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Case Report Open Access

Non-Traumatic Subperiosteal Orbital Haematoma Following Yoga

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Abstract

Non-traumatic subperiosteal orbital haematomas are rare. A 14 year old healthy female was diagnosed after feeling a sudden "rush of blood" in her head during a headstand, followed by unilateral painful proptosis and diplopia. The haematoma did not compromise the optic nerve and resolved spontaneously within two weeks. After a thorough literature search, the authors concluded that this is the first presentation of a yoga-induced subperiosteal orbital haematoma.

Keywords: Subperiosteal; Orbital; Haematoma

Case Report

A 14 year-old healthy female presented to the emergency department with acute, painful right eyelid swelling, proptosis and diplopia. She first noticed the symptoms earlier that day after performing a headstand manoeuvre during a yoga routine. At the onset of the headstand, she reported experiencing a sudden "rush of blood" in her head. Binocular, horizontal diplopia was appreciated upon standing upright. The patient was fit and healthy and denied any recent trauma, valsalva manoeuvres, coughing, vomiting or use of medications. There was no personal or family history of haemorrhagic diatheses, however systems review revealed occasional spontaneous lower limb purpura.

On examination, best corrected visual acuity was 6/6 in both eyes and there was no relative afferent pupillary defect. Subtle bilateral periocular petechiae were present, along with a bluish swelling superonasal to the right eye that was causing mechanical ptosis. The right globe was proptosed and displaced inferiorly (Figure 1). The proptosis was independent of positioning and non-resistant to retropulsion. Right superior eye movements were limited and there was binocular vertical diplopia in the primary position, which was exacerbated in upgaze. Remaining ophthalmic examination was normal, including optic nerve functions and intraocular pressures.

A non-contrast computer tomography scan of the head and orbits demonstrated a well-demarcated hyperdense biconcave mass in the right superior orbit, consistent with a subperiosteal orbital haematoma, displacing the globe (Figure 2). Coagulation studies revealed marginally prolonged prothrombin time of 14.1 seconds (normal range: 8.5–12.5 seconds) and normal activated partial thromboplastin time, fibrinogen levels and platelet count. Full blood count, renal and liver function tests were normal.

In the absence of compressive optic neuropathy, conservative treatment with close observation was considered the safest option. Two weeks after presentation, clinical features had completely resolved (Figure 3).

Figure 1: Right eyelid discolouration and swelling with associated proptosis and vertical dystopia.

