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Endoscopic pituitary adenomectomy

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Abstract
The authors' surgical technique for performing pituitary adenomectomy using the endoscopic transnasal approach is described.

Key words: Pituitary; Surgery; Endoscopic

Introduction

The evolution of pituitary surgery has been driven by the steady improvement in surgical equipment. Harvey Cushing is considered the father of pituitary surgery because of his introduction of the transseptal, transsphenoidal route from 1912 to 1925. However, he battled with the restricted view available, in the days before good artificial illumination and magnification, and ultimately reverted to a transfrontal craniotomy approach. The introduction of the operating microscope in the 1960s stimulated the move away from high morbidity transcranial surgical approaches. Transseptal and transethmoidal techniques became the standard approaches.

The endoscopic approach further refines this surgery, with improved visualization of the pituitary fossa and further reductions in morbidity.

Method

Preparation

Thorough decongestion of the nasal mucosa is essential. We use topical co-phenylcaine applied to the nasal mucosa when the patient is awake, 10 minutes before going through to the anaesthetic room, followed by 10 ml Moffat's solution instilled into the nasal cavity when the patient is anaesthetized in the reverse Trendelenburg position on the operating table, for 10 minutes. Further decongestion can be achieved by injecting a 1:10 000 solution of adrenaline using a spinal needle or by applying Moffat's solution on small neuropatties, as necessary.

Step 1: sphenoidotomy

The sphenoid sinus ostia are identified and enlarged using Stammberger sphenoidotomy punch forceps and Kerrison's and Hajek's punches, so that the front wall of the sphenoid is taken down to the level of the floor of the sphenoid sinus.

Step 2: resection of posterior septum and rostrum

To achieve good access to the sphenoid sinuses, it is necessary to remove the rostrum of the sphenoid. This is performed with a Killian's type incision 1 cm anterior to the front wall of the sphenoid. Use of a ball diathermy electrode minimizes mucosal bleeding. The muco-perichondrial flap raised from the incision to the sphenoidotomy is removed with a microdebrider. The bone of the posterior septum is carefully removed and sections preserved for potential use in closing the anterior wall of the pituitary fossa. The rostrum of the sphenoid is removed with Tillyhenkle's forceps and the muco-perichondrial flap on the opposite side to the incision is removed with the microdebrider. There should now be good access to the sphenoid sinus on both sides of the nose (Figure 1).

Step 3: identification of landmarks

The intrasphenoid sinus septae are highly variable but are visible on pre-operative magnetic resonance scans. The septae are reduced to allow access to the posterior wall of the sphenoid. In most cases, it is then possible to identify the positions of the carotid arteries, the bulge of the pituitary fossa and, possibly, the optic nerves in the sphenoid (Figure 2). Careful correlation of the pre-operative radiology and the observed anatomy usually allows accurate identification of the front wall of the pituitary fossa. However, the use of an image intensifier or a surgical navigation system will be necessary in a small minority of cases.

Step 4: opening of the pituitary fossa

The bone over the front wall of the pituitary may be thin if a tumour has caused local expansion but usually will require gentle drilling in the midline. When through the bone, the opening is enlarged with a Stammberger sphenoidotomy punch or Kerrison's forceps, without breeching the dura. The dura is opened in the midline, with a pointed diathermy needle, in the form of an X to allow entry into the pituitary fossa.

Step 5: adenomectomy

The pituitary fossa is explored using standard pituitary ring curettes. At this point, it is useful to have a second surgeon available to manipulate a sucker through the other nostril. Gentle manipulation of the ring curettes allows a soft pituitary adenoma to be gently teased out of the fossa. Normal pituitary gland appears yellower than tumour tissue and is more adherent to the walls of the fossa. This makes it

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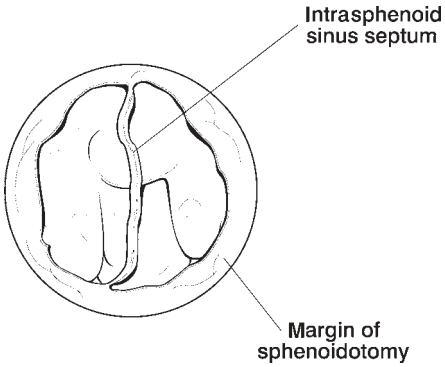

FIG. 1
View into sphenoid sinus after excision of rostrum

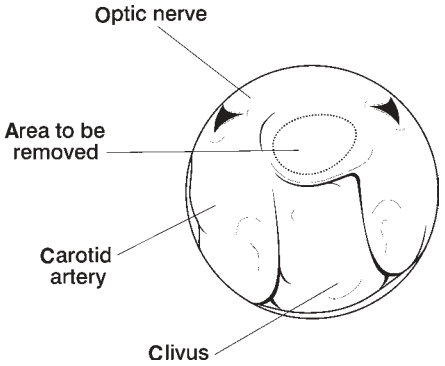

FIG. 2
View into sphenoid after excision of intra-sphenoid septum

possible to perform a selective adenomectomy and leave normal tissue behind. In cases with an expanded pituitary fossa, it is possible to look inside the pituitary fossa by positioning the tip of the endoscope inside the fossa. Care is taken not to breach the diaphram above the pituitary fossa. It is unusual for cerebrospinal fluid (CSF) to be encountered in the fossa.

Step 6: closure

Small balls of moistened curaspon (Curamedical, Amsterdam, Netherlands) are placed within the fossa. The dura of the anterior pituitary wall is not repaired but, if possible, the bony defect is repaired by placing a patch of bone taken from the posterior septum just inside the bony opening in the pituitary fossa wall. A flattened piece of moistened Spongistan is then placed over the opening into the pituitary fossa and the sphenoid sinus is packed with ribbon gauze. If there is no suggestion of a CSF leak, petroleum jelly coated ribbon gauze will suffice and can be removed after 24 hours. If there is excessive bleeding or concern about a CSF leak, a Bismuth & Iodoform Paste (BIPP) pack can be used as this can be left in situ for longer.

Post-operative management

Fluid balance is monitored to exclude diabetes insipidus and the patient is instructed not to blow his/her nose for 48 hours. A regime of steroid cover is required. This will vary with the pathology and is best done, along with the rest of the patient management, in conjunction with the endocrinologists.

Equipment required

The procedure requires: good quality endoscopes with three chip camera and monitor; neurosurgical pituitary instruments and standard functional endoscopic sinus surgery instruments; microdebrider; endoscrub with or without image intensifier; and surgical navigation equipment.

Discussion

The main advantage of the endoscopic approach is the improved view. The operating microscope gives good visualization of the anterior pituitary wall and the opening into the pituitary fossa, but the view inside the fossa is restricted by the size of the opening. The fish-eye lens of the endoscope allows a better view of the contents of the fossa. In cases with a small adenoma, the endoscope can be positioned right at the opening of the fossa. In cases in which the fossa has been expanded, the endoscope is placed inside the fossa, allowing better assessment of tumour clearance laterally towards the cavernous sinuses and superiorly towards the diaphragm.

The improved visualization of the anatomical landmarks inside the sphenoid sinus helps identify the anterior pituitary wall. This means that we have not needed to use surgical navigation equipment or an image intensifier in the majority of cases.

In our series thus far, the average operating time has been the same as that when using the transseptal approach (i.e. 1.25–1.5 hours). Patients have still been discharged on the second post-operative day, but there has been a reduction in morbidity in that there is no sublabial incision and the anterior septum is left undisturbed.

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