

Title:

COVID-19 Vaccine-Induced Tolosa-Hunt Syndrome: A Case Report

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Word Count: 1103

Figure/Table Count: 1

List of Abbreviations used in the article

COVID-19: Coronavirus Disease 2019

MRI: Magnetic Resonance Imaging

THS: Tolosa Hunt Syndrome

Abstract:

We present the case of a previously healthy 36-year-old male with right eye discomfort, associated diplopia and dizziness as the primary clinical picture, seven days after a booster vaccination with the ChAdOx1-S (Oxford/AstraZeneca) COVID-19 vaccine.

Learning Point for clinicians

Painful ophthalmoplegia should indicate clinicians to further workup their patients due to its diverse differential diagnoses, including rare disorders such as Tolosa-Hunt Syndrome, a combination of painful ophthalmoplegia and periorbital headaches. Patient history, including recent vaccinations, should be taken into consideration for patient workup.

Introduction

Diplopia as an isolated symptom can be due to many diseases, so trying to make a diagnosis with this symptom alone is almost impossible because of the multiple etiologies. Several steps need to be followed:

- The first step consists in determining if a single or multiple nerves are involved because the approach is different in each case.
- Identifying the presence or absence of associated pain is a very important distinguishing feature. As we'll discuss further, painful ophthalmoplegia has a specific differential diagnosis that is distinct from painless ophthalmoplegia. Even though it wasn't the diagnosis of our patient, a severe headache of sudden onset demands an urgent evaluation for cerebral aneurysm.
- Complete evaluation of any medical comorbidities associated should be performed.
- As the last step the onset and clinical progression of the disorder can be helpful, almost all the time signs of improvement means the process is benign, while fluctuating symptoms may suggest for example myasthenia and a sudden onset could be related to ischemia.

If we try to select a specific etiology only with diplopia, there are easily >15 possible diagnostic scenarios. In this paper we'll focus on one, the Tolosa-Hunt syndrome. We'll see in the case presentation and how the approach was managed to get into that diagnosis

The Tolosa-Hunt syndrome (THS) also known as painful ophthalmoplegia, recurrent ophthalmoplegia or ophthalmoplegia syndrome, is described as a severe and unilateral periorbital headache associated with painful and restricted eye movements. It involves one or more of the third, fourth, and/or sixth cranial nerves. This disease is provoked by a non-specific inflammation in the region of the cavernous sinus and/or superior orbital fissure. However, traumatic injuries, tumors, or an aneurysm could be the potential triggers

While it is considered a benign condition, permanent neurological deficits can occur if the diagnostic approach is delayed. Relapses are common and prolonged immunosuppressive therapy is needed. THS is an exclusion diagnosis and should be carefully differentiated from more commonly occurring malignancies and infections that involve the cavernous sinus. The downside is the lack of a specific diagnostic test abnormality

The annual estimated incidence of THS is about one case per million per year, Its incidence doesn't follow any geographical or racial pattern. The average year of onset is 41 years, while the most common presentation is unilateral there have been case report about bilateral involvement of approximately 5%, and it should be noted that there is no male-female predisposition. (1, 2, 3)

Case presentation

A 36-year-old male was referred to the ophthalmology department due to right eye discomfort associated with diplopia and dizziness seven days after a booster (third) vaccination with the ChAdOx1-S (Oxford/AstraZeneca) COVID-19 vaccine. Physical examination was unremarkable except for bilateral conjunctival erythema. The patient was prescribed eye lubricant, dexpanthenol 5% corneal gel and topical ciprofloxacin due to concern of bacterial conjunctivitis.

Seven days after the initial presentation he presented to a follow-up evaluation due to the presence of right eye pain, without diminished vision or visual field defects. The treatment was continued and 14 days after the initial presentation, the patient developed diplopia, worsening right eye pain, photophobia, right third and fourth cranial nerve palsy. Tramadol and pregabalin were prescribed. A brain and orbital contrast-enhanced magnetic resonance imaging (MRI) showed contrast enhancement of the right posterior orbital fissure (Figure 1)

The patient was referred to a neurologist for further workup. A complete blood count, thyroid function tests, liver function tests, protein electrophoresis, complete metabolic panel, serum electrolytes, C reactive protein and erythrocyte sedimentation rate were all within normal limits. p-ANCA, c-ANCA, antinuclear antibodies, anti-Smith and anti-dsDNA antibodies

were all negative. The diagnosis of Tolosa-Hunt Syndrome was made after excluding all other pathologies. Treatment with high dose prednisone was started and the patient's visual symptoms and eye pain improved dramatically in the first three days after starting the treatment and made a full recovery six weeks after the initial presentation, with no sequelae or permanent vision damage.

