Case Report
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Management of the Intractable Huge Intracranial Osteoma Based on the 3D Printing Model

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Osteoma is one of the benign tumor that occurs on the bones all over the body. Mostly the simple excision is known to be enough. However, sometimes we encounter the troublesome situation where the osteoma is located in very challenging area, which results in the recurrence. 26 year female presented with the intractable intracranial osteoma. Given the disease entity of the osteoma, the simple excision would be enough or conservative management. But this osteoma turned out to be huge and recurrent in spite of the endoscopic resections, which causes the facial disappearance accompanied by the orbital vertical dystopia. Moreover, the patient's main concern was the pain. We performed the intracranial resection of the whole lesion and reconstructed the skull base and frontal bone as well as the part of the orbital wall. In order to restore the original bony anatomy, the 3D printing model was used based on the titanium mesh. I report this unusual case of the intractable intracranial huge osteoma. This report may be helpful for the other surgeons to make a decision on their similar cases in the future.

Key Words Osteoma · Intractable osteoma · Recurrent osteoma · 3D printing · RP · Intracranial · Reconstruction.

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Introduction

Various kinds of the bone tumor can arise from our body. Among these, the osteoma would be the one of the easier things to deal with. Osteoma is one of the benign tumor that occurs on the bones all over the body. Mostly the simple excision is known to be enough except the syndromic occasions (1). However, sometimes we encounter the troublesome situation where the osteoma is located in very challenging area, which results in the recurrence (2).

26 year female presented with the intractable intracranial osteoma. Given the disease entity of the osteoma, the simple excision would be enough or conservative management. But this osteoma turned out to be huge and recurrent in spite of the endoscopic resections, which causes the facial disappearance accompanied by the orbital vertical dystopia. Moreover, the patient's main concern was the pain.

We performed the intracranial resection of the whole lesion and reconstructed the skull base and frontal bone as well as the part of the orbital wall. In order to restore the original bony anatomy, the 3D printing model was used based on the titanium mesh.

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A Case Report

26 years old women addressed the unilateral prominent globe accompanied by the vertical dystopia as well as the pain. She wanted to restore her facial shape and be relieved from the pain. The multiple endosopic resections were done in other department,

Fig. 1. Preoperative CT scan.

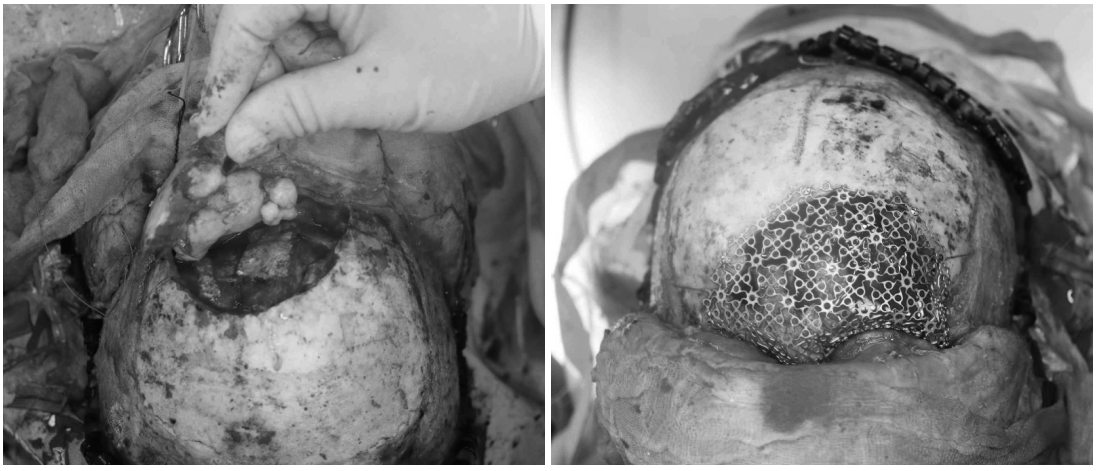

Fig. 2. Intraoperative view.

