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The transseptal approach to the pituitary gland

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SUMMARY

Transseptal, transsphenoidal pituitary surgery is safe and effective in the management of various problems associated with the region of the sella turcica. This series includes 285 operations on 272 patients treated from Sept. 1, 1972, to Sept. 1, 1976. The operative mortality was 1.75%. In every patient, the anatomy should be assessed preoperatively by polytomograms of the sella and the sphenoid sinus and by bilateral carotid angiography. The operating microscope and intraoperative x-ray control with the image-intensifier are essentials. Pneumoencephalography is performed whenever the possibility of an empty sella or arachnoidal cyst exists and when angiography does not satisfactorily outline the suprasellar extension of large pituitary tumors. Computerized tomographic scanning is also of value.

A new group of pathologic problems, namely microadenomas (tumors less than 1 cm in diameter), has now become amenable to transseptal surgical management. This series includes a group of 50 patients with microadenomas: 45 with functioning pituitary adenomas and 5 with nonfunctioning pituitary adenomas.

The transfrontal intracranial surgical approach also has specific indications. This choice is determined by the anatomy and the extent and nature of the pathologic lesion.

The rhinologic concepts of exposure and reconstruction are modifications of the "maxilla-premaxilla" (Cottle) approach to the nasal septum. This allows direct midline access to the sphenoid sinus and sella turcica while preserving both the caudal end of the nasal septum and the anterior nasal spine, thereby minimizing rhinologic airway and cosmetic complications. We believe that, by combining the talents of the neurosurgeon, endocrinologist, neuroradiologist, ophthalmologist, and rhinologist, this procedure can be offered to patients with a wide range of disorders and excellent results may be anticipated.

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Basic rhinologic principles (Cottle et al., 1958) are utilized for the transseptal approach to the pituitary gland. This extracranial approach to the sella turcica and pituitary gland has been in use for more than half a century. Large series of patients have undergone operation by an extracranial method dating back to the work of Cushing, Dott, and Hirsch (Cushing, 1909, 1913, 1914, 1932; Dott and Bailey, 1925; German and Flanigan, 1964; Henderson, 1939; Hirsch, 1910, 1930, 1959).

The limitations of this technique for the early workers resulted from the lack of steroid replacement and the absence of antibiotic therapy. Recently, however, Guiot and Hardy renewed the interest in the transseptal approach to the sella turcica when they contributed the technical advances of the x-ray image-intensifier and the operating microscope (Guiot, 1973; Guiot and Bouche, 1973; Guiot and Cheibani, 1972; Guiot et al., 1968; Hardy, 1969, 1973a, 1973b). Because of the advances in neurosurgery, neuroradiology, endocrinology, and rhinology, the transseptal approach to the pituitary gland has seen a reawakening in the surgical management of pituitary tumors and related disorders.

We wish to report our 4-year experience involving 285 operations on 272 patients (Table 1) using a modification of the "maxilla-premaxilla" approach to extensive surgery of the nasal septum (Cottle et al., 1958).

Table 1. Clinical Entities Treated by Transseptal Approach to Pituitary Gland (Sept. 1, 1972 to Sept. 1, 1976)

Entity	No.	
Pituitary adenoma (77% of all cases)		209
Functioning	116	
Acromegaly	(64)	
Galactorrhea	(24)	
Cushing's disease	(15)	
Nelson-Salassa syndrome	(13)	
Nonfunctioning	92	
Malignant	1	
Other (23% of all cases)		63
Craniopharyngioma	16	
Hypophysectomy	15	
Metastatic carcinoma	(12)	
Diabetic retinopathy	(3)	
Cerebrospinal fluid rhinorrhea	7	
Chordoma of clivus	5	
Empty sella	5	
Arachnoid cyst of sella	4	
Miscellaneous lesions	11*	
Total		272

* Sphenoid carcinoma 2, sphenoid cyst 1, sphenoid mucocele 1, sphenoid meningioma 1, cavernous hemangiona 1, nasal glioma 1, myeloma 1, fibrous dysplasia 1, ectopic pinealoma 1, cholesteatoma of clivus 1.

INDICATIONS

The transseptal, transsphenoidal approach to the sella turcica is useful in the management of sellar and parasellar lesions, microadenomas, sphenoid sinus lesions, and cerebrospinal rhinorrhea (from sphenoid sinus region) and also may be suitable for ablative procedures (hypophysectomy).

ADVANTAGES

The transseptal approach offers a safe, rapid midline access to the sella and parasellar region with a minimized risk of hemorrhage and concomitant trauma to the brain, especially when compared with craniotomy. The approach allows a direct, magnified visualization of the operative region using the microscope, with a rapid postoperative recovery. There are no external scars, and nasal tissues are preserved and reconstructed, thereby minimizing postoperative nasal sequelae.

PATIENT EVALUATION

Each patient undergoes appropriate testing to determine endocrine function. The endocrinologist is an important member of the team undertaking the management of patients with sellar and parasellar disease. The endocrinologist assesses endocrine function; determinations usually involve growth hormone, prolactin, follicle-stimulating hormone, luteinizing hormone, thyroid-stimulating hormone, adrenocorticotropic hormone, plasma corticosteroids (a.m. and p.m. levels), total thyroxine, testosterone, estrogen, urinary ketogenic steroids and 17-hydroxysteroids, and plasma and urine osmolality. Other more sophisticated provocative testing may be performed if indicated.

The rhinologic evaluation includes the rhinologic history, physical examination of the internal and external nasal structures, indirect mirror examination of the nasopharynx, photographic evaluation of the patient (preoperative photographs include the anteroposterior and right and left lateral views, smiling lateral view, base view, and enlarged lateral view), rhinomanometry to estimate the patient's nasal respiratory function, and olfactory testing.

The neuroradiologic examinations include plain roentgenograms of the skull and sinuses, polytomograms of the sphenoid sinus and sella turcica (anteroposterior and lateral views), a computerized tomographic scan of the head and angiography, which usually includes bilateral carotid arteriograms with magnification and subtraction techniques. Vertebral arteriograms are occasionally done. Pneumoencephalography is rarely necessary before operation; this study can be performed intraoperatively when suprasellar extension of a pathologic lesion is present or suspected.

The neuro-ophthalmologic evaluation includes funduscopic examination and determination of visual acuity and visual fields. These studies are performed on all patients.

PREOPERATIVE MANAGEMENT

Routine procedures include nasopharyngeal culture, cortisone preparation, and use of an indwelling urinary catheter and prophylactic antibiotics. The antibiotics are administered the morning of surgery and are maintained until the nasal packing is removed.

PATIENT DISCUSSION

A frank, open discussion involving the risk to life and the possible morbidity is carried out with the patient and his family. Morbidity may involve cerebrospinal fluid rhinorrhea and possible nasal cosmetic and nasal airway changes secondary to the transnasal approach, and other serious complications are also possible. Subsequent surgery may be required, and this possibility is discussed with the patient. We have prepared a videotape and reading material for patient information. These materials help allay the patient's fears by providing a realistic view of the events that are to occur.

