UDK 611(082) ISSN 1512-8245

AKADEMIJA NAUKA I UMJETNOSTI BOSNE I HERCEGOVINE
АКАДЕМИЈА НАУКА И УМЈЕТНОСТИ БОСНЕ И ХЕРЦЕГОВИНЕ
ACADEMY OF SCIENCES AND ARTS OF BOSNIA AND HERZEGOVINA

RADOVI

KNJIGA XCII

Odjeljenje medicinskih nauka
Knjiga 31
Centar za medicinska istraživanja
Knjiga 2

SARAJEVO 2003

BONE DEFECTS OF THE SCULL: APPEARANCE, INDICATIONS FOR REPAIR, AND ANALYSIS OF RESULTS

Faruk Konjhodžić[1]

Abstract

Author presents results of 4.236 consecutive cases of scull bone defects during thirty years period, starting April lst, 1970 to April lst, 2000. These bone defects, representing 2,8% of total operative pathology seen at Department of Neurosurgery, University Medical Center of Sarajevo, were mainly the result of following operative procedures: reduction of impressive (depressive) fracture or osteoclastic trepanation performed in oder to enable interventions on inner structures of the head. In majority of cases, defects were repaired by alotransplantation (polyacrilamid) although vast number of impressive fracutres were treated by plastic surgery with bone chips of Homologous bone. In this paper autror presents different plastic procedures and cites the number of treated cases.
Key words: *scull bone defects-repairing-bone chipspolyacrilamid-alotransplanttion-autotransplantation.*

Introduction and material

In thirty years, from April lst, 1970 to April lst 2000, Department of Neurosurgery, University Clinical Center, Sarajevo, treated 4.236 consecutive bone defects of scull, which amounted to 2,8% of ist total operative pathology. Majority of edefcts was of iatropic origin as a result of strenuous operative procedures by surgeon: either during reduction of depressed fracture or by osteoclastic trepanation performed in order to approach inner structures of the head (see Table l.)

[1] Academy od Sciences and Arts of Bosnia.and Herzegovina

Table 1. *Origin of the bone defects of the scull*

	Number of cases	percentage
Operation of depressed fracture	2223	52
Osteoclastic trepanation	1998	47
Congenital defect	1	0,023
Other and unknown	14	0,33

Craniectomy is the best and safest way to approach intracranial structures, specially in depressive fractures, but it is performed rutiniously only during Aggression on Bosnia and Herzegovina, because we had a lot of injuries and it was according to treatment doctrine. But all the time the question was aroused what one could have done with defects after the reduction of depressed fracture.

In these operations neurosurgeon was faced with several options. One could have performed repairement with bone chips (plastic with homologous autograft), using material from the bone which surgeon would have to remove. It is the best way probably: healing is good and in case of graft mixture with antibiotics they become very resistent to different infections which is of major benefit seeing that one of the biggest complications is a possible infection. This method we used befor Aggression on Bosnia in all compliated and non-complicated depressed fractures. This method we performed immediately during the operation of depressed fracture, and the patient did not need a second operation. Our patients disliked the second operation of repairment of defects and all patients disliked the material used from crissta ilica. Removal of the bone from crista ilica is even more painful than the operation of the head itself. In some cases the procedure included six hours period arrival of the fracture with delayed plastic with heterogous homo and heterotransplantation (Kiels bone). All others were parformed using alotransplantation (polyacrilamid mass). See Table 2.

It is of importance to mention techniques not often performed in our seria. These were the techniques performed at Department of Plastic Surgery: plastic with unique lamina of calvarious bone, plastic with the rib, reduction of depressed fracture and fixation of fragments with wire, reduction of depressed facture with Kiels bone (sterilized and deeply frozen bone of the calf). Concerning the last one, our experience is scarse since it was performed only once but with good operative outcome. Rare case was plastic procedure with unique lamina from calvaria: removal of normal bone, separation of lamina and fixation of both parts on newly established defect and existing bone defect. Reduction of depressed fractures exclusively or with a fixation of fragment with wire were rarely performed. Operator made bur-holes, lifting the whole bone with depressed fracture and scrubing nurse by the

use of hammer thus reducing the bone. Following the suspension of dura, operator places whole bone on its place. Plastic with rib was performed by fixation of fragments following the removal of twentieth rib done under same anesthesia. Operation was disliked by our patients thus representing main reason of our scarse performance of latter.

