Original Article

Sphenoid Sinus Mucocele: Our Experiences at a Tertiary Care Teaching Hospital of Eastern India

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Abstract

Background: Sphenoid sinus mucocele is a benign expansile mucus-filled cystic lesion as a result of chronic obstruction of the sinus ostium. Because of its expansile, growth may affect nearby vital structures and result in the involvement of optic nerve and intracranial structures. **Objective:** This study aims to evaluate the details of patients with sphenoid sinus mucocele. **Materials and Methods:** In 5 years, we reported eight patients with mucocele in the sphenoid sinus. The detailed clinical presentations of these patients were documented. All the patients with sphenoid sinus mucocele were investigated with diagnostic nasal endoscopy and imaging such as computed tomography scan and magnetic resonance imaging (MRI) of the nose, paranasal sinuses, and brain. All underwent transnasal endoscopic transsphenoidal marsupialization of the mucocele in the sphenoid sinus. **Results:** There were eight patients diagnosed with sphenoid sinus mucocele. Out of eight patients, five (62.5%) were male and three (37.5%) were female with a male-to-female ratio of 1.66:1. The mean age of enrolled patients was 48.37 years. Out of eight patients with sphenoid sinus mucocele, three (37.5%) patients had allergic rhinitis, two (25%) patients had chronic sinusitis, and one (12.5%) patient had a history of radiation therapy for nasopharyngeal carcinoma. **Conclusion:** Sphenoid sinus mucocele is a rare clinical condition. In this study, headache was the most common symptom. Allergic rhinitis, sinusitis, and radiation to the head-and-neck region are important predisposing factors for causing sphenoid sinus mucocele. Orbital symptoms are indicators for prompt surgical intervention. Endoscopic sinus surgery is an effective and safe treatment option for sphenoid sinus mucocele.

Keywords: Endoscopic sinus surgery, headache, mucocele, sphenoid sinus

Introduction

Paranasal sinus mucocele is the accumulation and retention of mucoid secretion inside the sinus, resulting in distension, thinning, and erosion of one or several of its bony walls.[1] Mucoceles of the paranasal sinuses were first described by Langenbeck in 1820 under the name of hydatids and Rollet used the word mucocele in 1909.[1] (1a) Mucocele is common in the frontal sinus, followed by the anterior ethmoid sinus. Mucocele is rarely found in the sphenoid sinus. Approximately 1%–2% of all paranasal sinus mucoceles are found in the sphenoid sinus.[2] The mucoceles of the paranasal sinuses are usually slow-growing benign cystic lesions and contain mucoid secretions. The clinical presentations of the mucoceles depend on the extent of the mass effect produced. The mucoceles of the sinuses may extend into the orbit, nasopharynx, and cranial cavity. The mucocele occurs due to blockage of the sinus ostium which may happen spontaneously or due to infection, chronic inflammation, trauma, iatrogenic injury, or neoplastic growth.[3] The common clinical manifestations of sphenoid mucoceles are headache, visual disturbances, and paralysis of the III and VI cranial nerves.[4] The diagnosis of the sphenoid sinus mucocele is done by clinical presentations, imaging such as computed tomography (CT) scan and magnetic resonance imaging (MRI) of the nose and paranasal sinus, and diagnostic nasal endoscopy. The treatment of choice for sphenoid sinus mucocele is endoscopic sphenoidotomy and drainage of the mucocele.[5] This study aims to evaluate the clinical details of sphenoid sinus mucocele including its treatment and prognosis.

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Materials and Methods

This retrospective study was conducted at a tertiary care teaching hospital in eastern India from November 2016 to December 2021. The Institutional Ethical Committee (IEC) of our institute approved this study with the reference number IEC/IMS/SOA/88/16.10.2021. The medical records of the patients with sphenoid mucocele were reviewed. Details of relevant medical history, demographics, clinical presentations, investigations, and treatment of sphenoid sinus mucocele were evaluated. All patients were investigated with a CT scan [Figure 1] of the paranasal sinuses and diagnostic endoscopy. Five patients were investigated with an MRI scan [Figure 2]. All enrolled patients underwent endoscopic sinus surgery for sphenoid sinus mucocele. Intraoperative and postoperative details of endoscopic surgery for sphenoid mucocele were recorded as well as the incidence of recurrence documented if any. Secretions from the sphenoid sinus were sent for microbiological culture.