SURGICAL TECHNIQUES

Rhinologic Surgical Opening. We think that septal surgery is easier to accomplish through a septal incision than through the sublabial approach. After the septal portion is completed, the sublabial approach is used to gain wider access to the face of the sphenoid and facilitates introduction of the self-retaining transsphenoidal speculum. The details of the rhinologic approach are important, and one who is not familiar with the exact approach but who is familiar with septal surgery can understand and perform this procedure safely and accurately.

The patient is placed in a semirecumbent position on the operating table, and a Mayfield headrest with a horseshoe support for the occiput and an external swivel at the base of the horseshoe are utilized. The patient is positioned so that the left ear is cocked downward toward the left shoulder, thus allowing the surgeon a more comfortable midline approach to the patient's nose and head. If suprasellar extension of a pituitary tumor is anticipated, an intraoperative pneumoencephalogram may be accomplished by injecting air through a malleable needle that has been placed into the lumbar subarachnoid space (a special split mattress is utilized so that the needle remains undisturbed).

Once the endotracheal tube is in place, the oropharynx is carefully packed with cotton gauze to prevent the accumulation of blood in the oropharynx and eventually in the stomach.

After preparation of the skin of the face and upper gingiva with an aqueous-based antiseptic solution, the vibrissae are trimmed and the nostrils are packed with pledgets of cotton gauze soaked in 5% cocaine solution; no more than 5 ml or a total of 250 mg of cocaine are used. These pledgets are inserted with a

nasal speculum and bayonet forceps and are allowed to lie in contact with the nasal mucosa for 5 to 10 minutes while the remainder of the draping is com-

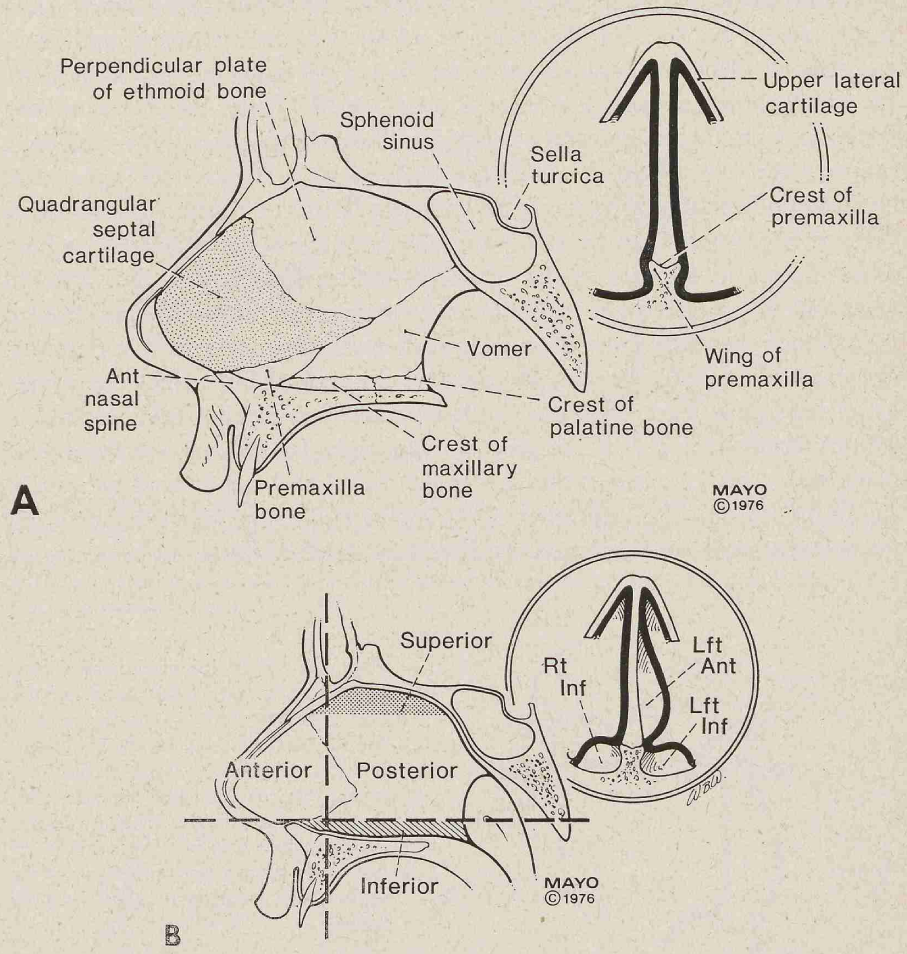


Figure 1. **A**, Pertinent terms and structural anatomy. **B**, Schematic drawing dividing the nose and nasal septum into anterior, posterior, superior, and inferior portions. Anterior portion of septum is that part of the nose anterior to an imaginary vertical line drawn from the proximal end of the nasal bones down to the hard palate. Inferior portion is that area of the septum and floor of the nose which lies below the articulation or the septal quadrangular cartilage with the anterior nasal (maxillary) spine and the crest and wings of the premaxilla. Superior refers to the portion of the septum that is in the region of the cribriform area. A left anterior tunnel would be a mucosal flap elevated from the left side of the septum back to the imaginary line that divides anterior from posterior. Beyond that imaginary line, the mucosal elevation on the same side would be called a left posterior tunnel. Mucosa elevated from the floor of the nose up to the region of the articulation of the septal quadrangular cartilage, with the anterior nasal spine and premaxillary wings, would be an inferior tunnel. If it is created on the right side, it would be a right inferior tunnel; if created on the left side, it would be a left inferior tunnel.

pleted. A solution of 0.5% lidocaine in 1:200,000 epinephrine is injected into the operative field. With a 25-gauge needle, 8 to 10 ml of this solution are infiltrated along the upper gingiva, the caudal end of the nasal septum, and finally along the floor of the nose. In addition to its anesthetic and vasoconstrictive effect, the solution serves to dissect the nasal mucosa away from the cartilaginous septum. Exposure is accomplished under direct vision with the aid of a nasal speculum and a headlight. The main purpose of the rhinologic exposure is to elevate the mucosal flaps (or tunnels) so the anterior septum can be moved off the anterior nasal spine and crest of the premaxilla, thus allowing the posterior septum to be removed. The removal of the posterior septum allows access to the face of the sphenoid and subsequently to the sphenoid sinus and sella turcica. The pertinent anatomy and submucosal tunnels needed to approach the face of the sphenoid are schematically represented in Figure 1. For the right-handed surgeon standing on the right side, a right hemitransfixion incision is made after the Cottle columellar clamp has been applied to identify the caudal end of the septum. This right hemitransfixion incision is made with a no. 15 blade in the skin of the nose 1 to 2 mm behind the caudal end of the septum. The columellar clamp is held in the surgeon's left hand while the assistant holds an alar protector (Figure 2). A left anterior tunnel is created

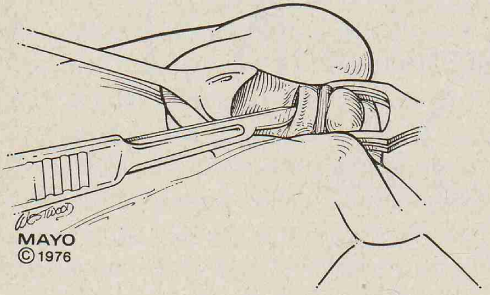


Figure 2. With the columellar clamp held in the surgeon's left hand and the alar protector held by the assistant, a no. 15 blade is used for the intranasal incision about 1 to 2 mm behind the caudal end of the nasal septum. This right hemitransfixion incision begins the operation and will be followed by dissection around the caudal end of the septum and creation of a left anterior tunnel.

