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Technical note

# Use of an acrylic jig to aid orbital reconstruction after resection of a sphenoid intraosseous meningioma: a technical note

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A 48-year-old woman presented to neurosurgery with proptosis of the left globe and worsening pain and swelling in the left temporal region. Her visual acuity was unaffected. A computed tomogram (CT) of her head showed a large expansile lesion that involved the left frontal, parietal, temporal, and sphenoid bones (Fig. 1 and Supplemental Fig. S1). It impinged on the orbit, causing proptosis and crowding of the orbital contents. A diagnosis of intraosseous meningioma was suspected.

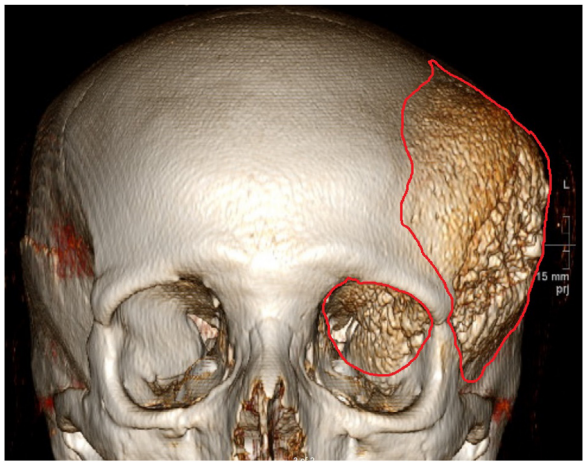

Fig. 1. Three-dimensional computed tomographic image of lesion (outlined in red) involving the left lateral orbital wall. This was subsequently mirrored to create a normal left orbit.

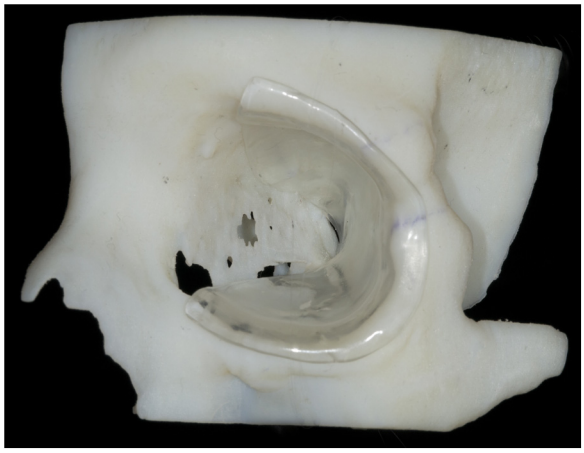

Fig. 2. Acrylic jig inside the stereolithic model of the mirrored right orbit.

We used a coronal approach to resect the meningioma, and after craniectomy, an extraorbital approach for the orbital resection. This was planned in advance with the maxillofacial surgeons and an in-house maxillofacial technician as a joint surgical case.

The DICOM data from the head CT was imported into Mimics software (Materialise). We used the software to select the data for the unaffected (right) orbit, then exported it to 3-matic software (Materialise), where the right side was mirrored to create a "normal" left side (Fig. 1). We then exported it back to Mimics and saved it as an STL file ready for the 3-dimensional printer. We then printed a stereolithic model of a healthy left orbit, based on the mirror image of the right (Fig. 2). Wax was added to the inner surface of the superior and lateral walls of the orbit on the model to record its topog-

