

Modified Transseptal Approach in Endoscopic Transsphenoidal Pituitary Surgery

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Abstract

Key Learning Points - A modified endoscopic transseptal transphenoidal technique for pituitary surgery is described. - It involves a septal mucosa incision in line with the anterior portion of the middle turbinate. - It does not require excision or deflection of the cartilaginous septum. - It maintains an intact septal mucosa on one side. - It avoids a septal perforation.

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1.0 Introduction

Transsphenoidal pituitary surgery has continued to evolve since being first described in the early 20th century. Initially with a headlight and speculum, to using a microscope, to now most commonly performed entirely endoscopically. In 1992, Jankowski et al described an entirely endoscopic transnasal approach to the pituitary. This is currently the most common endoscopic transsphenoidal technique for pituitary surgery and involves a direct transsial approach with a posterior septectomy. However, a technique via an endoscopic transseptal route has also been described which avoids a posterior septectomy but comes with its own disadvantages. We describe a modification of the endoscopic transseptal technique, and discuss its pros and cons.

2.0 Method & Surgical technique

2.1 Nasal preparation

The nose is prepared with Moffet's solution for decongestion and vasoconstriction. Nasal septal mucosa is injected with 2 to 4ml of xylocaine/1:80,000 adrenaline solution.

2.2 Lateralising turbinates and raising septal mucosal flaps

We perform the transseptal approach using a 0 degree endoscope from the start, although the initial steps could as well be performed using a headlight akin to performing a septoplasty. Bilateral middle and superior turbinates are pushed laterally using a Freer elevator to create space for the flap in the nasal cavity (we do not routinely resect the middle turbinates as some do). Incision is made on the nasal septum using a no.15 scalpel blade in level with the anterior end of the middle turbinate (Figure 1a), adjusting for any inherent septal deflections; for example, if there is a sharp deviation that might interfere with movement of instruments and endoscope further on and needs removal upfront then the incision is made that bit further anteriorly. Helpful modifications of this incision are detailed in the discussion section. The incision starts approximately a centimetre below the skull base superiorly (to avoid transecting the olfactory region and down to the nasal septal floor inferiorly). The latter is important because the septal flap would then be anchored at the floor rather than the inferior part of the septum itself resulting in a) wider operative field because the septal flap can be pushed more laterally into the nasal cavity and b) reduced risk of inadvertently

“dividing” the flap’s inferior attachment whilst raising the mucoperichondrial flap. A freer or suction elevator is used to raise a mucoperichondrial flap on the ipsilateral side from skull base superiorly, up to nasal floor inferiorly and on to the anterior surface of the sphenoid sinus (Figure 1b). Sphenoid sinus opening comes into view at the end of this step.

2.3 Excision of bony septum and left posterior septal mucosa

Incision is made at the osseocartilaginous junction of the septum, superior to inferior (Figure 1c). Mucoperichondrial flap is now raised on the contralateral side extending posteriorly over to the anterior surface of sphenoid on the contralateral side. Bony septum is removed using Tilley Henckel forceps or Luc’s forceps until the “keel” is defined (Figure 2a). At this point, we excise the posterior aspect of the contralateral mucoperichondrial flap (posterior septotomy) using a powered microdebrider (Medtronic) (Figure 2b, 2c). The size and position of this window can be adapted according to tumour features and surgeon preference, allowing binasal approach to the skull base as standard practice for endoscopic transnasal approach.

2.4 Sphenoidotomy and access to pituitary sella

Sphenoid sinus is entered, bony septae excised, keel removed, and the operative field widened to obtain optimum access to anterior and middle skull base structures (Figure 3).

2.5 Replacing the right septal mucosal flap and dressings

At the end of the operation, the lateralized intact mucoperichondrial flap is moved back to the midline (Figure 4a). We do not suture the incision line. We insert a small resorbable dressing (eg: Nasopore) wedged at the top of the nasal cavity adjacent to the incision site to ensure flap do not lateralise and allows end to end contact at the incision. Alternatively, tissue glue can be used to “stick” the incision back together.

3.0 Discussion

An endoscopic transseptal transsphenoidal approach to the pituitary fossa has been previously described by Papay et al in 1997 and Favier et al in 2018 . Our modified transseptal approach differs from the erstwhile described methods and has several advantages:

1. Classical transseptal approach incision is a hemitransfixion incision made at the anterior caudal margin of the cartilaginous nasal septum. The incision that we describe is positioned in level with the anterior end of the middle turbinate, standard for raising a nasoseptal flap for most pituitary surgery. This is because the length of a nasoseptal flap would be long and wide enough to seal any defects/CSF leak in the sella region. However, the incision can be made further posteriorly, anteriorly or extended to include mucosa of the floor and lateral wall of the ipsilateral nostril if one anticipates a larger anterior skull base defect or indeed unexpectedly faced with such a defect at the end of tumour resection and therein provides much more versatility and choice.
2. Making the incision at the level of anterior end of middle turbinate leaves behind at least 2cm (or more) of a caudal strut of septal cartilage with intact mucoperichondrium on both of its sides and reliable to maintain the vascularity and minimise chance of cartilage resorption leading to loss of nasal tip support and collapse.
3. Using a hemitransfixion incision at the caudal margin of nasal septum often require release of the nasal septum from its attachment to maxillary crest and spine. Although the septum can be reattached at the end of the procedure, this part of the septum has become unstable and might heal in a variable position to the right or left with resultant columellar deviation and nasal obstruction or columellar indrawing that might be cosmetically unacceptable.
4. Classical transseptal approach attempts to maintain the septum – cartilage, bone and mucoperichondrial flaps on both sides in its entirety. Although laudable in its intention, this creates a significant narrower operative field concentrated in the midline of the nose particularly with respect to the total space available for instruments (especially with two surgeons operating) to move in and out. The modified approach that we propose, since it essentially follows the same steps of raising a nasoseptal

flap prior to any anterior skull base surgery, uses the space in both nasal cavities familiar to skull base surgeons.

5. Once the ipsilateral mucoperichondrial flap is brought back to the midline at the end of the procedure ensuring end to end contact at the incision site, the septum heals with no perforation in our experience (Figure 4b). It also ensures nasal airflow in two separate nasal cavities that is natural and physiological that should result in less crust formation, reduced risk of whistling noise due to septal perforation and overall improved nasociliary transport of mucous.
6. In the event of previously unplanned need for a nasoseptal flap to repair the skull base, the flap can be released from its superior and inferior attachments (and extended as explained in I) and used without compromise to the dimensions or vascularity. This holds true in case of return to theatre for a recalcitrant CSF leak in the postoperative period.
7. If revision procedure to the same area is required at a later date, it is still possible to raise a nasoseptal flap and, therefore, “banks” a vascular pedicled flap for the future.

4.0 Key Learning Points

- a. A modified endoscopic transseptal transphenoidal technique for pituitary surgery is described.
- b. It involves a septal mucosa incision in line with the anterior portion of the middle turbinate.
- c. It does not require excision or deflection of the cartilaginous septum.
- d. It maintains an intact septal mucosa on one side.
- e. It avoids a septal perforation.



