European Review for Medical and Pharmacological Sciences 2012; 16: 1541-1545

A different placement of the stone; rhinolithiasis

R. KARLI, M. AK*, A. KARLI**

Department of the Otolaryngology, School of Medicine, Ondokuz Mayıs University Samsun, Turkey
*Department of the Family Medicine, School of Medicine, Inönü University Malatya, Turkey
**Pediatric Clinic, Malatya Government Hospital, Malatya, Turkey

Abstract. – INTRODUCTION: Rhinolithiasis is a rare disease and formed by mineralization in the nasal cavity. Precipitated calcareous material on intranasal foreign substances forms the rhinoliths. It is start time could have since childhood.

MATERIALS AND METHODS: In this article, we present eight cases of rhinolithiasis who admitted to our Clinic between January 2001 and December 2010 with unilateral chronic nasal discharge, nasal obstruction and oral malodor.

CONCLUSIONS: Rhinolithiasis mostly manifests itself with unilateral purulent rhinorrhea, nasal obstruction and facial pain symptoms. We aimed to discuss these entity with similar cases in the literature.

Key Words:
Rhinolithiasis, Purulent nasal discharge, Nasal obstruction, Oral malodor.

Introduction

The term "rhinolith" or "nasal stone" is used to define the mineralized masses located in the nasal cavity[1]. Rhinolithes usually originate from an endogenous or an exogenous nidus and grow up on this nidus. Endogenous nidus may be a blood clot, a bone fragment, epithelial debris or an ectopic tooth while materials such as paper, cotton wool, a piece of stone, a fruit seed or a button can act as an exogenous nidus[2,3]. As a result of mineralization around these niduses a progressively growing intranasal mass develops. The most commonly faced symptoms are nasal obstruction, malodorous nasal or postnasal discharge and headache.

Materials and Methods

We evaluated eight cases admitted to our Hospital between January 2001 and December 2010 retrospectively. Cases were evaluated in terms of age, sex, side of location of the rhinolith, coexisting nasal illness, history of foreign body aspiration and previously applied treatments. The presenting symptoms of the patients were recorded as nasal obstruction, purulent nasal discharge, oral malodor, nasal bleeding and headache (Table I). Rigid nasal endoscopy was applied to all patients except one as the diagnostic tool; computerized tomography (CT) was preferred for the confirmation of the diagnosis in this isolated case (Figures 1 and 2).

Results

Eight female patients with rhinolithiasis were evaluated in this study. The mean age of the patients was 24.6 (range 14-45) (Table I). Anterior rhinoscopy and rigid endoscopy were used as diagnostic tools. In order to confirm the diagnosis CT was required in one patient (Figure 1). The rhinoliths were located at right side in four patients and at left side in the remaining four patients. Rhinolith mass was located posterior to the deviated septum in one patient and it was recognized incidentally during the septoplasty operation. In a child, the mass was located posterior to the nasal cavity near to the nasopharynx. In all other patients,the mass was at the level of middle concha, impacted between the middle and inferior concha and nasal septum, markedly obstructing the nasal passage. Among the declared symptoms, nasal obstruction was the most common one and was found to be present in seven patients (87.5%). Six patients complained from purulent nasal discharge (75%) and three patients from oral malodor (37.5%). One patient's sole symptom was oral malodor. Headache was determined in three patients (37.5%) but no patient complained from epistaxis (Table I). There was no history of foreign body aspiration into the nose in any of the patients. In one patient after extraction of the rhinolith from posterior nasal cavity, it is

Corresponding Author: Rıfat Karli, MD; e-mail: rifatkarli@yahoo.com

Table I. Clinical characteristics of patients

N.	Age and sex	Location in the nasal cavity	Symptoms	History of foreign body aspiration	Co existing illness	Treatment
1	30, female	Left	Purulent nasal discharge, nasal obstruction, headache	Not present	Sinusitis	Extraction under general anesthesia
2	32, female	Right	Nasal obstruction	Not present	Septal deviation	Extraction under general anesthesia
3	45, female	Right	Purulent nasal discharge, nasal obstruction, oral malodor	Not present	Sinusitis	Extraction under local anesthesia
4	23, female	Left	Purulent nasal discharge, nasal obstruction, headache	Not present	Sinusitis	Extraction under local anesthesia
5	10, female	Right	Oral malodor	Not present	Sinusitis	Extraction under local anesthesia
6	15, female	Left	Purulent nasal discharge, nasal obstruction, oral malodor	Not present	Sinusitis	Extraction under general anesthesia
7	14, female	Left	Purulent nasal discharge, nasal obstruction	Not present	Sinusitis	Refused treatment
8	28, female	Right	Purulent nasal discharge, nasal obstruction, headache	Not present	Sinusitis	Extraction under general anesthesia

noticed that the mineralized exogenous material was a rubber gasket (Figure 4). Significant nasal septal deviation was detected in one patient. In this patient rhinolith was detected incidentally in the posterior part of the nasal septum during the septoplasty operation.