Table 2. *Kinds of the operations*

	Number of cases	percentage
Bone chips of homologous bone (autograft)	2358	55,66
Bone chips of heterologous bone (autograft)	91	2,19
Plastic with a lamina of calvarious bone (autograft)	18	0,42
Plastic with rib (auograft)	5	0,11
Reduction of depressed fracture and fixation with a wire	9	0.21
Reduction of depressed fracture only	4	0,09
Plastic with Kiel s bone (heterograft)	1	0,02
Polimerized isoacrilic acid	1748	41,26
Total	4236	approx. 100,00

In case of delayed plastic, method used was the same used in peaceful conditions. For this reason we used alotransplantation mixing the sterilized isomers and polymers of isoacrilic acid during the operation. First of all, we prepared the defect, and after that we put acrilic mass on it, trying to adapt the mass on defect till it was soft. As soon as the mass hardened, salin was used to lower the temperature liberated. But bad condition aroused when the alotransplantation came in contact with air sinuses because of the infection. Skin above the alotransplantat must be in good condition, with good vascularisation, and sutures without a tension. This transplant could be in function without any possibilities of infection. Otherwise it is very good, it funcioned properly and it could be done in course of the same operation with removing the osseous tumors.

This is full indication for filling the defect with bone chips made from homologous and heterologous bone in closed injuries of the head in course of same anesthesia. And in open injuries of the head if the skin is good and the patients arrives within 6 hours to our Emergency Department. It is also indicated to perform the second operation for filling the defect in every case. Poor conditions in use of bone chips aroused because of the time patient had to wait till osseous graft hardened. In performing the second operation, we have to consider the conditions and the pain patient has to underwent taking into

consideration painful use of crista ilica. Also, we have to consider a new scar which is of big importance to some occupations.

Use of polyacrilamid is very useful. It is good for the patient and shortens the time of operation itself. It is the easiest method for the patient, because there is no new scar on the post where we took the graft, it closes the defect sufficiently, it hardens in a very short time, and patient could perform any activity, even shoot ball. And it is cheap.

Complications

Concerning indications for different plastic procedures, the number of complications are pretty small: infection of bone ships and polyacrilamid and uncoverage of the graft without visible infection (UGWVI) during the use of polyacrilamid. Treating complication is different and it depends on situation, sometimes we performed the drainage only, but sometimes we had to remove the graft. Use of polyacrilamid is vast and offers various possibilities following the removal of the graft.

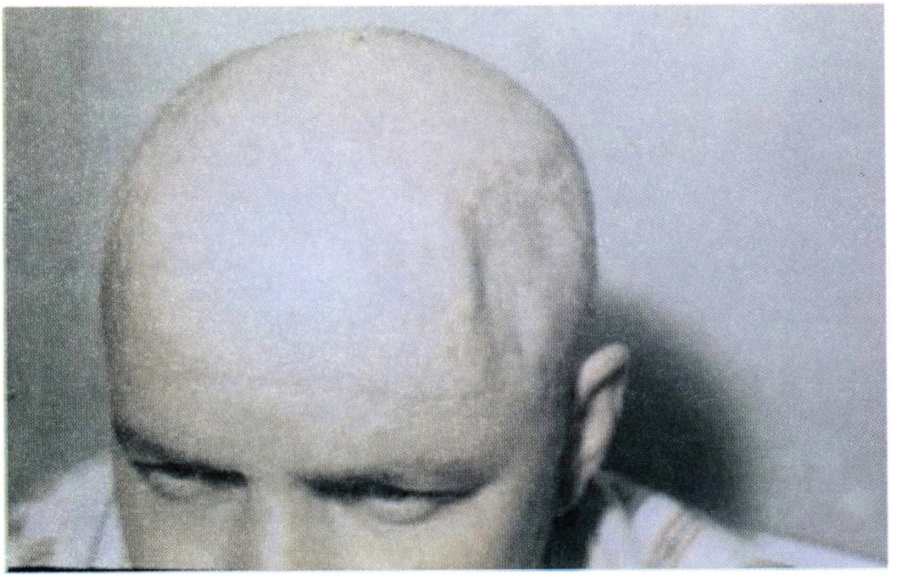
During the filling the defect we used bone chips and always we used it in closed injuries, immediately in same operation if the skin is good and within period od six hours after injury. Finally we used it in second operation if the defect was in connection with air sinus because it is very hard against infestion. In these situations we did not have any complications.

