

Available online at www.sciencedirect.com

ScienceDirect

journal homepage: www.elsevier.com/locate/radcr

Case Report

Sinonasal organized hematoma: Case report and review of the literature ☆,☆☆

Aakshit Goyal, MD^{a,*}, Devanshi Dubey, MBBS^a, Jonathan H. Burdette, MD^a, Daniel L. Coldren, MD^b, Drew P. Plonk, MD^c, Christopher M. Lack, MD, PhD^a, Paul M. Bunch, MD^a

^a Department of Radiology, Wake Forest University School of Medicine, Medical Center Blvd, Winston-Salem, NC 27157, USA

^b Department of Pathology, Wake Forest University School of Medicine, Medical Center Blvd, Winston-Salem, NC 27157, USA

^c Department of Otolaryngology – Head and Neck Surgery, Wake Forest University School of Medicine, Medical Center Blvd, Winston-Salem, NC 27157, USA

ARTICLE INFO

Article history:

Received 28 July 2023

Revised 13 September 2023

Accepted 15 September 2023

Keywords:

Diagnosis

Management

Sinonasal organized hematoma

ABSTRACT

Sinonasal organized hematoma is a rare condition characterized by an organizing blood clot in the sinonasal cavity, which consists of blood products, fibrin, and dilated blood vessels. As a benign entity with an aggressive imaging appearance, it is important to differentiate sinonasal organized hematoma from malignancies affecting the paranasal sinuses and nasal cavities to guide appropriate management. In this report, we discuss the clinical presentation and diagnostic evaluation of an 82-year-old male with a left maxillary sinus organized hematoma and provide a comprehensive review of the relevant literature.

© 2023 The Authors. Published by Elsevier Inc. on behalf of University of Washington.

This is an open access article under the CC BY-NC-ND license

(<http://creativecommons.org/licenses/by-nc-nd/4.0/>)

Introduction

Sinonasal organized hematoma is a rare benign condition that results in formation of a mass within the sinonasal cavity. Pathologically, the mass consists of a mixture of hemorrhage, fibrin exudation, fibrosis, hyalinization, and neovascularization [1]. Sinonasal organized hematoma can occur sponta-

neously or as a result of trauma to the nose or paranasal sinuses. Because the imaging appearance of sinonasal organized hematoma can mimic malignancy, accurate diagnosis of this benign entity carries important implications for patient care. We report the case of an 82-year-old male who presented to our facility with recurrent epistaxis that was subsequently found to be associated with an organized hematoma. Despite previous case reports discussing this condition, sinonasal

☆ Acknowledgments: Paul M. Bunch's effort was supported in part by an AUR GE Radiology Research Academic Fellowship Award.

☆☆ Competing Interests: The authors declare the following financial interests/personal relationships which may be considered as potential competing interests: Bunch – AUR GERRAF Fellow.

* Corresponding author.

E-mail address: aakshit11@gmail.com (A. Goyal).

<https://doi.org/10.1016/j.radcr.2023.09.045>

1930-0433/© 2023 The Authors. Published by Elsevier Inc. on behalf of University of Washington. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>)

organized hematoma remains a relatively unknown entity requiring awareness on the part of radiologists and managing clinicians to correctly diagnose and appropriately manage.

Case presentation

An 82-year-old male with a history of atrial fibrillation, hypertension, idiopathic thrombocytopenic purpura, and myelodysplastic syndrome presented to an outpatient oto-

laryngology clinic for evaluation of recurrent epistaxis from the left nostril. The patient described a history of extensive nasal surgery after nasal trauma sustained in childhood and stated that his nose had bothered him since that time. In the months leading up to his presentation, the patient's platelet count ranged between 86,000 and 156,000 platelets per microliter secondary to his idiopathic thrombocytopenic purpura.

Initial nasal endoscopy and in-office biopsy revealed acute and chronic inflammatory tissue, fibrosis, and blood clot. No definite malignant tissue was identified. Subsequently, a sinus CT without contrast was obtained (Fig. 1), which revealed



Fig 1 – Axial (A) and coronal (B) soft tissue window CT images without contrast demonstrate an expansile, mildly hyperattenuating mass (asterisk, A and B) centered in the left maxillary sinus and involving the left nasal cavity. Note that the mass erodes and extends through the left maxillary sinus anterior wall (arrow, A).

an aggressive-appearing expansile mass centered in the left maxillary sinus. Given the findings on CT and concern for malignancy, a sinus MRI without and with gadolinium contrast was obtained for further characterization (Fig. 2). On MR imaging, the mass exhibited intrinsic T1 hyperintensity and heterogeneous T2 signal with a T2 hypointense rim. On post-contrast images, most of the mass appears nonenhancing, though some internal enhancing components were present.

