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Cavernous haemangioma of cavernous sinus causing diagnostic dilemma: a case report with review of literature

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Abstract

Background: Cavernous haemangioma of the cavernous sinus is an uncommon vascular malformation. It is often confused with other parasellar masses like schwannomas and meningiomas due to overlap in imaging appearance. It is important to pre-operatively diagnose this condition as it is associated with severe intra-operative bleeding.

Case presentation: Here, we report a case of an octogenarian female who presented with left sided progressive ptosis and diminution of vision for one year. Cross-sectional imaging includes computed tomography and magnetic resonance imaging which were not conclusive of cavernous sinus haemangioma. Digital subtraction angiography was done which showed a vascular blush. After corroborating the findings of these imaging investigations, a diagnosis of cavernous sinus haemangioma was concluded. Patient underwent surgery which showed a hypervascular mass. Histopathology was consistent with the imaging diagnosis. Patient was discharged in good stable condition and doing well and is on follow-up in Neurosurgery Out-Patient Department.

Conclusions: The cavernous sinus Haemangiomas are uncommon benign vascular masses. They pose a diagnostic challenge when seen in the parasellar region as the imaging findings of a haemangioma, meningioma and schwannoma in this location can have a significant overlap in the imaging findings. Cross-sectional imaging, digital subtraction angiography and nuclear imaging help in pre-operative diagnosis which is a crucial as the surgery is associated with significant blood loss.

Keywords: Cavernous sinus haemangioma, Meningioma, Schwannoma, Computed tomography, Magnetic resonance imaging, Digital subtraction angiography, Case report

Background

Cavernous sinus haemangiomas (CSHs) are rare benign vascular tumours and are usually attached to the outer wall of the cavernous sinus. Imaging findings of meningiomas and schwannomas in this location overlap significantly with CSH. Surgery is associated with significant blood loss; hence, a pre-operative diagnosis helps to prevent it. Here, we report a case of a CSH which was diagnosed pre-operatively on cross-sectional imaging and digital subtraction angiography (DSA).

Case presentation

An octogenarian female presented with left sided progressive ptosis and diminution of vision for one year. She was not a diabetic or hypertensive. There was no other significant medical, family or psycho-social history and also no history of interventions in the past. Her vitals were stable, and she was alert, conscious and oriented. Speech and higher mental functions were normal. Extraocular muscles showed normal range of motion bilaterally. Left corneal reflex was impaired, and right corneal

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reflex was intact. No facial hypoesthesia or facial deviation was present.

Imaging was done for further evaluation. Non-contrast computed tomography (NCCT) brain (Fig. 1b) showed a hyperdense mass in middle cranial fossa in left parasellar region with homogenous contrast enhancement (Fig. 1c). There was no calcification (Fig. 1a) or necrotic areas. No associated hyperostosis of the overlying bone (Fig. 1a) or perilesional oedema was present.

Further characterisation of mass was done with magnetic resonance imaging (MRI) brain which showed a well-defined extra-axial mass in left parasellar region which was hypointense on T1 (T1WI) (Fig. 2a), hyperintense on T2 (T2WI) (Fig. 1d, e) and FLAIR (fluid-attenuated inversion recovery) sequences (Fig. 1f). The mass showed intense heterogeneous post-contrast enhancement (Fig. 2b). There was no restricted diffusion within the mass on DWI (Fig. 2c) sequence or corresponding signal drop on ADC (Fig. 2d).There were blooming foci on susceptibility-weighted imaging (SWI) (Fig. 2e).

Mass was extending superiorly up to the left thalamus and ganglio-capsular region. It was also causing mass effect over the foramen of Monroe with dilatation of the lateral ventricles and surrounding periventricular seepage of cerebrospinal fluid (CSF). The lesion was extending up to the orbital apex anteriorly causing narrowing of the optic canal.