Prior to the surgical operation informed consents were obtained from all of the cases except one who refused the treatment. Four patients were operated under general anesthesia (50%) and three patients were operated under local anesthesia (37.5%).

Masses were extracted in assistance with forceps endoscopically. In some cases masses were fragmented into small calculi while grasping. In some cases we tried to move the masses forward with a curette. Adrenalin and pantocain absorbed cottons were placed to the anteri-

Figure 1. Rigid endoscopic appearance of rhinolith in the nasal cavity with thick purulent secretions.

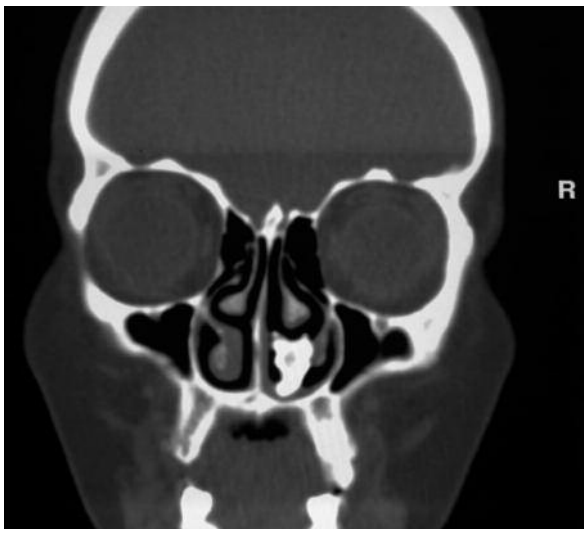

Figure 2. Coronal CT image of a rhinolith in nasal cavity.

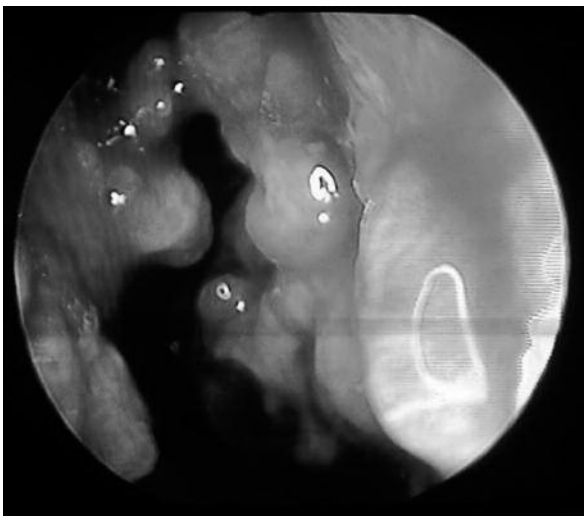

Figure 3. Endoscopic appearance of nasal passage after extraction of the mass showing the granulation tissue.

or side of the masses in patients who were operated under local anesthesia. Also in these patients anesthetics were injected to the septal mucosa and the concha neighbouring the rhinolith. In spite of all anesthetic medications extreme pain was felt by the patients. After the operation all patients were advised to perform nasal irrigation with saline. Oral antibiotherapy and nasal decongestant agents were prescribed to all patients.

Nasal passage was found to be completely open and mucosal erosion with granulation tissue formation was visible after the extraction (Figure 3). Infectious appearance of the nasal cavity and purulent discharge completely disappeared after ten days of medical treatment.

Discussion

Rhinoliths are calcareous formations in the nose[1]. They are formed and shaped by precipitatation of mineral salts on intranasal foreign bodies in long duration[2,3]. Rhinoliths are rarely encountered and usually seen unilaterally[1,2,4]. In Kharoubi's series of 20 cases,only one patient presented with bilateral rhinolithiasis due to destruction in the posterior nasal septum[5]. In our study rhinoliths were located unilaterally in all patients. Most of the patients with rhinolithiasis admit to hospital with nonspesific symptoms like nasal obstruction and purulent rhinorrhea[1-3,6]. Also epistaxis, sinusitis, headache and rarely epiphora can be seen[4]. Asymptomatic cases have also been reported[1]. In the literature no case with rhinolithiasis has been mentioned causing oral malodor. In our study one childrens patient's sole presenting complaint was oral malodor. In three cases oral malodor was accompanied by other symptoms like nasal obstruction, headache etc. Patients' complaints totally subsided after extraction of the masses.

