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## Cavernous Sinus Hemangioma Presenting with Binocular Diplopia

**Abstract**— A hemangioma is a benign vascular tumor of the brain, which rarely occurs in the cavernous sinus. We report a rare case of cavernous sinus hemangioma presenting with binocular diplopia. A 23-year-old lady presented with binocular diplopia associated with restricted left lateral gaze for 3 months. Visual acuity of both eyes was 6/6 with normal pupillary reaction. Both anterior and posterior segment were unremarkable. Contrast-enhanced computed tomography of brain showed an irregular mass within the left cavernous sinus causing pressure effect on the adjacent bone. Cerebral magnetic resonance imaging (MRI) showed a convexity in the left cavernous sinus, with a well-defined heterogeneous lesion with mixed hypo and hyperintensity in T1WI and T2WI; post gadolinium contrast, it was minimally enhanced. The patient was managed conservatively and at one-year post presentation, her symptoms improved but the lesion morphology and size remained static. We highlight the classic radiological presentation of a hemangioma and discuss the features differentiating it from the more commonly observed meningioma seen in the cavernous sinus.

**Keywords** - Cavernous sinus, hemangioma, meningioma

### 1 INTRODUCTION

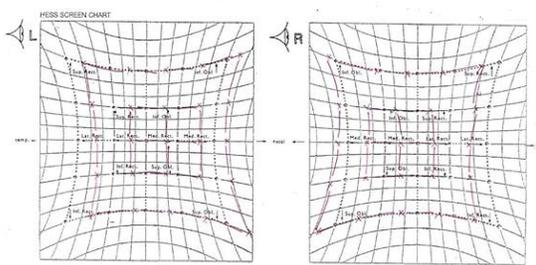
Cavernous hemangioma is a common benign vascular malformation characterized by a honeycomb network of vascular spaces lined with endothelial cells and interspaced with loose connective tissue sinusoidal vascular caverns lined by a single layer of endothelium and separated by fibrous stroma [1]. It is usually located in the brain, where the typical presentation is headache due to a mass effect or bleeding from the fragile vessels. Rarely, this tumour may present in unusual locations such as the cerebellopontine angle and the cavernous sinus [2]. Cavernous hemangioma is a diagnostic challenge for radiologists, as on initial presentation, it is often misdiagnosed as meningioma [3]. We report a rare case of cavernous hemangioma presenting with binocular diplopia.

### 2 CASE REPORT

A 23-year-old presented with intermittent headache and double vision on left lateral gaze for the past 3 months. There was no ptosis, retro-

bulbar pain, facial hypoesthesia or symptoms of raised intracranial pressure. On examination, visual acuity of both eyes was 6/6 (Snellen) with normal pupillary reaction. Both anterior and posterior segment were unremarkable. Optic nerve function tests including light brightness, red saturation and colour vision in both eyes were normal. Visual fields were normal bilaterally. Extraocular movement testing revealed diplopia on the left lateral gaze. Hess chart confirmed presence of lateral rectus restriction, more on the left (Figure1). Other cranial nerves and neurological examination were normal.

Contrast-enhanced computed tomography of the brain showed an irregular mass within the left cavernous sinus causing pressure effect on the adjacent bone. Cerebral magnetic resonance imaging (MRI) showed a convexity in the left cavernous sinus, with a well-defined lesion measuring 1.7cm (AP) x 1.4cm (W) x 1.0cm (CC). The lesion was hypointense in T1WI (Figure2) and hyperintense in T2WI (Figure3). Some area of hyperintensity in T1WI could represent the early



**Figure 1:** Hess chart showing left lateral rectus restriction

subacute haemorrhage. The cavernous part of internal carotid artery was normal and patent. There was no abnormality seen on MRA and MRV. The radiological findings were suggestive of left cavernous sinus hemangioma.

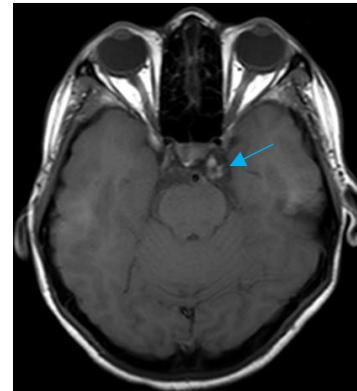
The patient was managed conservatively as her diplopia was not functionally debilitating and she had no other neurological symptoms. After one year of follow up, her symptoms remained static. Repeat MRI showed no significant change in size or morphology of the lesion.

