

Case Report

Isolated Sphenoid Sinusitis

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Abstract

Isolated sphenoidal sinus disease is a rare form of paranasal sinusitis, accounting for about 3% of all paranasal sinus lesions. Infections such as viruses, bacteria, parasites, and fungi can all cause sinusitis. Isolated sphenoidal sinus disease is difficult to diagnose and treat because the symptoms are hazy and usually appear late due to disease complications. A 36-year-old woman presented to the ENT polyclinic 3 months ago with complaints of intermittent and worsening headache. The patient was treated for a headache at the neurological clinic and given analgesics, but the headache did not go away. The neurologist recommended a CT scan, which revealed a ridge in the right sphenoid sinus. The patient was referred to an otolaryngologist, who performed an endoscopic sphenoidotomy under general anaesthesia. The sphenoid ostium was dilated, and the headache was relieved postoperatively.

Keyword : *sphenoid sinus, endoscopy, computed tomography, paranasal sinus, sphenoidotomy*

1. Introduction

Isolated sphenoid sinus is a pathology characterized by sphenoid sinus mucosa inflammation. Isolated sphenoid sinusitis is a rare condition that can occur in conjunction with other paranasal sinus infections. 1-3% of all sinusitis cases have an isolated sphenoid sinus. Because of the vague symptoms and lack of clinical findings, it is frequently misdiagnosed. Diagnosis is frequently delayed until the patient develops neurological complications.¹

The most common cause can be due to infection with *Staphylococcus aureus* and *Streptococcus* bacteria. On culture, Gram-negative bacteria and anaerobic organisms can be found. Fungi, particularly *Aspergillus*, should be considered in all patients, especially if the patient is immunocompromised. These infections can be caused by the anatomical shape and decreased air flow of the sphenoid sinus region.^{1,2}

If diagnosis and treatment are delayed, isolated sphenoid sinus can cause serious symptoms. The anatomical structure of the sphenoid sinus adjacent to vital organs such as the brain, meninges, optic nerve, internal carotid artery, cavernous sinus, and related cranial nerves (n.III, n.IV, V1, V2, and n.VI) will cause complications if the diagnosis is delayed. Due to the relationship of the sphenoid sinus with the important vital structures of the skull base, early diagnosis and treatment should be performed promptly to avoid serious intracranial and orbital complications.^{2,3,5}

The most common complaint was headache in the retro-orbital, frontal, and occipital regions (72%). Visual disturbances, such as diplopia-like, progressive unilateral vision loss, were the second most common complaint. 21% of patients with isolated sphenoid sinus experienced ophthalmological symptoms.^{2,3,5}

Isolated sphenoid sinus is diagnosed using a history, clinical examination, endoscopic examination of the sphenoethmoidal area, and imaging [5]. A sinus CT scan is a supplementary exam that can be used to determine the location of sinusitis, sinus bone boundaries, and adjacent intranasal structures. Existing nasal septal deviation or hypertrophy of the middle or superior concha may cause sinus hypoventilation and impaired drainage function in the patient.^{4,8}

As a cause of sinus pain, treatment is given to reduce inflammation in the sinus cavity, aid drainage, and lower sinus pressure. The gold standard surgical treatment for chronic sphenoid rhinosinusitis is sphenoidotomy with nasal endoscopy. Sphenoidotomy with nasal endoscopy improves visibility, allowing for faster healing, lower morbidity, and higher success rates.^{4,8}

