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Endonasal Endoscopic Approach to the lesions of Sphenoid Sinus and Pituitary Area

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SUMMARY

Surgical access to the sphenoid, sellar and parasellar regions has traditionally been done by transnasal or transcranial routes. Transnasal, transphenoidal approach has been used by neurosurgeons and ENT surgeons successfully for years for removal of pituitary tumours with lesser morbidity than transcranial approach. Over the last few years, endoscopic approach to these regions has gained much popularity because of advances in optics, endoscopes and illumination. This is a review of 14 cases of lesions in the area of sphenoid sinus and pituitary gland and their management with minimally invasive technique of endoscopic sinus surgery through the nose. Presentation, surgical details, advantages and disadvantages of endoscopic approach are discussed here. The technique was found to be successful in all these selected cases with quick postoperative recovery and no morbidity.

Compared to the traditional methods of approaching sphenoid sinus and pituitary area, like external ethmoidectomy approach or transeptal transphenoidal approach, endoscopic technique was found to have the advantages of being minimally invasive with no external incisions, less traumatic to the patient, no need for operating microscope or intraoperative image intensifier, better assessment and clearance of the disease by the use of straight and angled vision endoscopes, quicker post operative recovery and lesser overall morbidity.

INTRODUCTION

Solitary involvement of the sphenoid sinus is a relatively uncommon entity[1]. Lew et al[2] suggested an incidence of 2.7% for isolated sphenoid disease, however, another study estimated it to be less than 1% of all sinus disease[3]. Due to deep anatomical location and presence of small number of mucous glands, primary infection of the sphenoid sinus is uncommon. Secondary infection uncommonly follows blockade of the sinus unless a virulent organism is involved[4]. Once the sphenoid sinus is involved, signs and symptoms may be very subtle causing delay in diagnosis and the lesion may extend to affect adjacent structures giving rise to a variety of clinical manifestations[5]. Headaches, visual disturbances and cranial nerve involvement are the common presentations[3].

Mycetoma of paranasal sinuses are more frequently diagnosed now with the widespread use of nasal endoscopy and CT scan and sphenoid sinus involvement is seen more commonly now than reported in the past[6]. Pituitary tumours can present with similar symptoms to neurosurgeons, physicians or otolaryngologists. There has been a change in the way these lesions are approached for the purposes of diagnosis and treatment. The traditional transphenoidal approach for pituitary surgery can be performed via transnasal, transeptal, or sublabial routes through unilateral or bilateral nostrils. It requires wide mucosal and septal dissection and postoperative nasal packing. Endoscopic surgery has now been widely used because it allows excellent visualization with minimal invasion[7].

This study presents 14 cases of lesions of sphenoid sinus and pituitary area. Their presentations, assessment with CT and MRI scans and management with endonasal, endoscopic technique is discussed here. The efficacy of this technique and its advantages over traditional methods are also described here.

METEIRIALS AND METHODS

This is a review of 14 patients who were diagnosed to have lesions involving sphenoid sinus and pituitary area and were approached and managed endoscopically through the nose. The age ranged from 14 to 55 years (Table 1). Male:female ratio was 9:5. The common presenting complaints were headaches, nasal blockade and visual disturbances. Less common were cranial nerve palsies and neurological involvement. One patient presented with progressive quadriparesis due to brainstem involvement with sphenoid aspergilloma and meningeal involvement. The pattern of clinical presentation of these patients is given in Table 2. Patients were initially assessed with complete ENT examination followed by neurological and ophthalmological examination where such involvement was suspected or present. All patients had CT scans for assessment of extent of involvement of sphenoid sinus and any bony erosion or intracranial extension associated with it. More than half of them (9/14) went on to have MRI scan because there was considerable expansion and thinning of bony walls of the sphenoid sinus with extension beyond it's anatomical boundaries and intracranial extension needed ruling out (Table 3). One patient who presented with neurological involvement had involvement of brainstem meninges with small multiple brainstem infarcts.

All those cases with neurological and visual involvement were managed in collaboration with neurosurgeon and ophthalmologist. The surgical intervention was individually decided in each patient depending on the provisional diagnosis. Two patients had endoscopic assessment and biopsy of the lesions. Due to intracranial involvement, poor general health of these patients and suspicion of malignancy, single stage clearance was not advisable or possible. In these patients, a definitive diagnosis was made after endoscopic biopsy and definitive therapy was started according to the histological report.

