reznja.

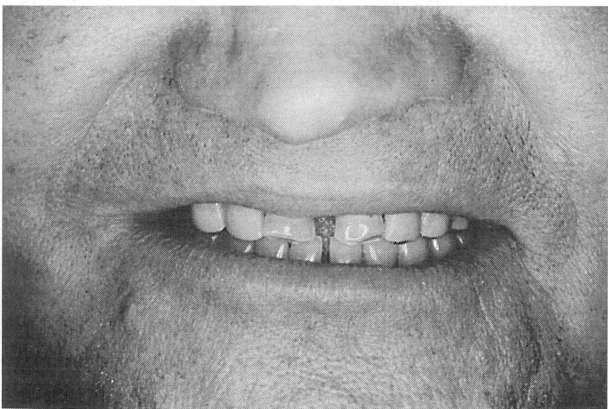
Donja čeljust

Defekte donje čeljusti dijelimo na defekte alveolarnoga grebena i defekte pune debljine kosti. U jednom i u drugom slučaju oni mogu biti posljedica trauma ili odstranjena tumora. Kod tumorskih operacija u pripremi onkološki kirurg i kirurški protetičar definiraju postoperativni defekt. Čuvanju svih zubi daje se najveća pažnja.



Slika 5a. Bolesnik nakon intraoralne ekscizije i marginalne resekcije mandibule zbog intraoralnog karcinoma. Postavljena suprastruktura nakon osteointegracije postavljenih implantata.

Fig. 5a Patient after intraoral excision and marginal resection of the mandible due to intraoral carcinoma. Placed suprastructure after osteointegration of the placed implants.

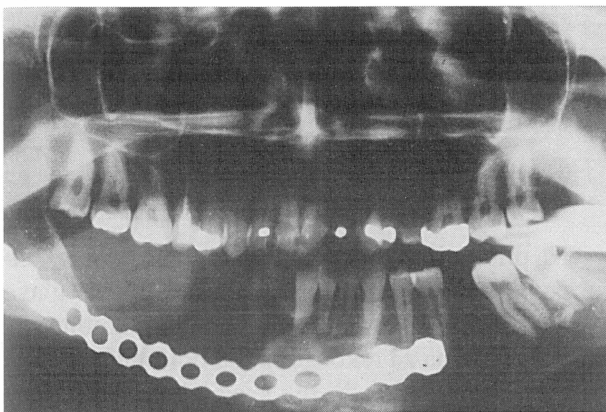


Slika 5b. Nakon postavljene proteze

Fig. 5b After placing the prostheses

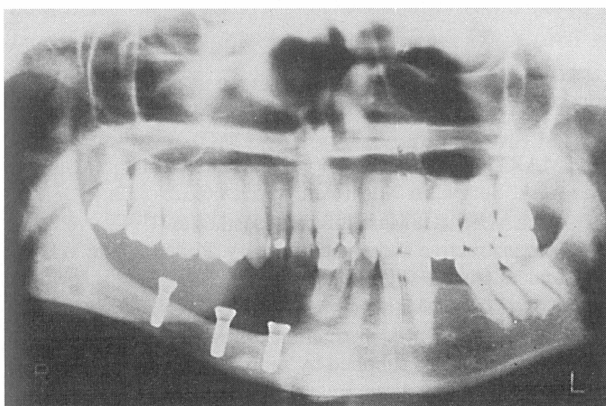
Kod defekta alveolarnoga grebena glavni protetski problem, nakon resekcije tumora, jesu plitki vestibulum ili nedostatak fiksne gingive. U oba slučaja potrebna je vestibuloplastika koju izvodi oralni kirurg. Retencija proteze bolja je ako postoje zubi u neoperiranom dijelu čeljusti, no ako oni nedostaju, najbolje je rješenje postaviti osteointegrirajuće implantate (Slika 5a, 5b).