The exact mechanism of the rhinolithiasis is not completely understood. However, formation of rhinolithiasis occurs after complex processes that take long time. Foreign body entrance into the nasal cavity initiates the process of the rhinolith formation. Also inflamation, increased density and stagnation of nasal secretions and precipitation of mineral salts play pivotal role in this processes[7]. Yıldırım et al evaluated eight rhinolithiasis cases in terms of the contents of the rhinolithes. In one case [$(Ca,Mg)_3$ $(PO4)_2$] and in seven cases [Ca_5 $(PO_4,CO_3)3OH$] were the major elements forming the rhinolith[8]. This trial supports the postulation regarding a central nidus surrounded by precipitated organic and inorganic compounds are the major factors in rhinolithiasis formation. Nidus usually comes to nasal cavity anteriorly. However, vomiting, coughing and sneezing makes a nidus possible to reach to nasal cavity posteriorly through nasopharynx. Jose et al[9] isolated *Morganella morganii* and *Klebsiella pneumoniae* from the rhinolith samples and found that this organism was sensitive to fourth generation quinolons. They found that a sunflower seed was forming the rhinolith in this patient who aspirated it at childhood, but thougt that it had fallen away. The material that forms the rhinolith by mineralization

Figure 4. Rubber gasket leading the formation of rhinolith.

may be endogenous or exogenous. Endogenous materials can be a dried secretion, ectopic tooth or a bone fragment. Exogenous materials can be vegetable seeds, a bead, a cotton ball or a dental amalgam[7]. Also nasal polips may calcify and lead to formation of rhinoliths[10]. In one children we found rubber gasket in the center of rhinolith after extraction (Figures 4). Foreign materials in the nose can lead to other pathologies. A case of concha bullosa pyocele presenting with nasal obstruction, post-nasal discharge, snoring, headache, and fever and mimicking an intranasal mass has been reported[11].

There are various methods to diagnose rhinolithiasis including physical examination, endoscopic approach and radiological imaging. In our study, rhinoliths have easily been visible with anterior rhinoscopy because of the sizes of the formed rhinoliths in three cases. In five cases endoscopy was used to identify the masses. Anatomy of the nasal cavity, density of the nasal secretions and size of the mass may affect the examination and rhinoliths may not always be visible with anterior rhinoscopy. In their series of 8 cases Oliveira et al initially could not see the rhinoliths by anterior rhinoscopy in half of the cases and they needed another diagnostic tool to observe the masses[1]. Moulonguet et al[12] evaluated two cases; initially they assumed that the nasal masses were mucosal inflammation and a large polip. Consequent evaluations revealed that masses seen in the nasal cavity were rhinoliths. In our first case we had difficulties in the diagnosis of this uncommon entity. In the rest of the cases literature review and clinical experience allowed us to differentiate the rhinoliths from common similar presenting conditions. However, at anterior rhinoscopic examination the image in posteriorly located rhinoliths may mimic sinusitis due to thick purulent secretions, and rhinolithiasis may not be detected (Figure 1). Endoscopic evaluation is more effective in the diagnosis, if it is performed after the drainage of nasal cavity. This also allows the clinician to detect the localization of the mass in the nasal cavity and its relation with neighboring structures. CT defines the nasal cavity and paranasal sinuses accurately. Rhinolith is a potential infection source depending on its size and the location, because of this it may lead to sinusitis. CT is of great value in the differentiation and management of coexisting sinusitis and rhinolithiasis. Rhinolithiasis is usually seen unilaterally and generally located between lower concha and nasal septum or at the base of the nose. Their color can be whitish, grey or brown, sizes and shapes can be variable. Rhinoliths are prone to growth, even can fill the whole nasal cavity and may erode the neighboring structures. This erosion may cause septum perforation, naso-oral fistulation and extension into cranium. In our trial at the time of diagnosis only granulation tissue formation and mucosal erosion was detected. In the differential diagnosis, hemangioma, osteoma, ossifying fibroma, enchondroma, benign or malignant chondrosarcoma and osteosarcoma should be kept in mind[13]. CT is an important tool in differentiating coexisting pathologies like sinusitis, septal deviation as well as the complications of rhinolithiasis as septal or hard palate perforation.

Treatment is surgical removal of the mass and symptomatic alleviation including medical treatment, pain control and decongestant agents. Small masses can be extracted under local anesthesia but large masses that are difficult to reach, usually require general anesthesia. Big rhinolithic obstructions can be extracted in the form of small pieces by using various instruments. If the entrance passage is narrow bone turbinoplasty and submucosal resection allow a better exposure and may ease the extraction. Masses that are difficult to reach, located posteriorly can be pushed and extracted from oropharynx. None of our patient needed septoplasty operation and no damage to the chonchas have occurred in our series. Irrigation and suction also facilitate the extraction of small fragments. If granulation tissue formation is present in the contact region of the rhinolith, nasal mucosa may be cauterized.

Conclusions

Rhinolithiasis is an uncommon entity of nasal cavity. The origin might have since childhood. It requires high attention especially at first admission. Examination should not be restricted to only anterior rhinoscopic evaluation. It may be together with septal deviation or other anatomical variations of the nose. Long standing unilateral nasal obstruction, purulent rhinorrhea, oral malodor and chronic headache unresponding to medical therapy should alert the physician about this rare disease of the nose.

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