The rest of the patients[12], were suspected to have sphenoid aspergillomas. They were assessed endoscopically and after confirmation of clinical suspicion, total clearance of the disease was achieved by endonasal, endoscopic approach (Table 4).

Table 1: Age distribution of patients

Age group (Years)	*Number*	*Percent*
10-20	7	50%
21-30	5	36%
31-40	1	7%
41-50	0	0
51-60	1	7%

Table 2: Presenting symptoms

Symptoms	*Number*	*Percent*
Headache	13	93%
Visual disturbances	7	50%
Nasal obstruction	7	50%
Cranial nerve palsy	2	14%
Neurological involvement	1	7%

Table 3: Radiological assessment method used

Scan	*Number*	*Percent*
CT scan face / brain	14	100%
MRI scan face / brain	9	64%

Table 4: Surgical procedure performed

Procedure	*Number*	*Percent*
Endoscopic assessment and biopsy	2	14%
Total endoscopic clearance of the disease (Bilateral ethmoidectomy & sphenoid clearance)	12	86%

The surgical technique applied was the same with some modifications according to the pathology. It was done under general anaesthesia with controlled hypotension. The nose was prepared with topical application of pack soaked with 1: 4000 adrenaline for 10 minutes. 00 and 300 rigid fibreoptically illuminated endoscopes were used with instruments commonly used for functional endoscopic sinus surgery (FESS). No septal surgery was required. Sphenoid sinus was approached directly by identifying it's opening and performing' Sphenoidotomy', in two cases (Figs. 1 & 2). The rest of them (12) required bilateral total ethmoidectomy and clearance of disease from sphenoid sinus as they were found to have ethmoid polyps along with fungal balls (Table 5). The nose was packed for 24 hours. Patients were discharged home after 24-48 hours except one patient with neurological involvement who needed intravenous antifungal therapy and other supportive care.

Fig. 1: Normal sphenoid ostium

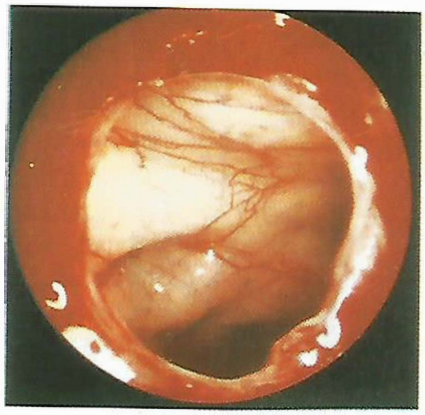
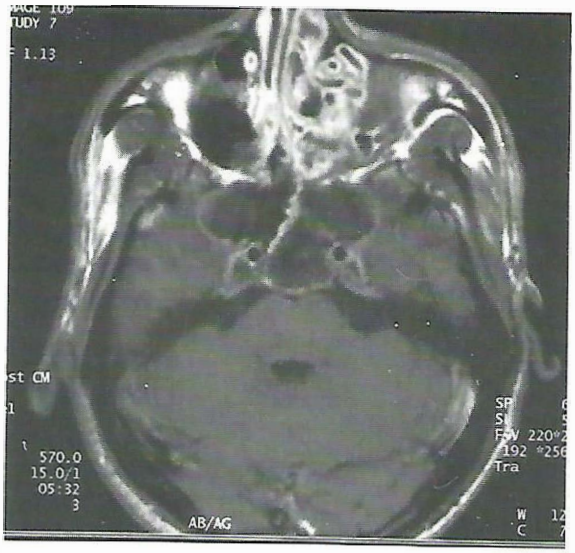
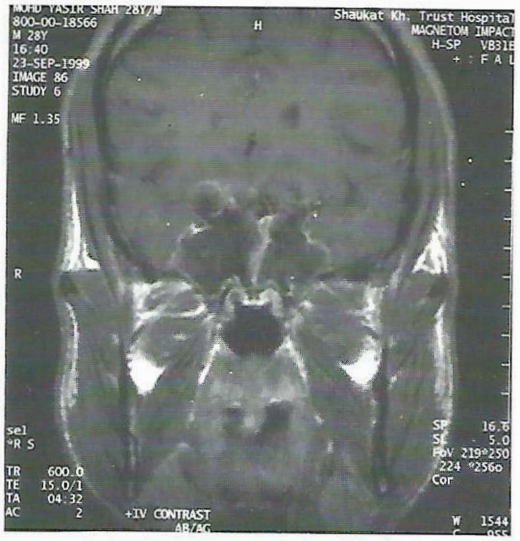


Fig. 2: Enlarged sphenoid ostium (Sphenoidotomy)

Table 5: Surgical approach used

Approach	*Number*	*Percent*
Direct endoscopic sphenoidotomy	2	14%
Endoscopic trans-ethmoid approach	12	86%





Figs. 3, 4. Axial and coronal MRI scans showing markedly expanded sphenoid sinus with extension beyond internal carotid arteries (Sphenoid Aspergilloma).

