Meningiomas Invading the Superior Sagittal Sinus: Surgical Experience in 359 Cases at an Italian Tertiary Referral Center

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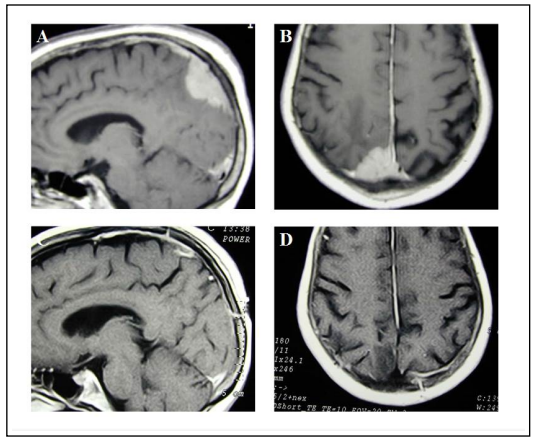
Introduction

Radical resection of meningiomas invading the superior sagittal sinus (SSS) presents several hazards. In fact, the relationship to venous structures often precludes radical surgery; the risk of recurrence and aggressive histology is greater for parasagittal meningiomas than in other locations. Some surgeons consider SSS invasion a contraindication for complete resection while others advocate total resection with venous reconstruction. The lack of published large series has failed to provide definitive guidelines for the surgical treatment of these complex cases. In particular, the timing of radiosurgery and the benefit of extensive sinus reconstruction to prevent recurrences is controversial. In 2004 we reported our 20-year-experience for surgery of parasagittal meningiomas invading the SSS on 108 patients. In this study we present a ten years later reappresal of our series now including 359 cases.

Methods

Between 1986 and 2014, 359 patients (229 females, 138 males, age range 11-87 years, mean 56.2) underwent surgery at our Institution for tumors invading the SSS.



Results

Simpson grade I and II removal was achieved in 287cases. Histological examination showed 260 (72.4%) benign, 77 (21.4%) atypical, and 15 malignant (4.1%) meningiomas along with 2 haemangiopericytomas. There were 7 perioperative deaths (2.2%). Follow-up ranged from 31 to 365 months (mean 91.3 months). 35 patient were lost to follow-up. Tumors recurred in 37 (11.9%) patients.

Fig. 1. 52 y.o. woman presenting with a history of headache. Pre-op gadolinium enhanced T1-weighted sagittal (A) and axial (B) MR images showing an extra-axial enhancing mass in close relationship with the posterior third of the SSS. The absence of enhancement or "void" signal indirectly suggests the complete obliteration of the sinus. (C) Three-month post-operative gadolinium enhanced T1-weighted sagittal (C) and axial (D) MR images show the complete removal of the lesion.

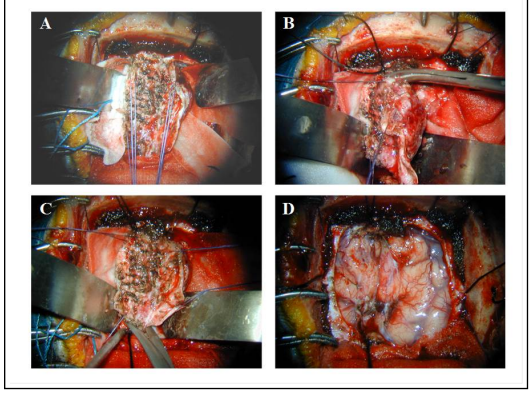


Fig. 2. (A) Intraop. photograph showing the sinus exposure and the dural opening. We start our dissection on one side then we complete the dissection on the other side with the help of two self-retaining retractors. Meticulous dissection is necessary to dissect veins of the tumor from the brain. (B) When the dissection is complete on both sides we ligate the sinus anteriorly using 2 stitches, then we cut the sinus and the falx. (C) The same procedure is done posteriorly. (D) The tumor is then completely removed and the tumor bed, the two ends of the sagittal sinus, and the resected edge of the falx are exposed.

Learning Objectives

Neurosurgery, radiosurgery, pathology, vein preservation, recurrency

Conclusions

Our standard is to achieve complete tumor removal without sacrifice of critical vascular structures, extensive venous bypasses and SSS reconstructions. Conversely, if the sinus is obstructed, the portion of the sinus involved can be resected completely and it is not necessary to re-construct the sinus. Routinely use of ioUS for meningioma surgery can be helpful to achieve complete resection preserving major vein structures. Residual lesions can then be tailored for radiosurgery or reintervention in case of relapse. In case of atypical meningiomas, tumor control could be better when radiosurgery is used immediately after tumor removal than only after demonstrated tumor progression.

References

Byard RW. Parasagittal meningioma: A not so benign entity. Med Sci Law. 2017 Oct;57(4):175-178.

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