Protetski je mnogo složenije rehabilitirati defekte pune debljine kosti. Defekti simfize donje čeljusti bez rekonstrukcije kontinuiteta čeljusti uzrokuju kolaps postraničnih fragmenata, što uvelike otežava govor i prehranu a potpuno onemogućuje protetsku rehabilitaciju. Kontinuitet kosti može se uspostaviti rekonstruktivnom pločom, koja najčešće nije trajno rješenje te se u drugoj fazi postavlja koštani transplantat. Koštani transplantat može biti slobodan, bez vlastite cirkulacije ili s vlastitom cirkulacijom (mikrovaskularni režanj). Slobodni koštani transplantat uzimamo iz kriste ilijake, a mnogo rjeđe rebro. Transplantat upotrebljavamo u rekonstrukciji poslijetraumatskih defekata ili kod resekcije tumora koji nakon kirurškog odstranjenja ne zahtijevaju dodatnu radioterapiju. Mikrovaskularni režanj upotrebljavamo u bolesnika kojih je defekt donje čeljusti prevelik za rekonstrukciju slobodnim koštanim transplantatom ili kod tumora koji, nakon kirurškog odstranjenja, zahtijevaju radioterapiju. Za rekonstrukciju donje čeljusti mikrovaskularnim režnjem služimo se podlaktičnim režnjem s djelomičnom debljinom radijusa, režnjem fibule i mikrovaskularnim režnjem kriste ilijake. Podlaktični je režanj s radijusom zbog tankoga kožnog dijela idealan za intraoralnu rekonstrukciju mekoga tkiva. Koštani dio, koji može koristiti samo 1/3 debljine radijusa, rijetko je duži od 8 cm. Služimo se njime u slučajevima kada ne planiramo protetsku rehabilitaciju s uporabom osteointegrirajućih implantata. Planiramo li rehabilitaciju s implantatima, rabimo fibularni režanj ili režanj kriste ilijake. Implantati se mogu postaviti istodobno s rekonstrukcijom mandibule (6), ali smo mi, zbog visoke cijene implantata, skloniji postaviti ih u drugoj fazi kada smo sigurni da je rekonstrukcija uspjela (Slika 6a, 6b). Nakon završene rekonstrukcije kirurški protetičar procjeni stanje mekoga tkiva i ostatka čeljusti bolesnika. U suradnji s oralnim kirurgom napravi se korekcija intraoralnih ožiljaka ili vestibuloplastika. Uporaba fiksnog ili mobilnoga protetskog aparata ovisi o intraoralnom nalazu i mogućnostima bolesnika.



Slika 6a. Defekt tijela donje čeljusti nakon eksplozivne ozljede

Fig. 6a Defect of the body of the lower jaw following injury caused by explosives



Slika 6b. Postavljeni osteointegrirajući implantati u mikrovaskularni režanj fibule

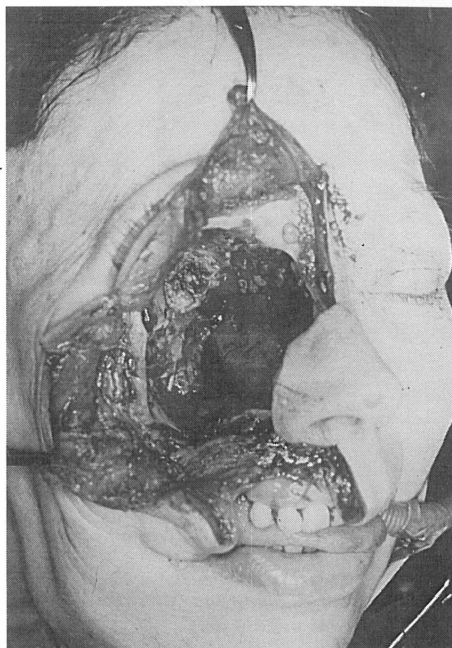
Fig. 6b Placed osteointegration implants in a microvascular flap of fibula

Kod segmentalnih defekata postraničnoga dijela donje čeljusti koji završavaju na kondilarnom nastavku najčešće rekonstruiramo samo meko tkivo, a uspješnost protetske rehabilitacije ovisi o dentalnom statusu bolesnika. U pripremi resekcije važno je da se sačuvaju svi zubi koji ne kompromitiraju uspješnost resekcije, a postoperativno, u bolesnika kojima je potrebna dodatna radioterapija, treba sačuvati zube od posljedica zračenja.

