Intra-cavernous aneurysm: a rare complication mimicking Tolosa Hunt syndrome

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Introduction

Tolosa Hunt syndrome (THS) is a disorder that is related to inflammation of cavernous sinus (CS) as well as superior orbital fissure although the exact etiology is unknown.¹ THS affects any age group (10-80 yr.) and can present with headache, ophthalmoplegia, oculomotor nerve palsies or even loss of visual acuity. The duration of symptoms ranges from days to weeks and they can be ipsilateral or even contralateral. Moreover, recurrence of symptoms has been noted in some cases despite the initial remission.

Currently, the neuroimaging modalities that are performed for the diagnosis of THS are MRI and high-resolution CT scans. However, the review of the literature shows that CT scan is less sensitive than MRI scan.⁴ Other laboratory tests performed in cases of suspected THS are blood tests (complete blood count, erythrocyte sedimentation rate (ESR) and C-reactive protein (CRP)). THS seems to be associated with leukocytosis and raised erythrocytes sedimentation rate⁵. Usually the treatment for THS involves intravenous corticosteroid administration. However, some studies have reported the efficacy of immunosuppression therapy such as cyclosporin or methotrexate⁶ while even infliximab has been reported as a successful treatment to a patient with steroid resistant THS.⁷

THS is a diagnosis of exclusion, as other causes can mimic this condition. The differential diagnosis includes neoplastic conditions such as meningioma or chordoma, vascular conditions such as intracavernous artery or posterior artery aneurysms, and finally inflammatory conditions such as sinusitis, or sarcoidosis⁵. Therefore, every patient should be evaluated thoroughly before the diagnosis is confirmed.

Cavernous carotid aneurysm (CCA) accounts for 2-9% of all internal carotid aneurysms. The causes for CCA include trauma, inflammation or idiopathic. Usually patients are asymptomatic in the first stages of the aneurysm but as it is enlarged the patients manifest diplopia, ptosis, ophthalmoplegia. Finally, one must underline the possibility of aneurysm rupture, that requires prompt medical intervention and in the majority of cases can be fatal.

In our study we present a patient suffering from an intracavernous aneurysm (ICA) mimicking Tolosa Hunt syndrome.

Case report

A 51 year old woman was referred to our clinic after 24 hours hospitalization in an ophthalmology clinic due to a periorbital cellulitis of her right eye. The woman had a history of headache and fever for 10 days and three days prior to her admission a periorbital edema appeared on her right eye. Her clinical examination revealed periorbital edema, diplopia and a reduced visual acuity on her right eye. A CT scan was performed
showing sinusitis involving mainly the maxillary, ethmoid and sphenoid sinuses on the right side. (fig. 1) Consequently, the clinical manifestations were characterized as complications of sinusitis and the following day the patient underwent an endoscopic sinus surgery. A middle mental antrostomy, anterior and posterior ethmoidectomy as well as frontal sinus drainage type DRAF I were performed on the right side. Part of the orbital lamina was removed in order to drain the orbital abscess leading to a successful orbital decompression. The patient was treated with intravenous antibiotics (sultamicillin, clindamycin) in combination with intravenous corticosteroids (dexamethasone). Post-operatively the orbital edema was diminished and her visual acuity returned to normal. (fig. 2) The intravenous corticosteroids were reduced. Her blood results improved steadily, the patient was asymptomatic and her neuro-ophthalmologic examination was normal.

On the 9th postoperative day the woman suddenly complained about headache, retro-orbital pain on the left side and diplopia on her left eye, which in 24 hours escalated to ophthalmoplegia and ipsilateral palpebral ptosis. (fig.3) After a complete clinical neurologic examination, revealing paresis of the third, fifth and sixth cranial nerves, intravenous corticosteroid treatment was re-administrated under the suspicion of a possible Tolosa Hunt syndrome. Emergency CT scan and CT-angiography scan were performed showing a possible intracavernous carotid artery aneurysm (ICA) on the left side. No clinical improvement was noticed in spite of the corticosteroid treatment. The diagnosis of intracavernous carotid artery aneurysm was confirmed by an MRI scan and the patient was referred to neurosurgeons. (fig. 4) Under their supervision a cerebral angiography was performed and the giant intracavernous aneurysm was treated with guglielmi detachable coils. The patient was symptom free within two months post-operatively and a complete follow-up schedule has been planned for the future. Two years later the patient remains symptom free and her follow-up imaging examination is free of findings.