Use of polyacrilamid is a method of choice, but has its limits in aneurysm and tumor when it is a case of first and second operations following osteoclastic trepanation. We always thought that graft in this situation is not in contact with air sinuses, and that skin above is very good. These facts we considered crucial.

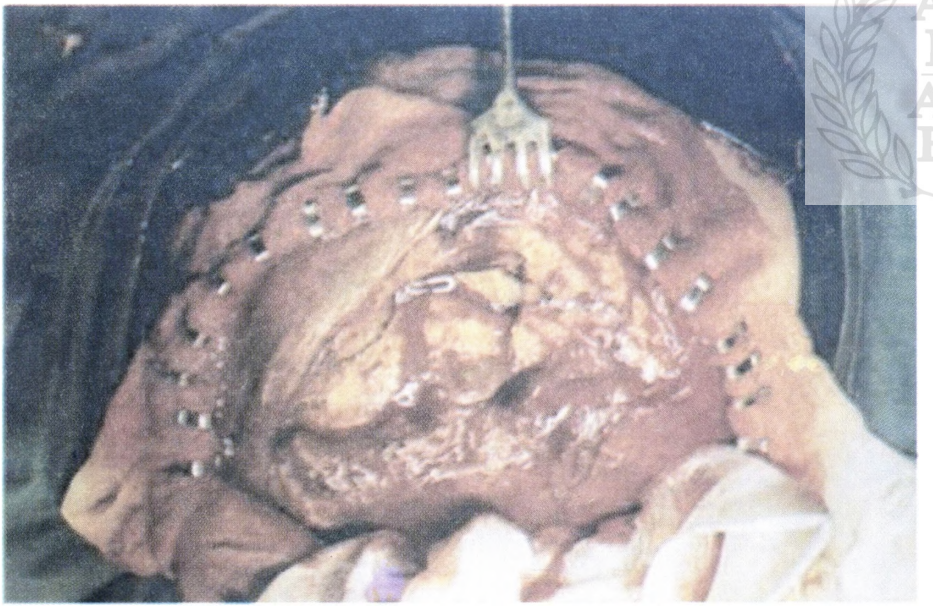
Plastic with bone chips leaves minor cosmetic defects and is more functional in patients with lot of hair. Also bone could be put in bone bank for second operation.

Conclusions

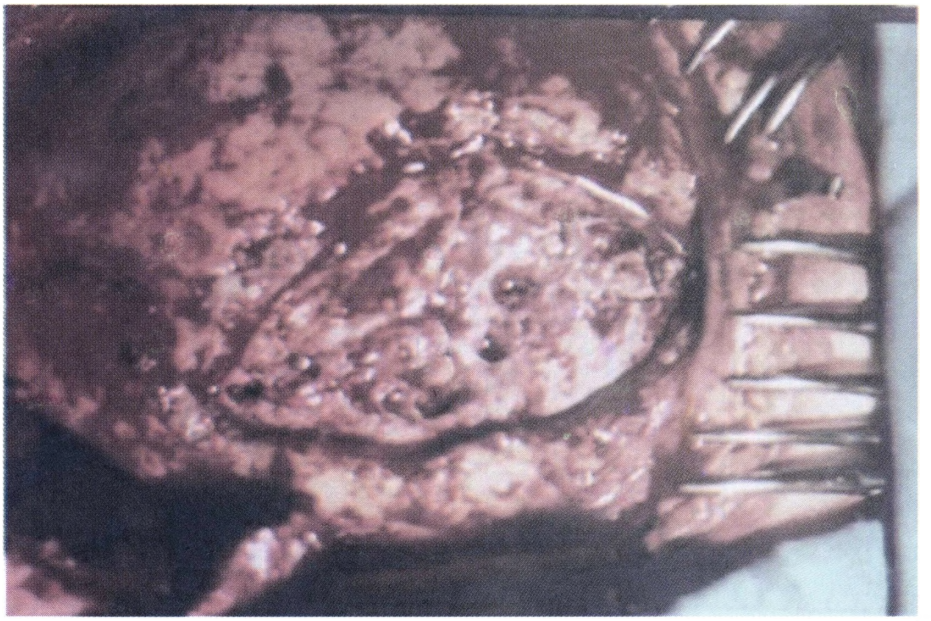
1. Plastic with bone chips and plastic with polyacrilamid are excellent methods for covering the defect of the scull. Complications are rear, if surgeon follows indications.
2. Plastic with bone chips could end with minor cosmtic defects and is more suitable in patients with lot of hair.
3. In all closed injuries of the head, and in second operation one could perform plastic with bone chips.
4. Material for acrylamid is very cheap and is always available.
5. In case one follows indications there are no complications.