Korekcije konture

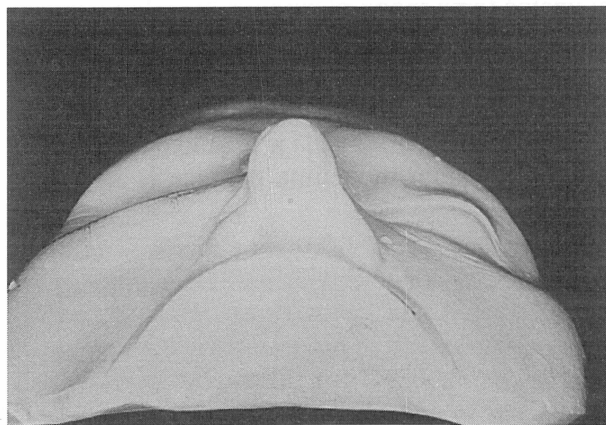
Korekcija deformiteta kostiju lica i glave u djelokrugu je plastičnog i rekonstruktivnoga kirurga glave i vrata. Poseban problem čine urođeni ili po-

straumatski deformiteti srednjeg lica i kalvarije kod kojih postoji asimetrija. Upotreba trodimenzionalnoga CT-a i stereolitografije omogućuje da se preci-



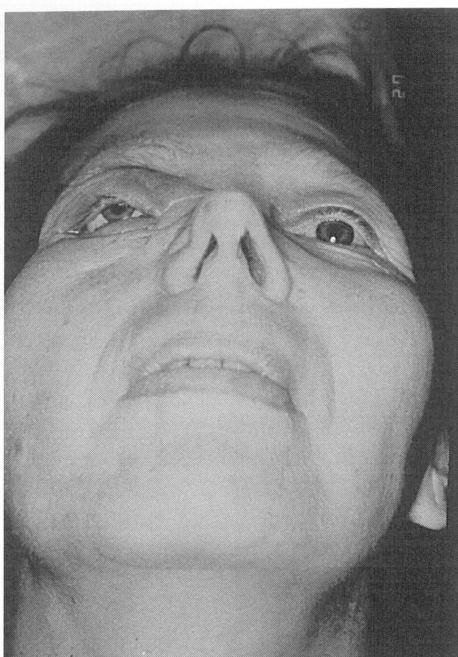
Slika 7a. Defekt nakon parcijalne maksilektomije i egzenteracije orbite zbog malignoga tumora suznoga kanala

Fig. 7a Defect after partial maxillectomy and exenteration of the orbit due to a malignant tumour of the lacrimal duct



Slika 7b. Gipsani otisak lica bolesnice koji pokazuje nepravilnu konturu lijevog obraza nakon rekonstrukcije kalvarija graftovima i temporalnim režnjem. Otisak je upotrebljen za simuliranje osteotomija.

Fig. 7b Plaster cast of a patient's face, showing the uneven contour of the left cheek after reconstruction of the calvaria with grafts and temporal flap. The cast is used for simulating osteotomy.



Slika 7c. Rezultat nakon osteotomija kalvarija grafta i postavljanja individualne proteze

Fig. 7c The result after osteotomy of the calvaria graft and placing of individual prostheses

zno preoperativno planira zahvat, bilo da se rekonstrukcija planira s autolognim transplantatom ili aloplastičnim implantatom. Izradba stereolitičkih modela vrlo je skupa i ne radi se u našoj zemlji. Kako bi unatoč tomu mogli planirati zahvat, koristimo se znanjem našega kirurškog protetičara koji je tehniku uzimanja otisaka za proteze i epiteze modificirao tako da nam je moguće dobiti gipsani odljev cijelog lica, poglavine i kada je to potrebno cijele glave. Na gipsanim modelima moguće je simulirati

osteotomije i modelirati implantate, što skraćuje operativno vrijeme i krajnji rezultat čini predvidljivim (Slika 7a, 7b, 7c).

Zaključak

Na primjerima smo pokazali da uspješnost rekonstrukcije bolesnika s defektom kostiju lica i glave ovisi o dobru planiranju i multidisciplinarnom pristupu. Priprema za rekonstrukciju bolesnika počinje s primitkom u bolnicu i tim specijalista sudjeluje u svim fazama planiranja i liječenja bolesnika. Suvremenim kirurškim metodama i uporabom suvremenih materijala moguće se je približiti cilju - potpunoj funkcionalnoj i socijalnoj rehabilitaciji bolesnika. Timskim radom moguće je smanjiti nedostatak svih potrebnih materijala i opreme.

