

## Case Report

# Clinical Case of Thrombosed Cavernous Sinus Aneurysm and Right Eye Third Nerve Palsy

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## Abstract

A 51-year-old lady was referred to the stroke team by the ophthalmologist. She presented with a sudden onset of right-sided headache, photophobia, and blurred vision, with drooping of the right eye. She also complained of nausea and vomiting. Before her admission, she had a recent right phacoemulsification and was discharged with prednisolone 1% eye drops. She was diagnosed with a completely right eye oculomotor nerve palsy, and a diagnostic imaging workup reported a thrombosed right cavernous segment ICA aneurysm. The gold standard investigation for a suspected thrombosed intracranial aneurysm is intra-arterial digital subtraction angiography (IADSA). However, magnetic resonance angiography (MRA), computed tomography angiography (CTA), and transcranial Doppler sonography are also considered effective diagnostic imaging for intracranial aneurysms. Management of intracranial aneurysm requires a specialist multidisciplinary review of the neuroimaging. In this patient's case, she had a repeat CTA scan after three months organised by the neurosurgical team which reported no significant changes, but she remains under surveillance.

## Introduction

Cavernous sinus aneurysms are very common in the elderly population, and often associated with an indolent ophthalmoplegia. Although the mortality rate of these aneurysms is limited but endovascular occlusion is an option in selected patient, and many patients may not need treatment [1].

The incidence of cavernous internal carotid artery aneurysms is estimated to be approximately 3% to 5% [2]. These aneurysms develop partial intraluminal thrombosis, leading to distal thromboembolism [3]. Cavernous aneurysms may cause facial pain or numbness, ptosis, visual changes, chemosis, and ophthalmoplegia [4]. Right-side thrombosed aneurysm can result in right cranial nerve III, IV, V1, V2, and VI weakness and optic chiasm compression [5]. Cavernous aneurysm and other intracranial aneurysm can be evaluated with computed tomography angiography (CTA) or magnetic resonance imaging angiography (MRA) of the brain [6]. However, IADSA is the gold standard for diagnosis of intracranial aneurysms [7]. Early recognition and prompt treatment are essential to reduce the risk of complications. We present a unique case of thrombosed right cavernous segment ICA aneurysm and right eye third nerve palsy.

## Case Presentation

A 51-year-old lady who had cataract surgery five weeks ago in her right eye, was prescribed prednisolone 1% eye drop after the surgery. She was referred to the stroke team by the ophthalmology clinic

with a sudden onset unilateral headache, with associated symptoms including photophobia, nausea and vomiting, blurred vision and drooping of her right eye. Her past medical history includes hypertension, migraine, type 2 diabetes, fibromyalgia, mixed anxiety, and depression. She denied any history of fever, neck stiffness, and skin rash. She was diagnosed with a third nerve palsy of her right eye at the ophthalmology clinic.

## Examinations

On examination, she was alert and well-oriented. Her visual acuity was 6/36, unaided on the right eye and 6/12 pinhole on the left. Fundoscopy was not performed due to tenderness in her right eye, and she found it difficult to tolerate any light. The intraocular pressure was 9 mmHg for the right eye, and 13 mmHg for the left eye. Her eye examination was carried out in the clinic. Figure 1A shows her complete right-sided ptosis, while Figure 1B shows passive right eye opening. She had tenderness in the right temporal region and frontal area. Respiratory, cardiovascular, and abdominal examinations were unremarkable.