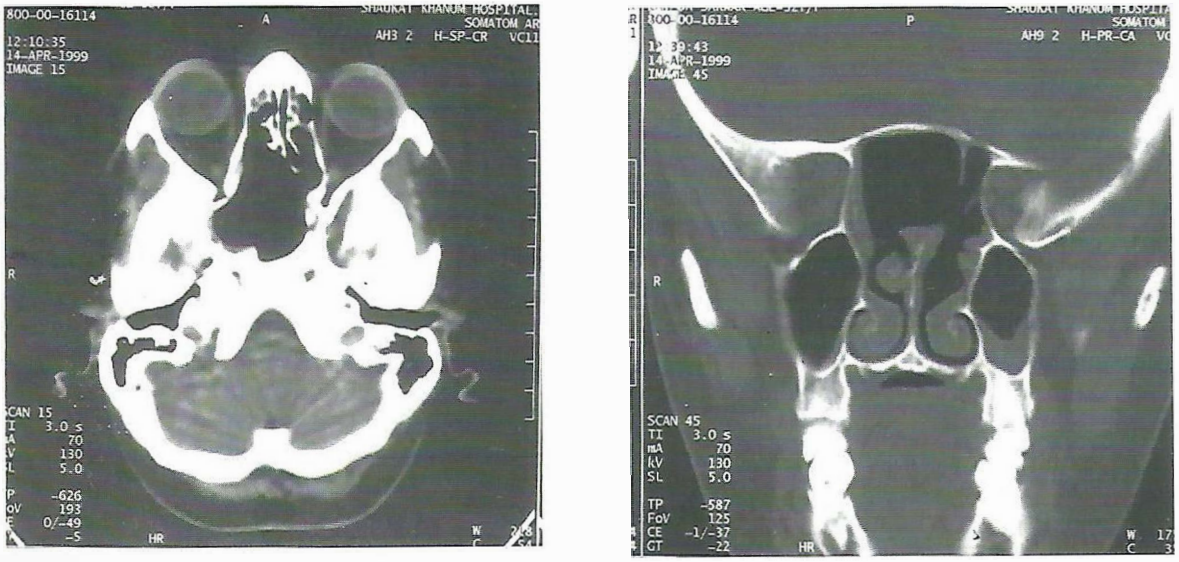


Fig. 5 & 6: Postoperative CT scans after complete clearance of sphenoid sinus disease (Aspergilloma)

RESULTS

All patients recovered well without any intra- or post-operative complication. Out of the two patients who underwent endoscopic biopsy only, one had pituitary adenocarcinoma (Figs. 7 & 8), and was referred for radiotherapy, and the other had disseminated aspergillosis with brainstem involvement arising from a sphenoid aspergilloma. She was treated with systemic antifungal and other suppoetive therapy by physicians and was not considered suitable for any further surgical intervention. Out of the 12 patients, who underwent total clearance of the disease with bilateral

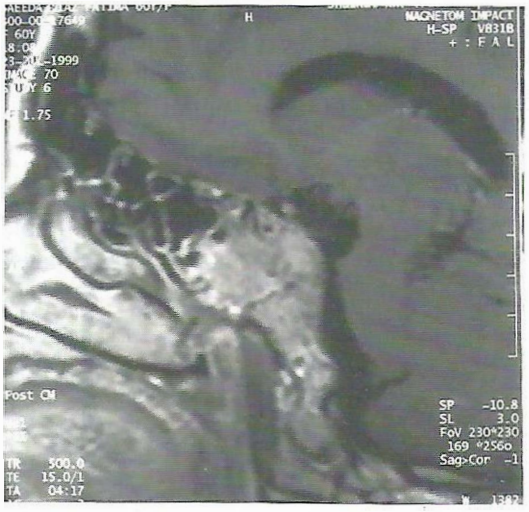


Fig. 7. Sagittal MRI scan

Fig. 8: Coronal MRI scans of patient with pituitary adenocarcinoma

ethmoidectomy and sphenoid clearance (Figs. 3 - 6), all had aspergilloma except one patient who was reported to have Wegener's Granulomatosis, later confirmed by a positive ANCA test. He was referred to physicians for further long term therapy. All other patients were treated with oral Itraconozole (Sporanox) for a minimum period of 3 months and remain well on follow up without any recurrence of the disease. There was no early or late post-operative complication of the procedure. The histopathological distribution of the lesions is given in Table 6.

