Isolated Sphenoid Sinus Diseases

Report of 39 Cases

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Objective: To detail the underlying pathological conditions, symptoms, signs, and outcomes of patients with isolated sphenoid sinus involvement.

Design: A retrospective survey.

Setting: An academic referral center of a university hospital.

Patients: All 39 patients, aged 7 to 85 years, treated in the Department of Otorhinolaryngology, Kuopio University Hospital, Kuopio, Finland, from 1988 through 1997 for isolated sphenoid sinus disease.

Results: Sinusitis was characterized as acute in 26 patients, subacute in 5 (including 1 pyocele), and chronic in 8 (including 2 fungal infections). No tumors were found. Isolated sinus cysts were excluded from the study. Headache, the main symptom in 32 patients (82%), was localized most commonly on the vertex. Other common complaints were rhinitis, dizziness, eye symptoms, and fever. In 2 patients, the finding was occult. Eight patients (21%) presented with cranial nerve deficits, and 1 patient had an intracranial complication. Sinus irrigation was performed in 16 patients (41%) and sphenoidotomy was performed in 10 (26%). Fifteen patients (38%) were treated with antibiotic drugs alone. Within 3 months, 31 (84%) of 37 patients had recovered from the illness; 5 still experienced headaches despite having normalized radiographic findings; and 1 had permanent unilateral visual loss. Two patients were lost to follow-up.

Conclusions: Sphenoid sinus opacity is mostly inflammatory in origin. Despite the benign nature of the disease, there is a risk of complications with high morbidity and mortality. Early and, if necessary, aggressive therapy to guarantee drainage of the sinus is recommended.


Isolated Sphenoid Sinus Diseases

Inflammatory involvement of the sphenoid sinus is, in most patients, inflammatory in origin. Neoplastic diseases are rare. Isolated sphenoid sinusitis accounts for only about 1% to 2% of all sinus infections. The disease is extremely rare in children, but some cases have been reported. The most common symptom of sphenoid sinus disease is headache that worsens with head movement; is aggravated by coughing, walking, or bending; might interfere with sleep; and is poorly relieved with analgetic drug use. Experimental stimulation of the sphenoid sinus results in pain at the vertex. In sphenoiditis, vertex headache is common, but pain can be localized in frontal, temporal, periorbital, or occipital regions or can be vague or occur anywhere in the craniofacial region.

Visual changes indicating imminent complications are common, being encountered in up to 70% of patients with inflammatory sphenoid disease. Trigeminal nerve symptoms have been reported in 10% to 30% of inflammatory diseases, and cranial nerve findings have been reported in 12% to 70% of cases. Fever can also occur, particularly in acute infections. In the article by Goldman et al, 7 (58%) of 12 patients with acute isolated sphenoid sinusitis experienced nasal drainage or congestion, but nasal symptoms are usually rare. A delay in diagnosis and treatment might result in serious complications because the disease may have secondary extension to the intracranial region and the orbita. Complications diminish the likelihood of full recovery. As late as 1983, the article by Lew et al revealed that mortality from acute sphenoiditis was 27% and that it was related to delayed diagnosis. In the evaluation of sphenoid sinuses, computed tomography (CT) has superseded conventional standard radiography. Magnetic resonance imaging helps detect in-
PATIENTS AND METHODS

From 1988 to 1997, 39 patients with isolated sphenoid sinus involvement were treated in the Department of Otorhinolaryngology, Kuopio University Hospital, Kuopio, Finland, which serves a population of about 250,000 inhabitants living in an area of 20,000 km². Patients were identified using a computerized search of diagnoses in the patient files. Isolated sphenoid sinus cysts were not included in the study. A retrospective analysis was made to evaluate the etiology, predisposing factors, symptoms, signs, treatment, and outcomes of isolated sphenoid sinus involvement, with special emphasis on the clinical symptoms of fungal sinusitis and pyocele. There were 18 females and 21 males, with a mean age of 46 years (range, 7-85 years). Five patients (13%) were children or adolescents (18 years or younger), and 13 (33%) were 60 years and older. The disease was unilateral in 30 patients and bilateral in 9. In all, 48 sphenoid sinuses were affected. Mean follow-up time was 4.2 years (range, 1-10 years).