Given the aggressive-appearing osseous changes, the enhancing components, and the clinical concern for malignancy, the patient underwent surgical resection of the mass, including left endoscopic medial maxillectomy, total ethmoidectomy, sphenoidotomy, and dacryocystorhinostomy. Intraoperative histologic frozen section evaluation of the specimens demonstrated predominately necrotic tissue with fibrinous exudate, scattered inflammatory cells, and rare atypical cells favored to be reactive without evidence of malignancy. Similarly, the permanent histopathologic evaluation of the specimens including the surgical margins demonstrated reactive sinonasal tissue with acute and chronic inflammation, fibrosis, vascular congestion, granulation tissue, and blood clot (Fig. 3); negative for malignancy. As such, the patient's left maxillary mass was diagnosed as an organized hematoma.

Following surgery, the patient's endoscopic exam normalized, and his bleeding resolved. One year of clinical follow-up demonstrated no evidence of recurrent symptoms or recurrent hematoma.

Discussion

Sinonasal organized hematoma is a rare condition that may mimic sinonasal neoplasms on imaging due to its round morphology, locally aggressive nature, and heterogeneous enhancement. The maxillary sinus is the most commonly reported site of involvement [2–4]. Symptoms usually result from hematoma expansion causing displacement and destruction of loco-regional structures leading to epistaxis, facial pain, nasal congestion, and headache [5].

The pathogenesis of sinonasal organized hematoma is incompletely understood. One proposed hypothesis is a multistage process beginning with the accumulation of blood, which can be due to trauma, surgery, bleeding diathesis, or an underlying hemorrhagic lesion [6]. In our patient, idiopathic thrombocytopenic purpura, myelodysplastic syndrome, and anticoagulation for atrial fibrillation may have contributed. Following initial hematoma formation, poor ventilation and impaired drainage result in persistence of the hematoma with subsequent development of a fibrous capsule, which further prevents hematoma resorption. Finally, neovascularization occurs, and these immature, frequently leaky blood vessels predispose the lesion to additional episodes of bleeding. These additional episodes of bleeding restart the vicious cycle resulting in hematoma enlargement with destructive changes to surrounding structures [7]. Because the maxillary sinus is the largest paranasal sinus and can be associated with negative pressure, it is believed that hemorrhage anywhere within the sinonasal cavity has a predisposition to accumu-

