

Pre-operative assessment of patients undergoing endoscopic, transnasal, transsphenoidal pituitary surgery

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Abstract

Objective: To demonstrate the importance of pre-operative ear, nose and throat assessment in patients undergoing endoscopic, transsphenoidal surgery for pituitary tumours.

Case reports: Literature pertaining to the pre-operative otorhinolaryngological assessment and management of patients undergoing endoscopic anterior skull base surgery is sparse. We describe two cases from our series of 59 patients undergoing endoscopic pituitary surgery. The first case involved a young male patient with a large pituitary macroadenoma. His main complaint was visual impairment. He had no previous history of sinonasal pathology and did not complain of any nasal symptoms during the pre-operative neurosurgical assessment. At the time of surgery, a purulent nasal discharge was seen emanating from both middle meati. Surgery was abandoned due to the risk of post-operative meningitis, and postponed until the patient's chronic rhinosinusitis was optimally managed. The second patient was a 47-year-old woman with a large pituitary macroadenoma, who presented to the neurosurgical department with a main complaint of diplopia. She too gave no history of previous nasal problems, and she underwent uneventful surgery using the endoscopic, transnasal approach. Two weeks after surgery, she presented to the emergency unit with severe epistaxis. A previous diagnosis of hereditary haemorrhagic telangiectasia was discovered, and further surgical and medical intervention was required before the epistaxis was finally controlled.

Conclusions: Pre-operative otorhinolaryngological assessment is essential prior to endoscopic pituitary or anterior skull base surgery. A thorough otorhinolaryngological history will determine whether any co-morbid diseases exist which could affect the surgical field. Nasal anatomy can be assessed via nasal endoscopy and sinusitis excluded. Computed tomography imaging is a valuable aid to decisions regarding additional procedures needed to optimise access to the pituitary fossa.

Key words: Hypophysectomy; Endoscope; Paranasal Sinuses; Otorhinolaryngologic Surgical Procedures; Computed Tomography

Introduction

Endoscopic, transnasal, transsphenoidal pituitary surgery is now commonly performed in many countries. During the early development of transnasal, transseptal, microscope-assisted surgery, the role of the ENT surgeon was limited and mainly restricted to identification of the rostrum of the sphenoid. Patients did not routinely undergo a pre-operative ENT assessment, and in many institutions the first encounter between the ENT surgeon and the patient was in the operating theatre. Literature pertaining to the pre-operative ENT assessment and management of patients undergoing endoscopic anterior skull base surgery is sparse. In many institutions, especially in developing countries with financial restrictions, only pre-operative magnetic resonance imaging (MRI) is requested by the neurosurgeon managing the patient.

The otolaryngologist's involvement in pituitary surgery has increased since the advent of the endoscopic, transnasal approach to the pituitary fossa.¹ Basic functional endoscopic sinus surgery principles apply, and the nasal mucosa should be preserved and safeguarded against mucosal

injury. The endoscopic approach carries an increased risk of mucosal trauma and subsequent adhesions. The four-handed technique allows for the simultaneous insertion of up to four instruments through both nostrils.² Movement of multiple instruments in a narrow nasal cavity can lead to mucosal injury. When two surgeons are working together, instruments are often inserted unguided by the endoscope. This can lead to inadvertent mucosal trauma, especially to the nasal septum and turbinates, increasing the risk of post-operative adhesions.

These problems had previously been avoided by the use of the operating microscope, with instruments usually being passed via a 'tunnel' created by the Killian speculum. It is sometimes necessary to improve access to the natural sphenoid ostium, pituitary fossa or skull base, and in these instances a septoplasty, septectomy, or middle or superior turbinectomy may be necessary, further increasing the risk of post-operative problems if not properly managed peri-operatively. Literature addressing potential post-operative ENT complications is sparse; only recently have articles mentioned the risks and incidence of post-operative nasal complications.³

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In our unit, we had not routinely used computed tomography (CT) to assess pre-operatively the bony surgical anatomy, due to cost factors. However, with the otolaryngologist's increasing participation in pituitary and other anterior skull base procedures, it is now important that the bony anatomy be properly evaluated pre-operatively. Sinus and septal anomalies can be identified and the sphenoid sinus septae better evaluated.

