CASE REPORT

Incidental 'ethmoid sinolith'—an unusual cause of frontal recess obstruction

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SUMMARY

We report a case of a middle aged, hypertensive man who presented with nasal obstruction, sneezing spells, headache and nasal discharge of long duration. On evaluation, he was diagnosed to have a deviated nasal septum with allergic rhinosinusitis with sinonasal polyposis. CT of the paranasal sinuses revealed a hyperdense, oval structure suggestive of a sinolith in the right anterior ethmoid sinus. The patient underwent septoplasty with right Draf 2B procedure and extraction of the sinolith from the ethmoid sinus.

BACKGROUND

'Sinolith' is a term that denotes the presence of calcareous collections of exogenous or endogenous origin within the frontal, ethmoid or sphenoid sinus whereas a similar pathology in the nasal cavity and the maxillary sinus has been termed as 'rhinolith' and 'antrolith', respectively.^{1–3} Rhinoliths and antroliths are extremely common in world literature, however, the presence of a sinolith is exceedingly uncommon, more so, in the ethmoid sinus.¹ There have been only three reported cases of true sinoliths in the ethmoid sinus.² Diagnosis and management protocols vary depending on the aetiopathogenesis of the sinolith. We present a case of a sinolith in the anterior ethmoid sinus obstructing the frontal recess with the purpose of discussing its pathology and management.

CASE PRESENTATION

A 45-year-old man presented to our tertiary care hospital with recurrent nasal obstruction, episodic sneezing spells, headache and nasal discharge of 20 years duration. Nasal obstruction was alternating and had aggravated over the past 3 years. Headache was bifrontal, increased on bending forward and in cold climate. Sneezing spells were seasonal and present in the rainy and winter seasons and on exposure to dust. He also reported watering of the eyes and itching in the nose and around the eyes. There was no history of hyposmia or anosmia, epistaxis and postnasal drip. There was no history of fever, snoring and mouth breathing. He was a hypertensive patient on treatment with antihypertensive medications. There was no history of bronchial asthma, tuberculosis, previous nasal or dental surgeries, nasal trauma or foreign body in the nose. He had a history of smoking and alcohol consumption on a regular basis for the past 20 years, but did not present any history of snuff use. He had a history of aspirin intolerance. He did not have any pets in his household or use of fire-wood for cooking purposes.

On examination, there was decreased fogging on cold spatula test on both sides. There was a deviated nasal septum to the left side with spur touching the left inferior turbinate. There was hypertrophy of the right middle turbinate with presence of pale, polypoidal, multiple grape-like structures in the right middle meatus which were insensitive to touch and did not bleed on touch. They shrunk on application of adrenaline. There was presence of mucoid discharge in both nasal cavities with presence of bilateral frontal sinus tenderness. Postnasal examination revealed mucoid discharge in the nasopharynx with presence of postnasal drip. Ear, oral cavity and oropharynx and neck examination were normal. Systemic examination was normal. We made a provisional diagnosis of left deviated nasal septum with spur with allergic rhinosinusitis with nasal polyposis.

INVESTIGATIONS

Complete blood and differential counts were normal. Absolute eosinophil and neutrophil counts were normal. Erythrocyte sedimentation rate was elevated. Serum IgE levels were normal. Diagnostic

Figure 1 A CT scan (coronal view) showing sinolith completely obliterating the right anterior ethmoid with presence of polyps.

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Figure 2 A CT scan (sagittal view) showing sinolith completely obliterating the right anterior ethmoid and blocking the frontal recess outflow tract with presence of polyps.

nasal endoscopy revealed a deviated nasal septum to the left side with bony spur on the right side of the nasal cavity with the presence of bilateral sinonasal polyposis arising from the middle meati. There was presence of copious mucoid discharge in both nasal cavities. CT scan of the paranasal sinuses revealed a $3 \times 2.9 \times 2.5$ cm hyperdense irregular mass seen in the right anterior ethmoidal cell blocking the frontal recess and the hiatus semilunaris with mucosal thickening in the right maxillary, frontal, posterior ethmoid and sphenoid sinuses (figures 1 and 2).

TREATMENT

The patient underwent septoplasty with spur reduction and right functional endoscopic sinus surgery (Draf 2B procedure) with retrieval of sinolith from the right anterior ethmoid sinus and clearance of sinonasal polyposis (figures 3–5). Swab was sent for fungal culture and acid-fast bacilli staining and culture. Sinolith was sent for histopathological examination and biochemical analysis.