Defect of the scull visible clinically, after depressive fracture

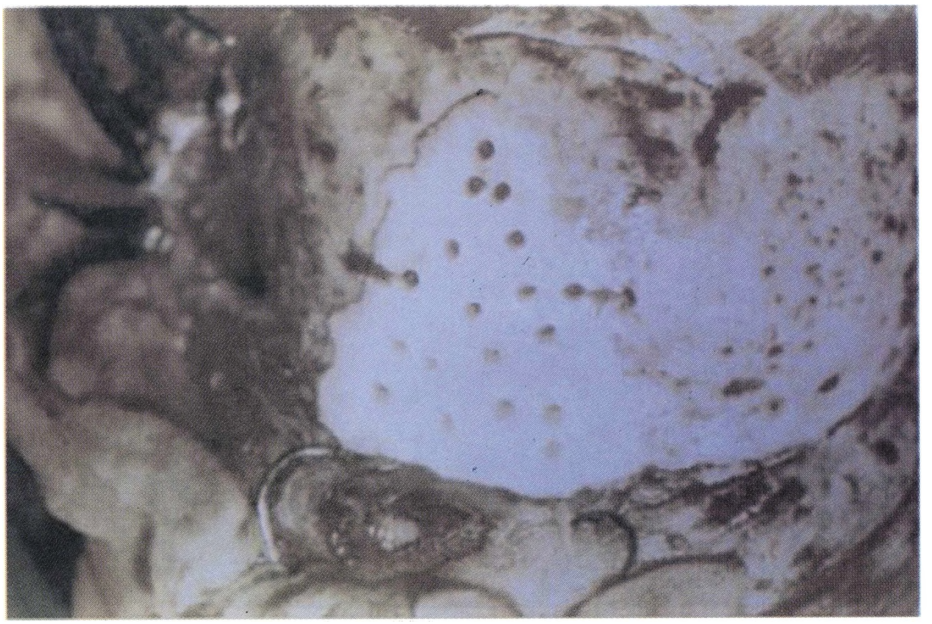


Fresh depressive fracture on operation.