Endoscopic approach for sphenoid sinus mucocele

All the patients underwent endoscopic drainage of both sphenoid sinuses under general anesthesia. During surgery, the sphenoid ostium was widened using upward biting and straight biting forceps under endoscopic visualization. The anterior and inferior walls of the sphenoid sinus were sufficiently removed for adequate drainage to the sphenoethmoidal recess and also for avoiding recurrence.

Results

There were eight patients of sphenoid sinus mucocele enrolled and comprised five (62.5%) males and three (37.5%) females with a mean age of 48.37 years (range 28–68 years). There was a male-to-female ratio of 1.66:1. There were five (62.5%) patients presenting with headache, three (37.5%) were presenting with nasal discharge, two (25%) patients were presenting with ocular symptoms, and two (25%) presenting with facial pain [Table 1]. Out of two patients, those were presenting with ocular symptoms, one showed decreased visual acuity, and one was presented with visual field defect and proptosis. Out of eight patients with sphenoid sinus mucocele, three (37.5%) patients had allergic rhinitis, two (25%) patients had chronic sinusitis, and one (12.5%) patient had a history of radiation therapy for nasopharyngeal carcinoma [Table 2]. All patients of sphenoid sinus mucocele underwent transnasal endoscopic drainage of the sphenoid sinus and marsupialization of the mucocele. After endoscopic sphenoidotomy and marsupialization of the mucocele, the patient's symptoms were gradually diminished. There were no complications evidenced intraoperatively and postoperatively. One patient showed purulent discharge from the sphenoid sinus during endoscopic drainage of the sphenoid sinus. The patient continued to be followed at the outpatient department by clinical examination and diagnostic nasal endoscopy. Postoperative follow-up was done at 1 week, 1 month, 3 months, and 6 months. Diagnostic nasal endoscopy revealed a patent ostium and clear sphenoid cavity in all patients. Routine postoperative CT or MRI scanning was not done. In two cases, those who were diagnosed with nasopharyngeal carcinoma and underwent radiation therapy were reviewed postoperatively with a CT scan for any evidence of recurrence and found no report of recurrent lesions.

Discussion

Mucoceles are benign, expansile, encapsulated, locally destructive masses inside the paranasal sinuses, filled with mucus, and lined by epithelium.[6] The mucoid secretion of the sinus is usually sterile but sometimes infected and result in pyoceles.[6] Mucocele commonly involves the frontal sinus and ethmoidal sinuses, whereas the maxillary sinus is less commonly affected by mucocele.[7] The sphenoid sinus is very rarely affected by the mucocele.[7] Mucoceles are thought to be caused by blockage of the sinus, but still other hypotheses for etiopathology of mucoceles such as cystic dilatation of glandular structures and cystic development

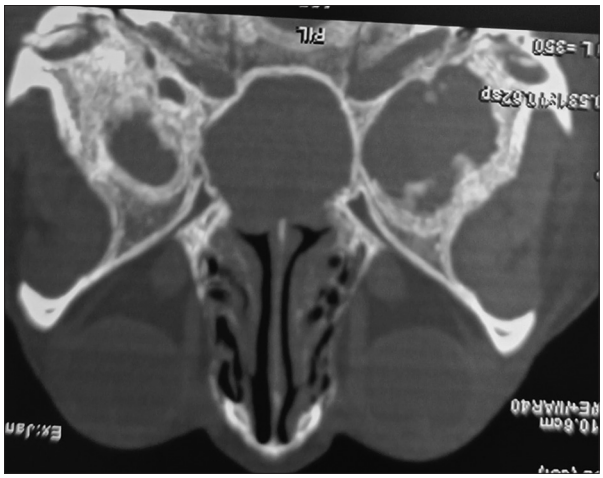

Figure 1: Computed tomography scan of the nose and paranasal sinus (axial view) showing sphenoid sinus mucocele