Discussion

Tolosa Hunt syndrome is an inflammatory disorder of the cavernous sinus and superior orbital fissure. It was first described in 1954 by Dr. Eduardo Tolosa, a Spanish neurosurgeon. In 1961 Hunt et al also described similar cases and in 1966 Smith and Taxdal introduced the term Tolosa Hunt syndrome for the first time. It is described as a painful ophthalmoplegia with unilateral periorbital headache. Its etiology remains unknown; it is referred to as idiopathic and from pathophysiological aspect it represents a nonspecific granulomatous inflammatory disorder of the cavernous sinus. However, injuries, tumors or aneurysms could act as potential triggers of the syndrome. Dr. Eduardo Tolosa who first reported the syndrome, described it as “a non-specific chronic inflammation of the septa and wall of the cavernous sinus with the proliferation of fibroblasts, an infiltration with lymphocytes and plasma cells.” Hunt et al also added that “such inflammatory changes, in a tight connective tissue, may exert pressure upon the penetrating nerves.” The cranial nerves that are involved are III, IV, V, VI. Pain is usually periorbitally located but it can also be retro-orbital. Pain seems to be the presenting symptom before ophthalmoplegia appears which involves all of the three ocular-motor nerves in various combinations. The oculomotor nerve is the most commonly affected in 80% of THS cases, followed by abducens nerve (70%), the ophthalmic branch of trigeminal nerve (30%) and trochlear nerve (29%). There can also be sympathetic or parasympathetic involvement causing pupillary abnormalities. In the literature, the involvement of the maxillary and mandibular branches of the trigeminal nerve, the optical nerve and the facial nerve have also been reported. The diagnosis of THS is basically set out of exclusion of other clinical entities with similar manifestations. It is suspected by the clinical presentation combined with negative neuroimaging scanning and good response to corticosteroid treatment. However the responsiveness to treatment with steroids is no longer required to confirm the diagnose of the syndrome. The 3rd Edition of the International Classification of Headache Disorders (ICHD) has refined its diagnostic criteria to require the demonstration of granulomatous inflammation of the cavernous sinus, superior orbital fissure or orbit on magnetic resonance imaging or biopsy. Nevertheless there are case series that underline that even the new diagnostic criteria are suboptimal for the diagnosis of THS which still remains a diagnosis of exclusion.

The proposed treatment for THS involves high doses of systemic corticosteroids, as it was first described, however, there are no specific data neither on the precise dose nor on the duration of the treatment. Remission of symptoms is usually expected within the first 24 to 72 hours from the first dose of corticosteroids.
Except THS there are many other diseases that can present with similar symptoms. The differential diagnosis of a painful ophthalmoplegia is extensive and must include neoplastic lesions such as pituitary adenomas, meningiomas, craniopharyngiomas, chordomas etc., vascular disorders such as aneurysms and arterial malformations, inflammatory disorders such as orbital pseudotumors, sarcoidosis, giant cell arteritis, Wegener’s granulomatosis, bacterial, mycobacterial and fungal infections and other diseases such as ophthalmoplegic migraine, trauma or diabetic mononeuropathy. It is mandatory when a patient presents with painful ophthalmoplegia that he is fully evaluated in order to avoid misdiagnosis.

