Case Report

Esthetic correction of depressed frontal bone fracture

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ABSTRACT
Depressed frontal bone fractures are occasionally seen in maxillofacial trauma patient. If untreated, they look un-esthetic. Although there are numerous options available for correction of these defects, use of bone cement (polymethylmethacrylate or PMMA) is simple and reliable. This is the report of one such case.

Key words: Alloplasts, esthetic correction of frontal bone, frontal bone fracture

INTRODUCTION
Fractures of the upper face and anterior skull base are a challenging neurosurgical, plastic, maxillofacial surgery problem. After clinical and radiographic evaluation of the fracture, prompt surgical intervention should be immediately instituted to excise any necrotic tissues inside or outside the cranial cavity, brain isolation by meticulous dural closure[1] ablation of the frontal air sinuses and bony coverage of the region by either immediate or delayed frontal bone reconstruction.

If frontal bone is comminuted, it is difficult to replace the small bony fragment by rigid bone plate fixation.[2] In such cases, it is prudent to leave the bony fragments where they are and camouflage the defect.[2]

Literature has many articles describing simple procedures for contouring the craniofacial skeleton. These procedures include use of hydroxyapatite cement, hydroxyapatite block, hydroxyapatite granules, carbonated calcium phosphate bone cement, norian craniofacial repair system (CRS) or carbonated calcium phosphate plate (CCPP), high-density porous polythene implants or bioactive glass ceramic implant and acrylic (methylmethacrylate).[3,4]

We have used polymethylmethacrylate or PMMA for correction of frontal bone defect in one patient and has found it to be a convenient, safe and simple method.

CASE REPORT
A 28-year-old male patient reported to our department with H/O of RTA. On clinical examination, there was depressed frontal bone and zygoma fracture [Figure 1 a and b].

Axial and spiral computerized tomography (CT) scanning of head was done to rule out any head injury. Radiograph revealed depressed comminuted fracture of frontal bone on left side leading to obliteration of frontal sinus on that side.

Treatment plan
As the comminuted bony fragments of frontal bone could not be brought back into the normal position, it was decided to camouflage the defect with gentamicin impregnated PMMA (poly methylmethacrylate) bone cement.

Surgical procedure
Patient was operated under general anesthesia. After proper scrubbing of operating field and draping, 2% lignocaine with 1:20000 adrenaline was infiltrated in
the area to achieve vasoconstriction and to get fluid dissection. The fracture site was exposed via extending the existing lacerated wound [Figure 2]. It was a depressed comminuted fracture of frontal bone. Since it was not associated with any head injury, the defect was flushed and dried to make it ready to receive the bone cement.

The bone cement was then mixed as per manufacturer’s instructions [Figure 3]. Once it reached dough stage, it

Figure 1a: Pre operative lateral view of depressed frontal bone fracture

Figure 1b: Pre operative depressed frontal bone close up view

Figure 2: Exposure of the fracture site through the lacerated wound

Figure 3: Bone cement being prepared as per manufacturer instructions

Figure 4: Bone cement placed and adopted over the defect

Figure 5: Immediate post operative picture
was used to fill up the defect and manipulated to the desired shape [Figure 4]. Closure was done 3'0 silk suture [Figure 5].

RESULTS

Patient recovered from anesthesia uneventfully. He received post operative broad spectrum antibiotics for five days. The wound healed very well and there was no sign of infection or any other complication at the time of discharge [Figure 6]. Suture removal was done on seventh day postoperatively. Patient was happy and satisfied with the result.

DISCUSSION

Management algorithms for frontal sinus fractures vary widely. Appropriate treatment depends on an accurate diagnosis, focusing on the physical examination and data from computed tomography scans.

It is not uncommon for post craniofacial trauma patients to require augmentation of depressed craniofacial skeleton. Reconstruction and contouring of these defects in natural esthetic fashion can pose challenge to clinician. Various autogenous bone graft and alloplastic materials have been in use for this purpose i.e. titanium mesh, polymethyl methacrylate\(^\text{[5,6]}\) autogenous bone, hydroxyapatite, HTR-PMI (hard tissue replacement patient matched implant)\(^\text{[7]}\) have been used with varying success. All materials and grafts have merits and demerits in their use.

Titanium mesh\(^\text{[2]}\) is costly and its shaping and moulding is difficult and time consuming.

Autogenous bone grafts\(^\text{[7]}\) such as iliac or rib require a second surgical site. This may lead to donor site morbidity, inability to obtain adequate bone for large defect.

Cranial defect caused by trauma can be satisfactorily treated using cranioplast implant\(^\text{[7]}\) made from HTR-PMI process. This implant consists of polymethyl methacrylate and polyhydroxyethyl methacrylate. Infection and foreign body reaction and availability are the main demerits of this alloplastic material.

Other alloplastic materials\(^\text{[7]}\) that have been used for such defects are hydroxyapatite, silicon rubber, acrylic metal plates and proplast. These have following advantages and disadvantages.

Advantages of alloplast:
1. Availability
2. Nonresorbability
3. Ease of surgical procedure
4. Excellent post operative cosmetic result

Disadvantages include:
1. Foreign body reaction
2. Potential for infection which may produce fistula, slippage, extrusion, granuloma and erosion.
3. Polymethylmethacrylate\(^\text{[8]}\) is the most commonly used alloplastic material.

Advantage:
• tissue tolerance
• reliable reconstructive material

Disadvantages include infection, limitation of growth and it may fracture and requires time for shaping and curing.\(^\text{[7]}\) The risk of infection may be reduced by adding antibiotic i.e. gentamycin to the acrylic and using it under sterile conditions, beneath well-vascularized skin. Growth limitation may be obviated by not placing acrylic across sutures in children with enlarging skulls.\(^\text{[8]}\)

This technique, apart from being affordable, also ensures shorter operative time and good esthetic result.\(^\text{[9]}\) so we have chosen this technique in our patient and did one patient using PMMA and got initial promising results.

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