

MANAGEMENT OF CRANIAL DEFECTS WITH POLYMETHYLMETHACRYLATE. CASE REPORT

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INTRODUCTION

Skull defects are the common reconstruction in neurosurgical procedures, independently of the cause have a cognitive repercussion. Different material exist for cranial reconstruction, however some have more comorbilities than others, the polymethylmethacrylate (PMMA) is a good material for reconstruction because its low cost is most accesible by patient, and its rigid structure allows support to the soft tissue and the same time allows the expansion of the brain, restoring the normal dynamic flow of the cerebrospinal fluid.

Craniectomy nullifies the Monroe Kellie doctrine which governs intracranial pressures, cerebrospinal fluid flow, cerebral blood flow, the same way causes the known syndrome of the trephined. Sunken flap syndrome results of the effects of atmospheric pressure over the soft tissue receding brain once the swelling is resolved. The incidence was reported in 26%. Symptoms are attributed to the hemispheric collapse including headache, dizziness, fatigue and psychiatric changes.^{1,2}

Usually time intervals between craniectomy and cranioplasty are between 6 weeks and 1 year. Because the previous incision must be well healed and clearance infection. There is a large selection the procedure and material for repair skull defects, which may be categorized in autografts, allografts, xenografts and bone substitutes. The ideal material must be malleable, sterilizable, nonmagnetic, radiolucent.; many material options have advantage and disadvantage.^{1,2}

OBJECTIVE

Management of cranial defect with material alloplastic by polymethylmethacrylate

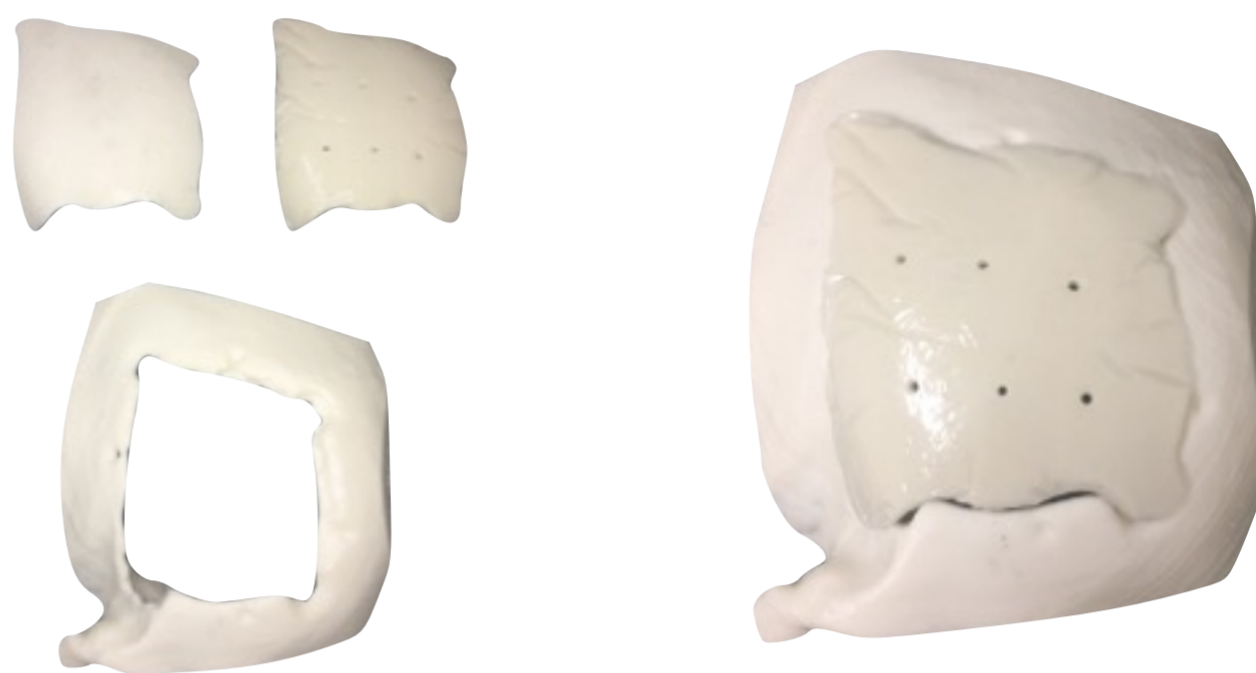
METHOD

The reconstruction of the cranial defect is carried out by a three-dimensional reconstruction with the model stereolithography skull made from Acrylonitrile Butadiene Styrene, because this material withstands high temperatures up to 212°F with is important in sterilization.