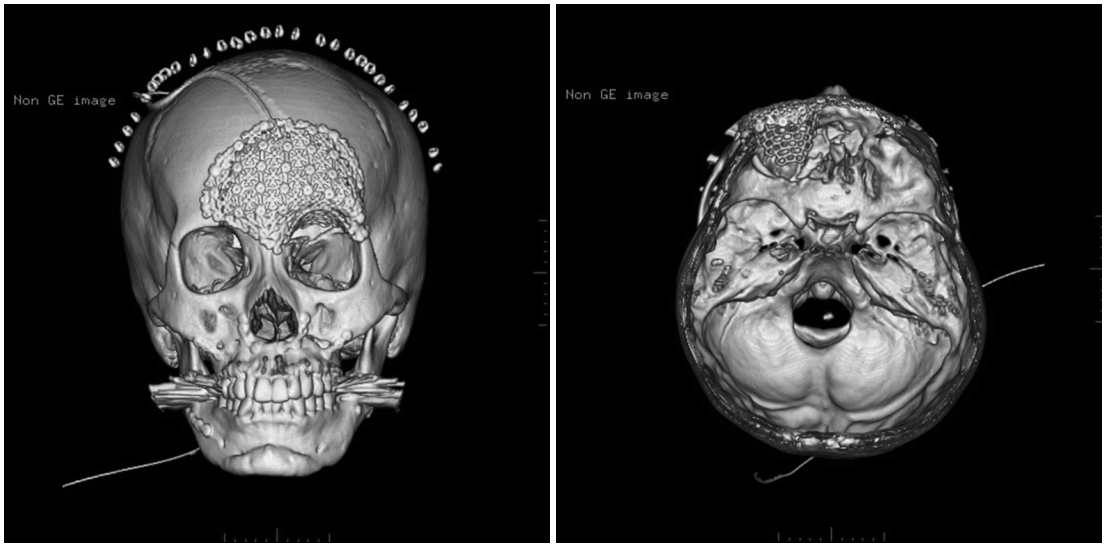

Fig. 3. Postoperative CT.

which turned out to be unsuccessful. The symptoms persisted. The 3D CT scan revealed us that the intractable huge intracranial osteoma remained while involving the frontal sinus, ethomoid sinus and intracranial parts. The huge lesion compressed the left orbital globe to the lateral and downward side.

We believed the intracranial approach would be the ideal way. After separation of the frontal bone flap, the lesion was resected completely. As a result, huge bony defect occurred including the skull base, medial and superior orbital walls, ethomoid sinus and the frontal sinus. It turned out to be very challenging in terms of the reconstruction. In order to get the more precise reconstruction of the frontal bone and orbital walls in terms of symmetry and the shape, we planned the adoption of the 3D printing model based on the three dimensional computer simulation. After the 3D CT scan from the patients, the dicom data was extracted and used for the three dimensional volume rendering.

At first, the orbital walls were reconstructed by the titanium medpore implant based on the 3D printing model. Then, the galeal flap was elevated for the prevention of the nasofrontal communication. Finally, the titanium mesh was bent according to the original bony contour based on the 3D printing model which was made from the DICOM files of the patient's CT scan.

During the operation, there isn't the problem. The operation was straightforward as the titanium mesh implant were designed preoperatively given the symmetry and contour of the mandible. The reconstruction turned out to be successful without any complications. The patient was satisfied with the result in terms of the facial aesthetics and the pain on the location of the lesion has gone.

Discussion

Computer simulation has been evolving the medicine so far. Most importantly, the craniomaxillofacial surgery have benefited from the evolution of the CAD-CAM based technique such as orthognathic surgery (3). The most benign lesions do not require the computer simulation technique. However, 3D printing model based on the CAD-CAM technology turned out to be very helpful for the reconstruction of the extensive huge mass on the tricky locations (4).

As such, the most plastic surgeons have depended on their experiences. However, the experience of one surgeon doesn't work all the time (5). Computer simulation can help the surgeon retain their skill levels constantly. In addition, for the beginners, it could be a great help.

The problems include the insufficient stiffness of the titanium mesh implant. But, the titanium product which were used for this case was made only for the cranium. It is known to provide the enough stiffness which can protect the brain.

In our experiences, the cranial reconstruction can be done with conventional technique without this 3D printing mdoel based on the CT scan, of course. But, for the patient with the very severe facial deformity on the trick area in terms of the resection and reconstruction, this CAD-CAM based 3D printing model could be very beneficial for making the ideal restoration of the original contour.

Conclusion

3D printing model made from the dicom file of the patient's CT data for the cranial reconstruction based on the computer simulation turned out to be very successful in this patient. Individualized approach for each patient could be an ideal way to manage the patients in near future.

References

1. Neff S, Hansen K, Domanowski GF, Wu JL. Cryptic osteoid osteoma of the cranium: case report. Neurosurgery 1990;27(5):820-821
2. Wertheimer P, Lecuire J. [Voluminous osteoma of ethmoidal origin occupying the anterior portion of the base of the cranium]. Lyon Chir 1950;45(5):623-629
3. Sanchez Burgos R, Gonzalez Martin-Moro J, Arias Gallo J, Carceller Benito F, Burgueno Garcia M. Giant osteoma of the ethmoid sinus with orbital extension: craniofacial approach and orbital reconstruction. Acta Otorhinolaryngol Ital 2013;33(6):431-434
4. Nicolotti M, Grivetto F, Brucoli M, Benech A. Direct access to a frontal sinus osteoma and reconstruction of the orbital roof displaced by the lesion by titanium mesh. J Craniofac Surg 2012;23(4):e364-e366