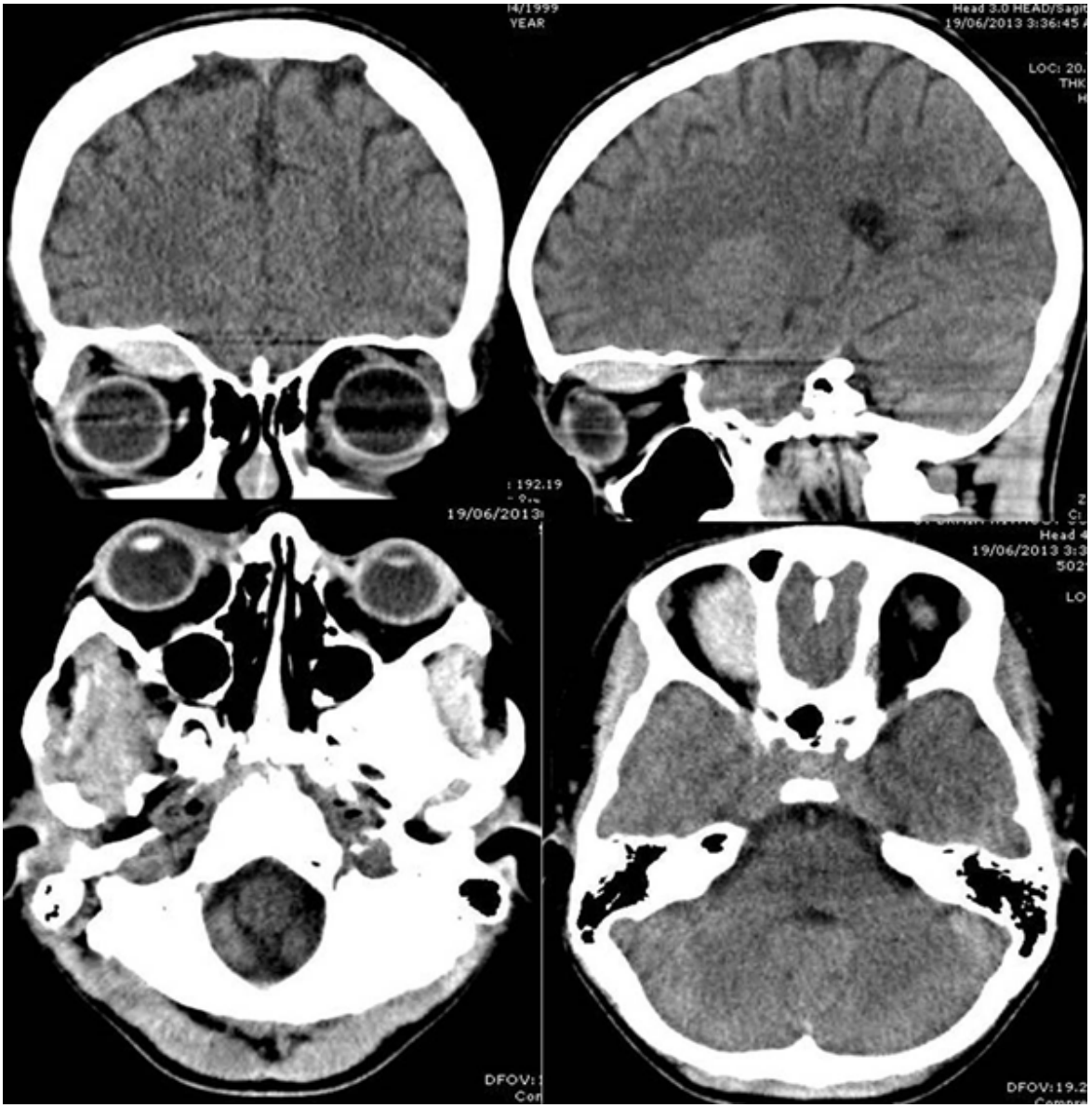

Figure 2: Computer tomography scan at presentation demonstrating right superior orbital subperiosteal haematoma.

Figure 3: Appearance two weeks after presentation demonstrating spontaneous resolution of orbital signs.

Discussion

Non-traumatic subperiosteal orbital haematomas are rare, although a number of cases have now been described in the literature. These can be divided into four categories, according to pathophysiology, which include increased cranial venous pressure, haemorrhagic diatheses, orbital wall compromise and idiopathic [1]. Although sometimes called 'spontaneous', this term should be reserved for idiopathic cases with no plausible inciting factors, which occur very rarely [2,3].

Sudden elevations in cranial venous pressure are thought to be the mechanism by which subperiosteal orbital haematomas have been diagnosed after scuba diving [4], childbirth [3,5], strangulation [6], emesis [3,7], anxiety [8] and thoracoabdominal crush injury [9]. Yoga headstands could be included in this list by means of sudden congestion of the valveless cranial venous system with associated increased venous pressure. As far as the authors are aware, yoga has never been described in the literature in association with non-traumatic subperiosteal orbital haematomas and seemed a relatively benign activity to be the only contributing factor.

Cases of subperiosteal orbital haematoma have also been attributed to increased haemorrhagic tendency from thrombolysis, liver disease, Henloch-Schonlein Purpura, anticoagulation, leukaemia, disseminated intravascular coagulation, scurvy, thrombocytopenia and Von Willebrand disease and haemophilia [1]. Investigations excluded haemorrhagic diatheses in our patient, who also denied use of anticoagulant, antiplatelet or complementary medications. We were advised by haematologists that her prothrombin time was not significantly elevated to explain pathological haemorrhage. When abnormalities of haemostasis have been present, there is often a worse prognosis with bilaterality and optic nerve compromise being relatively more common features [1,3,10-13]. The non-progression and rapid spontaneous resolution of our patient's haematoma might suggest that bleeding ceased soon after standing upright, consistent with an intact coagulation system. It is possible that if the headstand had been more prolonged, ongoing bleeding may have continued, resulting in more proptosis, resistance to retropulsion and the development of visual deterioration and optic nerve signs.

Orbital wall compromise from sickle-cell infarcts [1,14], sinus infections [15-17], and carcinoma [18] has been shown to predispose to non-traumatic subperiosteal orbital haematomas. However, no evidence of adjacent orbital wall or sinus pathology was evident on imaging of our patient to explain her unusual presentation (Figure 2).

Most subperiosteal orbital haematomas form in the roof of the orbit, between the periorbita and the concave orbital plate of the frontal bone. This is the largest surface area with loose adhesions that is uninterrupted by regions of firm attachments adjacent to fissures, sutures and foramina. The subperiosteal space is thought to be traversed by "cribra orbitale" or diploic vessels, which have the potential to rupture and expand this potential space with blood [3]. The only factors that could reasonably be implicated in this process in our patient include youth, because stronger adhesions develop with age [13], and a sudden increase in cranial venous pressure. In the standing position, the hydrostatic pressure within collapsed cranial veins are close to zero [19]. A sudden inversion of the body during a headstand would promote venous return from the lower half of the body and drain blood into the valveless tributaries of the superior vena cava, causing congestion of cranial and facial veins. This was experienced by our patient as a feeling of blood rushing to her head and observed as bilateral periocular petechiae (Figure 1), representing the rupture of tiny facial blood vessels. The suddenly elevated pressure within subperiosteal orbital veins may have been sufficient to also trigger bleeding into the subperiosteal space [3].

In this case, close observation was thought to be the safest option, which is generally accepted in the absence of evidence of optic nerve compromise. In situations where reversible conditions contribute to the pathogenesis, such as sinusitis and coagulopathies, these should be addressed. Orbitotomy and drainage in theatre is recommended in cases with suspicion about the diagnosis, when the optic nerve is at risk of compression or when the haematoma becomes organised and does not resolve. In latter cases, it has been suggested that there is a risk of secondary optic atrophy, strabismus, permanent choroidal folds and infection. Radiologically-guided fine-needle aspiration is safe, but has limited diagnostic potential and is only helpful if the haematoma is liquefied [3].

Conclusion

After a thorough literature search for non-traumatic subperiosteal orbital haematomas, the authors are unaware of previously documented cases resulting from yoga or headstands. The patient was an otherwise fit and healthy young female with no other examples of unprovoked, clinically-significant haemorrhage. This case highlights the need for a high index of suspicion of a subperiosteal orbital haematoma when presented with acute orbital symptoms and signs, even in the absence of trauma.

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