



Neuroradiology/Head and Neck Imaging Case Series

Subperiosteal Orbital Hematoma: An Uncommon Complication of Acute Sinusitis

Joseph P. Whitlock¹, Alok A. Bhatt², Jeffrey A. Stone²

¹Department of Radiology, Gainesville Radiology Group, Gainesville, Georgia, ²Department of Radiology, Mayo Clinic, Jacksonville, Florida, United States.



***Correspondence author:**

Alok A. Bhatt,
Department of Radiology, Mayo
Clinic, 4500 San Pablo Road,
Jacksonville - 32224, Florida,
United States.

bhatt.alok@mayo.edu

Received : 13 November 2020

Accepted : 04 December 2020

Published : 20 December 2020

DOI

10.25259/JCIS_209_2020

Quick Response Code:



ABSTRACT

Non-traumatic subperiosteal orbital hematoma is a rare finding and uncommon cause of proptosis. Reported cases describe an association with increased venous pressure. However, it is important to note that there is also an association with sinusitis, which must be differentiated from subperiosteal abscess. This article describes the unique imaging features of subperiosteal hematoma in the setting of sinusitis, as well as the suspected pathophysiology.

Keywords: Orbit, Hematoma, Acute sinusitis

INTRODUCTION

Non-traumatic subperiosteal orbital hematoma (SOH) is a rare disease and infrequent cause of proptosis. Isolated cases related to sudden increase in central venous pressure have been reported, as well as an association with inflammatory periorbital conditions such as sinusitis and orbital cellulitis.^[1]

It has been suggested that sinusitis-induced inflammatory response can lead to venous stasis and thrombophlebitis in the delicate subperiosteal orbital veins, leading to rupture and hematoma formation.^[2,3] Anticoagulation and blood diathesis also increase risk of SOH formation. The orbital periosteum confines the hematoma within the subperiosteal potential space. Subperiosteal fluid collection in the setting of sinusitis more commonly represents an abscess, and therefore, delineating between the two entities is important for appropriate treatment. Whereas medical management is often sufficient in cases of orbital abscess and phlegmon, symptomatic subperiosteal hematoma most commonly requires surgical drainage.^[4]

CASE REPORTS

Case 1

A 64-year-old male with a medical history of prior orbital fracture and extensive sinus surgery initially presented to an outside hospital with symptoms of acute sinusitis. His symptoms initially improved with antibiotics, however, approximately 7 days after starting antibiotics, he began to have right orbital pain, blurry vision, and transient vision loss. He was taking aspirin and warfarin for a vascular stent. Physical examination demonstrated proptosis, decreased visual acuity, and

This is an open-access article distributed under the terms of the Creative Commons Attribution-Non Commercial-Share Alike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as the author is credited and the new creations are licensed under the identical terms.

©2020 Published by Scientific Scholar on behalf of Journal of Clinical Imaging Science

impaired upward gaze. Computed tomography (CT) imaging showed a slightly hyperattenuating, well-circumscribed fluid collection confined within the subperiosteal space of the right orbital roof causing significant proptosis and mass effect on the superior rectus muscle and superior aspect of the globe [Figure 1]. The orbital apex and optic nerve were preserved. The collection was given a presumptive diagnosis of abscess and the patient was taken for surgery. Operatively, a superior orbitotomy was utilized to evacuate the collection, which was proven to be an organized hematoma at pathology. Cultures were negative.

Case 2

A 51-year-old female with a history of extensive sinus surgery for recurrent sinusitis presented with symptoms of acute sinusitis. Symptoms transiently improved with antibiotics. Despite initial improvement, she returned complaining of increased left orbital pressure and discomfort with upward gaze. Clinical examination noted 1–2 mm downward deviation of the left pupil and diminished visual acuity. CT demonstrated a hyperattenuating subperiosteal fluid collection in the superomedial aspect of the left orbit causing mild inferolateral deviation of the globe, as well as mild proptosis [Figure 2]. This was initially diagnosed as an abscess. On further investigation, a prior diagnosis of a von Willebrand-like disorder was revealed. A superior orbitotomy was utilized to drain a maroon-colored thick fluid collection proven to be an organized hematoma at pathology. Cultures were negative.

DISCUSSION

SOH is an infrequent cause of proptosis. While several reports of orbital hematoma associated with trauma, orbital cellulitis, and increased central venous pressure are described in the literature, only a few case reports are reported in the literature describing orbital hematoma occurring in the setting of sinusitis.^[2-6] The risk of developing a hematoma is increased in patients on anticoagulation or with a bleeding diathesis as in the two presented cases.

The superior and medial aspect of the orbit is the most common location of SOH.^[4] This is likely due to the rich network of subperiosteal vasculature in this location. This orbital location is adjacent to the frontal and ethmoid sinuses and is the frequent location of sinusitis-related SOH. Sinus or orbital CT is the initial imaging modality of choice. Findings that suggest a diagnosis of subperiosteal hematoma rather than abscess on unenhanced CT include a smooth, well-defined interface between the periosteum and orbital fat (no associated fat stranding) with no identifiable periosteal breach and a sharply defined, high attenuating, extraconal lesion that is biconvex with margins contained by the

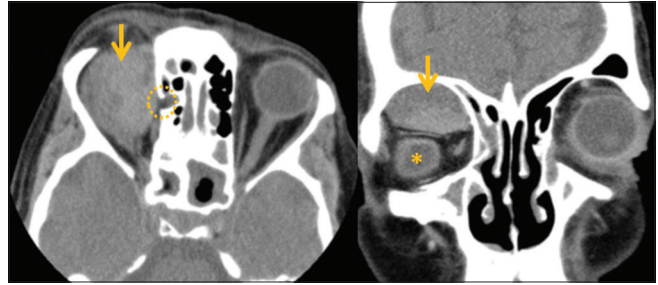


Figure 1: A 64-year-old male presents with right eye pain and proptosis, being treated for acute sinusitis. Axial (left) and coronal (right) non-contrast computed tomography images demonstrate a hyperattenuating subperiosteal fluid collection along the right orbital roof (arrows), which causes mass effect on the right globe (asterisk). Note the lenticular shape, which does not cross suture margins along the lateral aspects, as well as the smooth interface between the hematoma and orbital fat. Sinus disease is present within the right frontal sinus, bilateral ethmoid air cells, and bilateral sphenoid sinuses. There is a defect within the right lamina papyracea (circled).

