

Single-Stage Gross Total Resection and Customized CAD/CAM PEEK Cranioplasty for Primary Intraosseous Meningioma: Illustrative Case

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Abstract

Background: Primary intraosseous meningiomas (PIM) are extradural tumors that originate within the bones of the skull. Gross total resection is frequently curative, with slow and infrequent recurrence associated with higher WHO grade and subtotal resection. Prefabricated custom implants placed during the index resection reduce surgical burden and may lead to improved outcomes. With less than 200 published cases, further documentation of these entities is needed.

Observations: A 46-year-old woman presented with a slowly growing frontotemporal, calvarial mass discovered on workup for chronic migraine headaches. She underwent tumor embolization and craniectomy with concurrent cranioplasty using a prefabricated computer-aided design/computer-aided manufacturing (CAD/CAM) custom PEEK implant. A gross total resection was achieved with assistance of neuro-navigation and a prefabricated guide designed to mark the borders of the implant. At 10-month follow-up, she remained neurologically intact with continued symptomatic improvement. Surveillance MRI demonstrated no residual tumor or recurrence.

Lessons: PIM are amenable to gross total resection with a low recurrence rate, particularly for WHO grade I tumors. Reconstructive cranioplasty is often necessary after resection. This report details the use of a prefabricated PEEK implant placed during the initial operative session, illustrating the feasibility and potential advantages of single-stage reconstructive techniques for complex calvarial defects.

Key Words: Meningioma, Primary Intraosseous Meningioma, Cranial Tumor, Cranioplasty, Reconstruction

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