# The Transition from Microscopic to Endoscopic Transsphenoidal Surgery In High Case Load Neurosurgical Centers: The Groote Schuur Hospital Experience

***Patrick Semple***

**Key words**
- Endoscopic
- Microscopic
- Pituitary tumor
- Transsphenoidal approach

*Division of Neurosurgery, University of Cape Town, Cape Town, South Africa*

*To whom correspondence should be addressed: Patrick Semple, M.B.Ch.B., M.Med, Ph.D. [E-mail: Patrick.semple@uct.ac.za]*

*Citation: World Neurosurg. (2014) 82, 6S:S162-S163. http://dx.doi.org/10.1016/j.wneu.2014.08.002*

*Journal homepage: www.WORLDNEUROSURGERY.org*

*Available online: www.sciencedirect.com*



## INTRODUCTION

Dott and Guiot first pioneered the transsphenoidal route for pituitary tumors during the 1950s and 1960s, and the microscope was introduced for the procedure by Hardy in the 1970s. The microscopic transsphenoidal approach to pituitary tumors was further developed by Wilson, Weiss, Laws, and others and became the procedure of choice for pituitary tumors. The advantages, outcomes, and risks for this procedure are well established, and it has been an effective and safe method for treating pituitary tumors as well as other pathologies that occur in the sellar/suprasellar region (1, 4, 7, 13).

In the 1990s the endoscopic transsphenoidal route was developed, and along with a marked improvement in endoscopic equipment available and the refinement and extension of techniques used, was popularized and subsequently has become the approach of choice for many neurosurgeons, (2, 3, 8). A number of series has been published in which researchers highlight the advantages of the endoscopic approach with results equal or in some cases better than the microscopic approach (5, 6, 8, 9). Some authors have compared the 2 approaches and have described advantages associated with the endoscopic approach, including an improved and wider operative view that can be changed during surgery, no nasal packing required, a shorter duration of operation and hospital stay, and possibly improved resection of the tumor (10-12). However, as yet, there is no irrefutable proof that the outcomes are indeed better when the endoscopic approach is used.

The experienced neurosurgeon who uses the microscopic transsphenoidal technique may well continue doing so. The surgeon who does not perform many cases of transsphenoidal surgery and who is competent in the microscopic transsphenoidal may be best be served by continuing using the microscopic approach because there is a relatively steep learning curve for the endoscopic approach that lends a change better to high-volume centers (14). The neurosurgeon who has been trained in a unit that uses the endoscopic approach will be well versed in it; however, there is a growing group of surgeons who wish to change to an endoscopic approach or al least be competent in this technique so they can perform an endoscope-assisted approach.

## MANAGING THE CHANGE FROM MICROSCOPIC TO ENDOSCOPIC TRANSSPHENOIDAL APPROACH

The step-wise approach to transitioning from microscopic to endoscopic transsphenoidal surgery that happened in our institution and that we have taught to surgeons, although certainly not the only method available, may be of benefit in aiding neurosurgeons who wish to learn the endoscopic approach.

Most neurosurgeons are very comfortable and experienced in using the operating microscope but may have very little experience with an endoscope. Endoscopic equipment, including endoscopes, camera, light source, and instruments, need to be acquired and then surgeons need to familiarize themselves with the equipment. The problem is not so great if the neurosurgeon is already performing endoscopic third ventriculostomy and other endoscopic procedures. A decision needs to also be made whether the endoscopic technique will completely replace the microscope or whether an endoscopic-assisted technique is to be used. The endoscopic-assisted technique also obviously can be replaced by a pure endoscopic approach once the surgeon's confidence and technique have developed.

There are many workshops on endoscopic transsphenoidal surgery, and it is undoubtedly beneficial to attend one of these before embarking on endoscopic surgery. These courses usually are structured, and consequently experts are able to instruct on the anatomy and variations, instruments that are required, the technique of the procedure, advantages and disadvantages, outcomes, and complications and how to avoid them. In addition, many of these workshops have a hands-on approach in which participants get to handle the instruments and familiarize themselves with them and anatomy in a model or cadaver. In my opinion, the most important part of the workshop is the anatomy pertinent to the procedure that is learnt. Attending a workshop will not necessarily make one able to perform the first endoscopic approach but will make the trainee more aware of the nuances of the new approach. DVD and online computer training programs can fulfill a similar function and are considerably cheaper, which has relevance in the developing world.

The next step would be to visit a unit that is experienced in this surgery and observe the procedure. This will not only give the trainee a good idea of the set-up for the procedure in the operating room but also will allow them to see the difficulties encountered during surgery and how they are dealt with. Most endoscopic neurosurgeons do not use many instruments, and the aspiring endoscopic surgeon may well get a clearer idea which instruments are worth

acquiring from the vast number that are available.

The neurosurgeon also may choose to work with an otolaryngology surgeon, and this will have a number of benefits. The otolaryngology surgeon is experienced in endoscopic sinus surgery, and this includes the approach to the sphenoid sinus. They also are aware of the anatomical variations that may confuse a neurosurgeon, who is not experienced in the nasal and sinus anatomy. The otolaryngology surgeon can do the entire exposure of the sellar floor, leaving the neurosurgeon to concentrate on the pituitary tumor alone. This will certainly speed up the case and allow the neurosurgeon to concentrate on the area with which they are more familiar. The otolaryngology surgeon also can provide assistance with holding and directing the endoscope while the neurosurgeon operates with 2 hands. The cooperation between the 2 specialties also allows for extension to other areas, such as endoscopic surgery for cerebrospinal fluid leaks and base of skull tumors.