Based on CECT brain and contrast MRI of brain, differential diagnosis of a meningioma arising from sphenoid wing or a schwannoma in the left cavernous sinus

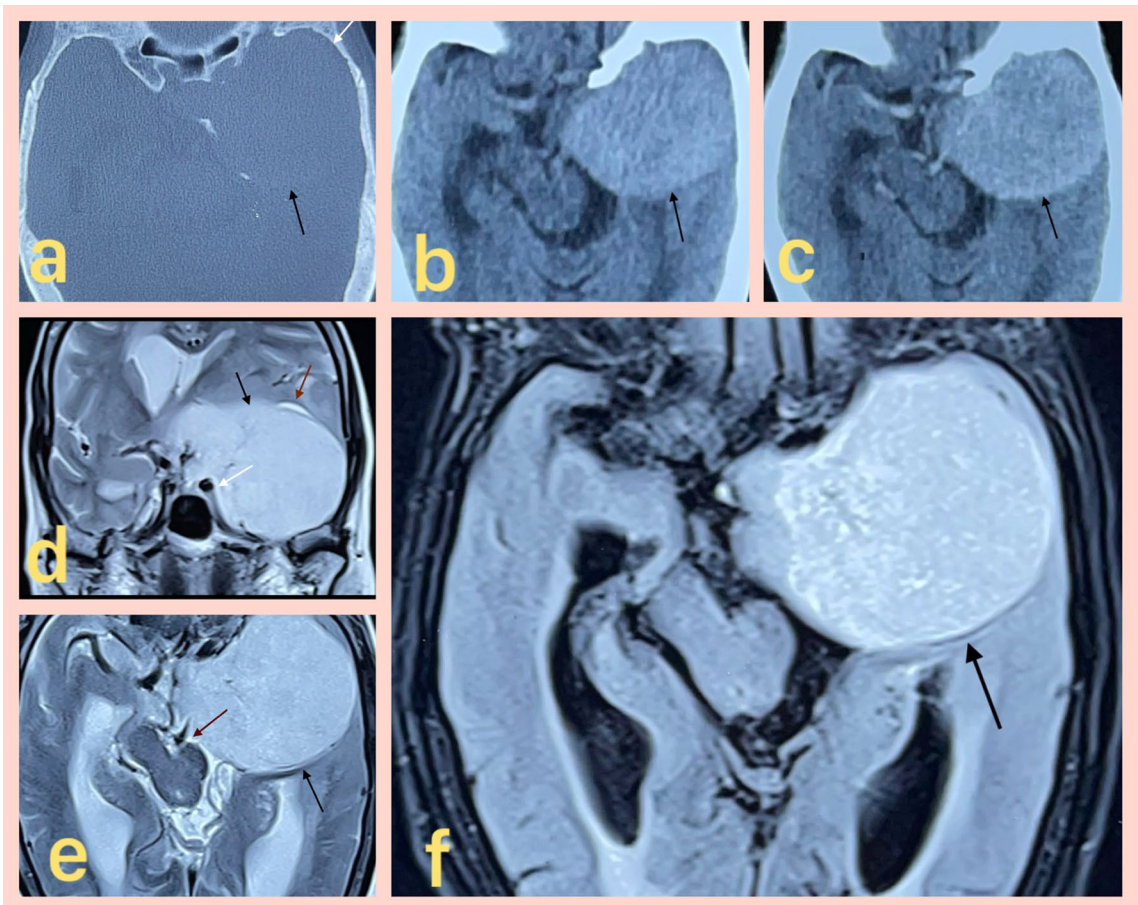

Fig. 1 **a** Axial non-contrast computed tomography (NCCT) image in bone window shows that the mass in the left parasellar region does not show calcification within and does show associated bony hyperostosis. **b** Non-contrast image showing homogeneously hyperdense mass with mass effect on left temporal lobes and left cerebral peduncle. **c** Post-contrast image showing homogenous post-contrast enhancement within the mass (denoted by black arrow). **d** Coronal T2-weighted image showing the extra-axial mass (denoted by black arrow) with encasement of cavernous ICA (denoted by white arrow) and CSF cleft sign (denoted by brown arrow). Axial T2WI (**e**) and FLAIR (**f**) images showing homogenously hyperintense mass (denoted by black arrows)

