

Short Communication**The Use of Frozen Autogenous Bone Flap for Cranioplasty***H.Moin MD*, P.Mohagheghzadeh MD**, A. Darbansheikh MD*****ABSTRACT**

Background: The artificial methods of cranioplasty such as using metals or alloplastic materials have some disadvantages, comparing with autogenic bone flaps. We tried to show that the autogenic flaps have less complications when used in cranioplasty.

Methods: With good sealing of bone flap after extraction and preserving in -70 to -80° C, in Immunology Department, the autogenic bone was fixed in the previous site.

Results: From 10 patients, one of them developed infection and osteomyelitic bone was extracted. No bone resorption was detected.

Conclusion: Comparing with other studies of autogenous bone flap cranioplasty, we have similar rate of complication. In other studies, the rate of infection was almost equal to our results. So using autogenous bone in our center is advisable.

Key words: cranioplasty, autogenous bone, frozen bone, infection

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Cranial defect as a consequence of decompressive craniotomy due to raised intracranial pressure, can be managed with using autogenic bone or alloplastic material later ¹. Brain protection and cosmetic aspects are the major indications of cranioplasty. Autogenic bone flap for the skull has these superiorities compared with artificial materials such as methylmetacrylate or some metals (e.g. tantalum): It is alive, not expensive, and completely fit with the size of the defect. Also, it doesn't have any risk for transmitted diseases ¹. It can be preserved in patient's own body (such as subcutaneous area of abdomen) or in the laboratory ^{2,3,4}.

In laboratory, bone can be preserved in formaldehyde ⁵, ethanol ⁴, or as we tried, it can be frozen. Frozen autogenic bone, after application for cranioplasty has lesser de-

gree of bone resorption in comparison with alloplastic materials ⁶.

We tried to show that autograft bone can be an acceptable and routine method of cranioplasty because of its high cost-benefit ratio.

Subjects and Methods

This is a prospective clinical trial performed in Alzahra and Kashani Hospitals in Isfahan Since 1999-2002. With simple randomized Sampling, thirteen patients were assigned who were going to undergo decompressive craniotomy for tumor or after trauma, without any infectious process or infiltrating tumor. Three of them were not accessible for follow-up and they were excluded.

Because of raised intracranial pressure, sometimes, in primary operation, the bone could not be replaced, so it was extracted. Bone

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flaps were irrigated with normal saline, dried, and wrapped in a sterile gauze, packed in two sterile gloves, and a plastic coverage, respectively. They then were transferred to Immunology Department of medical school. At there, the bone temperature was reduced quickly and suddenly to -70 to -80°C and then preserved in the same condition, until the patient would be ready for cranioplasty. In the day of second operation, the bone was transferred to hospital operation room, irrigated with normal saline in sterile condition, then fixed with zero silk. If any unsterility was suspected, the bone was first sterilized with Ethylen Oxide for 12 hours then was applied (3 patients). Post operative antibiotic therapy was continued for 3-5 days. Skull X-rays (anteroposterior and lateral) were taken 24 hours, 3 months, and 6 months later, post operatively.

Results

Information regarding age, sex, primary diagnosis, time of bone freezing, and complications were recorded. Mean age of the patients was 22.4 years old. From 10 patients, seven patients were male and three were female. One of the patients suffered from spontaneous intracranial hemorrhage due to arteriovenous malformation, 3 had traumatic intracranial hemorrhage, one had intracranial tumor, 4 had acute subdural hematoma, and one had acute subdural and epidural hematoma. Average time of freezing was 4 months. Minimal duration of follow-up was 6 months. Three bones were sterilized with Ethylen Oxide.

One of the operations was complicated with infection (10%), in which, the bone was not fully sealed in its package and was not steril-

ized with Ethylen Oxide. In 6 months follow-up, there was no case of flap resorption.

Discussion

In this study, one patient (10%) with acute subdural hematoma developed bone flap infection. So, we extracted the osteomyelitic bone. This was because of inadequate sealing of bone coverage. Also, because of our neglect, this bone was not sterilized with Ethylene Oxide. In 6 months follow-up, no bone resorption or mechanical disturbance were not seen.

Moreira and coworkers had 302 patients with different methods of cranioplasty. Complications were seen in 23.6% of them, that, infection was the poorest prognostic one. Also, autografts had partial resorption ⁶.

Durham and coworkers did cranioplasty with hydroxy appetite cement; they had 2 of 9 patients complicated as infectious osteomyelitic process ⁷.

Van gool and coworkers used methyl-metacrylate in 45 patients with 39 months follow-up. In the first year after surgery, 2 cases developed chronic infection ⁸.

Autologous bone flaps had also some infectious complications in article review. Iwana and coworkers reported 49 patients with one case of infection ⁹. Itoh-y reported 2 cases of infected bone, from 8 patients with autogenic bone cranioplasty ¹⁰.

Another major complication is bone resorption. According to controlled skull X-rays, we didn't have any case of bone resorption in our study. T- Flannery and coworkers also reported no case of bone resorption in their study ¹¹, but Iwana and coworkers reported 1 case of it (out of 49 cases) with significant bone resorption ⁹.

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