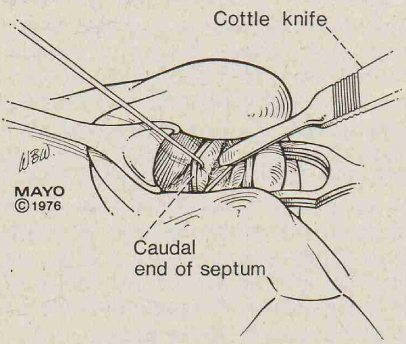


Figure 3. Through the hemitransfixion incision, the septal quadrangular cartilage is retracted to the right with a hook. A Cottle knife is used to begin the left anterior tunnel by sharp dissection beneath the mucoperichondrium of the septal cartilage.

by sharp dissection with a Cottle knife beneath the mucoperichondrium of the septal cartilage. As the dissection continues, this left anterior tunnel becomes a left anterior and posterior tunnel with elevation of the mucoperiosteum of

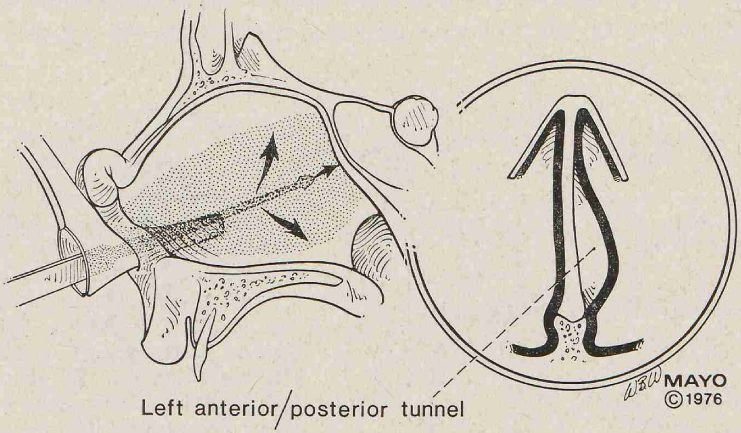


Figure 4. With a nasal speculum placed through the hemitransfixion incision into the left anterior tunnel, a Cottle elevator is used to continue the mucoperichondrial and mucoperiosteal elevation back to the face of the sphenoid. This entire mucoperichondrial and mucoperiosteal tunnel is called the "left anterior and posterior tunnel." *Inset*, Schematic demonstration of left-sided tunnel.

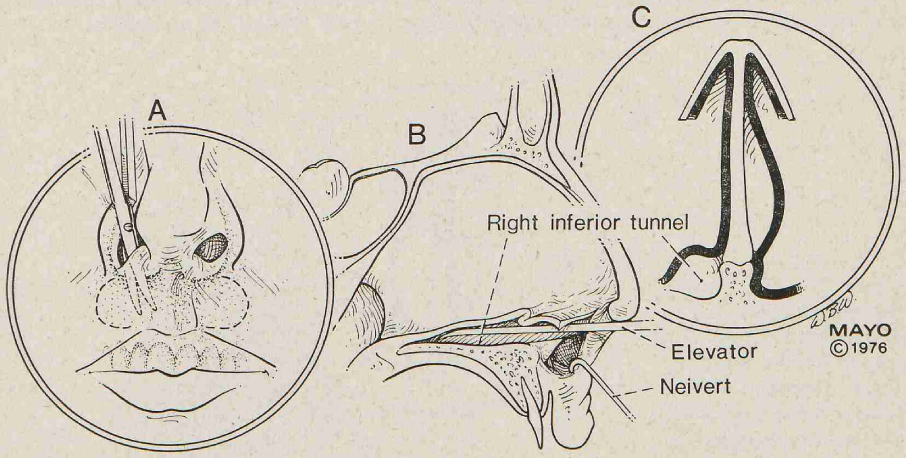


Figure 5. **A**, Lip is undermined with a Knapp scissors to allow exposure of the anterior nasal spine and the floor of the nose (within limits shown by dotted lines) so a right inferior tunnel can be created. **B**, A narrow Neivert retractor is inserted into the hemitransfixion incision, retracting the soft tissues to expose the anterior nasal spine, the pyriform aperture, and floor of the nose on the right. A curved Cottle elevator is used to elevate the mucosa along the floor of the nose, thereby developing a right inferior tunnel. **C**, Demonstrating both left anterior and posterior tunnels and right inferior tunnel.

the perpendicular plate of the ethmoid and the vomer in the posterior portion of the nose (Figures 3 and 4). The lip is undermined by elevating the tip of the nose with the left hand and by placing Knapp scissors into the hemitransfixion incision between the oral mucosa and the orbicularis oris muscle anterior

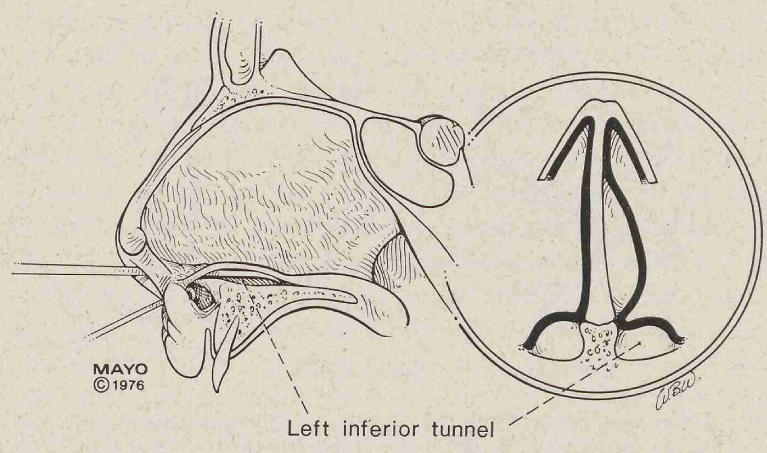


Figure 6. Crest of the pyriform aperture is identified, and a curved Cottle elevator is used to elevate the mucosa along the floor of the nose on the left, thereby creating the left inferior tunnel. At this stage, three tunnels have been developed: first, the left anterior and posterior tunnel; second, the right inferior tunnel; and third, the left inferior tunnel. Note that the left-sided tunnels are not connected, for the tissue is firmly adherent to the osseous and cartilaginous joint region between the quadrangular cartilage and the crest of the premaxilla.