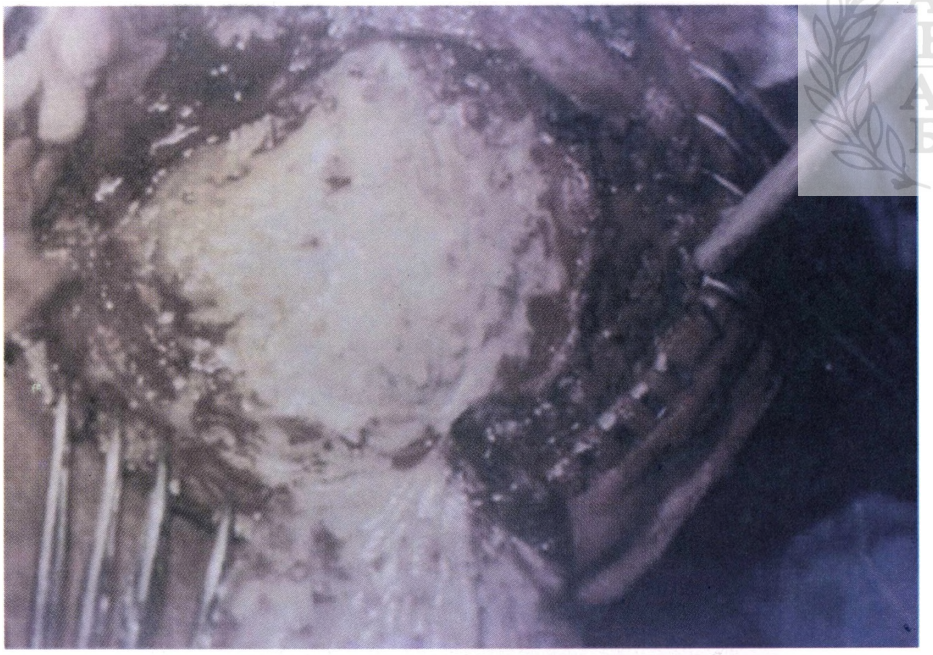


Prepared defect if the scull is visible during operation.

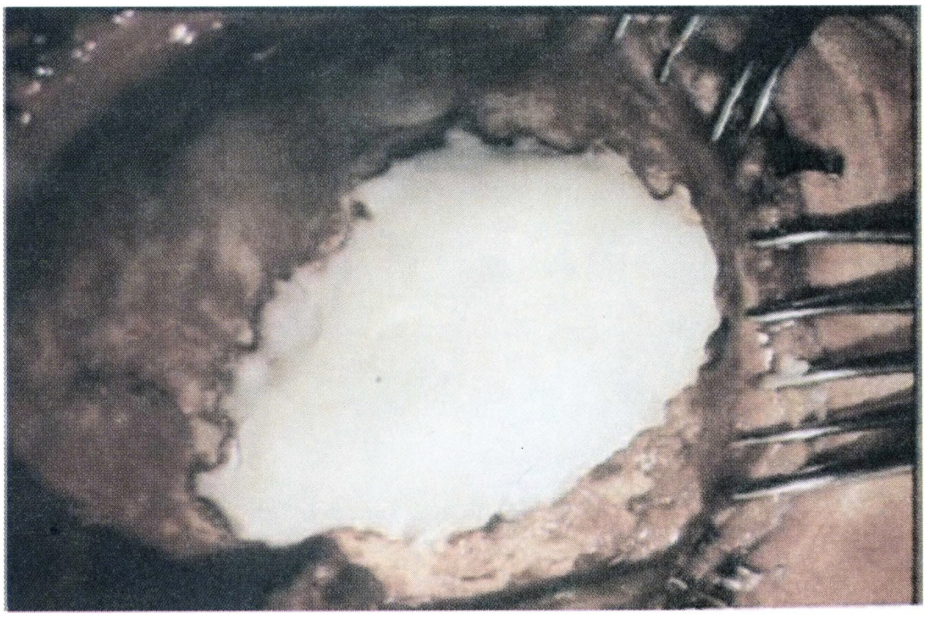
Filling the bone chips, immediately after reduction of depressed fracture.



Plastic with polyacrilamid and its fixation.



Growing the tissue throughout polyacrilamid holes, and in that situation we need no fixation.



Plastic with alograft.

Radiology post operational.

Apstrakt

Autor iznosi rezultate 4.236 uzastopnih defekata na koštanom dijelu skalpa u toku tridesetgodišnjeg perioda, počevši od prvog aprila 1970. do istog datuma 2000. godine. Ovi defekti su nastali uglavnom operativnim zahvatom, redukcijom impresivne (depresive) frakture ili osteoklastičnom trepanacijom da bi se omogućio rad na unutrašnjim strukturama glave i čine oko 2,8% od ukupne patologije na Klinici za neurokirurgiju Kliničkog centra Univerziteta u Sarajevu. U velikome broju slučajeva defekt je riješen plastikom sa alotransplantatom (poloakrilamidom) mada su, posebno kod impresivnih fraktura bile veoma zastupljene i plastike sa isitnjenim koštanim autotransplantatom (bone chips) homolognoga tkiva. U ovome radu autor iznosi indikacije za vrstu plastike i broj tretiranih slučajeva.

Ključne riječi: *defekti koštanog dijela skalpa-plastike-isitnjeni koštani transplantati-ploakrilamid-alotransplantacija-autotransplantacija*

References

Konjhodžić F.: *Neurosurgical Injuries in Defensive war of Bosnia and Herzegovina,* Sarajevo : OKO 1995.