## Diagnostic Investigations

Her blood investigations which included full blood counts, liver, bone profile, inflammatory markers, kidney function, cardioprotein antibodies, anti-beta glycoprotein antibody, and lupus anticoagulation were all normal. Computed Tomography (CT) head reported a hyperdense rounded right parasellar lesion (Figure 2). CT angiogram of the head reported a right hyperdense lesion (Figure 3). Magnetic resonance imaging (MRI) head with contrast reported a right cavernous sinus lesion (Figure 4). MRI orbit with contrast reported a thrombosed right cavernous segment ICA aneurysm caused by the right eye's third nerve palsy (Figure 5). An urgent referral was sent to the neurosurgical team in a specialist unit. Considering the various diagnostic imaging findings, the anaesthetics team were reluctant to perform a lumbar puncture on the patient. Instead, she was started on analgesia for headache and ondansetron for the nausea and vomiting. She was haemodynamically stable and was started on dexamethasone

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**Figure 1:** Right eye complete droop(A); Passive right eye opening (B).

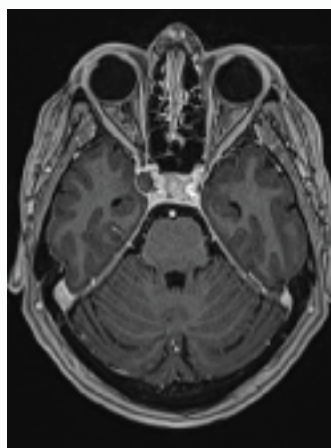
4mg twice daily while awaiting neurosurgery input. She was gradually weaned off her steroid. All the images were reviewed in a neuro-radiology multidisciplinary team (stroke consultant, neurologist consultant, radiologist consultant, and stroke specialist nurse) meeting and further discussed again with the neurosurgery team. The neurosurgery team requested a CT angiogram brain and then reviewed the case in their MDT. The neurosurgery team acknowledged that the patient had an intracavernous aneurysm which appeared to have some increased filling on the repeat CT angiogram brain. The cavernous aneurysm identified was enclosed by the dura of the cavernous sinus which was outside of the subarachnoid space and was less likely to lead to subarachnoid haemorrhage. The team felt that her double vision was not a result of the aneurysm; hence she was put under surveillance by the neurosurgery team.



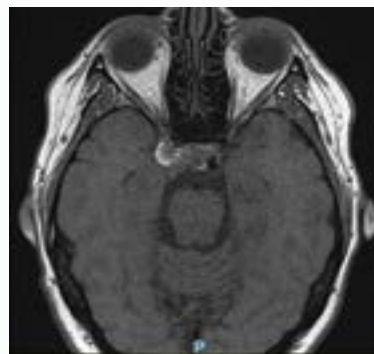
**Figure 2:** CT Head: Hyperdense rounded right parasellar lesion (blue arrow) in the region of the right cavernous sinus measuring 14 × 13 × 13 mm.



**Figure 3:** CT angiogram of the head: Right hyperdense parasellar lesion (orange arrow), differentials include parasellar meningioma, thrombosed ICA aneurysm.



**Figure 4:** MRI brain with contrast: Imaging appearances are in keeping with the right cavernous sinus lesion. 1<sup>st</sup> differential-Schwannoma 2<sup>nd</sup> differential thrombosed pseudoaneurysm sequestered from the anterior circulation.



**Figure 5:** MRI orbital with contrast both: Thrombosed right cavernous segment ICA aneurysm.

### Discussions

The cavernous sinus is closely related to the cranial nerves namely oculomotor (III), trochlear (IV), abducens (VI), V1 and V2 of trigeminal nerve (V). The mass effect of thrombosed cavernous segment ICA within the right cavernous sinus suggests compression of cranial nerves III, IV, V1 and V2 of V and the medially located VI. It is a life-threatening disorder that requires immediate evaluation [5]. Aneurysmal growth can occur due to a recurrent haemorrhage into the thrombus aneurysmal or if there is a gradual expansion of this wall [8]. Thrombosed right cavernous ICA aneurysm can be

triggered by damage to the endothelial due to stress on the aneurysm wall leading to thrombosis (haemodynamic stress); long-standing aneurysm which can precipitate thrombosis [9,10] or carotid artery aneurysm complications from medical interventions such as carotid endarterectomy, radiation therapy or central line placement. Thrombus formation in intracranial aneurysms is not uncommon [11]. Patients with antiphospholipid syndrome are susceptible to recurrent thromboembolic events, and long-term anti-coagulation is required [12]. As part of our investigation for our patient, she was tested for the following: blood test homocysteine, cardiolipin antibodies, anti-beta glycoprotein antibody, and lupus anticoagulation which were all within the normal range.