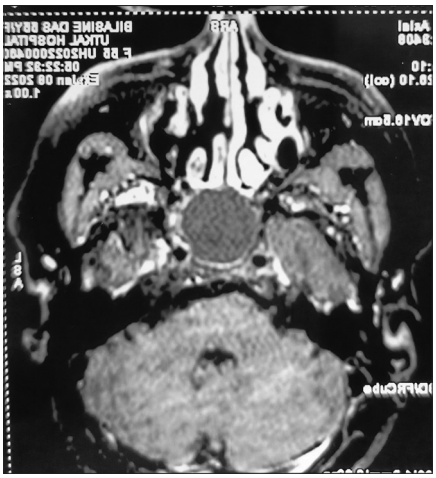

Figure 2: Magnetic resonance imaging of the nose and paranasal sinus (axial view) showing a large size sphenoid mucocele

Table 1: Clinical characteristics of patients with sphenoid sinus mucocele

Age (years)	Gender (male/female)	Clinical presentations	Investigations	Treatment
28	Female	Headache	CT, MRI	Endoscopic drainage of sphenoid sinus
38	Male	Nasal discharge, facial pain	CT, MRI	Endoscopic drainage of sphenoid sinus
42	Male	Headache	CT	Endoscopic drainage of sphenoid sinus
46	Female	Nasal discharge	CT	Endoscopic drainage of sphenoid sinus
48	Male	Nasal discharge	CT	Endoscopic drainage of sphenoid sinus
55	Male	Headache, decreased visual acuity	CT, MRI	Endoscopic drainage of sphenoid sinus
62	Male	Headache, visual field defect, proptosis	CT, MRI	Endoscopic drainage of sphenoid sinus
68	Female	Headache, facial pain	CT, MRI	Endoscopic drainage of sphenoid sinus

CT: Computed tomography, MRI: Magnetic resonance imaging

Table 2: Patients of sphenoid sinus mucocele associated with comorbidities

Diseases/comorbidities	Number of patients, *n* (%)
Allergic rhinitis	3 (37.5)
Chronic sinusitis	2 (25)
Past history of nasopharyngeal carcinoma with radiotherapy	1 (12.5)

from the embryonic epithelial tissues.[8] Sphenoid mucocele was first reported by Rouge in 1872 and later on described by Berge in 1889.[9] Sphenoid sinus mucocele is often found in the fourth decade of life and has no sex predilection.[9] Sphenoid sinus mucocele may be seen at any age group from early adulthood to 70 years and occurs in males and females with equal preponderance.[10] In this study, the mean age of the participating patients was 48.37 years with a male-to-female ratio of 1.66:1.

To date, only a few cases of sphenoid mucoceles have been reported. The underreporting of the sphenoid sinus mucocele may be due to its nonspecific presenting symptoms with suboptimal physical examinations because of inaccessibility of the sphenoid sinus. The exact cause of the sphenoid sinus mucocele is still not known. There are three mechanisms for the development of sphenoid sinus mucoceles such as submucosal edema, obstruction of secretory duct, and ostia obstruction.[11] Submucosal edema may happen from allergic rhinitis leading to narrowing of the ostia and obstruction of the drainage. Ostial blockage may also occur due to chronic sinusitis, polyposis, or both.[10] In this study, 37.5% of patients with sphenoid sinus mucocele had allergic rhinitis, 25% of patients had chronic sinusitis, and 12.5% of patients had a history of radiation therapy for nasopharyngeal carcinoma. Although the sphenoid sinus mucocele is pathologically being in nature, it may affect several vital structures such as the dura, pituitary gland, cavernous sinus, optic nerve, internal carotid artery, and cranial nerves such as oculomotor, trochlear, trigeminal, and abducent nerves.[12] Mucocele in the sphenoid sinus chronically expands and sometimes causes erosion of the bony walls of the sinus.[7,13] Bony erosion by the mucocele may give a pressure effect on orbital structures and the intracranial portion. In this study, 25% of the patients with sphenoid mucocele presented with ocular symptoms by giving pressure effect on the orbit.