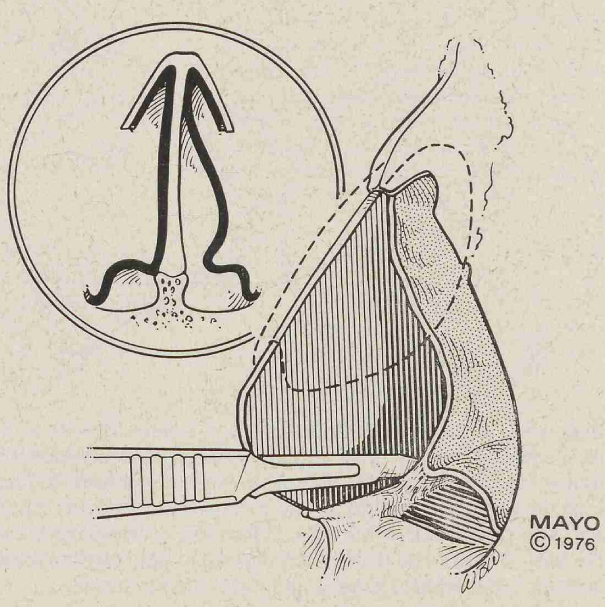


Figure 7. This drawing demonstrates the joining of the left anterior with the left inferior tunnel by sharp dissection of the fibrous tissue that binds the mucosa in this area to the crest of the premaxilla. Care must be taken not to perforate the mucosa here. *Inset*, Schematic demonstration of the joining of the left anterior tunnel with the left inferior tunnel.

to the nasal spine. The nasal spine is exposed, and a right inferior tunnel is created along the floor of the nose on the right side (Figure 5). A left inferior tunnel is then developed (Figure 6) by elevating the mucosa off the floor of the nose on the left side with a curved Cottle elevator. The left inferior tunnel is joined with the left anterior and posterior tunnel on the left by careful sharp

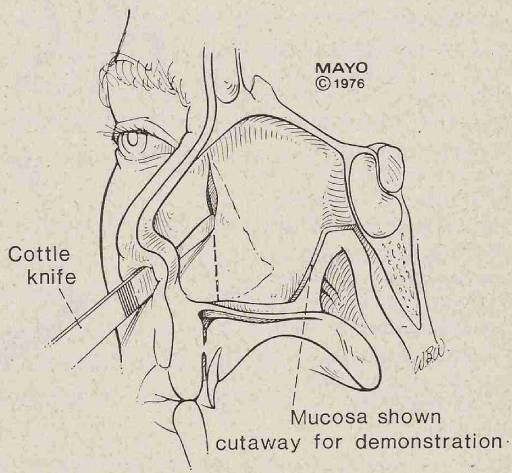


Figure 8. With the instruments in the left anterior tunnel, a vertical incision is made through the quadrangular cartilage caudal to the perpendicular plate of the ethmoid. The incision is made 2 to 3 cm behind the caudal end of the septum. Incision should be made carefully so that the mucosa on the right side of the nose is not perforated. This incision will allow access to the right side of the septum so a right posterior tunnel can be elevated before the posterior portion of the septum can be removed.

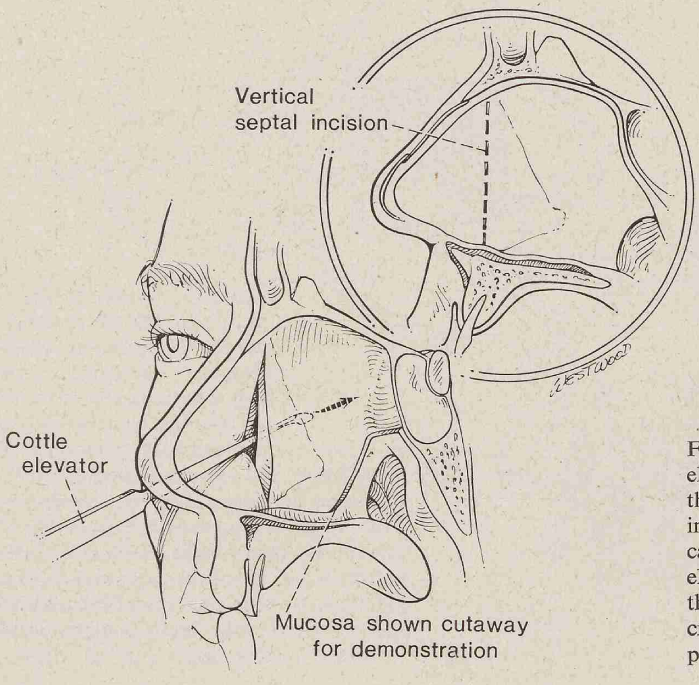


Figure 9. Cottle elevator is placed through the vertical incision in the cartilage, and the elevation is begun on the right side, thereby creating the right posterior tunnel.

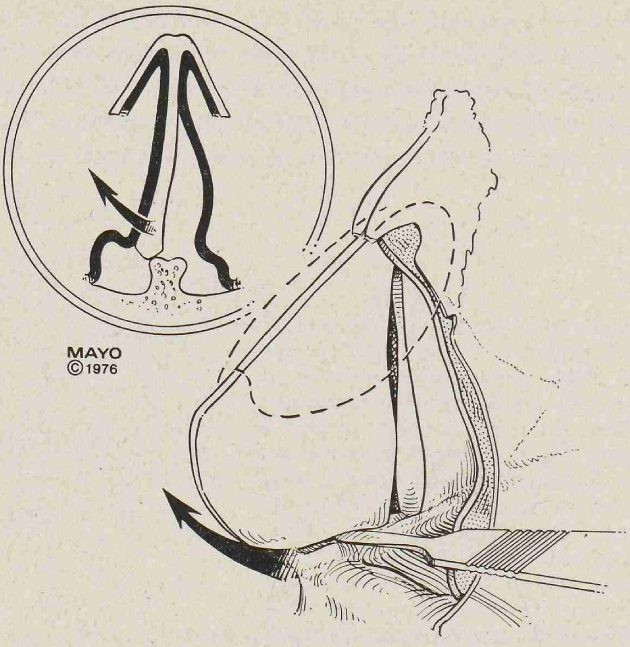


Figure 10. Caudal end of the septum is disarticulated from its attachment to the anterior nasal spine and crest of the premaxilla and vomer. This allows the caudal end of the septum, with mucosa attached on the right anteriorly, to be swung into the right nasal chamber. Mucosa has been elevated away from both sides of the posterior septum. Posterior septum can now be removed back to the face of the sphenoid.