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Teamwork in the Treatment of Patients with Defects of the Soft Tissue and Facial Bones

Vedran Uglešić¹
Siniša Varga²
Jakša Grgurević²

¹Clinic for Maxillofacial Surgery, Clinical Hospital "Dubrava"

²Clinical Department of Oral Surgery, Clinical Hospital "Dubrava"

Summary

The paper presents a multidisciplinary approach in the reconstruction of defects of the face and head. The team participating in the reconstruction consists of an oncological surgeon, plastics and reconstruction surgeon for the head and neck, an oral surgeon and a surgical prosthetist. Examples are used to show reconstruction of the orbit, auricle, upper and lower jaws and correction of the contour of the bones of the face. The phases of treatment and role of each specialist are shown for each reconstruction.

Key words: *plastic surgery, prosthetic care, teamwork.*

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Address for correspondence:

Vedran Uglešić
Clinic for Maxillofacial Surgery, Clinical Hospital "Dubrava"
Av. G. Šuška 6, 10000 Zagreb
Croatia

Defects which arise after the removal of tumours of the head and neck or after trauma have always represented a functional and psychological problem for the patient and his surroundings. The manner in which a tumour of the head and neck is surgically removed has not changed significantly since the middle of this century (1), although the reconstruction of the defects has seen great changes. The introduction of new surgical techniques and materials have enabled us to come close to the main objective - complete functional and social rehabilitation of the patient (2). The approach to rehabilitation of the patient is multidisciplinary and includes an oncological surgeon, plastics and reconstructive surgeon for the head and neck, an oral surgeon and a surgical prosthetist. Rehabilitation of the patient begins with his arrival at the hospital and therefore the above specialists are included in the patient's treatment from the start.

The aim of this study was to demonstrate on examples a multidisciplinary approach to the rehabilitation of patients with defects to the face and head in the Clinic for Maxillofacial Surgery, Clinical Hospital "Dubrava".

Examples

Orbit

Defects arising after enucleation of the eye are most frequently not in the domain of the maxillofacial surgeon and rehabilitation usually requires the fitting of a standard eye prosthesis. Exenteration of the orbit involves the removal of the eyeball with the whole of the orbital content, and is indicated in the case of malignant tumours of the orbit, tumours which penetrate into the orbit (tumours of the ma-

xillary sinus, ethmoid and skin tumours) or war injuries. In the case of trauma rehabilitation depends on the defect. If the patient's eyelids are preserved then ideal rehabilitation includes the construction of individual prostheses. The role of the plastic surgeon is to make the base of the prosthesis, i.e. to place a skin transplant partially of skin thickness or mucoperichondry of the hard palate onto the orbital walls. Covering the orbit with a transplant facilitates the fitting of the prosthesis and also toilet of the defect. During the second phase the surgical prosthodontist takes an impression of the defect. Based on the impression an individual prosthesis is made which can be made from one part, so that it includes the obturator and eye prosthesis, or for easier removing and replacing, it can be made from two parts obturator and eye prosthesis.

The team participating in the rehabilitation of the patient with a tumour are also included in the preparation of the patient for ablation. Based on a clinical examination and CT finding the extent of the operation and size of the defect are decided. While planning the resection plans are also made for a flap with which the defect will be reconstructed during the operation, and the procedures after the operation. If the eyelids can be preserved, although resection of one of the orbital walls will occur, bone reconstruction of the wall is planned, most frequently a composite flap, which includes bone and skin or muscle, by microvascular flap. After completion of the primary reconstruction the surgical prosthodontist continues rehabilitation by constructing individual prostheses (Figs. 1a, 1b, 1c). When the defect includes the eyelids primary reconstruction usually closes the defect with a flap, and reconstruction continues with the construction of an epithesis. The oral surgeon and surgical prosthodontist participate in the choice of flap for closing the defect. It is necessary to choose a flap which enables the placing of titan osseointegration implants for retention. We most often use the lateral edge of the scapula or angulus scapula because of the sufficient thickness of the corticalis which enables primary stability of the implant. Apart from in the costal part of the flap implants are placed in the supraorbital edge (3). After the period of osseointegration the third phase follows, which is placing the suprastructure for retention of the epithesis. The fourth phase involves taking impressions of the patient's face and construc-

tion of a plaster model. The fifth phase, which includes the construction of an epithesis from silicone, is the most demanding. Not only is it necessary to model the epithesis to resemble the shape of the patient's face, but also to form eyebrows and eyelashes and to adapt the colour, which requires special skill. Such a constructed epithesis is light, easy to maintain and because of good retention gives the patient confidence (4). One of the problems connected with the construction of the epithesis is a lack of experts engaged in the shaping and colouring of the epithesis, and thus the surgical prosthodontist is also included in this part of the work (Figs. 2a, 2b, 2c).