Table 6: Histological diagnosis of the lesions

Diagnosis	*Number*	*Percent*
Aspergilloma with nasal polypi	11	79%
Wegener's granulomtosis	1	7%
Pseudotumour	1	7%
Pituitary adenocarcinoma	1	7%

DISCUSSION

The sphenoid sinus is uncommonly involved solitarily by inflammatory disease and tumours[8]. Wyllie et al[9], who reviewed 45 cases of sphenoid lesions from Mayo Clinic over a period of 37 years, emphasized that the evaluation and diagnosis must be an active process rather that of an exclusion one. Physical findings are usually minimal, causing physician to rely on radiological studies. Failure to diagnose and treat sinus disease has been known to lead to serious sequelae[10]. The complications include optic nerve compression with subsequent blindness[13], cavernous sinus thrombosis[14], internal carotid artery spasm[12], and intracranial abscesses and meningitis[11].

Principal symptoms of sphenoid sinus disease are headaches refractory to medical management, visual disturbance and cranial nerve palsies. Headache is the most common presenting complaint. Its site can be nonspecific, retro-orbital, bitemporal or frontal. It is present in more than 95% of patients[15]. This non-localizing nature of such headaches may result in difficulties in establishing early diagnosis. Visual disturbances are the second most common presenting complaints. They vary from mild blurring of vision to total blindness and their incidence varies from 24% to 60% in various studies[1]. The commonly involved cranial nerve is abducens nerve due to its long course and medial intracavernous position. Its incidence has been reported to range from 6% to 50% in various studies[16,17]. Central to the diagnosis of sphenoid lesions is radiological imaging with high resolution CT scanning as the gold standard. MRI is an essential adjunct in the diagnosis and selection of treatment for many lesions involving sphenoid region[18]. Bone expansion, thinning and bone remodelling is commonly seen with mucoceles, aspergilloms and benign lesions. Bone erosion and extracranial extension is a hallmark of malignant disease. This requires MRI scanning to determine presence and extent of skull base and intracranial involvement.

Lesions involving sphenoid sinus, inflammatory or neoplastic, primary or infiltration from pituitary neoplasms, need proper radiological assessment and surgical planning.

They have been approached traditionally by neurosurgeons by transcranial or transnasal, transphenoid route. Transcranial route has much higher morbidity. ENT surgeons have approached them through external ethmoidectomy approach using operating microscope.

The excellent visualization and minimally invasive surgical technique of endoscopic sinus surgery has been applied for the management of sellar and parasellar region[19]. This not only offers advantage of improved visualization, but also provides magnification and a panoramic perspective of the important relationships of the sphenoid sinus and sella turcica. In many centers, the endoscope has replaced the operating microscope for surgery on pituitary adenomas and other sellar lesions[20,21]. This endoscopic technique is based on principals of functional endoscopic sinus surgery (FESS) which has become the technique of choice to treat benign or inflammatory diseases of paranasal sinuses resistant to medical therapy. The goal of this type of surgery is to open the obstructed sinus ostia and restore normal aeration and mucociliary clearance[22]. On the other hand, endoscopic sinus surgery may cause severe complications even when performed by a skilled surgeon. This is easily explained by the close vicinity of many functionally important structures to the operative site[23].

Advantages of Endonasal Endoscopic Technique

- Better illumination
- Better visualization
- Panoramic view
- Option of angled vision
- Minimally invasive
- Incisionless
- Quick postoperative recovery
- Minimal morbidity in experienced hands

Disadvantages of endonasal endoscopic technique

- Lack of binocular vision
- Lack of depth of field
- Requires endoscopic equipment and training in endoscopic surgery

CONCLUSION

Endonasal, endoscopic management of lesions of sphenoid sinus and pituitary gland has definite advantages over traditional approaches, even those using operating microscope. The combined use of imaging techniques like CT and MRI scan and diagnostic nasal endoscopy allows for accurate diagnosis and enables minimally invasive techniques to be tailored to the patient's disease. The technique described is minimally invasive, incisionless, allowing unsurpassed, unobstructed and panoramic view of the region of interest to the surgeon and the operative team. It can be performed safely and effectively with quick postoperative recovery and minimal morbidity.

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