At our tertiary care institution, we perform an average of one endoscopic, transsphenoidal pituitary tumour resection per week. We replaced our operating microscope with an endoscope in January 2005, and since then have performed 59 such procedures. During the initial stages of our transition, patients were primarily managed peri-operatively by the neurosurgeon. Two incidences changed our pre-operative preparation of patients undergoing pituitary surgery, as reported below.

Report of two cases

Both of the patients in question were seen only by a neurosurgeon pre-operatively. Neither patient had any history of previous nasal pathology, nor did they volunteer any nasal complaints.

The first case involved a young male patient with a large pituitary macroadenoma. His main complaint was that of visual impairment. He had no previous history of sinonasal pathology and did not complain of any nasal symptoms during the pre-operative neurosurgical assessment. No constitutional signs were present.

However, at the time of surgery, purulent secretions were found emanating from both middle meati. The nasal mucosa was oedematous and inflamed, even after adequate nasal decongestion with a topical 1:1000 adrenaline solution.

Due to the risk of post-operative sepsis and meningitis, the procedure was abandoned and the patient treated for acute sinusitis. On questioning the patient post-operatively, he disclosed that he often suffered from a blocked nose but that this was not particularly bothersome, and he therefore had felt no need to mention it at his pre-operative visit. An MRI scan performed a few weeks prior to surgery had shown only mild bilateral osteomeatal complex opacification.

The patient was assessed at weekly intervals. Surgery was performed after nasal endoscopy revealed resolution of the underlying sinusitis.

The second patient was a 47-year-old woman with a large pituitary macroadenoma, who presented to the neurosurgical department with a main complaint of diplopia. She too gave no history of previous nasal problems.

The patient underwent uneventful surgery via the endoscopic, transnasal approach.

However, two weeks after surgery, the patient presented to the emergency unit with severe epistaxis. A thorough history was once again taken, revealing no previous history of epistaxis, bleeding disorders or a family history thereof. Examination under anaesthesia identified multiple bleeding points where the posterior septum had been resected and also on the face of the sphenoid sinus, from the posterior nasal artery. The bleeding points were cauterised and the sphenopalatine artery ligated on the side of the bleeding.

The patient's epistaxis was initially controlled, but she presented again one week later with continuous, generalised, low-flow venous bleeding from the posterior septum. On endoscopy, it was noted that she still had excessive fibrin formation in the surgical field and extensive adhesions.

All blood investigations were normal, and a haematologist was consulted. During the ensuing assessment and extensive enquiry into the family history, the haematologist discovered that the patient had suffered from severe gastrointestinal bleeding 20 years previously. Records revealed that she had required numerous endoscopic sclerotherapy procedures and blood transfusions. Extensive investigations had been undertaken at the time and a tentative diagnosis of hereditary haemorrhagic telangiectasia (also known as Rendu–Osler–Weber syndrome) had been made. The patient had not experienced any further problems until after her pituitary surgery.

Discussion

Pre-operative ENT assessment may have altered or improved the management of our two patients. Such an assessment would concentrate on specific nasal symptoms and signs, and would be much more likely to elicit nasal pathology if present.

Our first case demonstrates the fact that patients can suffer from chronic nasal disease and, having adapted to their condition, consider it 'normal'. Such cases of chronic nasal obstruction are usually discovered incidentally during a medical consultation for an unrelated problem. During an ENT consultation, symptoms and signs of nasal pathology, in this instance, chronic sinusitis, would be observed if present.

Our second patient suffered from hereditary haemorrhagic telangiectasia, an autosomal dominant disorder characterised by telangiectasia affecting cutaneous and mucosal surfaces.⁴ The most common manifestations of the disease are epistaxis and gastrointestinal haemorrhage.⁵ Autosomal dominant disorders can show two characteristic features: (1) delayed age of onset, and (2) variability in clinical expression.⁶ Our patient was asymptomatic between her episode of gastrointestinal bleeding 20 years earlier and her post-pituitary surgery epistaxis. The patient failed to disclose the history of gastro-intestinal bleeding and its diagnosis, and she did not consider this important or related. Endoscopic nasal examination may have revealed telangiectatic abnormalities of the nasal mucosa. The absence of ectatic vessels at surgery could have been due to the vasoconstrictive effect of the topical adrenaline used to prepare the nose pre-operatively. Post-operative endoscopy revealed only a few lesions intranasally, in areas not operated upon. The patient had no oral mucosal lesions except for a few small telangiectatic lesions on the lips.

