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Operative Techniques in

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Endoscopic-Assisted Transsphenoidal Surgery: Operative Techniques

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Addition of the endoscope to the transsphenoidal approach for resection of sellar lesions can improve visualization by providing better illumination and wider views of the surgical field. This article describes the indications, instrumentation, and operative techniques for endoscopic-assisted transsphenoidal surgery
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The transsphenoidal approach has become the standard route to access sellar masses. For most neurosurgeons, the microscope provides a familiar view that has proven effective and safe for the removal of most tumors. However, the relatively long, dark, and narrow transsphenoidal corridor complicates visualization in some patients. Microneurosurgeons are accustomed to seeing only the face of the sella and extracting the tumor using instruments that pass beyond their vision within the sella or that even extend well above the sella. Nonetheless, improved visualization in surgery is always welcomed and may improve tumor removal.

In the course of performing endoscopic sinus surgery, otolaryngological surgeons have long used the endoscope to access the anatomy of the transsphenoidal approach.[1-3] The endoscope provides significant advantages in terms of its ability to bring illumination and magnification to the point of interest. Its wide viewing angle also provides a panoramic view of the sphenoid sinus, the face of the pituitary gland, and the interior of the tumor cavity in trajectories unavailable to the microscope. The approach used with the endoscope is typically direct, often requiring less dissection than is required when using the microscope to view the same pathology.[4] Transsphenoidal surgery can be performed with the endoscope alone (endoscopic controlled) or with the microscope and the adjunctive use of the endoscope (endoscopic assistance).

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Indications

The indications for the endoscopic transsphenoidal approach are identical to those for standard transsphenoidal surgery, including patients with masses in the sella turcica who are not candidates for medical therapy alone. The preoperative evaluation of patients should begin with a thorough history and physical examination and a complete panel of endocrinological laboratory studies. When time permits, preoperative consultation with an endocrinologist and often a neuroophthalmologist is recommended.

Instrumentation

The instrumentation used for the endoscopic transsphenoidal approach is identical to that used for the microscopic approach, with the exception of the endoscope itself. Various commercially available endoscopes can be used for this application. We prefer the endoscope designed by Perneczky (Aesculap, Tuttlingen, Germany). The endoscope is held in a pistol-grip configuration and is easily removed for the frequent cleaning that is required. The shaft is sturdier than that of endoscopes used for intraventricular work. Intraventricular endoscopes are delicate and should not be used for transsphenoidal work; the risk of breaking the rod lens is too great. Furthermore, these endoscopes have no working channel. All working instruments are introduced parallel to the endoscope.

For the approach phase of the operation, 0-degree endoscopes are used. Once the sphenoid sinus has been opened, a 30- or 70-degree endoscope can also be used.

Operative Technique

In most cases, the transnasal transsphenoidal approach is preferred. A unilateral or bilateral nostril approach may be

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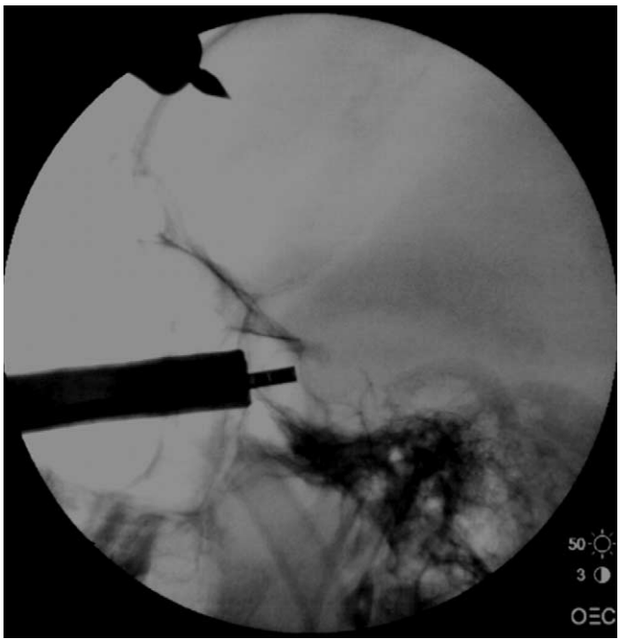

Figure 1 Lateral fluoroscopic radiograph shows the endoscope at the level of the sphenoid below an expanded sella.

used. For several reasons, preoperative preparation of the nasal mucosa with pledgets soaked in a 4% cocaine solution or oxymetazoline hydrochloride nasal spray is particularly valuable. Retractors are seldom used, and the endoscopes can abrade the mucosa and cause bleeding that can obstruct the view of the endoscope. This feature frustrates most novice transsphenoidal endoscopists. During this surgery, frequent and repeated cleansing of the endoscope is required.