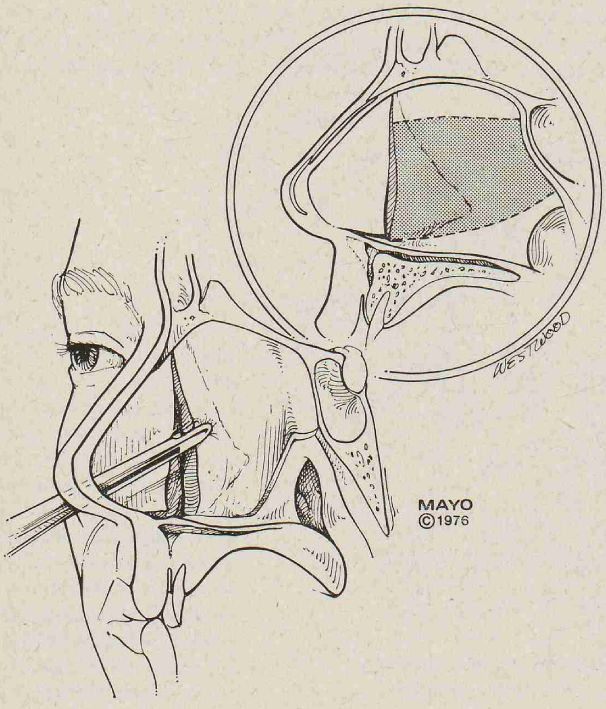


Figure 11. Posterior septum (including the posterior aspect of the septal quadrangular cartilage), the bony perpendicular plate of the ethmoid, and vomer are removed back to the face of the sphenoid (shaded area). Mucosa had been previously elevated from both sides of the posterior septum. Caudal end of the septum has been previously disarticulated and swung into the right nasal chamber.

dissection (Figure 7). With a Cottle knife, a vertical incision is then made in the septal cartilage, caudal to the perpendicular plate of the ethmoid at a point approximately 2 to 3 cm behind the caudal end of the septum (Figure 8). With a Cottle elevator, the right posterior tunnel is then fashioned beneath the mucoperichondrium and mucoperiosteum on the right side of the nasal septum posteriorly (Figure 9). The caudal end of the septum is then dislocated from its attachments to the anterior nasal spine and the crest of the premaxilla and to the vomer by sharp dissection. This caudal end of the septum with its mucosa attached on the right side is swung into the right nasal chamber (Figure 10). At this juncture, the posterior aspect of the quadrangular cartilage, the perpendicular plate of the ethmoid, and the vomer are removed with a Koffler-Lillie bone forceps (Figure 11).

Once this portion of the operation has been completed, several cotton pledgets soaked in 5% cocaine solution are placed in the intraseptal space between the flaps, and attention is then directed to the sublabial region. The lip is elevated, and an incision is made from the canine fossa on one side to the canine fossa on the opposite side above the first premolar teeth. This incision is made in the mucosa, 1 to 2 cm above the buccogingival fold, with a no. 15 surgical blade (Figure 12).

Through the sublabial incision, the septal space is entered, the cocaine-soaked

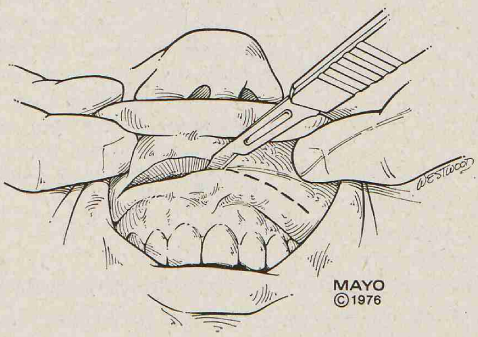
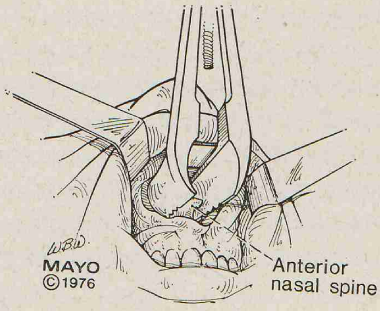


Figure 12. With the lip elevated, an incision is made approximately 1 to 2 cm above the buccogingival fold from the canine fossa to the canine fossa above the first premolar teeth on each side.

Figure 13. Transsphenoidal speculum has been inserted into the septal space straddling the anterior nasal spine and the crest of the premaxilla. Speculum is in the anterior septal space between the left mucosal flap and the caudal end of the septum on the right. Posteriorly, speculum is in the septal space between both left and right mucosal flaps.



cotton pledgets are removed, and the transsphenoidal speculum is introduced (Figure 13). At this time, the face of the sphenoid is identified. Usually, a lateral roentgenographic view of the skull is obtained or a portable x-ray image-intensifier is used to determine the anatomic relationships and bony landmarks. Any maneuvers necessary to correct the position of the transsphenoidal speculum are made, and the operating microscope is introduced. The sphenoid sinus is entered by using a chisel and mallet, and the face of the sphenoid is further opened with a sphenoid punch (Figure 14). Frequently, it is possible to fracture into the sphenoid by grasping the vomer or rostrum of the sphenoid with a grasping forceps and removing it.

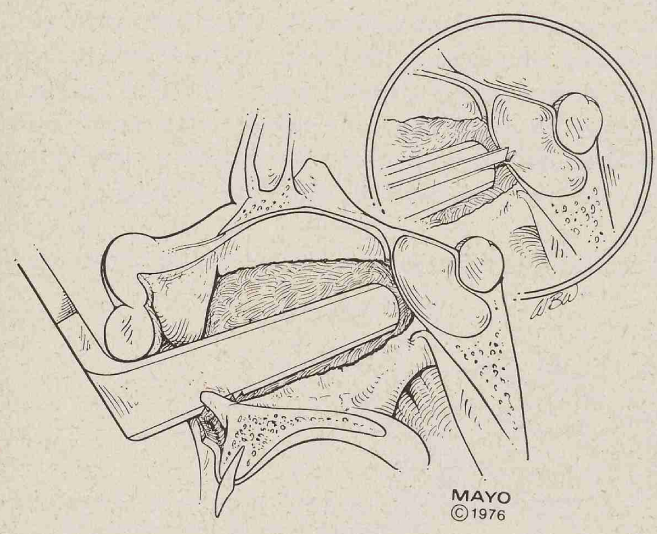


Figure 14. This lateral view shows speculum in the septal space, and the posterior portion of the septum has been removed, allowing direct access to the face of the sphenoid sinus. *Inset*, A chisel is used to remove the anterior wall or face of the sphenoid so that entrance may be gained into the sphenoid sinus. Opening in the face of the sphenoid can be enlarged with a sphenoid punch.

Neurosurgical Technique. A schematic representation of the room arrangement used for the neurosurgical portion of the technique is shown in Figure 15. Once the operating microscope is introduced, the neurosurgeon usually completes the opening into the sphenoid sinus, exposing the floor of the sella. The preoperative polytomograms of the sphenoid sinus are helpful in determining the anatomy and internal landmarks to be visualized. The operative approach may need to be adjusted if anomalies of the sphenoid sinus are present. The mucosa within the sphenoid sinus is removed using a cup forceps. This measure reduces bleeding and probably decreases the risk of postoperative formation of a mucocele. The floor of the sella is clearly visualized, and use of the portable x-ray image-intensifier allows confirmation of the inferior and superior limits of the sella.

