

Case Report

Is “en-bloc” excision, an option for select large vascular meningiomas?

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Abstract

Background: Large highly vascular meningiomas are surgically challenging when preoperative embolization is not feasible.

Case Description: We present an illustrative case of ‘en bloc’ excision of a highly vascular giant lateral sphenoid wing meningioma using the technique of 4 D’s. After ruling out neurovascular encasement and significant brain interposition, our technique consisted of devascularization, diminutive dural opening, early detachment, and progressively deeper circumferential dissection. “En bloc” delivery was aided by the underlying brain pulsations and edema with no retraction or manipulation. This was successfully employed in a series of seven more patients with large meningiomas with less blood loss. All the patients recovered well with no clinical or radiological sequelae.

Conclusion: In select large vascular meningiomas, en bloc excision appears to be a simple, safe, and effective alternative to piecemeal excision, which can be performed in any set-up.

Key Words: Meningioma, excision, en bloc, piecemeal, blood loss

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INTRODUCTION

Meningiomas constitute the most common primary brain tumors overall, accounting for around one-third of the same.^[3] Large meningiomas are usually excised after thorough internal decompression, so that arachnoid plane is not violated and brain retraction may be avoided.^[8] We report an illustrative case of ‘en bloc’ extra arachnoidal excision of a highly vascular giant lateral sphenoid wing meningioma, describe and discuss the technique.

CASE REPORT

A 25-year-old male presented to our hospital in drowsy state with history of headache for 3 years progressively

worsening for 6 months. His Glasgow Coma Scale was 13/15, magnetic resonance imaging (MRI) brain revealed giant left lateral sphenoid wing meningioma measuring $8 \times 7 \times 5$ cm³ with no encasement of major blood vessels [Figure 1a and b]. Preoperative embolization was not feasible. Hence left external carotid artery (ECA) was exposed in the neck and kept occluded. Large fronto-temporal scalp flap was raised after adequate infiltration of local anesthetic with adrenaline, and use of Raney’s clips. Large fronto-temporal free bone flap was raised with craniotome and temporal bone rongeur flush with middle cranial fossa. Profuse bleeding of bone edges was controlled with bone wax. Bipolar coagulation of middle meningeal artery and other vessels over the dura was carried out. Dura was opened just around the tumor, and

reflected as a flap detaching it from the underlying tumor. The tumor surface was studded with blood vessels. Bipolar coagulation was performed all around the exposed tumor surface thereby devascularizing and shrinking the tumor. Gradually the tumor started to separate from the arachnoid plane and started to bulge in a pulsatile manner [Figure 2]. Progressively deeper circumferential dissection carried out with placement of patties protecting the adjacent arachnoid layer. *It appeared as if the brain pulsations were gently pushing the tumor out of the dural defect.* No retractor or tumor manipulation was used throughout the procedure and finally, the whole tumor was delivered en bloc [Figure 3]. The blood loss was around 500 ml, most of which occurred during craniotomy. Patch duraplasty was carried out using pericranium, and layered closure performed. Postoperatively the patient had improved remarkably, contrast enhanced computed tomography (CECT) showing no residual tumor, and was discharged in good functional status on fourth day [Figure 4a and b]. This 'en bloc' technique, as elaborated below, has been utilized in a series of seven more large meningiomas (>5 cm) safely with less blood loss.

Technique description

Patients with meningioma were positioned intraoperatively so that tumor was more superficial than brain. Sufficiently large basal craniotomy was

carried out. Meningiomas with suspected encasement of neurovascular structures and significant interposition of brain around the tumor attachment were considered for internal decompression before dissection of tumor capsule. However, meningiomas with no contraindication as above were taken up for surgery with the rule of 4 D's: Devascularization, Diminutive dural opening, Detachment, and either Debulking followed by dissection or Dissection without debulking. After extensive coagulation of dural surface vessels, dural opening was made just at the tumor margin, so that surrounding brain was not exposed. The decision on performing internal decompression was made following early severance of dural attachment. Whenever arachnoid plane appeared favorable, dissection was carried out without debulking, and nearly always the *tumor was pushed gradually by the underlying brain pulsations and edema* so that the tumor gets delivered en bloc. The main advantages of 'en bloc' removal appear to be lesser bleeding and shorter operative time. The limited dural opening cannot be overemphasized to avoid herniation of the edematous brain being pushed out by the tumor. Also if tumor cannot be freed of its attachment in the initial phase of surgery internal debulking becomes unavoidable.

Of the total 35 large meningiomas (>5 cm) operated by us in 2 years, 8 patients had en bloc removal while the rest had initial debulking. The mean blood loss in en bloc removal was around 400 ml, with no patient having new

