Falx meningioma

J.Sales-Llopis, *R.López García*

Neurosurgery Department, General University Hospital Alicante, Spain

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Falx or falcine meningioma, as defined by Harvey Williams Cushing, is a intracranial meningioma arising from the falx cerebri and completely concealed by the overlying cortex [1].

Not involving the superior sagittal sinus.

Epidemiology

Falcine meningiomas account for 9% of all intracranial meningiomas.

Falcine meningioma tends to grow predominately into one cerebral hemisphere but is often bilateral, and in some patients the tumor grows into the inferior edge of the sagittal sinus.

The patients with falcine meningiomas with reference to gender had the following ratio of male:female of 1:2.1 and an average age of 55 years.

In the series of Pires de Aguiar et al 1:6 (men:women) relationship, and the mean age was 55.4 years old [2].

Classification

Falx meningioma classification

Clinical features

Symptoms can vary depending upon the location of these tumors along the falx.

Those located in the frontal section may impair higher levels of brain functioning such as reasoning and memory, while those located in the middle section would be more likely to cause leg weakness.

In the series of Chung et al. at presentation, symptom durations were found to vary widely. Twenty-one patients (30%) presented with headache, and eleven (16%) with unilateral motor weakness. Five (7%) patients had a chief complaint of a seizure history. Five (7%) patients presented with personality change and four (6%) were asymptomatic and their brain tumors were detected incidentally [3].

Diagnosis

MRI with and without gadolinium helps better to delineate the tumor in relation to the dural sinus, the tumor interface with the cerebral cortex, presence of significant blood supply, and presence of cysts or other intra-tumoral structures that will add to the complexity and malignant potential of the tumor. Good pre-operative evaluation of falcine meningiomas is also important when integrated with neuronavigation protocols to be utilized in the operating room. Furthermore, the junction between tumor and adjacent brain suggests the presence or absence of an accessible arachnoid plane and enables the surgeon to predict the potential degree of neurologic deficit that may follow surgical removal. Gadolinium-enhanced MRI allows demonstration of tumoral or adjancent dural enhancement. The radiological appearance affords a valid predictor of the degree of dural involvement in the region of the sinus and adjacent falx. This may suggest the presence of syncytium of meningeal cells spreading along the falx from the site of major dural attachment.

Multiplanar MRI is the current standard study for the preoperative evaluation of patients with falcine meningiomas. Coronal, sagittal, and axial T1-weighted gadolinium-enhanced sequences help define the anatomical locations, sizes, and medial hemisphere involvements of these tumors.

MR venography in vertex view can be useful for demonstrating nearby parasagittal draining veins, which must be protected [4] , but MRA alone seems to be inadequate in the lack of venous phase of cerebral vasculature around tumors.

Cerebral angiography

Cerebral angiography is necessary in patients with these meningiomas, and the pericallosal artery is often displaced and may actually be engulfed by the tumor. Arterial phase cerebral or MR angiograms should be studied to determine the relationship between tumor and ACA. Anterior falcine

meningiomas are usually supplied by the ACA or by a tentorial branch of the ophthalmic artery. Venous phase cerebral angiography is important because it provides significant information about whether a tumor mass has invaded the sagittal sinus. Moreover, it provides information about the courses of many large drainers around a mass, which must be determined to identify trajectory to a falcine mass and to prevent postoperative venous infarction. It is also useful for determining sinus patency and for delineating the anatomical location of the major cortical draining vein. Signs of venous occlusion include the disappearance of a segment of the superior sagittal sinus (SSS), a delay in venous drainage in the area of obstruction, and failure of the cortical vein to reach the sinus.

Differential diagnosis

Falx meningioma differential diagnosis.

Treatment

see Falx meningioma treatment.

Complications

The falcine meningiomas may be present with bleeding as intraparenchymal hematomas, subdural hematomas and subarachnoid hemorrhage, causing a clinical finding of apoplexy in the patients.

Hemorrhages occurring in asymptomatic falcine meningiomas are known beforehand to have been described after the internal use of low-dose aspirin for prolonged period.

During falcine meningioma surgery, we must pay attention to cardiac monitoring due to the risk that the handling of falx and tentorium could provoke cardiac asystole. The mechanical stimulation of the falcine area may result in the hyperactivity of the trigeminal ganglion, thereby triggering TCR.

The dorsal region of the spinal trigeminal tract includes neurons from hypoglossal and vagus nerves, and projections have been seen between the vagus and trigeminal nuclei.