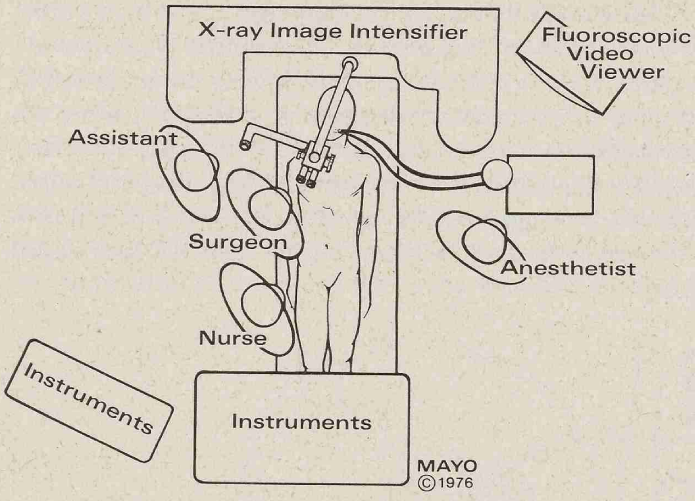


Figure 15. Schematic representation of the operating troom arrangement during the neurosurgical portion of the procedure. Operating microscope has been introduced into the field before the x-ray image-intensifier is brought into position for use during the procedure.

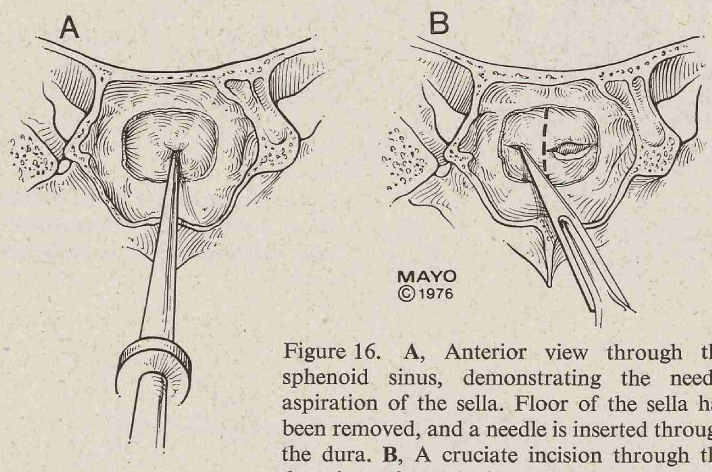


Figure 16. **A**, Anterior view through the sphenoid sinus, demonstrating the needle aspiration of the sella. Floor of the sella has been removed, and a needle is inserted through the dura. **B**, A cruciate incision through the dura is performed after dura has been cauterized.

In some patients with tumors, the face of the sella has been eroded or is so thin that it can be easily fractured with a blunt nerve hook. Occasionally, a chisel or even a drill is used to enter the floor of the sella. A right-angle punch completes the removal of the sellar floor and exposes the dura of the sella. Excellent visualization of the sella is obtained using the operating microscope with a 300-mm objective lens and a 12.5 × ocular lens. The magnification is usually set at 6 or 10 ×. Needle aspiration of the sella is performed under x-ray control (Figure 16**A**) to be certain that there is no aneurysm within the sella and to detect either a cystic tumor or an empty sella. Once the dural exposure is

complete, the dura is cauterized with a suction cautery device, and then a dural incision is made in a cruciate fashion (Figure 16**B**). The subdural plane of cleavage is defined. The dural leaves are then coagulated, leaving an unobstructed view of the sella (Figure 17). Intrasellar dissection is performed, using the appropriate instruments, x-ray control, and extreme care (Figure 18). After removal of the tumor, the sella or tumor cavity is packed with allograft (homograft) muscle, which can be tagged with a tantalum clip for postoperative identification. The muscle is secured in place with a stent of nasal septal

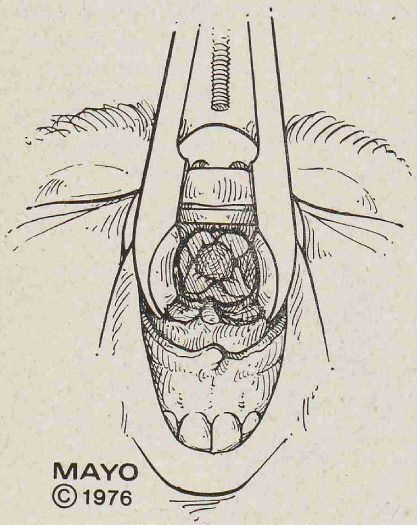


Figure 17. Anterior view demonstrating direct unobstructed midline path to the sella with preservation of the anterior nasal spine.

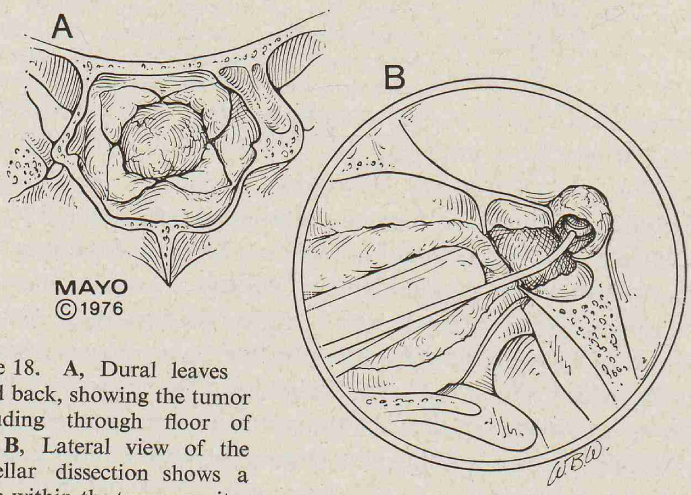


Figure 18. **A**, Dural leaves turned back, showing the tumor protruding through floor of sella. **B**, Lateral view of the intrasellar dissection shows a curette within the tumor cavity.

cartilage or bone (Figure 19). If there is an intraoperative cerebrospinal fluid leak, allograft muscle is also packed into the sphenoid sinus.