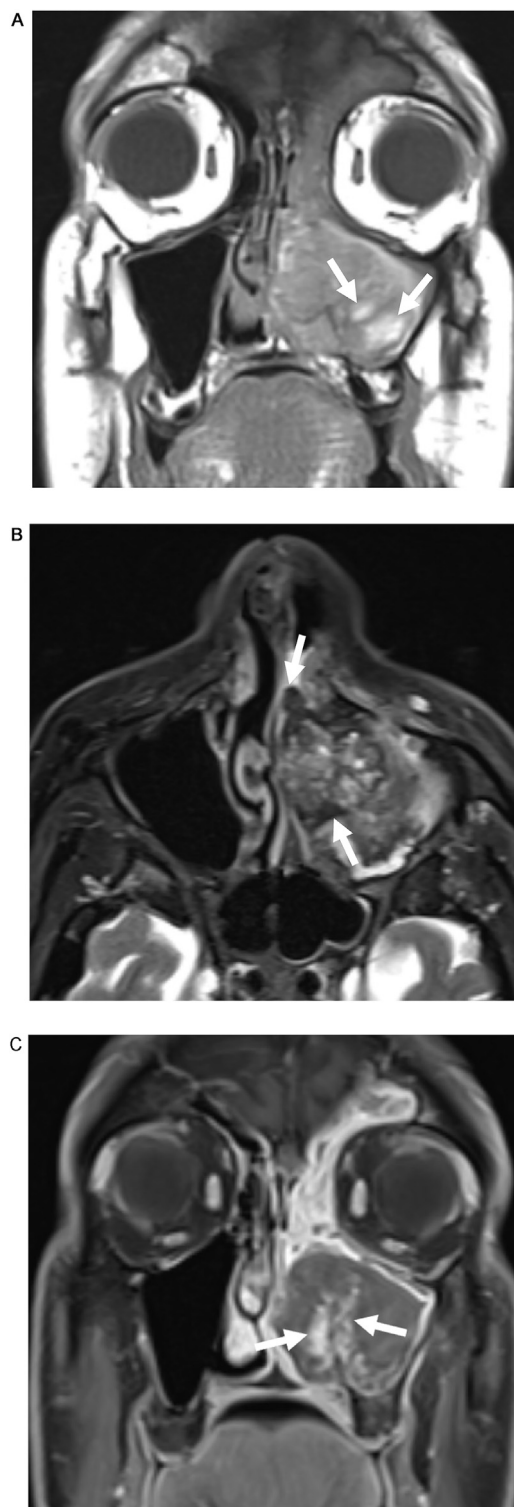


Fig 2 – Coronal T1-weighted (A) and axial T2-weighted (B) images without contrast demonstrate heterogeneous signal associated with the left maxillary sinus mass, including areas of T1 hyperintensity (arrows, A) and T2 hypointensity (arrows, B) suggestive of blood products. On the coronal T1-weighted, gadolinium-enhanced, fat-suppressed image (C), most of the mass appears nonenhancing, though some areas of internal enhancement (arrows, C) are present.

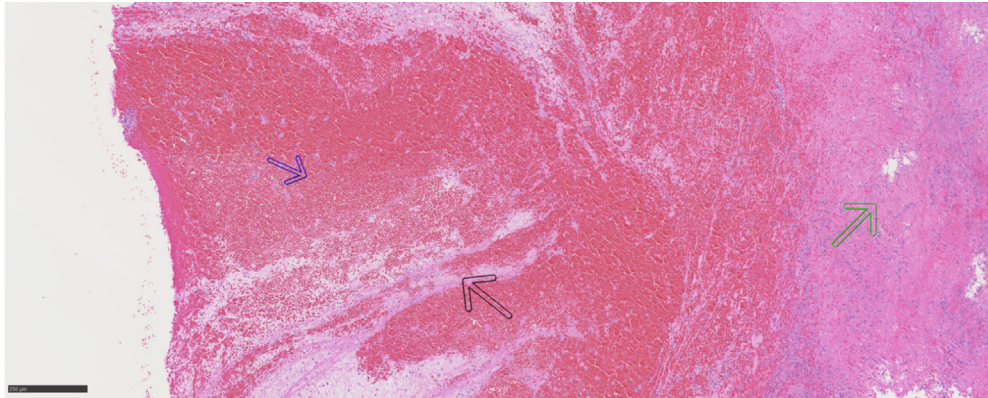


Fig 3 – Representative histological section (hematoxylin and eosin stain; 10x magnification) of the resected left maxillary sinus lesion demonstrates fresh red blood cells (ie, recent hemorrhage, blue arrow), fibrin deposition (ie, intermediate stage of hemorrhage degradation, black arrow), and fibrous tissue with inflammatory cells (ie, later stage of hemorrhage degradation, green arrow).

late within the maxillary sinus, thus potentially explaining the predilection of organized hematomas to occur in this location [8]. In some cases, superinfection can occur and result in facial and orbital abscesses [7].

The CT appearance of this condition is nonspecific; however, an expansile mass with surrounding osseous destruction is typical [6,9]. MRI is superior to CT for determining the margin and extent of the lesion with the added benefit of confidently differentiating between the lesion and secretions within opacified, obstructed sinuses [6]. On MRI, the T1-weighted images of an organized hematoma demonstrate areas of T1 hyperintense signal secondary to methemoglobin from repeated hemorrhage, and T2-weighted images often demonstrate a peripheral rim of hypointensity due to hemosiderin with heterogeneous central T2 signal due to blood products of varying ages. Heterogeneous enhancement on postcontrast images is attributed to fibrosis and neovascularization [4,6,8]. FDG-PET images show central photopenia and moderate peripheral hypermetabolism believed to relate to inflammation [10]. In our experience, suspicion for sinonasal organized hematoma is primarily raised on the basis of the above-described MRI findings, typically after initial identification of the lesion on CT. Like sinonasal organized hematoma, sinonasal melanoma may also manifest on MRI as an expansile mass with intrinsic T1 hyperintensity; however, sinonasal melanoma tends to exhibit avid, homogeneous enhancement without a T2-hypointense hemosiderin rim.