Auricle

Smaller defects of the auricle, due to trauma or removal of a tumour, can be successfully reconstructed with local flaps. Large defects of the auricle can also be reconstructed with tissue from the surroundings and cartilage from the rib. However this operation can be considered only in the case of congenital malformations of the ear and are not possible in cases when the outer auditory canal is open/exposed. In all other cases we decide on a total epithesis of the auricle. The team comprises a reconstructive surgeon, who prepares the approach for the placing of osseointegration implants, an oral surgeon and a surgical prosthodontist who determine the site and placing of the implant. During the second phase the suprastructure for retention of the epithesis is placed and impressions taken of the other healthy auricle. After construction of a plaster model of the auricle a silicone prosthesis is constructed which must resemble the colour and size of the healthy auricle (5).

In the case of traumatic ablation of the auricle there is frequently a bone defect in the area of the mastoid. It is then necessary to make up for the bone defect during the first phase, most often with transplants of cortical bone from the skull. Bone implants can be placed at the same time as the reconstruction of the bone defect, or after integration of the bone transplant, which is safer (Figs. 3a, 3b, 3c).

Upper jaw

Defects of the upper jaw can be classified as partial, when part of the jaw is missing, or total when the whole jaw is missing.

Partial defects are connected mainly with the alveolar ridge, hard and soft palate. They occur as a consequence of trauma, resection of intraoral tumours or malignant tumours of the minor salivary glands. The possibility of reconstruction of such defects is twofold. In our Clinic such defects are most frequently reconstructed prosthetically. If a tumour is the reason for the reconstruction then it commences prior to the removal of the tumour. An impression is taken before the operation and the model used by the oncological surgeon and surgical prosthodontist to simulate removal of the tumour. On the basis of the model the surgical prosthodontist makes an immediate resection prosthesis to be fitted at the end of the operation. The surgeon covers the resection cavity with a skin transplant of partly skin thickness, which enables better retention of the final prosthesis. The placing of an immediate resection prosthesis enables postoperative normal speech and nutrition. A week after the operation the immediate resection prosthesis is removed and a new impression taken for a resection prosthesis with an obturator with which the defect is closed. This prosthesis includes the teeth. Months after tumour removal the resection cavity changes its shape and thus it is necessary to adapt the resection prosthesis. It is often necessary to construct a new prosthesis (4) (Figs. 4a,4b,4c).

Defects of the alveolar ridge and palate can also be constructed by microvascular flaps. A fibula flap and a flap of crista iliaca can be considered. We decide on reconstruction with a microvascular flap in the case of younger patients who are better able to tolerate the defects of the donor area.

Defects of the whole of the upper jaw are connected with the removal of malignant tumours of the maxillary sinus. Reconstruction is possible by resection prosthesis with obturator as in the case of a partial defect of the upper jaw, although success is poorer. Because of its weight retention of the prosthesis is difficult, and the obturator never gives sufficient fullness to the soft tissues of the cheek. During the last seven years we have used microvascular flaps for reconstruction of the whole of the maxilla. Namely, a latissimus dorsi flap and a scapula flap. Our experience has shown that a combination of these two flaps on the common artery gives the best possible complete reconstruction of the soft and osseous tissue of the maxilla. After the extent of the

resection has been determined preoperatively, it is decided whether the bone will be taken from the lateral edge or the angulus of the scapula. The bone is placed into the defect vertically, so that the alveolar ridge and frontal wall of the maxilla is reconstructed with the same osseous flap. The osseous part is placed in the area of the medial and lateral part of the remaining orbit and in the area of the contralateral alveolar ridge. After the bone has been fixed, osteotomy is performed on the orbital part of the flap, with which a new orbital base is formed. The muscular part of the flap is used to separate the oral cavity from the nose and to line the cheeks with soft tissue. When fixing the osseous flap care must be taken to position it in an anatomical relation, so that it can be used later for prosthetic rehabilitation. It is unnecessary to line the muscle in the mouth with skin as it will completely epithelialize from the edges after two weeks. During the later phase, after atrophy of the muscles, an impression is taken for prosthetic rehabilitation. Teeth on the opposite side of the jaw are used for retention of the prosthesis, and in the case that there are none, implants in the area of the alveolar ridge are placed in the osseous part of the flap itself.