This second patient continued to have minor, intermittent bleeds from the surgical site for two months, even after ligation of the sphenopalatine artery and its posterior septal branch. Fibrin deposits persisted for months after surgery, and she was the only patient of a series of 54 who developed adhesions. The adhesion formation simulated an intranasal Young's procedure, and this was probably the reason for eventual control of the epistaxis.⁷

Otolaryngologists should play a major role in the assessment and initial management of patients undergoing endoscopic, transnasal pituitary surgery. A detailed rhinological history, ENT examination, nasal endoscopy and sinus CT should be performed pre-operatively. At the pre-operative visit, the following should specifically be noted.

Firstly, concomitant nasal pathology should be treated adequately prior to anterior skull base surgery, in order to prevent post-operative infection and meningitis.

Secondly, any anatomical abnormalities or variants should be assessed during endoscopy and after reviewing the sinus CT. A septal deviation or concha bullosa can

limit access to the sphenoid sinus, and prior knowledge of these will assist pre-operative planning. A decision can be made on which nostril would be most suitable for multiple neurosurgical instrument manipulation and which for endoscope placement.

- **Otolaryngologists should play a major role in the assessment and initial management of patients undergoing endoscopic, transnasal pituitary surgery**
- **Concomitant nasal pathology should be treated adequately before anterior skull base surgery, in order to prevent post-operative infection and meningitis**
- **Anatomical abnormalities or variants can be assessed during endoscopy and after reviewing the sinus computed tomography scan**
- **A decision can be made on which nostril would be most suitable for multiple neurosurgical instrument manipulation and which for endoscope placement**

Thirdly, CT should be the modality of choice for evaluation of the paranasal sinuses and skull base anatomy, and assessment of the position of the sphenoid sinus septum.⁸ Magnetic resonance imaging alone cannot be reliably used as an operative 'road map' to guide the ENT surgeon during pituitary surgery.⁸ Knowledge of the sphenoid sinus septum insertion is essential in order to avoid injury to the carotid artery. The presence of an Onodi cell should also be looked for on the axial CT. In many institutions, CT imaging is routine, and necessary if neuronavigation is used during surgery.⁹ In South Africa, neuronavigational systems are not routinely available in tertiary state hospitals, and fluoroscopy is still used. Prior knowledge of the bony sphenoid anatomy and possible dehiscence of the carotid arteries or optic nerves can prevent unpleasant surprises and fatal complications.

Fourthly, post-operative nasal care should be emphasised at the first consultation. Post-operative management of the nasal cavity should be the same as for any endoscopic sinus surgery procedure. Patients should be warned against nose-blowing and given instructions on the use of nasal irrigation. Post-operative ENT complications such as cerebrospinal fluid leakage, septal perforation, adhesions and sinusitis should be discussed with the patient.

Conclusion

A synchronised, team approach to endoscopic, transnasal pituitary surgery is important. Pre-operative ENT assessment is essential prior to endoscopic pituitary or anterior skull base surgery. A thorough ENT history will determine whether any co-morbid diseases exist which could affect the surgical field. Nasal anatomy can be assessed using nasal endoscopy and CT imaging, and valuable decisions can be made regarding additional procedures needed to optimise access to the pituitary fossa. Computed

tomography imaging is invaluable in order to determine the presence of bony abnormalities, sinus septae and dehiscences over vital structures.

Post-operative assessment by an endoscopic surgeon is indicated in all cases. The nasal passages should be cleaned and any adhesions divided.

With more extensive anterior skull base surgery, the risk of permanent post-operative nasal sequelae increases. At present, it is uncertain whether there is an increased risk of developing chronic rhinosinusitis and atrophic rhinitis following extensive surgery. Turbinatectomies and septectomy can lead to an enlarged nasal cavity with abnormal nasal airflow and permanent nasal crusting. It is therefore imperative that an otolaryngologist be involved in the post-operative follow up and management of patients undergoing endoscopic anterior skull base surgery.

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