The use of fluoroscopy and neuronavigation is common in the microscopic transsphenoidal approach, but many surgeons who use the endoscopic approach feel they do not need to use it in the majority of cases because of the wider field vision of the endoscope, which allows for better identification of landmarks. However, at least in the initial cases, fluoroscopy or neuronavigation can help guide and confirm the landmarks and trajectory of the opening to the sellar floor, and this offers increased confidence for the surgeon and improved safety for the patient. As the surgeon becomes more familiar and comfortable with the endoscopic technique, he or she may then choose not to use fluoroscopy or neuronavigation.

Initially, the surgeon should continue using the microscopic technique with which they are comfortable, but they can insert the endoscope into the operative field during and at the end of the surgery to get an idea of the vision possible with the endoscope and familiarize themselves with the handling of the endoscope. When the endoscope is used in the first few cases, it may be useful to follow a similar approach used with the microscopic approach. If the surgeon is familiar with the nasoseptal approach and using a speculum, then it is reasonable to continue doing this but using an endoscope instead of the microscope. This allows for familiarity of the anatomy for the surgeon and also allows for the easy introduction of the microscope if the surgery with the endoscope becomes difficult. The use of an otolaryngology surgeon doing the nasal and sphenoid sinus phase of the surgery may obviate the need for this. Once the neurosurgeon, with or without the aid of the otolaryngology surgeon, is comfortable with the endoscopic approach, then he or she can change to the posterior endonasal approach without the use of a speculum.

If the endoscopic stack has a video-recording feature, then it is extremely useful to record the procedure so the approach can be reviewed later and mistakes identified and corrected for the next operation. The videos also can be reviewed with an expert to allow for guidance and advice in developing the surgical technique required for endoscopic transsphenoidal procedures.

## CONCLUSION

The endoscopic transsphenoidal approach offers distinct advantages over the microscopic approach; however, the change to the endoscopic approach has a steep learning curve and may be intimidating, particularly for the surgeon who does not have experience in endoscopic surgery. The stepwise approach to converting to the endoscopic approach may include attending a course on the endoscopic transsphenoidal approach, observing experienced surgeons with the endoscopic approach, enlisting the help of an otolaryngology surgeon, using fluoroscopy or neuronavigation, and then phasing in the endoscope to the procedure. This approach may help in developing an effective and safe transition from microscopic to endoscopic transsphenoidal surgery.

## REFERENCES

1. Black PM, Zerves NT, Candia GL: Incidence and management of complications of transsphenoidal operation for pituitary adenomas. Neurosurgery 20:920-924, 1984.

2. Cappabianca P, Cavallo LM, Calao A, De Basso De Carm, Esposito F, Corillo S, Lombardi G, De Divitiis E: Endoscopic endonasal approach: outcome analysis of 100 consecutive procedures. Minim Invasive Neurosurg 45:193-200, 2002.

3. Cappabianca P, Cavallo LM, De Divitiis E: Endoscopic endonasal transsphenoidal surgery. Neurosurgery 55:933-940, 2004.

4. Ciric I, Ragin A, Baumgartner C, Pierce D: Complications of transsphenoidal surgery: results of a national survey, review of literature and personal experience. Neurosurgery 40:225-237, 1997.

5. Comer BT, Young AB, Gal TJ: Impact of endoscopic surgical techniques on efficiency in pituitary surgery. Otolaryngol Head Neck Surg 145: 732-736, 2011.

6. Dhepnorrarat RC, Ang BT, Sethi DS: Endoscopic surgery for pituitary tumors. Otolaryngol Clin N Am 44:923-935, 2011.

7. Ebersold MJ, Quest LM, Laws ER Jr, Scheithauer B, Randal RV: Long term results in transsphenoidal removal of non-functioning pituitary adenomas. J Neurosurg 64:713-719, 1984.

8. Fatemi N, Dusick J, de Paiva Neto M, Kelly DF: The endonasal microscopic approach for pituitary adenomas and other parasellar tumors: a 10 year experience. Neurosurgery 63:244-256, 2008.

9. Kawamata T, Iseki H, Ishizaki R, Hori T: Minimally invasive endoscope-assisted endonasal transsphenoidal microsurgery for pituitary tumors: experience of 215 cases comparing with sublabial trans-sphenoidal approach. Neurol Res 24:259-265, 2002.

10. Messerer M, De Battista JC, Raverot G, Kassis S, Dubourg J, Lapras V, Trouillas J, Perrin G, Jouanneau E: Evidence of improved surgical outcome following endoscopy for nonfunctioning pituitary adenoma removal. Neurosurg Focus 30: E11, 2011.

11. Rotenberg B, Tam S, Hyung WA, Duggal N: Microsopic versus endoscopic pituitary surgery: a systemic review. Laryngoscope 120:1292-1297, 2010.

12. Strychowsky J, Nayan S, Reddy K, Farrokyar F, Sommer D: Purely endoscopic transsphenoidal surgery versus traditional microsurgery for resection of pituitary adenomas: systemic review. J Otolaryngol Head Neck Surg 40:175-185, 2011.

13. Wilson CB, Dempsey LC: Transsphenoidal microsurgical removal of 250 pituitary adenomas. J Neurosurg 48:13-22, 1978.

14. Yang I, Wang MB, Bergsneider M: Making the transition from microsurgery to endoscopic transsphenoidal pituitary surgery. Neuorosurg Clin N Am 21:643-651, 2010.

*Conflict of interest statement: The authors declare that the article content was composed in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.*

*Received 23 July 2014; accepted 1 August 2014*

*Citation: World Neurosurg. (2014) 82, 6S:S162-S163. http://dx.doi.org/10.1016/j.wneu.2014.08.002*

*Journal homepage: www.WORLDNEUROSURGERY.org*

*Available online: www.sciencedirect.com*