Rhinologic Surgical Technique of Closure. After the neurosurgical portion of the procedure has been completed, the rhinologic surgeon reconstructs the nose. Attention is first directed to the region of the sublabial incision. A 3-0 Dexon suture is used to fix the caudal end of the septum to the prespine fascia (Figure 20). This will hopefully prevent the caudal end of the septum from slipping off the anterior nasal spine and producing a possible nasal airway obstruction or saddle nose deformity or both. The sublabial incision is then closed with

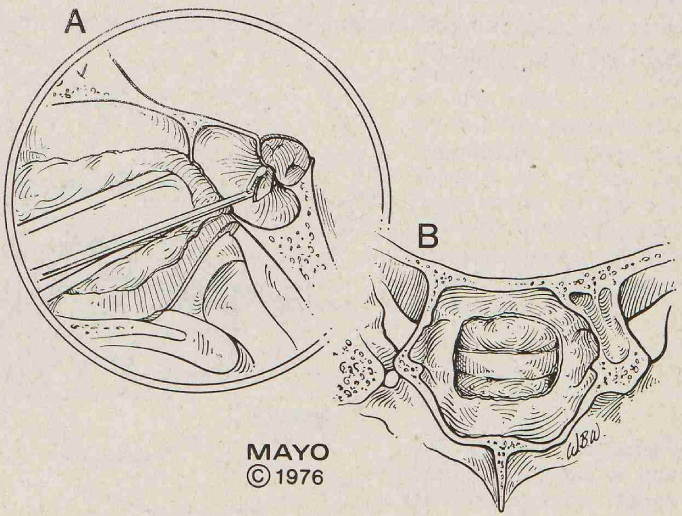


Figure 19. Piece of allograft (homograft) muscle is placed within empty sella, and piece of septal cartilage is wedged subdurally anterior to the muscle.
A, Lateral view.
B, Frontal view.

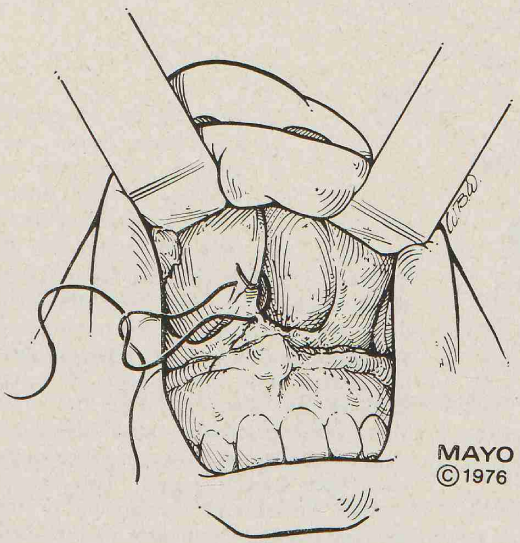


Figure 20. Caudal end of septum is sutured to the prespine fascia. Suture material is passed through caudal end of septum twice to avoid tearing through the septal cartilage. By anchoring to the prespine fascia, postoperative dislocation of caudal end of septum is avoided.

interrupted chromatic mattress sutures (Figure 21). Any sizable septal mucosal tears are sutured. Plastic stents are placed intranasally, and $\frac{1}{4}$-inch gauze packs, covered with Cortisporin ointment, are introduced loosely into each nasal chamber. Lightly crushed septal cartilage and uncrushed septal bone are replaced into the septal space to prevent postoperative scar contracture, with loss of height and saddling of the nose (Figure 22). A suture is placed at the base of the nose to help prevent postoperative widening (Figure 23). One septal columellar stitch is introduced to close the initial right hemitransfixion incision (Figure 24). The plastic stents are then sewn in with a 2-0 black silk suture to hold the septum in place (Figure 25). The remainder of the Cortisporin antibiotic gauze packing is introduced. External taping and an external supporting stent are then applied.

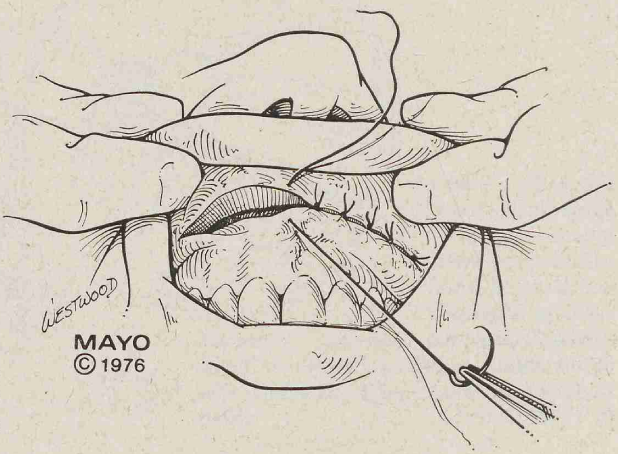


Figure 21. Sublabial incision is closed with interrupted chromic mattress sutures.

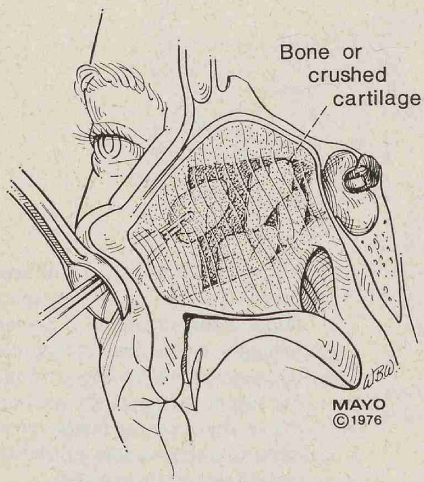


Figure 22. Lightly crushed septal cartilage and uncrushed septal bone are introduced into septal space. Stents and gauze packing are not shown in order to graphically demonstrate replacement of septal cartilage and bone. Cartilage and bone should be introduced after intranasal stents and $\frac{1}{4}$-inch Cortisporin gauze packs have been loosely placed. This should prevent sliding and overlapping of the replaced cartillage and bone.

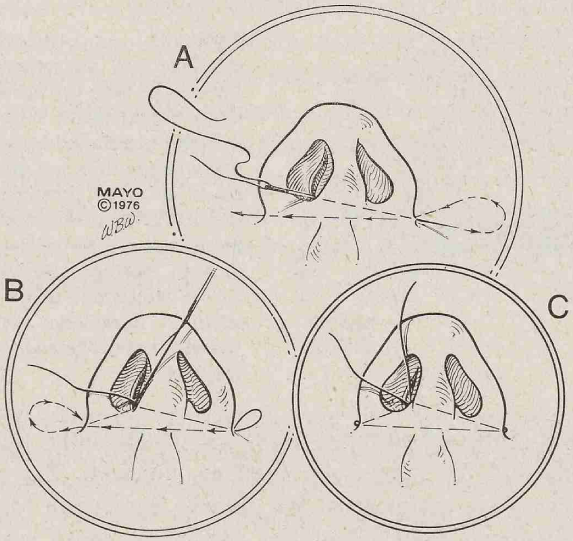


Figure 23. **A,** A 3-0 chromic suture on a Keith needle is introduced through right hemitransfixion incision anterior to the nasal spine. Needle then exits through the left alar facial groove. Long end of suture remains, extending out the hemitransfixion incision. **B,** Needle is pulled through alar facial groove on the left, and the needle is then reintroduced through the same point in the left alar facial groove and extends across to the right alar facial groove. This needle is then reintroduced through the puncture site of the alar facial groove on the right and exits through the hemitransfixion incision. **C,** This suture is then tied, narrowing the base of the nose.