RESULTS

Sphenoid sinus opacity was inflammatory in origin in every patient. No tumors were detected. Eight patients (21%) had been directed to the Department of Otorhinolaryngology by a general practitioner; 17 (44%) by a neurologist; and the others by ophthalmologists (n=4), neurosurgeons (n=3), internists (n=3), pediatricians (n=2), a general surgeon (n=1), and a radiotherapist (n=1). Eight patients (21%) had received at least 1 course of antibiotic drug therapy before attending the Department of Otorhinolaryngology. Twenty-two patients (56%) had concomitant diseases. Cardiovascular disease was present in 15 patients and diabetes was present in 4 (including the patient with pyocele) (Table 1). Twelve years previously 1 patient had undergone local postoperative radiotherapy owing to skin melanoma in the temporal region, with bone and cerebral growth but no extension to the sphenoid sinus. Furthermore, 1 patient had acute lymphatic leukemia in a remission phase, and another had undergone surgery 2 weeks earlier because of acute subarachnoid hemorrhage. None of the patients had any previous history of chronic sinus infections.

According to the American Academy of Otolaryngology—Head and Neck Surgery classification,¹⁵ sinusitis was acute in 26 patients (67%); subacute in 5 (13%), including 1 pyocele; and chronic in 8 (20%), including 2 noninvasive fungal infections caused by Aspergillus species and Pseudallescheria boydii (the diagnosis based on positive culture and typical histopathological findings). Acute symptoms lasted 1 day to 4 weeks (mean, 9 days), subacute symptoms lasted 5 to 8 weeks, and chronic symptoms lasted 3 months to several years. Headache was the principal symptom in 32 patients (82%), located in most patients on the vertex (Table 2). Fifteen patients (38%) had rhinitis, which in 5 patients was an occasional infection and in 10 was a perennial condition. Other common complaints were dizziness, fever, and eye symptoms. Unilateral visual loss caused by optic atrophy was the only symptom in the insidious sphenoid sinusitis caused by P. boydii. Pyocele presented with general headache and oculomotor palsy. In 2 elderly men with cerebral apoplexy, CT scan incidentally detected sphenoid opacification without there being any other than cerebral symptoms. An intracranial complication was detected in 1 elderly patient in whom a neurosurgeon had punctured 2 sepa-

Table 1. Concomitant Diseases in 22 Patients With Isolated Sphenoid Sinus Disease

<table>
<thead>
<tr>
<th>Disease</th>
<th>Diagnoses, No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cardiovascular diseases</td>
<td></td>
</tr>
<tr>
<td>Ischemic heart disease</td>
<td>7</td>
</tr>
<tr>
<td>Cerebral disease</td>
<td>2</td>
</tr>
<tr>
<td>Arterial hypertension</td>
<td>5</td>
</tr>
<tr>
<td>Cerebral arteriovenous malformation</td>
<td>1</td>
</tr>
<tr>
<td>Bronchial asthma</td>
<td>5</td>
</tr>
<tr>
<td>Diabetes</td>
<td>4</td>
</tr>
<tr>
<td>Blood dyscrasia</td>
<td></td>
</tr>
<tr>
<td>Acute lymphatic leukemia</td>
<td>1</td>
</tr>
<tr>
<td>Idiopathic thrombocytopenia</td>
<td>1</td>
</tr>
<tr>
<td>Hormonal disorders</td>
<td></td>
</tr>
<tr>
<td>Hypothyroidism</td>
<td>2</td>
</tr>
<tr>
<td>Panhypopituitarism</td>
<td>1</td>
</tr>
<tr>
<td>Skin melanoma (temporal region)</td>
<td>1</td>
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</table>