Sphenoid sinus mucocele has varied clinical presentations. The clinical manifestations are often nonspecific and lead to delayed diagnosis.[2] Diagnosis accelerates if there is the involvement of the cranial nerves. Headache is the most common symptom of sphenoid mucocele and it should be differentiated from other causes of headache such as ophthalmology-related causes such as acute angle-closure glaucoma or neurology-related cause such as raised intracranial pressure.[14] Complications of the sphenoid sinus mucocele are diplopia, meningitis, blindness, cavernous sinus thrombosis, and compression of the internal carotid artery.[15] Visual disturbance is the second-most common symptom and is often due to optic nerve involvement. It can result in decreased visual acuity and even blindness which is usually irreversible.[16] Visual disturbance may also occur due to the involvement of the III, IV, and VI cranial nerves. The patient may also present with dropping of the upper eyelid, diplopia, and restricted eye movements (external ophthalmoplegia).[2,17] Sphenoid sinus mucoceles usually do not present with bitemporal hemianopia as seen in other sphenoidal and sellar lesions such as pituitary macroadenoma.[17] CT and MRI are the imaging of choice. Mucoceles may show variable densities in CT and signal intensities on MRI depending on their protein content, possible superinfection, inspissation, and do not reveal contrast enhancement.[18] Hyperintensity on T1-weighted signals indicates proteinaceous or mucoid materials. These differences were also found in our study patients.

The treatment of the sphenoid sinus mucocele is surgical intervention.[19] The aim of the surgery for the sphenoid sinus mucocele is to make a large ostium that will allow drainage into the sphenoethmoidal recess.[20] Previously, the treatment of the sphenoid sinus mucocele was complete removal of the mucocele through transcranial or transfacial approach.[21] However, transnasal endoscopic sphenoidotomy has largely replaced such old-fashioned open methods with an excellent outcome.[22] Transnasal transsphenoidal marsupialization of the mucocele of the sphenoid sinus is an excellent technique for treating mucocele.[23,24] ently, the recommended treatment for sphenoid sinus mucocele is endoscopic transnasal sphenoidotomy with adequate removal of the anterior and inferior walls of the sphenoid sinus which cause proper drainage of the mucocele and avoid recurrence.[25,26] In this study, all cases of sphenoid sinus mucocele were treated by

transnasal endoscopic sphenoidotomy with adequate removal of the anterior and inferior walls of the sphenoid sinus for adequate drainage to the sphenoethmoidal recess and also for avoiding recurrence. Early surgery is strongly recommended in patients of sphenoid sinus mucocele with vision loss to prevent a permanent neurological deficit.[9,27]

Conclusion

Sphenoid sinus mucocele is an uncommon clinical entity. Although sphenoid sinus mucocele is uncommon, it is often associated with allergic rhinitis, sinusitis, and postirradiated patients. The clinical presentations are often nonspecific although patients with sphenoid mucocele may present headaches and visual disturbances. Clinicians should have a high index of suspicion of sphenoid sinus mucocele with chronic, nonspecific symptoms, and/or ocular symptoms. The clinical examination may be within the normal limit. Imaging is crucial for diagnosis. CT scan and MRI are two important imaging are helpful to diagnose the sphenoid sinus mucocele. The endoscopic approach of the sphenoid mucocele is presented as a safe and effective method for treatment.

Study limitation

This study has a relatively small sample size and may limit the outcome of the above interpretation. However, the results/outcomes of this study will definitely encourage future research work in the sphenoid sinus mucocele.

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Conflicts of interest

There are no conflicts of interest.

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