



Giant True Ossified Meningioma Removed with Surgical Ultrasonic Aspirator with Shear Wave Technology

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Keywords

Ossified meningioma; Surgical ultrasonic aspirator; Shear wave technology

Introduction

Meningiomas are known as a benign extra-axial brain lesion, but operative modalities vary from the simple to the most challenging. The surgical treatment of calcified lesions resulted from long term growth requires various kinds of strategies [1]. We successfully operated on a giant meningioma using a surgical ultrasound aspirator with shear wave technology, combined with a manual maneuver with an osteotomy rongeur.

Patient Information

A 65-year-old male was brought to our outpatient clinic by his family member. The patient was non-ambulatory during the initial physical examination and presented with motor weakness on the right extremities. The patient was diagnosed in the past with hypertension, diabetes mellitus, and hyperlipidemia. Despite his diagnoses, the patient had refused any kind of medication. Family members had noticed limping approximately 8 months prior to our initial examination, and signs of right hand weakness followed 3 months later. Recently these symptoms had aggravated; he became clumsy, spoke less, and seemed depressed.

Clinical Findings and Diagnostic Assessments

A complete neurological and physical examination was performed, revealing disorientation (unable to address the date and the place of examination, nor a famous political figure), positive motor aphasia signs, and right sided hemiparesis assessed with an MMT scale of 4 out of 5 for both upper and lower limbs.

Neuroradiological Examinations

Computerized tomography (Figure 1A) and Magnetic Resonance Images (Figure 1B) revealed an extra-axial mass of 75 mm in diameter, attached on the dura mater of the left frontal convex, with signs of hyperostosis. The center of the mass showed a coral-shaped lesion with different density/intensity suggesting calcified lesions. Contrast enhanced T1-weighted image revealed a homogenous increase in intensity on the periphery of the mass (Figure 1C). Additionally, the brain parenchyma was severely depressed towards the contralateral side, suggesting falcian herniation accompanied with an impending uncal herniation. Tumor staining was positive through the middle meningeal artery and recurrent ophthalmic artery.

Therapeutic Intervention

Surgical excision diagnosed as convexity meningioma was performed through a bifrontal craniotomy. CUSA EXcel Plus (Integra Life Sciences Corporation: 311 Enterprise Drive, Plainsboro NJ, USA) [2] was used as a surgical aspirator, together with a ShearTip, which successfully demarcated the core/surrounding areas (Figure 2A-C). The extremely solid central part was not susceptible to the CUSA Excel Plus at ShearTip with 36 kHz, therefore a piece-meal resection with a surgical osteotomy rongeur was performed manually. These combined techniques were useful and resulted in a total resection of the hardest parts.

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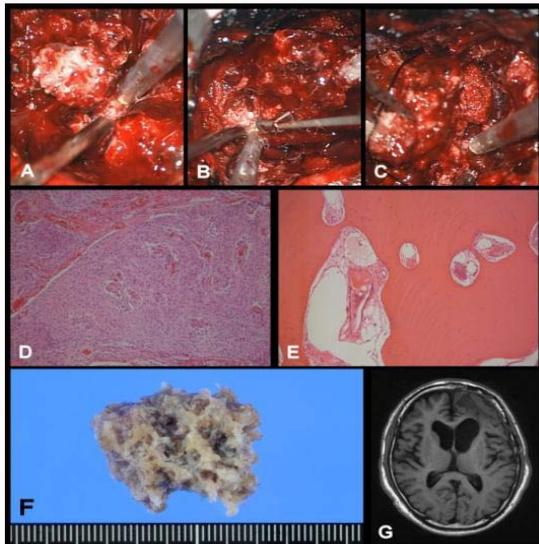


Figure 1: (A) Huge mass on the left frontal convex is seen with central high-density suggesting calcification on computerized tomography. (B) Mass showed a severe shifting on the brain to the contralateral side with prominent perifocal edema on fluid-attenuated inversion recovery image. (C) Periphery of the mass showed the homogenous contrast enhancement effect. (D) Mass is mediated through the middle meningeal and recurrent ophthalmic arteries.

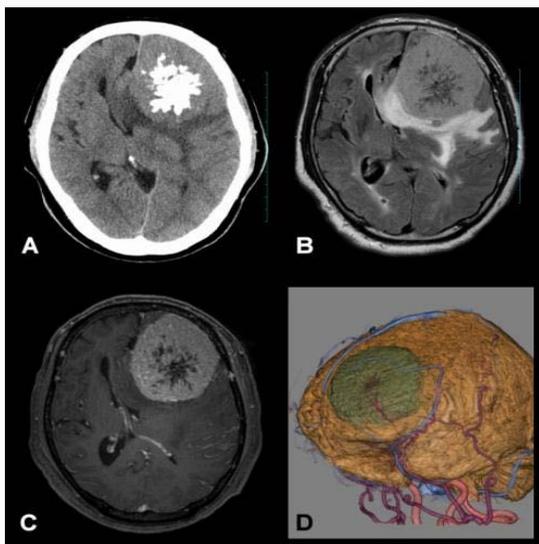


Figure 2: (A,B,C) The margin between hard core and the peripheral tissue is absorbed with ultrasonic aspirator with ShearTip. (D) Histopathology reveals the peripheral tissue shows typical meningioma configuration (E) with true bone formation. (F) Hard core of the tumor looks like a coral. (G) Postoperative T_1 -weighted image looks successful.

Histopathology

Histopathological examination (Figure 2D-2F) revealed that the hard core of the lesion, preoperatively presumed as a calcified lesion, showed true ossification.

Follow-up and Outcome

With adequate post-operative management of brain edema after surgical excision, he showed a surprising recovery. He is now fully ambulant and does not suffer from aphasia, and can travel without supervision, no decline in his quality of life (Figure 2G).

Discussion

The surgical procedure for meningiomas requires various modalities such as bipolar coagulators, monopolar coagulators with ring-excision tip, motor drills, and ultrasonic aspirators [1]. The surgical aspirator with shear wave technology, which has become recently available, has a significant role in the excision of meningiomas, because of its high destructive vibration energy and tissue selectivity [2]. Our case was unique since a truly ossified intracranial meningioma is indeed uncommon [3]. Therefore we required a very special technique for its removal, and fortunately resulting in a total excision. If the tumors or the lesions are attached to the bone, high-speed drilling is advised as the equipment of choice. On the contrary, for hard lesions within the giant soft mass, high-speed drillers may be of no effect. The strongest power of the surgical aspirator is the more effective modality in removing such intrinsic ossified brain lesions rather than electrocoagulator or high-speed drillers, because of its destructive capabilities and tissue selectivity. In such situations, combinations of manual resection with shear wave technology is another possibility, of which was applied to our case.

Conclusion

CUSA EXcel Plus with ShearTip is the only modality to remove the lesion which has soft, elastic, and truly hard lesions.

References

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