2. Case Illustration

A 36-year-old woman arrived at the clinic complaining of a headache that had been bothering her for three months. The patient claimed that he had previously been treated at a neurological clinic, but his complaint had not improved. According to the patient, the headache was felt in the forehead area, was aggravated when lying down, and was persistent. The patient denied any photophobia, nausea, or vomiting and stated that she had never had a migraine. There was no history of trauma, vertigo, nausea, vomiting, or weight loss. Cold, cough, and fever complaints were denied. A history of tobacco, alcohol, and drug use was denied. The patient appeared healthy on physical examination; both pupils were isocorrected with a size of + 3 ml, round with flat edges, and direct and indirect light reflexes (+). There was no concha swelling, septal deviation, or polyps. A nasal endoscopy revealed sphenoid swelling. Imaging studies are required to make this diagnosis. A computed tomography (CT) scan of the maxilla revealed a ridge that completely filled the right sphenoid sinus cavity. The right sphenoid sinus was then sphenoidotomized via a direct transnasal approach, with the goal of opening the drainage and ventilation of the right sphenoid sinus. An anterior sphenoidotomy was performed using a nasoendoscope, followed by a posterior sphenoidotomy to widen the sphenoid sinus ostium. Approximately 5 cc of pus mixed with blood was drained when the sphenoid sinus ostium was widened. There was no evidence of a ball mass or fungus in the sphenoidal sinus.

As analgesic, postoperative therapy included antibiotic injections of Ceftriaxon 2x1 gram and Norages 3x1 gram iv. The first postoperative day saw a reduction in complaints of head pain and no bleeding from the anterior or posterior cavum nasi. The second postoperative day saw no complaints of pain and no evidence of bleeding, with the same therapy as the first. The patient was discharged on the third day and given discharge medication, which included oral Cefixime 2x100mg and nasal irrigation with NaCl 0.9% solution 3x50cc. One week after surgery, the patient was able to control the ENT clinic and the headache was gone. Postoperatively, the patient made remarkable progress. The severe headache has gone completely.



Figure 1. CT scan of the head showing right sphenoidal sinusitis

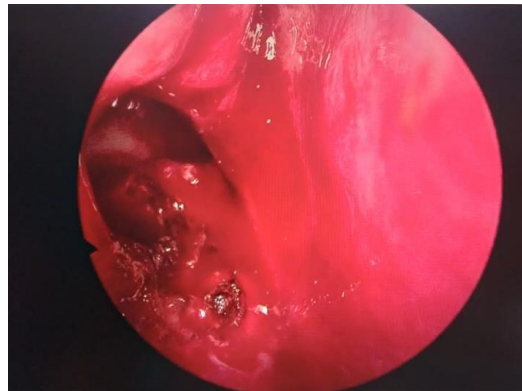


Figure 2. Performed sphenoidotomy on the right sphenoid sinus

3. Discussion

The accumulation and retention of mucoid secretions within the sinus causes thinning, distension, and erosion of one or more of its bony walls, which is known as paranasal sinusitis. Isolated sphenoid sinusitis is uncommon and can coexist with other paranasal sinus infections. Only about 3% of sinusitis cases are caused by isolated sphenoid sinusitis. Because of the vague symptoms and lack of clinical findings, it is frequently misdiagnosed. Diagnosis is frequently delayed until the patient develops neurological complications.¹

Infection with *Staphylococcus aureus* and *Streptococcus* bacteria is the most common cause. On culture, Gram-negative bacteria and anaerobic organisms can be found. Fungi, particularly *Aspergillus*, should be considered in all patients, especially if the patient is immunocompromised due to radiation or chemotherapy, AIDS, or prolonged steroid use. There was no history of comorbidities or prolonged use of steroid drugs in this patient.^{1,2}

Berg described the first case in 1889, and it was discovered that there was no gender preference. According to Shah (2014), the number of patients in this case is equal between men and women, but according to Prateek (2013), the ratio of men to women is 2:1.^{2,3}

In this case of isolated sphenoid sinus, the patient is 36 years old, which is consistent with Yiotakis et al (1997), who state that this case is common in middle age. According to Shah (2014), the age range is typically between 25 and 60 years old.^{2,3}

