

Preoperative Embolization in Intracerebral Meningiomas - Contradistinction: A Report of two Cases

Vidhu Bhatnagar¹, Urvashi Tandon², P Swapna³, Aakash Agarwal⁴

¹DM (Neuro Anesthesiology), Associate Prof, Department of Anesthesiology, INHS Asvini, Colaba, Mumbai 400005, India

²MD (Anesthesiology), Professor and HOD, Department of Anesthesiology, INHS Asvini, Colaba, Mumbai 400005, India

³MBBS, Post Graduate Trainee, Department of Anesthesiology, INHS Asvini, Colaba, Mumbai 400005, India

⁴MBBS, Post Graduate Trainee, Department of Anesthesiology, INHS Asvini, Colaba, Mumbai 400005, India

Abstract: *The optimal treatment for intracerebral meningiomas is complete resection of the tumour, whenever possible; but this resection is often hindered by the hypervascularity of the tumour¹. Meningiomas being quite vascular, preoperative embolization can ease complete tumor resection by achieving devascularization of the tumour bed by initiating tumour necrosis by filling intratumoural vascularization by embolic material as far as the precapillary level and thus, diminishing operative time and intraoperative blood loss. The procedure is angiographically guided². We report the contradistinction in two cases of intracerebral meningiomas, one of which was preoperatively embolized while the other was not.*

Keywords: Embolization, Meningioma, Neoplasms, Angiography, Blood loss surgical

1. Case Report

Case 1

A 75 years old male patient, 168 cm in height, weighing 68kg, presented to the hospital as a case of recurrence of right parieto occipital meningioma (operated) and left sided hemiparesis. He was posted for the embolization of the intracranial tumour (size 8.0 * 6.5 * 5.5 cm) to be followed by craniotomy and tumour excision. A preoperative anaesthesia check up (PAC) revealed well optimized comorbidities: Hypertension (HTN) and Diabetes Mellitus Type 2 (DM2). Vital parameters (VP), systemic examination (SE), Airway examination and preoperative investigations were within normal limits (WNL). Patient was accepted in American Society of Anesthesiologist (ASA) grading 2. A written informed consent was taken before both the procedures.

The patient underwent pre-craniotomy embolization under Monitored Anaesthesia Care (MAC). Few days later, the patient was taken up for craniotomy and tumour excision. Premedicated with Fentanyl 150 microgram intravenously (iv), induced with propofol 140 mg iv and intubated with 8.5 cuffed Endotracheal Tube (ETT) orally using vecuronium 8 mg iv. Arterial Blood pressure (ABP) monitoring with right radial artery cannulation and Central Venous Pressure (CVP) monitoring with right Subclavian vein cannulation was instituted along with regular monitoring of Heart rate (HR), Electrocardiography (ECG), end tidal Carbon-dioxide (etCO₂), Pulse oximetry (SpO₂).

Maintenance of anaesthesia was done with oxygen: air:sevoflurane (Minimum Alveolar Concentration (MAC) of 0.5-0.7) and Vecuronium for muscle relaxation. Fentanyl infusion @ 1 mcg/kg /hr (total dose 300+ 300) and

paracetamol 1 gm slow IV infusion before closure was administered for analgesia. Mannitol iv 60 gms as antiedema measure, iv phenytoin as antiepileptic medication and iv phenylephrine in divided doses (200 microgram) for maintenance of hemodynamics were also utilized. The blood sugar levels were maintained between 150 - 200 mg/dl throughout the surgery. Total anesthesia time was 6.5 hours while surgery time was 5.5 hours. Total Blood loss was 800 ml and intraoperatively 1 unit packed red Blood cells (PRBC) and fresh frozen plasma (FFP) each were administered along with 5000ml of crystalloids. After reversal, patient recovered and smooth and awake extubation performed.

Case 2

A 50 years old lady, 166 cm in height, weighing 62kg, presented to the hospital as a case of left Parieto occipital meningioma (size 7.5 * 5.5 * 6.0 cm) for craniotomy and excision. A PAC revealed history of right hydronephrosis on medical treatment and seizures with right sided hemiparesis. VP, SE, Airway examination and preoperative investigations were WNL. Patient was accepted in ASA grading 2. A written informed consent was taken.

Basal VP on day of surgery were WNL. Patient was premedicated with Fentanyl 150 microgram iv, induced with propofol 140 mg iv and intubated with 7.5 cuffed ETT orally using Vecuronium 6 mg iv. ABP monitoring with left radial artery cannulation and CVP monitoring with right Subclavian vein cannulation was instituted along with regular monitoring of HR, ECG, etCO₂ and SpO₂.