Recurrence

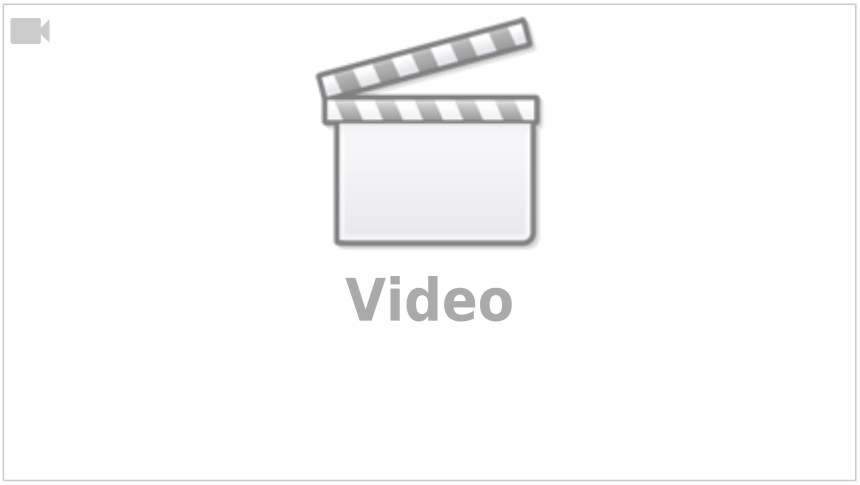
It has been reported that parasagittal meningioma and falx meningiomas recur more frequently than other intracranial meningiomas [5].

The rate of recurrence of falx meningiomas significantly increases in cases of non-radical resection of tumor. Aggressive surgical treatment obviously may present several hazards and may carry an increased risk of unsatisfactory outcome; however, the risk of recurrence is significantly decreased [6].

Abou Al-Shaar et al. have utilized brachytherapy as a salvage treatment in two patients with a unique implantation technique. Both patients had recurrence of WHO Grade II falcine meningiomas despite multiple prior surgical and RT treatments. Radioactive I-125 seeds were made into strands and

sutured into a mesh implant, with 1 cm spacing, in a size appropriate to cover the cavity and region of susceptible falcine dura. Following resection the vicryl mesh was implanted and fixed to the margins of the falx. Implantation in this interhemispheric space provides good dose conformality with targeting of at-risk tissue and minimal radiation exposure to normal neural tissues. The patients are recurrence free 31 and 10 months after brachytherapy treatment. Brachytherapy was an effective salvage treatment for the recurrent aggressive falcine meningiomas in two patients [7)].

Videos



Books

Parasagittal and falx meningiomas 1970 by P. C Gautier-Smith (Author)

Publisher: Appleton-Century-Crofts (1970) Language: English ISBN-10: 0407352406 ISBN-13: 978-0407352407

Case series

Falx meningioma case series.

Case reports

see Falx meningioma case reports

1)
Cushing H, Eisenhardt L. Their Classification, Regional Behavior, Life History, and Surgical End Results: The chiasmal syndrome, in Meningiomas. Suprasellar Meningiomas. 1938:224–49.
2) , 6)
Pires de Aguiar PH, Aires R, Maldaun MV, Tahara A, de Souza Filho AM, Zicarelli CA, Ramina R. Is sagittal sinus resection in falcine meningiomas a factor of bad surgical outcome? Surg Neurol Int. 2010 Oct 25;1:64. doi: 10.4103/2152-7806.71983. PubMed PMID: 21125007; PubMed Central PMCID: PMC2980903.
3)

Chung SB, Kim CY, Park CK, Kim DG, Jung HW. Falx meningiomas: surgical results and lessons learned from 68 cases. J Korean Neurosurg Soc. 2007 Oct;42(4):276-80. doi: 10.3340/jkns.2007.42.4.276. Epub 2007 Oct 20. PubMed PMID: 19096556; PubMed Central PMCID: PMC2588203.
4)

Alvernia J, Sindou M. Preoperative neuroimaging findings as a predictor of surgical plane of cleavage : Prospective study of 100 consecutive cases of intracranial meningioma. J Neurosurg. 2004;100:422–430.
5)

Melamed S, Sahar A, Bellar AJ. The recurrence of intracranial meningiomas. Neurochirurgia. 1979;22:47–51.
7)

Abou Al-Shaar H, Almefty KK, Abolfotoh M, Arvold ND, Devlin PM, Reardon DA, Loeffler JS, Al-Mefty O. Brachytherapy in the treatment of recurrent aggressive falcine meningiomas. J Neurooncol. 2015 Aug 8. [Epub ahead of print] PubMed PMID: 26253325.