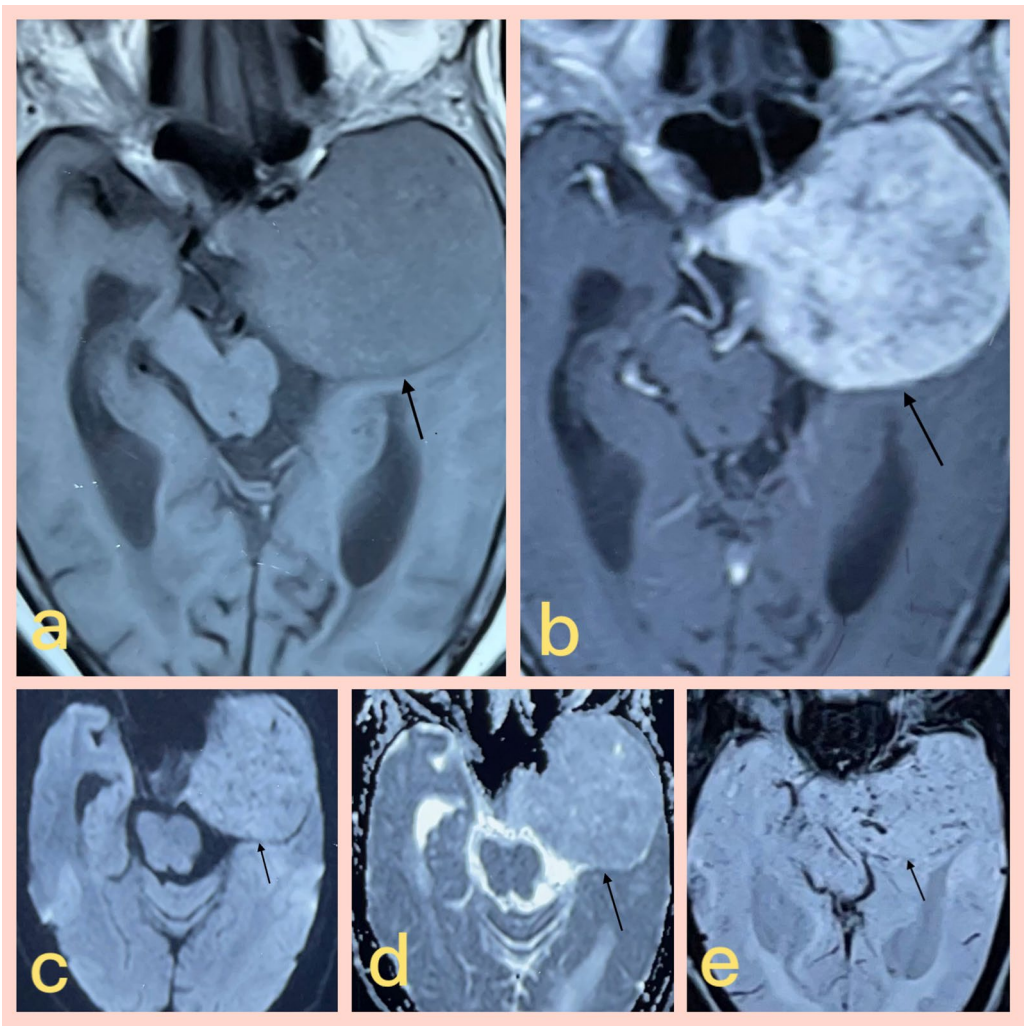

Fig. 2 **a** Axial T1-weighted non-contrast image shows a isointense-to-hypointense mass in middle cranial fossa in left parasellar region. **b** Axial T1-weighted post-contrast image shows mass (denoted by black arrow) showing intense heterogeneous enhancement. **c** Axial DWI image showing no DWI restriction within the mass (denoted by black arrow). **d** Corresponding ADC image shows no loss of signal within the mass (denoted by black arrow). **e** Susceptibility-weighted imaging (SWI) showing multiple blooming foci within the mass (denoted by black arrow)

was given although the imaging findings were not in favour of either of these possible differentials.

In view of encasement of left ICA and MCA by the mass and keeping in mind the possibility of sacrificing the left ICA during the surgery, a pre-operative DSA with balloon occlusion test (BOT) was requested by the neurosurgeon to look for cross-flow via anterior communicating artery in anterior circulation and posterior communicating artery in posterior circulation.

BOT was negative, and patient tolerated the procedure well.

DSA showed blush in the area supplied by M1 segment of left middle cerebral artery at 3.19 s (Fig. 3a, b) and showed progressive filling on delayed venous phase (Fig. 3a, b). This area corresponded with the location of our lesion on prior imaging. Corroborating all the imaging findings, a diagnosis of left parasellar region cavernous sinus haemangioma was concluded.

Patient was taken for surgery with the pre-op diagnosis of left parasellar haemangioma likely arising from left cavernous sinus. Intra-operatively a well-defined mass was present in the region of left cavernous sinus. The mass was reddish and highly vascular with glistening outer surface (Fig. 4A) and was engulfing the left 3rd, 4th and 6th cranial nerves along with the V1 and V2 divisions of left trigeminal nerve. Gross total resection of the mass was done, and haemostasis was achieved. The post-operative course was uneventful.

