A direct transnasal approach to the sphenoid sinus

Technical note


Department of Neurosurgery, Frenchay Hospital, Bristol, England

The transsphenoidal route to the pituitary gland is well established in neurosurgical practice, and several approaches to the sphenoidal air sinus have been described. In this paper, the authors describe a technique that utilizes a direct route through the nasal cavity, thereby minimizing disruption of normal tissues.

KEY WORDS • pituitary gland • transnasal approach • transsphenoidal approach • nasal septum • operative approach

For the last 6 years, in over 150 cases, the direct transnasal approach to the sphenoid sinus has been the standard extracranial approach for pituitary tumors used by the first author (H.B.G.). This approach has been found to be rapid, effective, and safe with minimum disruption of normal tissues. The merits and demerits of the transsphenoidal route to the pituitary gland have been described in detail elsewhere. It is now an accepted technique for the treatment of a large variety of pituitary tumors. In this paper we do not review the advantages of the transsphenoidal route, but instead we describe a method of approach to the sphenoid sinus itself.

Anatomical Considerations

The posterior part of the nasal septum is made up of the perpendicular plate of the ethmoid bone and the vomer. The ethmoidal crest is a midline elevation on the anterior surface of the sphenoid bone which forms the front wall of the sphenoid sinus. This crest articulates with the upper part of the nasal septum formed by the ethmoid bone and is a useful landmark ("the prow") in this approach to the sphenoid sinus. The anterior nasal septum (much the larger part) is formed of fibrocartilage and is displaceable. The anterior nares vary in size and shape in different individuals. The margins of these openings are made up of cartilage and fibrous tissue, lined by skin. Although this imparts flexibility to the external nose, the ability of the external nares to stretch to facilitate instrumentation is sometimes restricted, so that a short lateral releasing incision along the junction of the nares with the cheek and half in and half outside the nostril is very occasionally necessary. This heals without a noticeable scar.

The mucosa lining the nasal cavity is thickest over the nasal septum and the turbinated bones. In the intervals between the spongy bones and on the floor of the nasal fossa it remains very thin.

Operative Techniques

A preoperative lateral skull x-ray film is performed routinely to confirm the extent of aeration of the sphenoid sinus. Computerized tomography also gives valuable information about the air cell configurations in the sphenoid sinus. X-ray guidance, however, is not routinely necessary.

The nasal cavity is packed with roll-gauze soaked in a solution of 5% cocaine and 1:2000 adrenaline, or is sprayed with a similar mixture. Orotracheal anesthesia with inhalation agents is used. The inhalation tube is best positioned at the left corner of the mouth. As an additional precaution, the oropharynx is packed with roll-gauze to prevent pulmonary aspiration of blood and mucus during the operation. The head of the patient is held in a horseshoe headrest and is turned slightly toward the operator, who sits to the patient’s right. Skin preparation of the external nose and nostrils is carried out with povidone-iodine and chlorhexidine, and the nasal pack is then removed. No preoperative nasal antibacterial preparation is used.
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A short nasal speculum is then introduced into the right nostril after its tips have been lubricated with providone-iodine solution. The operating microscope is introduced at this point. The nasal speculum is passed between the middle turbinate laterally and the nasal septum medially. The microscope provides the necessary illumination to guide the passage of the speculum and prevent tearing of the septal mucosa. Opening this speculum fully compresses the right middle turbinate laterally and enables the slightly everted tips of the second speculum to pass without abrading the nasal mucosa. When the posterior nasal cavity is reached, the tips of the speculum are closed and the posterior part of the septal bone is fractured across to the left as close as possible to the anterior surface of the sphenoid bone. This is achieved by forcibly turning the blade tips of the speculum to the left, and usually results in an associated tear in the septal nasal mucosa close to the ethmoidal crest on the anterior surface of the sphenoid bone (Fig. 1).

The first speculum is withdrawn and in its place the second (longer) speculum with everted tips is introduced. The “prow” of the sphenoid bone now comes into view on opening the speculum, and is a useful guide to the midline (Figs. 2 and 3). Occasionally there is a need to stop bleeding from the torn nasal mucosa with bipolar diathermy, but this is rarely troublesome. The sphenoid sinus is entered by removing its anterior wall with heavy rongeurs or with a small bone chisel if necessary. The operation then proceeds as for any other transsphenoidal approach.

At the end of the procedure, the dural defect of the pituitary fossa is occasionally repaired with a small piece of lyophilized human dura or with an autogenous fascia lata graft. This graft is held in place with a roll-gauze pack soaked in proflavine emulsion. The same material is used to pack the nasal cavity, the left half more than the right to encourage return of the nasal septum to the midline. This nasal pack and the pack holding the graft in place are removed after 48 hours. Systemic antibiotics are not given.

Discussion

This method of approaching the pituitary gland has proven to be less time-consuming and possibly less destructive to normal structures in the nasal cavity than the direct or sublabial transseptal techniques. In an ordinary uncomplicated case, the surgeon often finds himself entering the sella within 10 minutes of starting the procedure.

Postoperatively, the nasal septum usually returns to a nearly normal position and long-term complications attributable to the nasal septal fracture and the displacement have not been encountered. The longer speculum with everted tips (which was adapted from the Cushing...
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speculum) has slightly broader blades than the Hardy speculum (17 mm as opposed to 16 mm). The blades are slightly flatter than in the Hardy instrument; they enable a full-width inspection of the sellar face when mucosal tags, which may restrict the approach (particularly on the right side), have been trimmed away. When a hinged speculum of this type is opened, the width of the approach may be limited by the pyriform gap in the facial skeleton between the maxillae. Any method that preserves the anterior nasal septum, which this approach does, will compress the displaced cartilaginous anterior septum across to the contralateral side. This makes the pyriform opening slightly asymmetrical but, as the "prow" of the sphenoid is an accurate guide, there is no particular merit in rigorous adherence to the midline which is necessary in the sublabial or submucosal approaches.

Of 100 patients questioned at follow-up examination about their nasal airway, 85 said it was unchanged compared with preoperatively, 12 said it was better than before surgery, and three said it was not as good. All patients were able to breathe through both nostrils. Two of our last 150 patients had delayed epistaxis (more than 1 week after operation); this stopped spontaneously in one case and needed repacking in the other. No other hematomas and no postoperative infections

have come to light. In the rare cases of cerebrospinal fluid leak, reoperation to reposition the sellar or dural graft has caused no further difficulties.

References


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Address reprint requests to: Huw B. Griffith, F.R.C.P., F.R.C.S., Department of Neurosurgery, Frenchay Hospital, Bristol BS16 1LE, England.