### 3 DISCUSSION

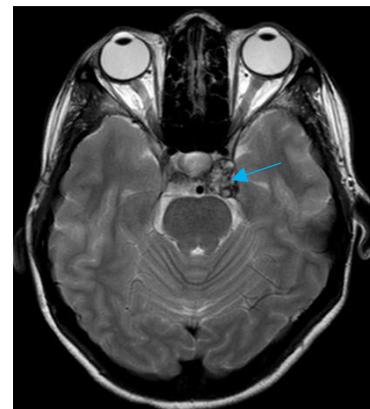
Cavernous hemangioma can occur in any part of central nervous system; however, it more commonly involves the cerebral hemisphere. Extra-axial cavernous hemangioma is extremely rare, accounting for 0.4-2% of hemangioma [2]. Our case highlights an extra-axial intracranial hemangioma of the cavernous sinus.

A hemangioma is a highly vascularised benign tumor commonly found among middle-aged females [3, 4]. It may present with blurred vision, headache, facial numbness or impaired extraocular muscle movements, depending on its location [2, 5]. For this case, the presenting sign of a sixth nerve palsy raised the index of suspicion for a cavernous sinus lesion. However, the patient's age was atypical for hemangioma because she was in her early twenties.

The diagnosis of cavernous hemangioma necessitates radio-imaging, as an incision biopsy is not feasible in these vascular tumours due to the risk of massive bleeding. Prior to any definitive treatment, a thorough radiological assessment is required to plan a safe surgical approach [2, 3, 6]. However, differentiating a cavernous sinus hemangioma from the more commonly observed meningioma may pose a diagnostic dilemma [7]. Awareness of certain defining features of these



**Figure 2:** Magnetic resonance imaging (MRI) T1W1 showing a well-defined hyperintense lesion at left cavernous sinus



**Figure 3:** Magnetic resonance imaging (MRI) T2W1 showing a heterogenous lesion at left cavernous sinus  
two conditions on CT and MRI may assist in the diagnosis (Table 1).

In a case series of five patients reported by Sohn et al, intracavernous cavernous hemangiomas gave high signal intensities on T2-weighted images, with a strong homogeneous enhancement on contrast-enhanced T1-weighted images [6]. Our patient had a similar presentation, with hyperintensity on T2-weighted images, which reflects the existing literature [5].

The treatment of hemangioma may be conservative or surgical. In most instances, asymptomatic cases are managed conservatively, as was the case with our patient. Surgical options include microsurgical resection and stereotactic radiosurgery. Kayali et al retrospectively reviewed 37 patients with cavernous sinus hemangioma over a period of 14 years [9]. Of these, 4 cases were treated surgically, 13 by stereotactic radiosurgery and the remainder conservatively. Surgical intervention was indicated for patients with two or

more documented episodes of haemorrhage or medically uncontrolled seizures [9].

**Table I.** Radiological features differentiating a hemangioma from a meningioma [3, 8]

	Hemangioma	Meningioma
<b>Computed tomography (CT)</b>		
Plain CT	Homogenously hyperdense	Heterogenously hyperdense
Post contrast	Non-enhanced / faint enhancement	Avidly enhances
Effect on adjacent structures	Compress and erode bone	Hyperostosis of adjacent bone
<b>Magnetic resonance imaging (MRI)</b>		
Morphology	Popcorn or berry-like appearance with rim of signal loss	Broad-based lesion
T1/T2	Generally hypointense on T1 and hyperintense on T2. Signal intensity may vary in presence of haemorrhage.	Hypointense on T1, Hyperintense on T2
T2 (GRE)	Blooming artefact (due to haem)	No blooming artefact
Post gadolinium contrast	Mild enhancement	Avidly enhances

The prognosis of this condition depends on the location of the hemangioma, as well as its rate of growth. In certain locations, the risk of epilepsy is significant. However, studies have shown that unless seizures are refractory, surgical intervention does not offer a better outcome than conservative management [10]. In cases where growth of the tumour necessitates removal, the outcome of intervention also depends on the site of hemangioma. For example, hemangiomas situated in the infratentorial region are reported to have a greater risk of bleeding complications

compared to supratentorial lesions [9]. In general, the outlook for hemangiomas is positive, as these benign malformations tend to remain static.

#### 4 CONCLUSION

In conclusion, cavernous sinus hemangiomas are rare, but remain an important differential diagnosis in the workup of cavernous sinus lesions. Awareness of the radiological differences between hemangiomas and meningiomas will aid the clinician in making an accurate diagnosis.

#### CONFLICTS OF INTEREST

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the paper.

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