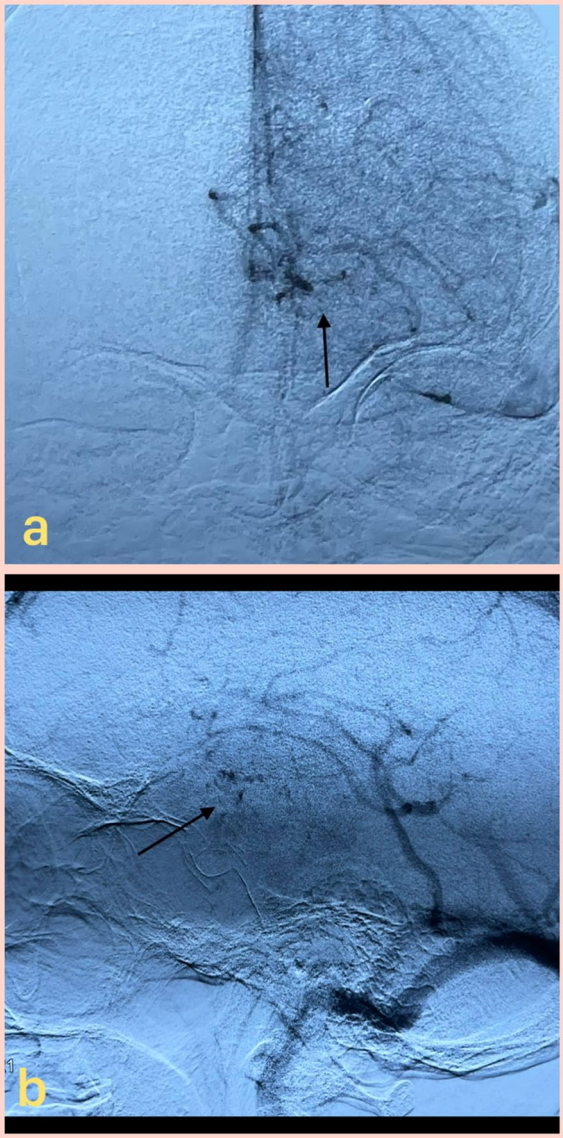

Fig. 3 Antero-posterior (**A**) digital subtraction angiography (DSA) image in early venous phase of the left internal carotid artery angiogram shows filling of venous pouches in the region of the mass(denoted by black arrow). Lateral DSA image (**B**) of the left internal carotid artery angiogram in late venous phase showing angiographic blushing in left parasellar region (denoted by black arrow)

Histopathology report showed dilated and congested, blood-filled vascular channels lined by bland endothelial cells consistent with the diagnosis of CSH (Fig. 4B).

Patient was discharged in satisfactory condition, and on follow-up, there was no residual neurological deficit.

Discussion

Cavernous haemangioma constitutes less than a percent of all parasellar masses [1]. They have a predilection for middle-aged females [1]. These are benign vascular malformations, and hence, pre-operative diagnosis helps to avoid unexpected surgical blood loss. Surgery is challenging due to chances of life-threatening blood loss with a reported intra-operative mortality of up to 12.5% in the literature [2]. Intracranial haemangioma is one of the four most common types of vascular malformation [3]. These consist of abnormally dilated vascular spaces without intervening neural tissue [2, 3]. They are usually seen in intra-axial location in brain parenchyma [2, 4]. Extra-axial location is rare with cavernous sinus being one such common location [5]. Both are similar histologically but have a different clinical presentation, imaging features and treatment [4]. Compared to the intracranial variety, the one arising from cavernous sinus rarely has haemorrhagic onset [5, 6]. They usually grow as dumbbell-shaped masses occupying the middle cranial fossa and sellar regions.

Clinical presentation is usually with headache and mass effect on structures both within and outside the cavernous sinus. Decreased vision or loss of vision can occur due to pressure effect on optic nerve or chiasma [7].