In this case report, we had a patient with a thrombosed right cavernous segment ICA aneurysm, associated with right-sided headache, blurred vision, photophobia, nausea, and vomiting. The cause of the thrombus in the right ICA in her case is quite difficult to establish but we know this patient has had right phacoemulsification. Her recent cataract surgery may not be directly linked to her current symptom. She had a history of migraine and hypertension which increases her risk of intracranial aneurysms. Experimental studies have shown a link between the formation of intracranial aneurysms and hypertension [13,14] and migraine increases the prevalence of unruptured intracranial aneurysm in patients [15]. In this case report, we did not carry out a pathological examination of the thrombosed aneurysm in this patient, and this was a limitation of our report.

Management of thrombosed intracranial aneurysms involves thrombolysis, but the majority of patients are successfully managed conservatively with some patients experiencing ischaemic stroke [9]. In our case report, her previous CT angiogram brain reported some increase in the intracavernous aneurysm. A repeat CT angiogram of her brain three months after her initial diagnosis reported no significant changes to the previous. Studies have shown that a rapid growth in thrombosed aneurysm and its parent artery increases the risk of ischaemic stroke [9,11].

## Therapy Input

The patient requested a referral to the Occupational Therapists (OT) for equipment provision. She was mobilising independently on the ward. However, she was unsteady at times due to her visual impairment and unfamiliarity with the ward environment. Similarly, she was able to manage her personal activities of daily living (PADLs) whilst an inpatient and was happy for her next of kin to support if needed on discharge. OT consider an individuals' occupations (activities performed daily to provide purpose and meaning) within the domains of leisure, productivity and self-care [16].

She was known to Community Occupational Therapy (COT) team who had been involved in completing other major adaptations such as provision of a stair-lift, a wet-room with grab rails to maintain her independence and enable her to remain living in her own home for as long as possible based on her pre-existing co-morbidities.

The OT discussed her needs and was able to offer alternative solutions for some of the equipment. She required an elevated head-rest due to her ongoing nausea and dizziness, however she did not meet the criteria for provision of a hospital bed but would benefit from additional pillows or a pillow lifter. The OT offered the patient equipment provision on discharge to support but this would need to be completed by a technician from the equipment provider on discharge. In addition, the patient was offered a referral to the visual

impairment team to review her home environment for provision of assistive technology to support her domestic activities of daily living (DADLs) and guidance with outdoor mobility with an appropriate cane.

## Eye clinic Follow up

She was reviewed in the eye clinic three months post diagnosis of complete right eye oculomotor nerve palsy. She still has a droopy eyelid and a noticeable squint. She is managing well with a frosted lens in her glasses and have advised to drive short distances with her glasses on, as the vision in the fellow eye was excellent. This ensures she is not experiencing diplopia. She is for further review in about 4-5 weeks' time with the eye clinic.

## Conclusion

We presented a case report of a thrombosed cavernous segment right ICA aneurysm developed as a result of underlying risk factors. She had a completely right oculomotor nerve palsy which was diagnosed following a CT brain by the ophthalmologist. She remains under the care of the ophthalmologist. The gold standard investigation for suspected intracranial aneurysms is IADSA, but CTA and MRA can be effective diagnostic tests. A suspected or confirmed intracranial aneurysm requires a referral to a neuroscience centre for further management. Our patient is currently on surveillance CTA scan, but it is well known that rapid growth of a thrombosed aneurysm increases the risk for an ischaemic stroke.

## Declaration of Interest Statement

All co-authors of this case report have seen and agreed with the content, and there is no financial interest to report.

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