The Imaging Findings of Sinonasal Organized Hematoma

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Purpose

Organized hematoma involving the paranasal sinus and/or nasal cavity is a rare, benign disease and most commonly affects the maxillary sinus. It may be mistaken for a malignant lesion both clinically and radiologically. In case of expansion with bone destruction, it can be mistaken for malignancy. In the presence of uncinate bulging, the clinical and radiographic differential diagnosis includes cholesterol cyst, hemorrhagic mucocele, extensive polyposis, and mucous retention cyst. Precise preoperative diagnosis is important because organized hematoma is usually curative with complete surgical resection simply by using endoscopic sinus surgery or Caldwell-Luc operation avoiding unnecessary extensive surgery.

The objective of this study was to define a characteristic imaging findings of sinonasal organized hematoma.

Methods and Materials

Patients:

Of patients referred to our institution between November 2005 and November 2011, 8 patients were diagnosed as sinonasal organized hematomas pathologically. Four patients were men, and four were women. The age range was 9-83 years with a median age of 40 years. We retrospectively reviewed computed tomography and magnetic resonance images obtained in these 8 patients.

Imaging Techniques:

CT scanning was performed in all 8 patients and MR imaging in one patient. CT scans were performed with LightSpeed Pro 16 scanner (GE Healthcare, Milwaukee, WI, USA) or iCT 256 scanner (Philips Medical systems, Best, the Netherlands). Scanned images were reconstructed to axial, coronal and sagittal images with a slice thickness of 2.5mm. MR examination was performed on Intera Achieva 3T scanner (Philips Medical systems, Best, the Netherlands). Pre-contrast T1 and T2-weighted spin-echo images were obtained and contrast-enhanced T1-weighted spin-echo images with fat saturation after the intravenous injection of gadolinium dimeglumine was followed.

Image Analysis:

We analyzed the following characteristics: size, shape, location, expansile nature, density for CT, signal intensity for MR, internal structure and enhancement pattern of the
organized hematoma and surrounding bony wall change. The size of the lesion measured was the greatest diameter of the lesion.

**Results**

Mean size of the lesions was 3.55 cm, ranging from 2 to 5.2 cm. The shapes were lobular or lumpy or nodular. They were located primarily in nasal cavity (n=1), maxillary sinuses (n=2) and both nasal cavities and maxillary sinuses (n=5). Two cases were expansile and showed locally aggressive margins. All lesions were hyperdense on precontrast CT scans and smaller lesions were evenly hyperdense whereas larger ones showed uneven density. MRI showed mixed signal intensity consisted hemorrhage, fibrosis and neovascularization. Hypointense peripheral rim surrounding the lesion was noted on T2-weighted. Contrast-enhanced CT and MR images demonstrated irregular nodular, frond-like, papillary or cerebriform enhancement in all lesions. Smooth erosion of medial walls of maxillary sinuses were seen in all cases and epicenter was secondary maxillary ostium. Two lesions showed erosion of lateral walls of maxillary sinuses and were expansile in nature. Non-hemorrhagic polyps were accompanied with the organized hematomas in three cases.

**Images for this section:**

![A](image1.png) ![B](image2.png) ![C](image3.png)

**Fig. 1:** Organized hematoma of the maxillary sinus in an 83-year-old woman. A, Precontrast axial CT scan shows a large, expansile soft tissue mass in the left maxillary sinus with cortical thinning, scalloping and partial dehiscence of bony walls of the maxillary sinus (arrow). The ipsilateral nasal cavity is occluded by the lesion and the medial maxillary sinus wall is moved cotralaterally. B, Contrast-enhanced axial CT scan shows an irregular nodular, frond-like enhancing area within the lesion. C, Contrast-enhanced sagittal CT scan shows that ipsilateral orbital floor is bowed but intraorbital extension is not seen. The irregular nodular, frond-like enhancing area is again noted.
**Fig. 2:** Organized hematoma of the maxillary sinus in a 55-year-old man. A, Precontrast axial CT scan shows a large, expansile soft tissue mass in the left maxillary sinus with erosion of the maxillary sinus wall. The lesion is slightly hypoattenuated to the temporalis muscle. B, Contrast-enhanced axial CT scan shows some irregular nodular enhancement within the lesion. C, Axial T2-weighted MR image shows marked heterogeneity of the lesion varied from hypointensity to hyperintensity. A dark peripheral rim surrounding the lesion is demonstrated (arrow). D, Contrast-enhanced axial, fat-suppressed, T1-weighted MR image shows a marked frond-like, papillary enhancement within the lesion. E, Contrast-enhanced coronal, fat-suppressed, T1-weighted MR image shows the enhancing area is localized in the upper medial part of the lesion.
**Fig. 3:** Organized hematoma the maxillary sinus with extension into nasal cavity in a 42-year-old man. A, Precontrast axial CT scan shows a soft tissue mass filled in the left maxillary sinus, which protrudes into the ipsilateral nasal cavity through the widened secondary maxillary sinus ostium. B, Contrast-enhanced axial CT scan shows an frond-like, papillary or cererbriform enhancement within the lesion in the maxillary sinus and the nasal cavity (arrow). C, Contrast-enhanced coronal CT scan well demonstrates the lesion protruding into the ipsilateral nasal cavity through the widened secondary maxillary sinus ostium. Note the focal enhancement with lesion in the nasal cavity (arrow).
Conclusion

Sinonasal organized hematoma develops most frequently in the maxillary sinus, because the maxillary sinus is the largest paranasal sinus that allows conditions of negative pressure and decreased ventilation. Organized hematoma is believed to develop initially from the accumulation of blood in the maxillary sinus resulting from various causes. Due to poor ventilation and drainage, the hematoma stays for a long time and fibrosis occurs. The formation of a fibrous capsule prevent reabsorption of the hematoma and result in neovascularization and fibrosis with recurrent intracapsular bleeding, leading to the eventual formation of organized hematoma. This process accounts for progressive expansion and local bony erosion associated with organized hematoma.

The differential diagnosis of expanded maxillary sinus encountered on CT include mucocele, cholesterol granuloma, antrochoanal polyp, hemangioma, inverted papilloma, and maxillary sinus carcinoma on addition to organized hematoma. The clinical history may contain a significant clue because recurrent epistaxis is most frequently encountered in patients with hemangioma, cholesterol granuloma, or organized hematoma. In patients with a history of trauma, cholesterol granuloma and organized hematoma should be the primary considerations. Antrochoanal polyp is different from other conditions because it usually protrudes through a maxillary sinus ostium, resulting a dumbbell configuration with a substantial component in the posterior nasal cavity. In contrast, mucocele, cholesterol granuloma, organized hematoma, and early carcinoma may fill and expand the sinus. Frank osseous destruction, rather than thinning and expansion and erosion of the sinus walls, associated with extension to the orbit or pterygopalatine fossa is a hallmark of carcinoma.

Administration of contrast material is extremely useful for differential diagnosis, because mucocele, polyp, and cholesterol granuloma do not usually enhance. Organized hematoma shows typical frond-like or cerebriform enhancement pattern as seen in this study. Inverted papilloma can be shown with characteristic convoluted cerebriform pattern on enhanced images. However, inverted papilloma primarily involves the nasal cavity, on the other hand, organized hematoma primarily involves the maxillary sinus.

Although sinonasal organized hematoma can be mistaken for a malignant tumor, smooth erosion of maxillary sinus walls and typical frond-like, papillary or cerebriform enhancement pattern can be helpful to make diagnose as organized hematoma.

References


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