First-line treatment of sinonasal organized hematoma is complete surgical removal, which is curative [1,10]. However, as in our case, the diagnosis of sinonasal organized hematoma is commonly only established postoperatively after resection of a suspected sinonasal neoplasm. By considering organized hematoma in the differential diagnosis of a sinonasal mass and mentioning it as a possibility when the typical imaging features are encountered (eg, T1 hyperintensity, peripheral T2 hypointensity, nonenhancing and enhancing components, destructive osseous changes), radiologists may facilitate the pathologist's intraoperative correlative diagnosis of

the biopsy specimen as well as aid the surgeon's operative planning, particularly with respect to the approach to the lesion and in deciding whether to resect nearby uninvolved structures [6,11,12].

Although the surgical approach to our patient's lesion was endoscopic, suspected sinonasal malignancies are often approached via an external trans-facial incision and osteotomy. During endoscopic resection of our patient's lesion, the edematous nasolacrimal duct was sacrificed due to the surgeon's concern for involvement by possible malignancy. In hindsight, this structure could have been spared if a preoperative diagnosis of sinonasal organized hematoma had been established through radiologic-pathologic correlation of the preoperative imaging, preoperative biopsy specimen, and intraoperative histologic frozen section.

Conclusion

Sinonasal organized hematoma is an uncommon condition with imaging features that may mimic sinonasal malignancy and which requires a high index of suspicion and collaboration among clinicians, radiologists, and pathologists for accurate preoperative diagnosis. Consideration of this entity, especially in the setting of the typical imaging features, can aid the pathologist in establishing a correct preoperative diagnosis and aid the surgeon in formulating an operative plan that adequately addresses the lesion while sparing adjacent structures that might be aggressively resected if the organized hematoma were misdiagnosed as sinonasal malignancy.

Patient consent

Written informed consent was obtained from the patient to publish this case report.

REFERENCES

- [1] Ohta N, Watanabe T, Ito T, Kubota T, Suzuki Y, Ishida A, et al. Clinical and pathological characteristics of organized hematoma. *Int J Otolaryngol* 2013;2013:539642.
- [2] James J, Shackelford AJ, Gudis DA, Overdeest JB. Diagnostic dilemma: sinonasal organizing hematoma. *SAGE Open Med Case Rep* 2020;8:2050313X20945843.
- [3] Varghese L, Mukhopadhyay S, Mehan R, Kurien R, Thomas M, Rupa V. Sinonasal organising haematoma: a little known entity. *Braz J Otorhinolaryngol* 2019;85(6):698–704.
- [4] Choi SJ, Seo ST, Rha K-S, Kim YM. Sinonasal organized hematoma: clinical features of seventeen cases and a systematic review. *Laryngoscope* 2015;125(9):2027–33.
- [5] Yagisawa M, Ishitoya J, Tsukuda M. Hematoma-like mass of the maxillary sinus. *Acta Otolaryngol* 2006;126(3):277–81.
- [6] Kim EY, Kim H-J, Chung S-K, Dhong H-J, Kim HY, Yim YJ, et al. Sinonasal organized hematoma: CT and MR imaging findings. *AJNR Am J Neuroradiol* 2008;29(6):1204–8.
- [7] Yoon TM, Lee DH, Kim SB, Lim SC. Organized hematoma of the maxillary sinus: rapid progression and complications. *Korean J Otorhinolaryngol Head Neck Surg* 2016;59(2):150.
- [8] Park YK, Kim KS. Organizing hematoma of the maxillary sinus mimicking malignancy diagnosed by fluorodeoxyglucose positron-emission tomography (FDG PET/CT): A case report. *Iran J Radiol* 2015;12(4):e18924.
- [9] Ginat DT, Moonis G. Case 217: sinonasal organized hematoma. *Radiology* 2015;275(2):613–16.
- [10] Tokue H, Tokue A, Okauchi K, Tsushima Y. 2-^[18F]fluoro-2-deoxy-D-glucose (FDG) positron-emission tomography (PET) findings of chronic expanding intrapericardial hematoma: a potential interpretive pitfall that mimics a malignant tumor. *J Cardiothorac Surg* 2013;8:13.
- [11] Yoon TM, Kim JH, Cho YB. Three cases of organized hematoma of the maxillary sinus. *Eur Arch Otorhinolaryngol* 2006;263(9):823–6.
- [12] Lee HK, Smoker WRK, Lee B-J, Kim SJ, Cho KJ. Organized hematoma of the maxillary sinus: CT findings. *AJR Am J Roentgenol* 2007;188(4):W370–3.