Table 2. Symptoms of 39 Patients With Isolated Sphenoid Sinus Disease

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Patients, No. (%)</th>
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<tbody>
<tr>
<td>Headache</td>
<td>32 (82)*</td>
</tr>
<tr>
<td>Vertex, top of head</td>
<td>18</td>
</tr>
<tr>
<td>Frontal and temporal region</td>
<td>4</td>
</tr>
<tr>
<td>Orbita</td>
<td>3</td>
</tr>
<tr>
<td>General</td>
<td>13</td>
</tr>
<tr>
<td>Rhinitis</td>
<td>15 (38)</td>
</tr>
<tr>
<td>Allergic perennial</td>
<td>3</td>
</tr>
<tr>
<td>Nonallergic perennial</td>
<td>7</td>
</tr>
<tr>
<td>Infection</td>
<td>5</td>
</tr>
<tr>
<td>Eye symptoms</td>
<td>11 (28)</td>
</tr>
<tr>
<td>Double vision</td>
<td>6</td>
</tr>
<tr>
<td>Decrease in visual acuity</td>
<td>3</td>
</tr>
<tr>
<td>Conjunctival irritation</td>
<td>1</td>
</tr>
<tr>
<td>Photophobia</td>
<td>1</td>
</tr>
<tr>
<td>Dizziness</td>
<td>10 (26)</td>
</tr>
<tr>
<td>Cranial nerve palsies</td>
<td>8 (21)*</td>
</tr>
<tr>
<td>Optic nerve</td>
<td>3</td>
</tr>
<tr>
<td>Oculomotor nerve</td>
<td>4</td>
</tr>
<tr>
<td>Trigeminal nerve</td>
<td>2</td>
</tr>
<tr>
<td>Fever</td>
<td>7 (18)</td>
</tr>
</tbody>
</table>

*Some patients had more than 1 type of symptom.
rate brain abscesses before the patient was sent to the Department of Otorhinolaryngology. The patient was disoriented and had hemiplegia and oculomotor palsy on the diseased side. Until that time, the symptoms had persisted for 1 month. Cranial nerve deficits were found in 8 patients (21%) (Table 2 and Table 3). Involvement of nerve II was expressed as loss of visual acuity, nerve III as double vision, and nerve V as facial numbness.

On physical examination, nasal septal deviation was seen in 9 patients (23%), in 7 of whom the ipsilateral sphenoid sinus was involved. No nasal polyps or any other anatomical obstructions were detected. A sinus CT scan was performed in 30 patients, magnetic resonance imaging was performed in 4, and both were performed in 3. In 2 patients, imaging of the sinuses was achieved by conventional radiography, including occipitofrontal, lateral, occipitomental, and submentovertical projections. The finding was unilateral in 30 patients (77%) and bilateral in 9 (23%). In all, 48 sphenoid sinuses were affected: 22 (46%) were totally opaque, 16 (33%) had an air-fluid level, and 10 (21%) were partially opaque. There was no clear correlation between the different types of radiological findings and the duration of symptoms. The patient with brain abscesses had partial unilateral sphenoid opacity on CT scans and magnetic resonance images. In the patient with pyocele, CT revealed remodeling of the totally opaque sphenoid sinuses, bony erosion, and extension of the disease to the cavernous sinus.

In 16 patients (41%)—15 with acute and 1 with chronic sinusitis—the sphenoid sinus was irrigated via its natural ostium with a special cannula, which was introduced along the nasal septum toward the end of the middle turbinate, making an angle of about 30° with the floor of the nasal cavity. In 12 (80%) of 15 patients with acute symptoms, irrigation relieved the pain—in 5 almost immediately after the procedure and in 7 in a few days. In 1 patient, irrigation possibly did not technically succeed, and in 2, acute sphenoiditis originally presented without pain symptoms. In the patient with chronic sphenoid disease, irrigation did not relieve the headache.