The cavernous sinus and the superior orbital fissure are the anatomic places where the ocular-motor nerves, the internal carotid artery and the ophthalmic branch of the trigeminal nerve co-exist. In THS the non-specific granulomatous inflammation can result in periarteritis of the cavernous sinus, resulting in compression and/or a stenosis of the cavernous portion of the internal carotid artery. Campbelli mentioned that leukocytes, lymphocytes and plasma cells can cause thickening of the vessel wall. However, a completely de novo aneurysm arising from the cavernous portion of the ICA is rather uncommon in Tolosa Hunt syndrome. Zhou et al reported a case of an intracavernous carotid stenosis with a reversible dissecting aneurysm. A 49 year old woman with oculomotor and abducens nerve palsy on the right side and retro orbital pain was diagnosed with Tolosa Hunt syndrome and a CT angiography revealed a right intracavernous carotid dissecting aneurysm. After the administration of dexamethasone not only the symptoms improved but also the follow up CT scan showed a decrease in size of the dissecting aneurysm. On the other hand, Kambe et al reported a 58 year old woman with right retro-orbital pain and abducens nerve palsy, whose CT angiography revealed stenosis of the left intracavernous ICA and aneurysms of bilateral ICAs. After the administration of prednisolone the right C4 aneurysm decreased in size while the left C3 aneurysm remained unchanged. The MRI showed an increase in the size of the hypophysis and a biopsy was performed. The histopathologic examination revealed inflammatory cells. The unchanged left C3 aneurysm was treated with Guglielmi detachable coils. It still remains unknown whether the aneurysms in those cases pre-existed the illness or the local vasculitis as a consequence of the inflammation led to their development. Takasuna et al reported for the first time a case with a steroid resistant Tolosa Hunt syndrome case with a de novo intracavernous aneurysm. A 53 years old woman appeared with recurrent bilateral painful ophthalmoplegia accompanied with sphenoid sinusitis and pituitary abscess. In the end, she was diagnosed with a de novo ICA aneurysm as well.

Intracavernous aneurysms can cause nerve palsy due to a mass effect. Hahn et al reported that 61% of patients with giant intracavernous aneurysms suffered from retro-orbital pain due to the compression and ischemia that giant aneurysms caused. On the other hand, non-giant aneurysms can also cause retro-orbital pain. Lanzino et al proposed that the pain might be attributed to a form of vascular compression syndrome. They pointed out that the oculomotor nerve contains sensory ganglion cells and conveys afferent fibers entering the brain stem and reaching the spinal trigeminal nucleus.

Cavernous carotid aneurysms pose dilemmas in management. Symptomatic aneurysms require either endovascular or open surgery treatment. Unfortunately, these modalities carry their own risks with high morbidity and mortality rates. Treatment options include artery ligation or clip application or embolization of the artery involved with success rates up to 60-80%. In our case we used guglielmi detachable coil (GDC) to treat the aneurysm. GDC was introduced in 1991 in the treatment of aneurysms, showing good effectiveness as it is minimally invasive; with bleeding and vasoconstriction being their main drawbacks. Mycotic aneurysms occur more often on patients with human immunodeficiency virus infection or those receiving immunosuppressive therapy. Shimizu et al reported a case of an intracranial mycotic aneurysm that ruptured after the patient was misdiagnosed with Tolosa Hunt syndrome and received high dose steroid therapy for 9 days. Irwin et al reported for the first time an extracranial mycotic aneurysm associated with Tolosa Hunt syndrome to a 57 years old patient located in the abdominal aorta. In our case, we initially suspected THS on the left side because of a recent history of inflammation of her right sinuses with periorbital cellulitis on the right side. Such inflammation does not spread easily to the other side because cavernous sinus and sella turcica are covered by bone and dura matter. However, there have
been cases reported of inflammation related with THS spreading to adjacent sites such as the hypophysis or the contralateral cavernous sinus. It remains unknown whether the aneurysm existed before the illness and the inflammation triggered its enlargement or it was a completely de novo mycotic aneurysm associated with Tolosa Hunt syndrome. If so, it is possible that the aneurysm may have been directly induced by inflammatory infiltration of the intracavernous ICA.

Conclusion

Our case underlines the importance of including intracavernous aneurysms in the differential diagnosis of painful ophthalmoplegia in all directions. Such manifestations should lead to Tolosa Hunt syndrome diagnosis only after exclusion of all other clinical conditions via thorough radiological examination. It is of great importance that the radiological examination focuses on vascular structures since the intracavernous aneurysms can be life-threatening, depending on their size, and their early diagnosis is crucial for determining the treatment strategies.

References


[12] Evan Mullen, MS; John W. Rutland, BA; Mark W. Green, MD; Joshua Bederson, MD; Raj Shrivastava, MD Reappraising the Tolosa-Hunt Syndrome Diagnostic Criteria: A Case Series Headache 2020;60:259-264


Figure 1

Ct scan showing sinusitis and periorbital cellulitis on the right side.

Figure 2
Periorbital cellulitis preoperatively on the right eye and clinical improvement after the performance of endoscopic sinus surgery.

Figure 3

9th postoperative day: ophthalmoplegia and palpebral ptosis on the left eye.

Figure 4
MRI scan revealing a giant intracavernous carotid artery aneurysm on the left side.