Lower jaw

Defects of the lower jaw are divided into defects of the alveolar ridge and defects of the whole thickness of the bone. In both cases they can be a result of trauma or removal of a tumour. In the case of tumour operations the oncological surgeon and surgical prosthodontist define the postoperative defect during the preparation. Maximum attention is paid to the preservation of all teeth.

In the case of defects of the alveolar ridge the main prosthetic problem, after resection of the tumour, is a shallow vestibulum or absence of fixed gingiva. In both cases vestibuloplastic operation is necessary which is carried out by an oral surgeon. Prosthetic retention is better when there are teeth in the part of the jaw not being operated. However, if there are none the best solution is the placing of osteointegration implants (Figs. 5a,5b).

Prosthetic rehabilitation of defects of the whole thickness of the bone is more complex. Defects of the symphysis of the lower jaw, without reconstruction of continuity of the jaw, lead to collapse of the lateral fragments, which significantly hinders spe-

ech and nutrition and completely prevents prosthetic rehabilitation. Continuity of bone can be achieved with a reconstruction plate, which is usually a temporary solution, and in the second phase a bone transplant is fixed. The bone transplant can be free, with or without its own circulation (microvascular flap). Free bone transplants are taken from the crista iliaca and less frequently from the rib. A transplant is used in reconstruction of post-trauma defects or tumour resections, which do not require additional radiotherapy after surgical removal. We use a microvascular flap in patients whose defect of the lower jaw is too extensive for reconstruction with a free bone transplant or for tumours which, following surgical removal, require radiotherapy. We use a forearm flap from the partial thickness of the radius, fibula flap and a microvascular flap from the crista iliaca for reconstruction of the lower jaw by microvascular flap. A forearm flap from the radius is ideal for intraoral reconstruction of the soft tissue because of the thin skin part. The osseous part, which can only be used for 1/3 of the thickness of the radius, is rarely longer than 8 cm. We use it in cases when prosthetic rehabilitation with osseointegration implants is not planned. When rehabilitation with implants is planned we use a fibula flap or a flap of crista iliaca. Implants can be placed at the same time as reconstruction of the mandible (6). However, because of the high cost of implants, we tend to use them in the second phase, when we are sure that the reconstruction has been successful (Figs. 6a, 6b). After reconstruction has been completed the surgical prosthodontist assesses the condition of the soft tissue and remaining jaw of the patient, and in co-operation with the oral surgeon makes corrections to the intraoral scar or vestibuloplastics. Use of a fixed or mobile prosthetic appliance depends on the intraoral finding and patient possibilities.

In the case of segmental defects of the lateral part of the lower jaw, which end on the condylar process we usually only reconstruct the soft tissue, and the success of the prosthetic rehabilitation depends on the dental status of the patient. During preparation for the resection it is important to preserve all teeth which do not compromise the success of the

resection. Postoperatively, in cases when additional radiotherapy is necessary, the patient's teeth should be protected from the effects of radiation.

Correction of contour

Correction of deformities of the bones of the face and head falls into the domain of the plastics and reconstruction surgeon for the head and neck. Congenital or post-traumatic deformities of the middle face and calvaria represent a specific problem, in the case of asymmetry. By using a three-dimensional CT and stereolithograph the operation can be precisely planned preoperatively. The reconstruction can either be planned with an autologous transplant or an alloplastic implant. The construction of a stereolithic model is extremely expensive and is not done in this country. However, in order to plan the operation we utilise the knowledge of our surgical prosthodontists, who modified the technique of taking impressions for the prosthesis and epithesis and made it possible to obtain a plaster cast of the whole face, half the face, and when necessary the whole head. It is possible to simulate osteotomy on these plaster models and to model implants which reduce operative time and thus the end result can be anticipated (Figs. 7a,7b,7c).

Conclusion

We have used examples to demonstrate that the success of reconstruction of the patient with a defect of the bones of the face and head depends on good planning and a multidisciplinary approach. Preparation for the reconstruction of the patient commences with his admittance to hospital, and a team of specialists participate in all phases of the planning and treatment of the patient. With modern surgical methods and utilisation of modern materials it is possible to come close to the goal of complete functional and social rehabilitation of the patient. Teamwork helps reduce to a minimum the effects of the lack of necessary materials and equipment.