Atypical Presentation of Cavernous Sinus Infection with Intracavernous ICA Aneurysm

Bhawana Pant · H. C. K. Joshi · D. K. Isser

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Abstract In a typical presentation of intracavernous internal carotid artery aneurysm and cavernous sinus infection there is involvement of 3rd, 4th and 6th cranial nerves along with 2nd and 5th cranial nerve. Here we present a case of a 32 years old male with unilateral mycotic intracavernous internal carotid artery aneurysm with a history of head injury. Atypical features in this case was involvement of distantly situated multiple cranial nerves and sparing the 5th cranial nerve and optic nerve which are more near and commonly involved. Besides this patient has marked sphenoid sinusitis on left side but having no sign and symptoms.

Keywords Atypical · Cavernous sinus · Intra cavernous · Aneurysm

Introduction

The oculomotor cranial nerves lie in close proximity within the cavernous sinus and superior orbital fissure. The cavernous sinus area contains structures that continue through the superior orbital fissure it is often impossible to say

whether a lesion is in the cavernous sinus or superior orbital fissure. More general designation is parasellar syndrome as described by Kline et al. [1] Typically, patient present with periorbital or hemicranial pain, combined with ipsilateral oculomotor cranial nerve palsies, oculosympathetic paralysis, and sensory loss in distribution of ophthalmic and occasionally maxillary (V2) division of trigeminal nerve. Clinically various combinations of these cranial nerve palsies occur. Orbital apex syndrome should be reserved for multiple ocular cranial nerve palsies plus optic nerve dysfunction.

The cavernous sinus receives blood supply from not only cerebral veins but also from ophthalmic veins and emissary veins.(from pterygoid venous plexus in infra-temporal fossa) These connections provide pathways for infection to pass from extra cranial sites to intracranial sites as these veins have no valves [2]. In addition structures passing through cavernous sinus and are located in the wall of cavernous sinus are vulnerable to get injured due to inflammation. The term mycotic aneurysm, first used by Osler today refers to any aneurysm caused by infection. Mycotic aneurysm of internal carotid artery are not so common. They are caused by hematogenous spread of infection or direct spread of infection from contiguous focus, trauma or complication of dental surgery. Other common causes include intravenous injection drugs abuse, sinusitis, meningitis and lymphoid disorders.

Intracavernous internal carotid artery aneurysm seem to be far more common in females according to a series described in literature [3]. Here we describe a case of 32 year old male suffering from right mycotic intracavernous internal carotid artery aneurysm (Fig. 5) caused by *Staphylococcus aureus* after an episode of head injury with involvement of multiple cranial nerves.

B. Pant (✉) · H. C. K. Joshi · D. K. Isser
Department of Otorhinolaryngology, Dr. Sushila Tiwari
Memorial Hospital & Govt Med College, Haldwani, Nainital,
Uttarakhand, India
e-mail: pantbhawnaufht@yahoo.in

B. Pant
C/O Dr. Pushpa Pant, GGIC, Haldwani, Nainital, Uttarakhand,
India

Fig. 1 Showing patient with *right* eye ptosis

Case Report

A 32 years old male patient was admitted to our department with complaints of neck pain from last 2 months which was persisting and later on became episodic along with recurrent attacks of fever. From last 8 days he developed absolute dysphagia for solids and liquids along with change in voice and inability to open his right eye. He had a history of head injury 3 months back. He took some treatment from local practitioner and improved partially. There was no history of loss of consciousness or vomiting or nasal symptoms. At the time of presentation patient was febrile while other parameters were normal.

Local examination of face showed right eye ptosis, diplopia, pupil was dilated, there was no reaction to light. Right eye ball was fixed because of ophthalmoplegia due to

Fig. 3 Showing patient with *right* palatal paralysis

involvement of 3rd, 4th and 6th cranial nerves (Fig. 1). Vision and fundus examination of right eye showed no abnormality. Left eye was absolutely normal.

Tongue was deviated to the right side indicating 12th nerve palsy (Fig. 2). There was palatal paralysis (Fig. 3). Right true vocal cord showed decreased mobility. Lot of thick secretions were present in the oropharynx. 1st, 2nd, 5th, 7th and 8th cranial nerves were absolutely normal. Nasal examination did not revealed any positive signs of infection. Patient was given broad spectrum intravenous antibiotics (Amoxycillin with clavulanic acid, Metronidazole and Gentamycin along with high dose of Corticosteroids for 1 week.). Ryles tube feeding was started. He started improving within 2 days and started taking orally. Examination of larynx returned to normal. Blood investigations revealed increased TLC, blood culture showed