OUTCOME AND FOLLOW-UP

The patient was reviewed at 2 weeks and 1 month following the operative procedure for diagnostic nasal endoscopy and

Figure 3 Intraoperative visualisation of sinolith in the right anterior ethmoid.

Figure 4 Intraoperative visualisation of frontal sinus outflow tract after sinolith removal.

endoscopic cleaning of the operative cavity. Symptoms had regressed and there was adequate control of the allergic symptoms with medical therapy which consisted of fluticasone topical spray and montelukast-levocetirizine. Fungal culture and acid-fast bacilli staining and culture sent intraoperatively were negative. Histopathology of the sinolith revealed presence of bone in the specimen (figure 6). Biochemical analysis of the sinolith revealed presence of carbonate and phosphate salts of calcium, magnesium and high amounts of ammonia. He has been advised close follow-up in view of recurrence of nasal polyps because of presence of nasal allergy.

DISCUSSION

Formation of a stone in the paranasal sinuses is rare. The incidence of stone formation is the maximum in the maxillary sinus followed by frontal sinus and ethmoid sinus. There are only three reported cases of ethmoid sinolith in world literature to date.^{1–3}

The pathogenesis of a sinolith is unclear. It develops from an exogenous or an endogenous nidus.^{1 2 4–7} Foreign bodies implanted in the nose serve as common exogenous niduses.¹ The commonest foreign bodies are pencil and paper whereas there is presence of other bizarre foreign bodies reported in the literature such as living leeches, cotton, glass, stones and matchsticks. These bizarre foreign bodies, however, were responsible

Figure 5 Sinolith specimen measuring $3 \times 2.9 \times 2.5$ cm.

Figure 6 The histopathological specimen of $\times 40$ magnification showing bone architecture.

for the formation of a maxillary antrolith.^{1 5 7} The presence of long-standing infections, inspissated secretions, clots, polyps and bony fragments act as common endogenous niduses. Commonest fungal infection known to cause stone formation in the sinuses is *Aspergillus*.^{1–5} Endogenous niduses form a predominant role in the formation of ethmoid sinolith. Pathogenesis depends on two important predisposing factors. First, the presence of a long-standing infection leads to the accumulation of pus followed by the deposition of salts around the nidus of pus. Second, poor aeration and drainage of the sinus causes blockage of the sinus ostia leading to accumulation of secretions within the sinus acting as a nidus for sinolith formation.^{1–3 5 7} The occurrence of variation of pH due to the accumulation of secretions results in the formation of calcium salts on the surface of the nidus.³

Clinical presentation varies. Nasal obstruction, nasal discharge (occasionally foul smelling), epistaxis, postnasal drip and presence of facial pain/headache are the common clinical manifestations of a sinolith.^{3–5}

CT of the paranasal sinuses clinches the diagnosis where a bony density is visualised. Biochemical analysis and infrared spectrography along with histopathology are useful to detail the composition of the sinolith.^{1 2 5} Fungal culture should be performed from the secretions to rule out fungus as a cause of stone formation.^{2 3} Histological examination of the sinolith reveals the presence of osteocytes and bone marrow consistent with bone tissue. There may be evidence of bony metaplasia in the region of the sinolith.¹ Infrared spectrography reveals the presence of calcium salts, magnesium salts, protein, water, organic matter and sometimes the presence of fungal elements. Colour of the sinolith may vary depending on the composition, however, examination of the stone reveals the presence of concentric arrangement of layers in the form of rings.^{1 5–9}

Inverted papilloma, osteblastoma and osteoma are the most common differential diagnoses of sinolith, however, literature states that presence of isolated, distinct bony density is usually due to the presence of long-standing infection and presence of numerous bony densities is because of tumours or infections.^{4 10}

Treatment of a sinolith is endoscopic sinus surgery and retrieval of the stone.^{2 4 5 7 11} There is no information regarding recurrence of sinolith in literature.

Learning points

- ▶ Ethmoid sinoliths are extremely rare and occur due to the presence of endogenous niduses.
- ▶ CT, infrared spectrography, biochemical analysis and histopathology usually detail the site, structure and composition of a sinolith.
- ▶ Treatment of sinolith usually involves endoscopic sinus surgery and retrieval of stone.

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