Sphenoidotomy was performed in 10 patients (26%), including both with fungal sinusitis. In 2 patients, the sphenoid sinus had been irrigated previously. Of 26 patients with acute sinusitis, 3 (12%) needed surgery (Table 3). The patient with pyocele underwent surgery via an external approach using an operating microscope; the other 9 sphenoidotomies were all performed intranasally using endoscopes. In 5 patients (including the one with brain abscesses), the operative finding was mucous or mucopurulent secretion and swollen mucosa; in 2 patients there was polypous mucosa obstructing the natural ostium. In the patient with pyocele, external transthyroid sphenoidotomy revealed purulent material under pressure and localized areas of bone destruction (Figure). During every sphenoidotomy, samples were taken for bacterial and fungal cultures, and 5 of these yielded growth: (1) Staphylococcus aureus; (2) Branhamella catarrhalis (β-lactamase negative); (3) a combination of Morganella morganii, Peptostreptococcus species, and Propionibacterium acnes; (4) Aspergillus species; and (5) P bovis. Both the cultures were negative in 5 patients, including the one with intracerebral complication, in whom S aureus had earlier been cultured from the brain abscesses and from the blood and cerebrospinal fluid samples.

Twenty-nine patients (74%) were hospitalized, with an average hospital stay of 6 days (range, 2-13 days). In the hospital, antibiotic drugs (mostly cefuroxime) were given intravenously to 20 patients and orally to 9. The other 10 patients, who were afebrile, otherwise healthy, and had no evidence of complications, were treated on an outpatient basis and received oral antimicrobial medication. There seemed to be no differences in the hospitalization times or the number of outpatient visits related to different treatment measures. In many cases, long hospitalization times were needed because outpatient treatment was not possible because of long geographical distances.

The outcomes of 37 patients could be checked; 2 patients were lost to follow-up (Table 3). From 1 week to 3 months, a mean of 4 weeks after the end of treatment of sphenoid disease, 31 (84%) of 37 patients were virtually free of symptoms; 5 (14%) still experienced headache, although the radiographic finding had become normalized; and 1 (3%) had permanent unilateral blindness. At the last control assessment, the primary

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Table 3. Main Symptoms, Signs, Treatment, and Outcome in 39 Patients With Isolated Sphenoid Sinus Disease*

<table>
<thead>
<tr>
<th>Sphenoid Sinus Disease</th>
<th>Main Symptoms and Signs</th>
<th>Treatment Measures</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Headache</td>
<td>Rhinitis</td>
<td>Dizziness</td>
</tr>
<tr>
<td>Acute (n = 26)</td>
<td>22 (85)</td>
<td>8 (31)</td>
<td>8 (31)</td>
</tr>
<tr>
<td>Subacute (n = 5)</td>
<td>4 (100)</td>
<td>2 (50)</td>
<td>2 (50)</td>
</tr>
<tr>
<td>Chronic (n = 8)</td>
<td>4 (67)</td>
<td>4 (67)</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>5 (50)</td>
<td>1 (50)</td>
<td>0</td>
</tr>
<tr>
<td>Total (N = 39)</td>
<td>32 (82)</td>
<td>15 (38)</td>
<td>10 (26)</td>
</tr>
</tbody>
</table>

* Data are given as number (percentage) of patients.
radiographic pathological finding had either totally (n=20) or considerably (n=7) resolved in 27 patients. In 3 patients, the finding (total opacity) was unchanged but the patients were free from symptoms, and in one of them, sphenoid sinus irrigation was negative. In 7 patients, no control radiographs were taken but recovery of the sphenoid sinus was confirmed by endoscopy (n=6) or irrigation (n=1). The 2 patients with fungal infection made an otherwise full recovery in 2 weeks, but unilateral visual loss in one of them was irreversible. In the present study, this was the only permanent disability associated with the sphenoid disease. The patient with pyocele became free of symptoms, and there was no recurrence during the rest of his life (he died 2 years later of cardiovascular disease).