The patient is placed supine with the neck mildly extended. The head is laterally bent away to tilt the nose slightly toward the surgeon. The head of the bed is elevated 15 to 20 degrees, which helps control bleeding. The oropharynx is packed with gauze to prevent runoff into the esophagus or trachea. Fluoroscopic guidance, frameless stereotactic guidance, or both can help confirm the trajectory to the sella (Fig. 1). Image guidance can be especially helpful for reoperations and large or invasive tumors. The approach to the sella can be performed by the neurosurgeon or with the assistance of an otolaryngologist according to the surgeon's preference.

Depending on the patient's anatomy, it may be helpful to outfracture or resect the middle turbinate process, to fracture the cartilaginous septum away from the working side, or both. These maneuvers help expose the anterior wall of the sphenoid sinus. At the back of the nasal cavity, the sphenoid ostia may be visualized, providing additional anatomical confirmation that the surgeon is following the proper trajectory to the sella (Figs. 2 and 3).

The ostia are widened with a Kerrison rongeur, and the bone of the vomer is removed between the ostia, providing access to the sphenoid sinus itself. This bone is saved to use during closure. The septum is removed from the interior of the sinus, along with the mucosa overlying the face of the sella. The relationship of the septum to the midline should be checked against the preoperative imaging. In some patients it is markedly asymmetric; failure to recognize this configuration can lead the surgeon to open off midline. Doing so can

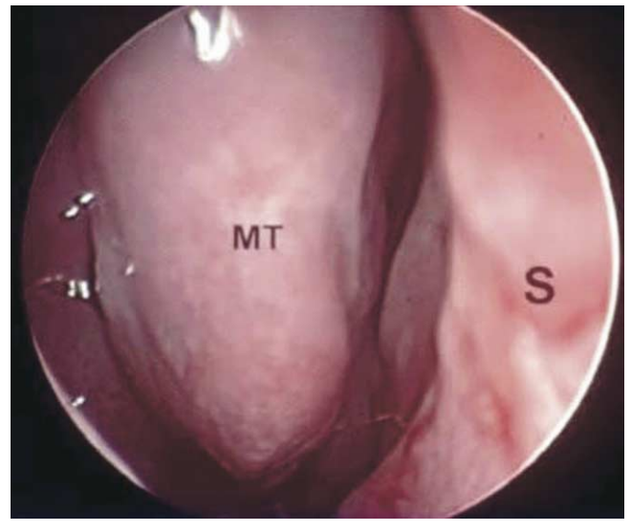

Figure 2 Intraoperative photograph shows endoscopic view of the middle turbinate (MT) and septum (S). (Color version of figure is available online.)

hamper obtaining the ideal exposure, cause troublesome bleeding from the cavernous sinus, or cause disastrous bleeding from the internal carotid arteries.

Once the mucosa is denuded from the walls of the sphenoid sinus, the bulge of the sella becomes apparent. To either side, the impressions of the carotid arteries are seen, with the optic nerves above them. These landmarks are easily verified even with a 0-degree endoscope because of its wide angle of view. The 30-degree endoscope provides a lateral view of the sphenoid never visible with the microscope. This portion of the procedure may be performed with the microscope or endoscope (Fig. 4).

The endoscopic view of the sella is somewhat fish-eyed and takes getting used to. Because much of the learning curve in working with this view is overcome during the first several exposures to it, preoperative practice in the anatomy laboratory should be considered. When accustomed to the micro-

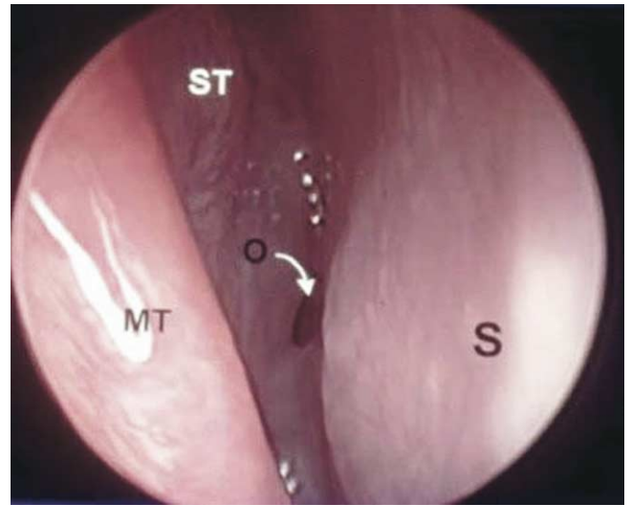

Figure 3 Intraoperative photograph shows the relationship of the ostia (O) to the middle turbinate (MT) and septum (S). ST = pituitary stalk. (Color version of figure is available online.)