If diagnosis and treatment are delayed, isolated sphenoid sinus disease can cause serious symptoms. The anatomical structure factor where the sphenoid sinus is adjacent to the brain and meninges, optic nerve, internal carotid artery, cavernous sinus and associated cranial nerves (n.III, n.IV, V1, V2, and n.VI), sphenopalatine ganglion, and sphenopalatine artery, will have negative consequences if the diagnosis is delayed. Because of the sphenoid sinus's relationship with vital skull base structures, early diagnosis and treatment are essential to avoid serious intracranial and orbital complications. Diplopia, blindness, meningitis, cavernous sinus thrombosis, and internal carotid artery compression are all possible complications.^{2,3,5}

Isolated sphenoid sinus patients may present with non-specific clinical symptoms. Headache is the most common clinical manifestation, accounting for approximately 80% of all cases. 12% of the symptoms are vision problems and other cranial nerve involvement. According to Nugent et al, pain is a common symptom in patients with sphenoidal sinusitis. In 71% of their patients, they reported pain. According to Kennedy et al, headache symptoms are often accompanied by ophthalmological complications. Pain in the supraorbital or aurothoro-orbital region, frontal, above the vertex, and may radiate to the occipital is typical. The pain is either dull or sharp.

The headache originates from irritation of the first and second branches of the trigeminal nerve, through the nasociliary and sphenopalatine nerves, which innervate the sphenoid sinus.^{1,2,4,6}

The second most common symptom is visual disturbance, which is caused primarily by optic nerve involvement. This can result in decreased visual acuity and, in extreme cases, blindness, which is usually irreversible. The involvement of nerves III, IV, and VI may also cause visual disturbances. Drooping of the upper eyelid, diplopia, and restricted eye movements are common symptoms.^{5,6}

Table 1. Isolated sphenoid sinus symptoms in many studies.⁶

	Asymptomatic	Headache	Nasal symptom	Eye symptom	Neurologic symptoms	General symptom
Friedman, et al		72%	Rhinorrhea 46% Nasal congestion 26%		14%	
Marcolini, et al		71.70%	Nasal obstruction 32.6%, cerebrospinal fluid rhinorrhea 15.2%, mucopurulent rhinorrhea in 6 patients 13%, epistaxis 4.3%	Epiphora 4.3%, 5.2% with diplopia, another 2.1%		Fever (10.9%), patient's level of consciousness was altered and be required hospitalization (2.1%)
Kim, et al.	5.3%	65.80%	Nasal obstruction 22.4% Postnasal drip 21% Rhinorrhea 9.2%	Decreased visual acuity 11.8 % visual field defect 3.9 %	Facial numbness 3.9%	15.8%
Martin, et al.		69%	Unilateral nasal obstruction 24%	Decreased visual acuity or diplopia (21%)	Facial pain 17%	Patients presented with symptoms consistent with meningitis, 3 presented with cerebrospinal fluid (CSF), rhinorrhea and 2 presented with endocrine abnormalities
Ruoppi, et al.		82%	Rhinitis 38%	28%	Cranial nerve palsy 21%	Dizziness 26% Fever 18%

Any patient suspected of having sinusitis can have a nasal endoscopy. Endoscopic examination may reveal signs of sphenoidal inflammation such as mucopurulence and swelling/edema in the sphenoethmoidal recess in some patients who do not complain of nasal symptoms. It can also determine the presence of purulent drainage from the sphenoid ostium or nasopharynx. However, a radiological examination is still required. According to Sethi et al, a normal-appearing sphenoethmoidal recess on nasal endoscopy does not rule out the possibility of pathology in the sphenoidal sinus in 50% of cases.²

A CT scan of the nose and paranasal sinuses will reveal a ridge in the sphenoidal sinus, which may or may not extend into the adjacent sellar, suprasellar, parasellar, and retrosellar areas. CT scans can detect various pathological abnormalities and aid in the diagnosis of inflammatory diseases, neoplasms, bacterial and fungal infections.^{2,4}

When medical treatment for bacterial sinusitis fails, sphenoid sinus surgery is recommended. Cases involving cranial nerves may necessitate more rapid surgical treatment to restore or optimize all nerve functions in a timely manner.^{4,8}