**COMMENT**

Isolated sphenoid diseases are rare, and because of the nonspecific character of their symptoms, they have previously been largely misdiagnosed. The present data were collected during a period when CT scans were available and sinus endoscopy was commonplace. In this study, all the diseases were inflammatory in origin. No primary sphenoid sinus tumors were identified in our patients during 1988 through 1997. Pituitary and skull base tumors invading the sphenoid sinus were excluded. It seems that sphenoiditis is not necessarily a consequence of rhinitis in the same way as infections in other paranasal sinuses. Although 38% of patients in the present study complained of rhinitis, this does not necessarily argue in favor of a strong causality between isolated sphenoid sinusitis and rhinitis. It might simply be coincidental; nasal symptoms are relatively common, and up to 40% of healthy persons report them when asked. None of our patients had a previous history of chronic sinus infections.

Craniofacial pain is the main symptom of sphenoid sinus disease; therefore, sphenoid sinusitis should be considered in the differential diagnosis of anyone complaining of acute and subacute headaches. Dizziness was also common in our patients (n = 10 [26%]). It should be remembered that, although this symptom is often vague and is not rare in elderly people, if it is persistent then it demands a thorough examination. One in every 3 of our patients was at least in his or her 60s and had concomitant diseases, which could well have interfered with the symptoms of sphenoid sinus disease. Preceding radiation therapy, allergic mucosal swelling, and nasal septum deviation were possible local predisposing factors in the present study.

Visual loss in conjunction with sphenoiditis must always be considered an emergency. Visual changes have been common also in earlier studies, ranging from 12% to 70% of isolated sphenoid diseases. In the present study, eye symptoms were reported by 11 patients (28%). Double vision was present in 4 patients as a consequence of oculomotor nerve palsy, but in 2 patients there were no signs of any nerve involvement. Decreased visual acuity (in 3 patients) was reversible in 2 patients, probably because of transient inflammation or ischemia of the optic nerve. Optic nerve atrophy in 1 patient caused permanent blindness. Other cranial nerve deficits can also occur in sphenoiditis, although they are even more common in association with tumors rather than inflammatory diseases, in which they have been reported in as many as 70% of patients. Hypesthesia or hyperesthesia of the face in the region of the fifth cranial nerve (V1 and V2) has been reported in up to 1 in every 3 patients. In this study, 2 patients (5%) had a trigeminal nerve deficit, and in 1 of them it was combined with oculomotor nerve palsy.

In acute sphenoid sinusitis, the organisms cultured are usually aerobic gram-positive bacteria, with *Streptococcus pneumoniae* and *S aureus* being prominent. Gram-negative and anaerobic bacteria are more prevalent in chronic conditions. In immunocompetent patients and especially in the subarctic climate, fungi rarely cause sinus infections. There are, however, reports of isolated sphenoid sinusitis in otherwise healthy patients caused by *Aspergillus* species. To our knowledge, there are only 4 earlier studies (1 case in Europe) of isolated sphenoid sinus infections in immunocompetent patients yielding *P boydii* in a fungal culture. Of these 4 earlier reported noninvasive cases, 3 resulted in cure and 1 died of an intracranial complication.

Sphenoid sinus mucoceles are uncommon, and because of their insidious progression, the diagnosis is of-
endoscopic transnasal sphenoidotomy has become increas-
different options are available; however, in recent years,
ations in the nose (eg, septal deviation). In surgery, many
times prove impossible because of anatomical consider-
ily be done with the help of endoscopes, this might some-
dicated.5,10-12 According to our experience, irrigation of the
hours or if there are signs of complications, surgery is in-
therapy the symptoms get worse or continue for 24 to 48

CONCLUSIONS

Headache is the main symptom in sphenoid sinus dis-
ese; therefore, CT scan of paranasal sinuses should al-
 Cranial nerve symptoms are also noteworthy. Sphenoid
sinus diseases are mostly inflammatory in origin, and treat-
ment consists of antibiotic drug administration; how-
ever, surgery might be needed if drainage of the sinus
cannot otherwise be guaranteed, the patient does not
promptly respond to medical therapy, or there are im-
inent complications. Transnasal endoscopic sphenoid-
otomy is primarily recommended as a treatment for iso-
lated sphenoid sinusitis and should also be performed
in patients in whom the diagnosis cannot otherwise be
confirmed.

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