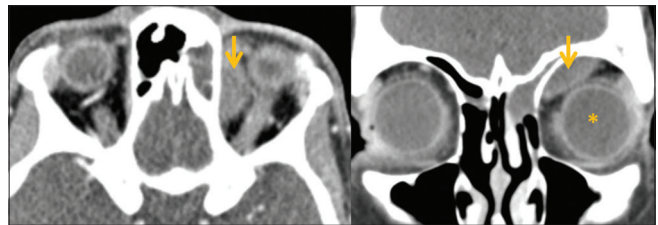


Figure 2: A 51-year-old female with a history of recurrent sinusitis, presents with left orbital pressure. Axial (left) and coronal (right) post-contrast computed tomography images demonstrate a subperiosteal lentiform shaped fluid collection along the left superomedial orbit (arrows) causing mild inferior displacement of the left globe (asterisk). There is no fat stranding within the adjacent orbital fat. Note sinus disease involving the left frontal sinus and left anterior ethmoid air cells.

sutures.^[7] No contrast enhancement would be expected with hematoma.

Magnetic resonance imaging (MRI) is useful when there is an indeterminate diagnosis on CT and may increase diagnostic accuracy; however, the effect of blood product degradation on the T1- and T2-weighted MRI sequences can present a diagnostic dilemma. T1-weighted and T2-weighted image signal intensity varies temporally with blood product degradation. With acute and subacute hematoma, T1 hyperintensity and T2 hypointensity would be expected. In the late subacute stage, T2 signal intensity increases; during transition to chronic hematoma, T1 and T2 intensity decrease progressively overtime. Blood sensitive sequences such as gradient recalled echo and susceptibility-weighted images are strong detectors of blood products but can be easily degraded by magnetic

field inhomogeneity, as in the orbit near the interface with aerated sinuses, facial bones, and orbital soft tissue. Diffusion-weighted imaging (DWI) is a sensitive sequence for detection of high cellularity showing high signal intensity as in the case of abscess and would demonstrate low signal intensity with hematoma.

In patients with small asymptomatic SOH, non-surgical management is the preferred method of treatment. Close clinical follow-up is recommended due to the fact that extension of SOH into the orbital apex can result in rapid onset blindness.^[1,4,6] Some authors have expressed concerns that hematoma could serve as nidus for infection, potentially leading to orbital abscess formation. Nearly all reported cases of symptomatic sinusitis-induced orbital hematoma were treated surgically.^[1,6]

Commonly used operative approaches for evacuation of subperiosteal collection include (1) superior or superomedial orbitotomy and/or (2) endoscopic partial ethmoidectomy with partial lamina papyracea resection. While multiple factors determine the selected surgical approach, there is a trend toward endoscopic evacuation due to decreased risk of bleeding and better esthetic outcome.^[3]

CONCLUSION

When a subperiosteal orbital fluid collection is present in the setting of sinusitis, the radiologist must consider the possibility of SOH and distinguish it from abscess due to differing treatment. Features that favor SOH on non-contrast CT are a hyperattenuating fluid collection with smooth borders, no orbital fat stranding, no appreciable periosteal breach, and biconvex shape contained by suture lines. MRI with DWI can be useful if there is doubt on CT.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

REFERENCES

1. Crawford C, Mazzoli M. Subperiosteal hematoma in multiple settings. *Digit J Ophthalmol* 2013;19:1-10.
2. Harris GJ, Kay MC, Nilles JJ. Orbital hematoma secondary to frontal sinusitis. *Ophthalmology* 1978;85:1229-34.
3. Nomura K, Honkura Y, Ozawa D, Okumura Y, Hidaka H, Takenori O, *et al.* Endoscopic drainage of orbital subperiosteal hematoma secondary to acute rhinosinusitis in a child. *Tohoku J Exp Med* 2014;233:171-4.
4. Atalla ML, McNab AA, Sullivan TJ, Sloan B. Nontraumatic subperiosteal orbital hemorrhage. *Ophthalmology* 2001;108:183-9.
5. Leopold DA, Kellman RM, Gould LV. Retroorbital hematoma and proptosis associated with chronic sinus disease. *Arch Otolaryngol* 1980;106:442-3.
6. Woo KI, Kim YD. Subperiosteal hematoma of the orbit associated with sinusitis. *Korean J Ophthalmol* 1997;11:118-22.
7. Cunnane ME, Sepahdari A, Gardiner M, Mafee MF. Pathology of the eye and orbit. In: Som PM, Curtin HD, editors. *Head and Neck Imaging*. 5th ed., Vol. 1. St. Louis: Elsevier; 2011. p. 669-70.

How to cite this article: Whitlock JP, Bhatt AA, Stone JA. Subperiosteal orbital hematoma: An uncommon complication of acute sinusitis. *J Clin Imaging Sci* 2020;10:85.