A rhinolith is a stone that forms in the nose. It occurs as a result of the solidification of mucus and nasal debris by mineral salts, calcium, magnesium phosphate and carbonate. It can be seen on radiographs as a radiopaque object in the nasal fossa and may be confused with several pathologic entities that will call for more invasive surgical procedures. We present the first case of a giant rhinolith, possibly arising from aspergillosis, and discuss its clinical and radiologic features.

**CASE PRESENTATION**

A 56-year-old female suffered from left nasal purulent discharge for more than 1 month. She came to our outpatient department for care in August 2004. She also complained of occasional left nasal bloody discharge. A brown bone-like mass with pus coating was found in the left nasal cavity on nasal endoscopy. Water’s view showed opacity and a huge calcified mass plugging the left nasal cavity and maxillary sinus (Figure 1). Left maxillary sinus medial wall destruction and lateral wall thickening were also noted. Functional endoscopic sinus surgery was performed to remove the mass and treat the maxillary sinusitis. Pathology showed sharp-angled fungal hyphae and spores compatible with Aspergillus spp. inside the mass (Figure 2). The patient did not have diabetes mellitus, immune diseases, or other diseases predisposing to fungal infection. She recovered uneventfully.

**DISCUSSION**

Rhinoliths, or nasal calculi, are calcareous concretions that arise secondarily to the complete or partial encrustation of intranasal foreign bodies [2]. The foreign body incites a chronic inflammatory reaction with deposition of mineral salts, mainly calcium and magnesium. It is usually exogenous in origin and may include beads, buttons, fruit stones, pieces of paper, parasites, wood, glass, and retained nasal packing [2]. Less commonly, endogenous foreign material may form the nidus of the rhinolith, including misplaced teeth, sequestra, blood clots, dried pus, desquamated epithelia, and bone fragments [2].

Rhinoliths are usually unilateral and single, and are usually situated on the floor of the nose in the inferior meatus, or between the inferior turbinate and the nasal septum, about midway between the anterior and posterior nares. They are gray, brown, or greenish-blackish in color.
Giant rhinolith

and vary widely in size. They are usually hard but may be friable and of chalky consistency. They also vary in shape, but usually conform to the shape of the nasal cavity.

Aspergillosis is the most common fungal pathogen in sinus disease, in predominantly the maxillary sinus [3]. The radiologic presentation of aspergillosis of the paranasal sinus is a focal radiodense shadow in the sinus. This is usually accompanied by mucosal thickening or diffuse clouding in the sinus on plain radiography and CT [3–7]. There are no standard CT diagnostic criteria for fungal sinusitis. In general, focal areas of hyperattenuation and calcification seen in a soft-tissue mass in the sinus or nasal cavity are the most common findings. Sinus wall destruction or thickening may also be noted.

There has been considerable research on the association of paranasal sinusitis and aspergillosis. However, there is no mention of the association of rhinolith with aspergillosis. Our patient is the first reported case with such an association.

Mucus in the sinus plays an important role as a protective colloid preventing salts from concentrating, even in a calcium-enriched environment. However, once inflammation takes place in the sinus, damage to ciliary movement and the mucous barrier on the epithelium may increase stasis of secretions, changing the mineral environment and concentrating inorganic salts to form calculi around a nucleus [8].

Diagnosis of rhinoliths includes a history of nasal obstruction, discharge, odor or pain, and rhinoliths are frequently referred to as nasal stones during intranasal examination [1]. Typical symptoms of the rhinolith are unilateral nasal obstruction and a foul-smelling discharge. The discharge is often purulent and fetid and may be blood stained. Other signs and symptoms include epistaxis, swelling of the nose or face, anosmia, epiphora, and headache. Radiologic examinations include x-ray and sinus CT. CT helps in differential diagnosis and it also demonstrates complications of the rhinolith such as sinusitis, expansion of the nasal cavity, and displacement or perforation of the nasal septum or the palate [9].

Figure 1. Sinus computed tomography shows a huge calcified mass plugging the left nasal fossa and maxillary sinus. (A) Axial view and (B) coronal view.

Figure 2. Pathology shows Aspergillus spp. sharp-angled fungal hyphae and spores (× 40).
Most rhinoliths are removed anteriorly using local anesthesia to control pain. However, if septal or antral perforation has occurred, more extensive surgery may be necessary.

The bony destruction of fungal sinusitis on CT images may sometimes be confused with malignancy. The characteristic of fungal sinusitis is focal areas of hyperattenuation and calcification in a soft-tissue mass in the sinus or nasal cavity. Biopsy may be needed to differentiate fungal sinusitis from malignancy.

In our case, there are two etiologic possibilities for this condition: formation of the rhinolith may have obstructed the osteomeatal complex and induced secondary sinusitis, or *Aspergillus* sinusitis may have triggered the formation of the rhinolith. Repeated inflammation thickens the mucosa, obstructs the ostium of the sinus, and leads to conditions that favor fungal proliferation. It may also change the nature of the mucus in the maxillary sinus, which contributes to calcium phosphate and calcium sulfate deposits, and leads to stone formation. The patient recovered uneventfully after endoscopic sinus surgery.

### References

巨大鼻結石 — 病例報告

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鼻結石是形成於鼻內之硬塊，藉由黏液及鼻內礦物成分固化所產生。鼻結石於放射影像學上可見鼻腔內不透光之物體，可能會與其他需侵入性手術之病理解剖混淆。本文為首篇由黴菌所造成鼻結石之個案報告；探討其臨床症狀，病理報告及放射影像之表現。

關鍵詞：鼻結石，黴菌，黴菌症
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