Reconstruction defects are sterilized in ethylene oxide gas at temperatures of 80° at 131°F with an exposure time of 5 at 6 hours. In a sterile flask, the personalized reconstructions are placed in order to later perform the casting of the plaster to obtain a negative model. Polymethylmethacrylate with Gentamicin in powdered form is mixed with liquid monomer to later place it in the negative model and be compressed into the plastic flasks, the excess of

polymethylmethacrylate is removed and it will again be placed in the compressor, the exothermic reaction is slowly cools like the plaster.

Obtaining the reconstruction based on polymethylmethacrylate, multiple holes are made with the drill with the aim of passing the suture that will give suspension to the dura. The sterilization process is carried out with ethylene oxide gas at temperatures of 80° at 131°F with an exposure time of 5 at 6 hours.



DISCUSSION

Methyl methacrylate prothesis have a disadvantage including postoperative infection, at a rate of 5% to 10%. However the polymethylmethacrylate with medical antibiotic Gentamicin diminish the probability infection. keeps its strength comparable with the native bone and easy fit. In the past, PMMA cranioplasty implants were shaped manually intraoperatively to fit the skull defect, which in many cases resulted in disappointing cosmetic outcomes. For very large defects (>50 cm² or >12 cm in one axis), custom-made cranioplasties proved to be more appropriate.^{1,3}

DECLARATION OF CONFLICT OF INTERESTS

There is no conflict of interest between the author and co-author.

RESULTS



Fig.1 Preoperative Frontal view

Fig.2 Preoperative lateral view

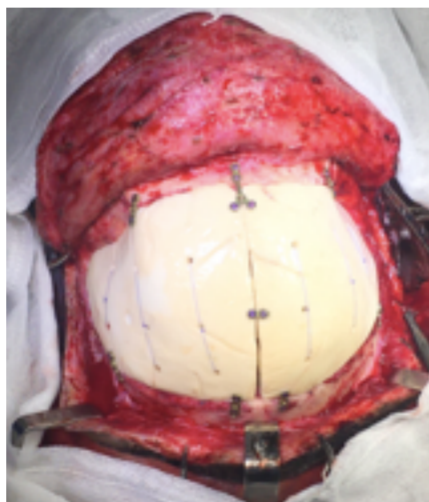


Fig.3 Intraoperative frontal view



Fig.4 Intraoperative lateral view



Fig.5 Postoperative front view at 15 days



Fig.6 Postoperative front view at 15 days



Fig.7 Preoperative Frontal view

Fig.8 Preoperative three-quarter view

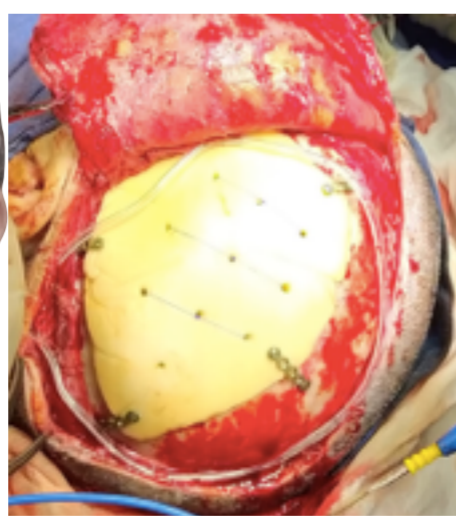


Fig.9 Intraoperative lateral view



Fig.10 Immediate postoperative



Fig.11 3D volumetric reconstruction

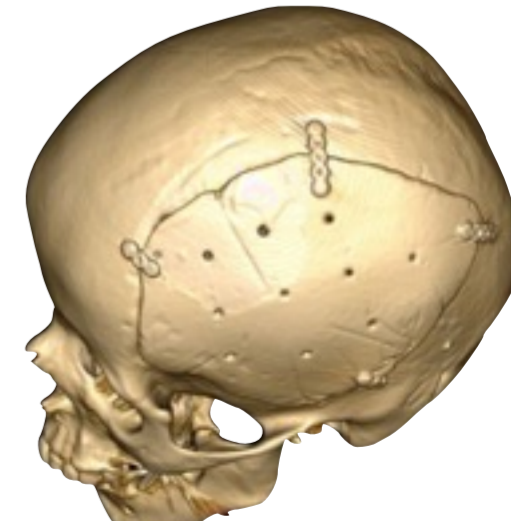


Fig.6 Postoperative front view at 15 days

CONCLUSION

With the advancement in 3D printing technology, custom PMMA construction has become a good treatment option due to its rigidity, low cost, and easy adaptation. At the same time, it reduces complications since its manufacture can be carried out prior to the surgical event, reducing the probability of damage due to its exothermic reaction, and complementing PMMA with Gentamicin helping to reduce the postoperative infection.

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