Fig. 2 Showing patient with *right* tongue paralysis

Fig. 4 MRI scan showing inflammation of extraocular muscles on *right* side

Fig. 5 MRI scan showing pre and para vertebral collections reaching up to clivus, basisphenoid and basiocciput (arrow)

growth of *S. aureus*, ESR was raised (60 mm), other investigations were normal. Plain CT scan of head showed inflammation of extraocular muscles on right side (Fig. 4). MRI of brain revealed infective pathology involving central and posterior skull base reaching up to C1 with associated Pre and Para vertebral collections reaching up to clivus, basisphenoid and basiocciput (Fig. 5). Involvement of right hypoglossal canal was present. Right cavernous sinus was involved showing partially thrombosed aneurysm of intracavernous suggestive of fungal infection (Fig. 6). Left sphenoid sinus was filled with infective material suggestive of fungal infection although no signs and symptoms of active sinusitis were present in the patient (Fig. 7).

At the time of discharge all the symptoms had improved except ophthalmoplegia and ptosis.

Fig. 6 MRI scan showing intracavernous internal carotid artery aneurysm on right side

Fig. 7 MRI scan showing left sphenoid sinusitis (arrow)

Discussion

Mycotic aneurysm of intracavernous internal carotid artery are rare and constitute only 3–4 % of a large series of intracranial aneurysm as reported by Knouse et al. [4]. In India and other eastern countries there is lower incidences of intracranial aneurysm compared to western countries as reported by Ramamurthi and Reddy et al. [5, 6]. Mycotic aneurysm of intracavernous internal carotid artery typically produces slowly progressive, unilateral ophthalmoplegia which may become painful. They rarely rupture, but this occurrence produces a carotid-cavernous fistula whose common cause is head trauma. Hence it should be detected well in time and treated as suggested by Kline et al. [1]. Other common complications include hemorrhage, and thromboembolic complications with neurological sequelae. Computed tomography (CT) was considered superior when compared to magnetic resonance imaging in previous studies however digital subtraction angiography remains the gold standard for diagnosis and determination of specific anatomical details and endovascular management as suggested by Sandmann et al. [7]. Connor et al. [8] described the definitive treatment of carotid mycotic aneurysm as surgical resection of aneurysm with reestablishment of arterial flow, if possible. Prolonged intravenous antibiotic with bactericidal activity is essential along with high dose of steroids to reduce inflammation in early stages.

After head injury and subsequent infection patient had developed sign and symptoms of 3rd, 4th, 6th, 10th, 11th, 12th cranial nerves palsies. In this case infection must have spread from extra cranial site of infective focus to cavernous sinus through emissary veins and spread of infection occurred posteriorly involving 10th, 11th and 12th cranial

nerves. This explanation supports the view of Ramanand et al. [9] who have described the involvement of 7th cranial nerve in a case of cavernous sinus thrombosis which was not present in this case. Besides this aneurysm was another factor to press upon 3rd, 4th and 6th cranial nerves. This is the reason why after broad spectrum antibiotics and high dose of corticosteroids infective edema reduced resulting in recovery of 10th, 11th and 12th cranial nerves while eye signs and symptoms persisted due to aneurysm. Infective collections in the neck were reaching up to central and posterior skull base as indicated in MRI scan of brain (Fig. 4). But to our surprise 5th cranial nerve and its branches were spared. Cavernous sinus is a narrow compartment bounded by tight dural envelope. With increasing pressure drainage from nerves is impeded with alteration of nerve physiology and production of nerve paresis. With further increase in pressure arterial supply to nerve is impeded with consequent complete nerve deficits. Sign and symptoms in this patient must have been aggravated by formation of intracavernous internal carotid artery aneurysm which has pressed upon the 3rd, 4th, 6th cranial nerves but surprisingly spared much thicker 5th cranial nerve which is much closer to the internal carotid artery than 3rd, 4th, 6th cranial nerves. This may be due to compartment formation because of meningeal adhesion. Most cases described in the literature have symptoms like headache, loss of vision, involvement of 5th cranial nerve along with involvement of 3rd, 4th, 6th and 5th cranial nerve.

Summary and Conclusion

The anatomical relationship of cavernous sinus with structures lying in its lateral wall carries a great clinical significance in cases presenting with unilateral or bilateral

ophthalmoplegia and ptosis, with or without symptoms of cavernous sinus syndrome. Any other factor including head injury whether blunt or penetrating, chronic sinus infection, dental surgery, intravenous drug abuse etc. should be thoroughly traced and treated well in time. Posttraumatic infection can lead to multiple cranial nerve involvement as happened in this case. It can also lead to various other vascular complications like mycotic aneurysm. It also suggests that cavernous sinus infection may also be suspected even 1st and 5th cranial nerves are not involved and in the absence of other typical features of cavernous sinus thrombosis. It also suggests that potential dangerous areas in head and neck are larger than usually described in the text book.

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