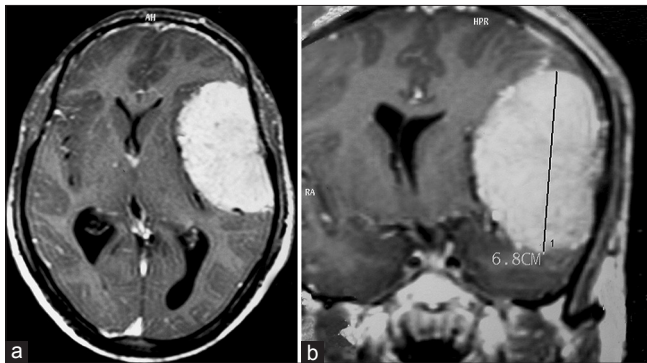


Figure 1: (a and b) Preoperative radiology



Figure 3: En bloc tumor specimen

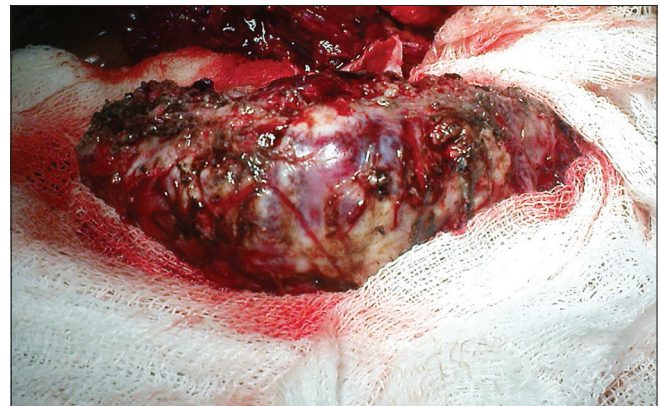


Figure 2: Progressive extrusion of tumor out of dural opening just around the tumor

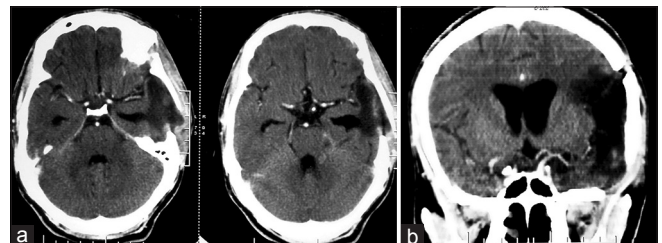


Figure 4: (a and b) Postoperative radiology

neurological deficit, new onset seizures, or postoperative hematomas.

DISCUSSION

Meningiomas are the most frequent primary brain tumors representing around one-third overall.^[3] Some of the highly vascular meningiomas are surgically challenging and often require preoperative embolization, which may not be feasible everywhere. En bloc excision of meningiomas once widely practiced fell out of favor due to the morbidity of brain handling and retraction.^[1,8] Except for small convexity tumors, most meningiomas are presently excised piecemeal following internal decompression. This makes the tumor capsule to fall on itself away from the adjacent arachnoid, so that surrounding brain is not manipulated. However, this may cause troublesome bleeding and attendant complications in some of the highly vascular tumors.

There are only few reports of 'en bloc' excision in large intracranial meningiomas. Fox *et al.* described vacuum-assisted en bloc resection of large convexity meningioma to be safe, simple, and rapid to be employed in any setup.^[2] Salibi *et al.* commented on en bloc excision to be valuable in poor risk patients by reducing blood loss and operating time.^[6] Suga *et al.* noted acute brain swelling causing en bloc delivery of a huge falx meningioma, probably due to the relative hyperemia of the underlying brain.^[7]

The main advantage of en bloc excision lies in the early tackling of tumor surface blood vessels and pial feeders, as well as in the early detachment, completely rendering the tumor into an avascular mass, avoiding significant blood loss. The gradual spontaneous delivery of large tumors noted by us appears to be due to the underlying brain pulsations pushing the tumor once it is freed of the attachment. This was noted only in cases with limited dural opening just around the tumor, and seldom when the dural opening had been inadvertently extended over the surrounding brain. The bipolar shrinkage of the tumor also aids in its extrusion. Though nothing new, the concept of early detached tumor pushed by the underlying brain pulsations out of limited dural opening, causing en bloc delivery has not been reported.

Commentary

The authors report the technique of en-bloc removal of large, highly vascularized, meningiomas of the convexity. I agree with them that this is the most appropriate way to perform exeresis of this kind of lesions when they are not embedded into the brain and have a superficial

In select cases of large vascular meningiomas with no encasement of neurovascular structures, no significant brain interposition around the tumor attachment and presence of favorable arachnoid plane, en bloc excision may be kept as an alternative option to piecemeal resection, to be decided as per the feasibility of early tumor detachment. This is feasible in any set-up even where preoperative embolization, or ultrasonic aspirator is unavailable. While en bloc excision is a standard practice in surgery for hemangioblastomas and arteriovenous malformations, there is no reason why it should not be employed in some of the equally vascular meningiomas. It is also interesting to note that the recurrence rate in Olivecrona's series of parasagittal meningiomas is only 6%,^[4] wherein most meningiomas were removed en bloc, compared with the present average of above 10% noted in even total excisions.^[3] Moreover, Saeed *et al.* reported en bloc excision of optic sheath meningiomas to be better than piecemeal excision due to the marked reduction in recurrence caused by tumor seedlings.^[5]

In conclusion, 'en bloc' excision of select large vascular meningiomas appears to be a simple, safe, and effective alternative to piecemeal excision, associated with lesser bleeding, which can be employed in even ill-equipped operating rooms around the world.

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pattern of growth. In effect, this technique, which is largely employed in the neurosurgical practice, is well described in ancient textbooks, but it has not been so well described in recent literature;^[1-4] for this reason this paper may be useful for younger neurosurgeons.

It is obvious that when large meningiomas are deeply embedded into the brain, the technique of intracapsular piecemeal decompression remains the more effective one.

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