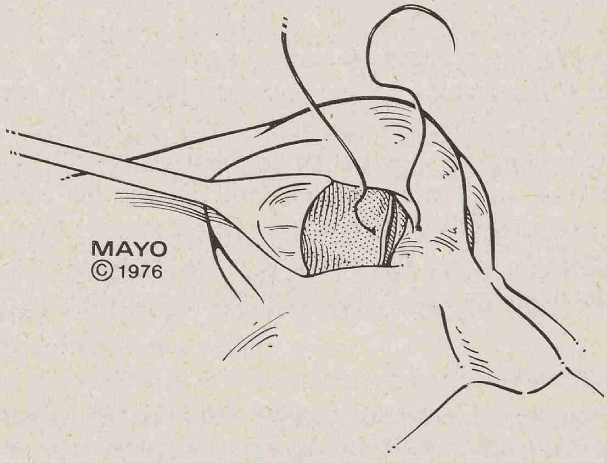


Figure 24. A 3-0 chromic suture, either on a curved or a straight needle, pierces both the septum and the columella and is tied, thus closing the right hemitransfixion incision.

POSTOPERATIVE MANAGEMENT

Basic principles of postoperative management include observing vital signs and measuring intake and output as a guide to fluid and electrolyte replacement. Progression from a full liquid diet to a general diet is the usual course within 24 to 48 hours. Dentures are replaced in 24 to 48 hours. The use of antibiotics is continued postoperatively until the nasal packing is removed.

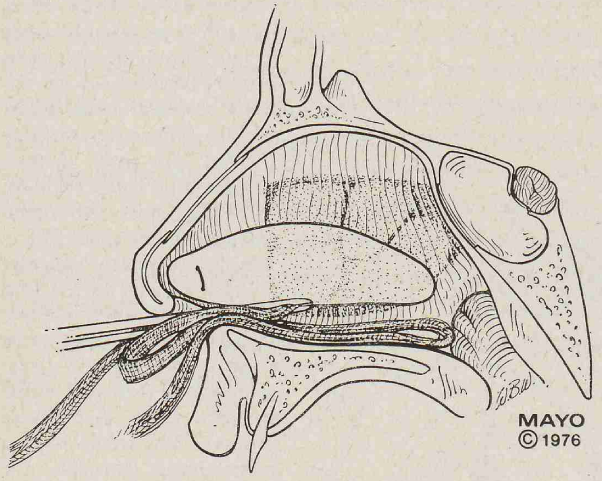


Figure 25. Crushed cartilage and uncrushed bone have been replaced in the septal space. With muscle in sella and the caudal end of the septum fixed to the prespine fascia, the stents are fixed by a suture (to be removed postoperatively) to the caudal end of the septum. Remainder of the intranasal packing is inserted.

Other medications – including cortisone administration and medications for diabetes insipidus if it occurs and for pain – are used as indicated. Early ambulation (within 24 to 48 hours) is encouraged. We observe the patient for signs of meningitis and cerebrospinal fluid rhinorrhea. Intranasal packs are loosened on or about the fourth postoperative day and are withdrawn slowly so as not to produce pain or bleeding. Packs are not routinely removed on a specific day, but they are allowed almost to "fall out" and are removed between the fourth and the seventh postoperative day. The intranasal stents are usually removed at that time or the day after pack removal. Most patients are dismissed from the hospital on or about the seventh postoperative day. A metal external nasal stent and tape are given to the patient, with instructions to apply at bedtime for 6 weeks. Postoperative visual and endocrine tests are obtained. At the 3-month visit, nasal breathing tests, physical and intranasal examinations, and evaluation of pituitary function are performed.

RESULTS

There were five deaths resulting from the 285 operations, giving an operative mortality of 1.75%. Two patients died of postoperative meningitis, two from carotid vascular occlusions, and one after an intraoperative hypothalamic injury. The overall complication rate was 13%: 1% transient cranial nerve paralysis (oculomotor or abducens nerve), 1% postoperative decrease in vision, 1% postoperative subarachnoid hemorrhage, 1% postoperative meningitis (two patients died), 1% perioperative intracranial vascular occlusion (two patients died), 2% postoperative cerebrospinal fluid rhinorrhea, 2% nasal septal perforations, 3% permanent diabetes insipidus, and 1% other (palatal diastasis,

hemorrhage, hypothalamic injury – this patient died). Of the six patients with postoperative cerebrospinal fluid rhinorrhea, five underwent reoperation and the leak stopped. In one, the rhinorrhea persisted; he developed meningitis and died. Two patients suffered diastasis of the palatal suture from opening the transsphenoidal speculum, and one patient had hemorrhage from an intracavernous sinus, which resulted in abandonment of the transsphenoidal procedure. Eighty-five patients had tumor related visual field defects before operation: 66 with nonfunctioning pituitary adenoma, 7 with functioning pituitary adenoma, 9 with craniopharyngioma, and 3 with chordoma of the clivus. Of these 85 patients, vision was improved in 81%, unchanged in 13%, and worse in 16%. The nature and incidence of these complications are compatible with other large series.

RÉSUMÉ

La chirurgie de l'hypophyse par voie trans-septo-sphénoïdale apporte une solution sûre et efficace à divers problèmes situés au niveau de la selle turcique. Cette série comprend 285 opérations effectuées sur 272 malades du 1/09/1972 au 1/09/1976. La mortalité opératoire est de 1,75%. Dans chaque cas, une étude anatomique soigneuse de la selle et du sinus sphénoïdal sera effectuée par polytomographies. Certaines conditions sont essentielles: angiographie carotidienne bilatérale, utilisation peropératoire du microscope et amplificateur de brillance pour le contrôle radiologique. On exécute une pneumo-encéphalographie chaque fois qu'existe la possibilité d'une selle vide ou d'un kyste arachnoïdien, ou lorsque l'angiographie ne montre pas de façon satisfaisante l'extension suprasellaire des tumeurs importantes. L'examen au scanner est également valable.

Les micro-adénomes (moins d'un centimètre de diamètre) constituent un nouveau groupe de problèmes pouvant être réglés par l'abord trans-septal. Cette série comprend 50 malades porteurs de microadénomes: 45 avec adénomes pituitaires actifs et 5 avec adénomes non actifs.

L'abord neurochirurgical transfrontal a des indications spécifiques. Le choix sera déterminé par l'anatomie, l'étendue et la nature de la lésion.

Les concepts rhinologique d'exposition et de reconstruction sont des modifications de l'approche "maxillo-prémaxillaire" (Cottle) au septum nasal. Il permet l'accès direct au sinus sphénoïdal et à la selle turcique tout en préservant à la fois l'extrémité caudale du septum et l'épine nasal antérieure, minimisant de ce fait les complications respiratoires et cosmétiques. En combinant les possibilités neurochirurgicales, endocrinologiques, neuroradiologiques, ophthalmologiques et rhinologiques, nous croyons que ce procédé est indiqué dans un grand nombre de cas et permet d'escompter d'excellent résultats.

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