The gold standard surgical treatment for chronic sphenoid rhinosinusitis is sphenoidotomy with nasal endoscopy. Endoscopic surgery provides better visualisation than external approaches, allowing for faster healing, better aesthetic results, lower morbidity, and higher success rates. Endoscopic transnasal sphenoidotomy and drainage, as well as removal of the anterior and inferior sinus walls sufficient to allow adequate drainage and avoid recurrence.^{4,8}

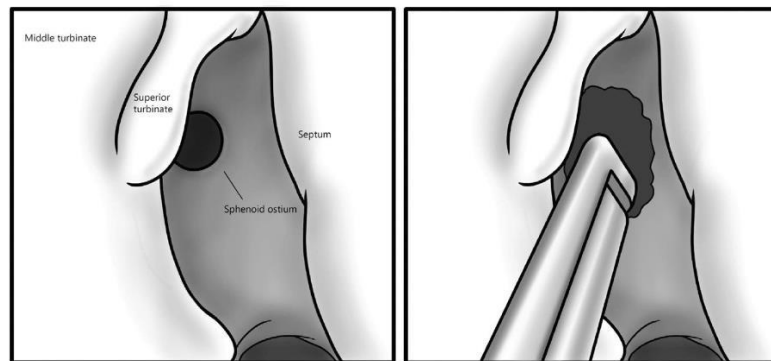


Figure 3. Illustration of sphenoidotomy

Postoperative care is critical, with postoperative cleansing performed to remove residual bleeding, secretions, crusts, and fibrotic tissue. Postoperative cleansing procedures have been mentioned in several studies. Talbot et al. in their study using hypertonic saline solution (NaCl 0.9% pH 7.6) can further improve mucociliary transport.

4. Conclusion

A 36-year-old female adult was diagnosed with isolated right sphenoidal sinusitis, and sphenoidotomy was performed with good results. The patient was no longer experiencing headaches.

References

- Karpishchenko S, Vereshchagina O, Stancheva O, Nagornykh T, Krasichkov A, Serdiukova I, Sinitca A, Kaplun D. Isolated Sphenoid Sinusitis: Anatomical Features for Choosing a Method of Treatment, a Case-Control Study. *Diagnostics (Basel)*. 2022 May 21;12(5):1284. doi: 10.3390/diagnostics12051284. PMID: 35626437; PMCID: PMC9140527.
- Alali M, Khatib AA, Azzeh GA. Isolated sphenoid inflammatory diseases. *J Otolaryngol ENT Res*. 2018;10(4):248–51.
- Friedman A, Batra P, Fakhri S, Citardi M, Lanza D. Isolated Sphenoid Sinus Disease: Etiology and Management. *Otolaryngology-Head and Neck Surgery*. 2005;133(4):544
- Fokkens WJ, Lund VJ, Hopkins C, et al. European Position Paper on Rhinosinusitis and Nasal Polyps 2020. *Rhinology*. 2020 Feb 20;58(Suppl S29):1-464. doi: 10.4193/Rhin20.600. PMID: 32077450
- Ishak NL, Subha ST, Abu Bakar S. Isolated sphenoid sinusitis: A big headache. *Malays Fam Physician*. 2019 Apr 30;14(1):29-30. PMID: 31289629; PMCID: PMC6612268.
- Ramadan O. Isolated Sphenoid Sinus Disease: Review of Some Cases. *Journal of Otolaryngology-ENT Research*. 2016;4(4):1-3
- Moss W, Finegersh A, Jafari A, Panuganti B, Coffey C, Deconde A, et al. Isolated sphenoid sinus opacifications: a systematic review and meta-analysis. *Int Forum Allergy Rhinol*. 2017;7(12):1201-6
- Villemure-Poliquin N, Nadeau S. Surgical treatment of isolated sphenoid sinusitis - A case series and review of literature. *Int J Surg Case Rep*. 2021 Feb;79:18-23. doi: 10.1016/j.ijscr.2020.12.091. Epub 2021 Jan 2. PMID: 33422847; PMCID: PMC7808