Discussion

We present the case of a previously healthy 36-year-old male with right eye discomfort, associated diplopia and dizziness as the primary clinical picture, seven days after a booster vaccination with the ChAdOx1-S (Oxford/AstraZeneca) COVID-19 vaccine. Previous case reports have shown neuro-ophthalmologic adverse events of vaccines (1,2), including THS in a patient that received an mRNA-based vaccine (3).

Tolosa-Hunt Syndrome (THS) is a rare disorder characterized by severe and unilateral painful ophthalmoplegia (4). Although the causative etiology is currently unknown, it is characterized by deposition of granulomatous material in the walls of the cavernous sinus and superior orbital fissure (5). The clinical features of THS can include painful ophthalmoplegia, periorbital headache and paresis of the third, fourth and/or sixth cranial nerves (5,6).

Diagnostic workup for patients with painful ophthalmoplegia can include blood and neuroinfections, sarcoid, and diabetic ophthalmoplegia (5). However, neuroimaging with a contrast-enhanced MRI should be performed, and in cases of THS findings can include enhancing of the cavernous sinus, clinoid process and/or orbital fissures (4,5,7). Corticosteroid therapy is the mainstay of treatment, with patients often dramatically improving in the first 48-72 hours after starting the treatment (4,5).

To summarize, painful ophthalmoplegia should prompt clinicians to consider many differential diagnoses (including Tolosa-Hunt Syndrome), and a thorough physical examination is warranted to better identify and characterize the pathological entity in their

patients. A complete patient history, including history of recent vaccinations, is key to a prompt diagnosis and treatment.

Figure 1

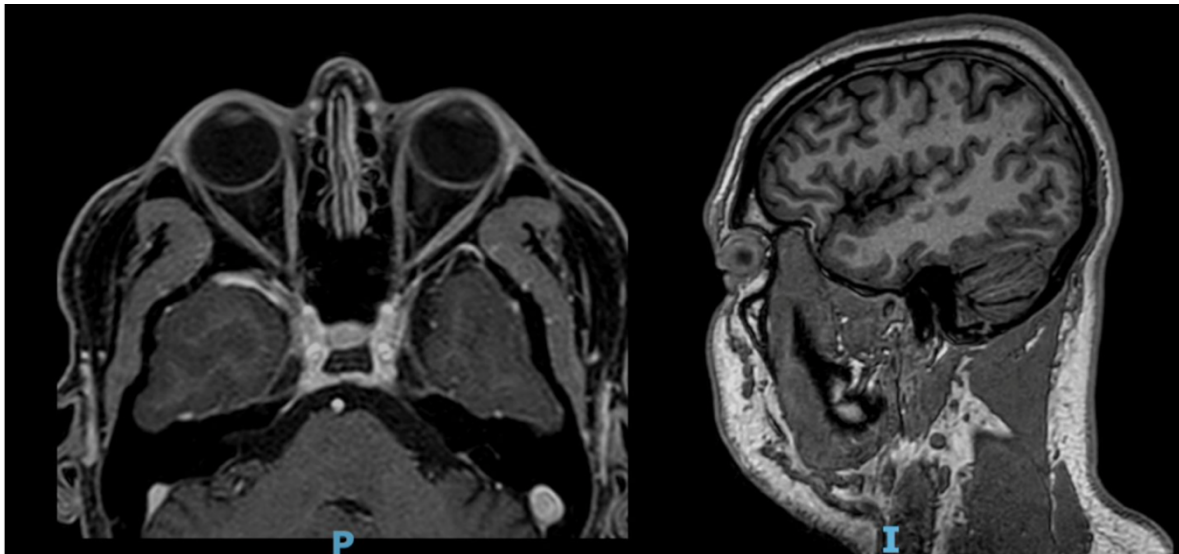


Figure Legends

Axial (Figure 1a) and sagittal (Figure 1b) views of a brain MRI showing a contrast-enhancing hyperintense lesion in the right posterior orbital fissure.

Funding

None declared.

Conflict of interest

None declared.

Consent

Written consent was obtained from the patient prior to writing this article

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Figure 1b. Axial (Figure 1a) and sagittal (Figure 1b) views of a brain MRI showing a contrast-enhancing hyperintense lesion in the right posterior orbital fissure