On NCCT, they appear homogeneously hyperdense. On MRI, these appear as soft masses in the region of cavernous sinus with hypointense signal intensity compared to brain parenchyma on T1WI, marked hyperintensity on T2WI and pronounced contrast enhancement. Gradual filling is seen on dynamic imaging just like cavernous haemangioma elsewhere. Accumulation of ^{99m}Tc pertechnetate-labelled red blood cells within the cavernous sinus with scintigraphic imaging techniques is specific for cavernous haemangiomas. Surgical management is preferred for CSH as it is associated with less recurrence. The extent of surgical resection depends on the associated risk of neurovascular injury as these tumours are associated with 40% risk of intra-operative bleeding [8]. Transient ophthalmoplegia is the most common complication seen post-operatively in 40–86% of the cases [9, 10]. Mortality and morbidity after cavernous sinus surgery are about 12.5% as per recent literature [11]. In view of these, many patients with cavernous sinus lesions can undergo subtotal resection with followed by adjuvant therapies. Gamma knife radiosurgery (GKS) is a good treatment option for patients with inoperable lesions or those who undergo limited subtotal resection. Tang et al. in 2015 reported a 79% mean reduction in tumour volume in 53 patients treated with GKS during a 24.5-month follow-up period. Likewise, no tumour showed enlargement after treatment [12].

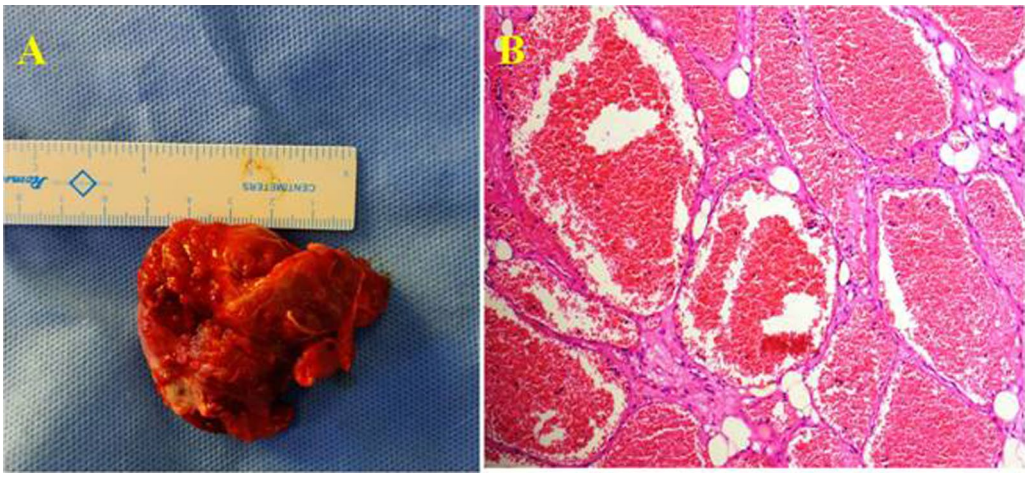

Fig. 4 Gross surgical specimen (**A**) shows a reddish vascular mass with glistening outer surface. Photomicrograph (Haematoxylin and Eosin, 200X) shows dilated and congested, blood-filled vascular channels (**B**) lined by bland endothelial cells suggestive of cavernous haemangioma

Conclusions

CSH is benign intracranial vascular masses and pre-operative imaging diagnosis is often challenging. But it should always be kept in differentials. DSA and nuclear imaging can be used as adjunct in case of diagnostic dilemma. Intra-operative bleeding is a significant risk factor, and hence, a pre-operative diagnosis is helpful. However, surgery or GKS has good proven results and helps reduce the mass effects by the lesion.

Patient was happy with the outcome of the surgery and has no objection with her case being discussed. She is happy that her case is going to help the doctor over the world in better understanding of this not so common pathology.

Abbreviations

CSH: Cavernous Sinus Haemangioma; DSA: Digital subtraction angiography; NCCT: Non-contrast computed tomography; MRI: Magnetic resonance imaging; FLAIR: Fluid attenuation inversion recovery; CSF: Cerebrospinal fluid; BOT: Balloon occlusion test; GKS: Gamma knife surgery.

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None.

Author contributions

SCM wrote the manuscript and compiled the references and was involved in obtaining patient consent. PC was involved in researching recent and relevant literature for the topic. AG helped in preparing the images and also adding the relevant figure captions. SS was involved in editing the final draft and ensuring the relevancy of data presented and references. These have participated sufficiently in the submission to take public responsibility for its contents. The manuscript has been approved by all authors. There is no conflict of interest. All authors read and approved the final manuscript.

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Availability of data and materials

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Declarations

Ethics approval and consent to participate

Not applicable.

Consent for publication

Written informed consent was obtained from the patient for publication of this case report.

Competing interests

The authors declare that they have no competing interests.

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