Maintenance of anaesthesia was done with oxygen: air:sevoflurane (MAC of 0.5-0.7) and Vecuronium for

muscle relaxation. Fentanyl boluses 50 microgram was administered (total dose 150+ 200) and paracetamol 1 gm slow IV infusion before closure was administered for analgesia. Mannitol iv 60 gms as antiedema measure, iv phenytoin as antiepileptic medication and iv phenylephrine in divided doses (200 microgram) for maintenance of hemodynamics were also utilized. Total anesthesia time was 7.5 hours while surgery time was 6.5 hours. Total Blood loss was 2200 ml and intraoperatively 4 units PRBC and 4 units FFP were administered along with 8000ml of crystalloids. Urine output and hemodynamics were maintained intraoperatively, hence after reversal, on complete patient recovery a smooth and awake extubation was performed.

2. Discussion

The intraoperative bleeding seen in the two case reports described above depict the contradiction; the first case, in which preoperative embolization of tumour was done blood loss was 800 ml while in the other patient blood loss accounted for around 2200ml, hence the difference also in the intraoperative requirement of blood product administration. Preoperative embolization in the first case led to decreased vascularity, hence less surgical blood loss. The decreased surgery time could also be attributed as one of the effects of preoperative embolization in the first case.

Though there have been conflicting opinions on preoperative embolization in meningiomas amongst neurosurgeons, this procedure has been prompted for decreasing blood loss during surgery³. Superselective catheterization of supplying vessels and administration of embolic material in the distal-most vascular bed ascertains the efficacy of embolization. The choice of embolic material depends on the location and size of tumor, size of feeding arteries, blood flow and presence of any potentially dangerous vessels (anastomoses between external and internal carotid arteries or vertebral arteries or the arteries supplying cranial nerves).

Possible risk factors for procedural complications have been identified as age above median, tumor size above median, female sex, use of small particle size (45-150 micromoles), presence of major peritumoral edema, and arterial supply and meningioma location⁴. Bendszus reported complication rates of 6.4% in a series of 185 patients⁵. Complications like neurological deficit due to hemorrhagic or ischemic complications and death occurring during or after embolization have been noted but in properly selected cases the risks of meningioma embolization are small and are related to the experience of the interventional radiologist².

3. Conclusion

Although high costs and potential side effects of embolization are a hindrance in the use of this technology for intracranial meningiomas, the use of preoperative embolization can reduce morbidity and mortality in patients with diagnosed intracranial meningiomas for surgical excision⁶. To conclude, keeping in view the complications like death and dependency and weighing the risk benefit ratio from decreased blood loss and decreased blood product replacement intraoperatively the management of

intracerebral meningioma require tailoring for optimum results⁷.

References

- [1] Gruber A, Killer M, Mazal P, et al. Preoperative embolization of intracranial meningiomas: a 17-year single center experience. *Minim Invasive Neurosurg* 2000; 43(1):18-29
- [2] Krajina A, Cesak T, Zelenak K, Rehak S. Therapeutic embolization of cranial tumors. Diagnostic techniques and surgical management of brain tumors. *InTech*; 2011. Chapter 26 P.493-506. cited [2011 Sep 22]. Available from: <http://www.intechopen.com/books/diagnostic-techniques-and-surgical-management-of-brain-tumors/therapeutic-embolization-of-cranial-tumors>
- [3] Carli DF, Sluzewski M, Beute GN, van Rooij WJ. Complication of particle embolization of meningiomas: frequency, risk factors and outcome. *Am J Neuroradiol* 2010 Jan; 31(1):152-154
- [4] Waldron JS, Sughrue ME, Hetts SW, Willson SP, Mills SA, McDermott MW, Dowd CF, Parsa A. Embolization of skull base meningiomas and feeding vessels arising from the internal carotid circulation. *Neurosurgery* 2011 Jan; 68(1):162-169
- [5] Bendszus M, Monoranu CM, Schütz A, Nölte I, Vince GH, Solymosi L. Neurologic complications after particle embolization of intracranial meningiomas. *Am J Neuroradiol* 2005 Jun-Jul; 26(6):1413-1419
- [6] Gupta R, Thomas AJ, Horowitz M. (2006). Intracranial head and neck tumors: endovascular considerations, present and future. *Neurosurgery* 2006 Nov; (59):251-60.
- [7] Bendszus M, Rao G, Burger R, et al. Is there a benefit of preoperative meningioma embolization? *Neurosurgery* 2000 Dec; 47(6):1306-1311.