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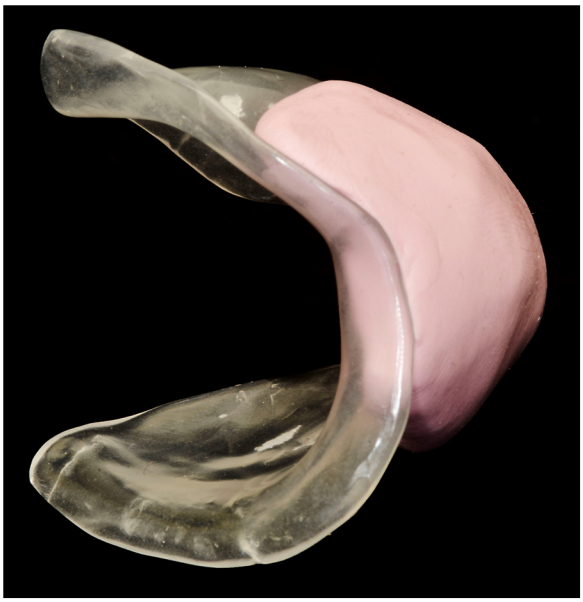

Fig. 3. Putty on external surface of the jig to illustrate how the PALACOS R + G cold cure acrylic was moulded intraoperatively on the jig to obtain an accurate intraorbital contour.

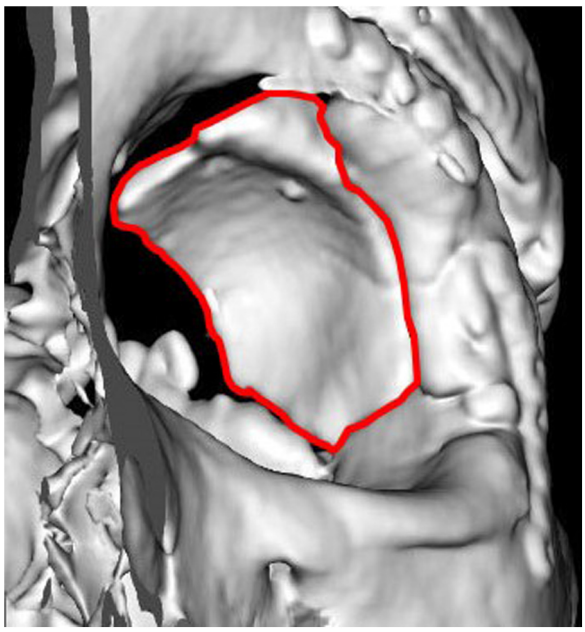

Fig. 4. Postoperative three-dimensional computed tomographic reconstruction of left the orbit showing the acrylic plate in situ (outlined in red).

raphy. This wax template was then removed and invested in plaster to create a cast. The jig was made using the lost wax technique with heat cured clear acrylic (Detrey Trevalon Acrylic) (Fig. 2).

The jig was then sealed inside a sterile clear plastic bag, and PALACOS® R + G (Heraeus) cold cure acrylic was moulded onto the convex (outside) surface (Fig. 3) to form an acrylic plate with which to reconstruct the defect. As the surface of the jig was an accurate representation of the anatomy of the inside wall of the orbit, this helped to form an accurate acrylic plate.

Once cured, the plate was inserted into the orbital defect from the extraorbital direction and excess material trimmed. It was then was secured with titanium mini-plates and screws (Supplemental Fig. S2) and Fig. 4 shows it in situ on postoperative 3-dimensional CT.

## Conclusion

Using our technique, the orbital walls can be reconstructed using an extraorbital approach. It affords accurate restoration of the lost orbital volume to that of the unaffected side. Other advantages of this technique are the avoidance of a standard orbital dissection and its attendant risks, and shorter time in theatre. At one month postoperatively, there was resolution of the initial proptosis but reduced visual acuity in the same eye. There was no diplopia, exophthalmos, or enophthalmos. The condition of the optic nerve did not affect our decision to use this technique. To the best of our knowledge, this technique to aid orbital reconstruction has not been described previously.

## Conflict of interest

We have no conflicts of interest.

## Ethics statement/confirmation of patient's permission

Ethics approval was not required. There is no patient-identifiable data.

## Appendix A. Supplementary data

Supplementary material related to this article can be found, in the online version, at doi:https://doi.org/10.1016/j.bjoms.2019.08.026.