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## Comparison between endoscopic and microscopic approaches for surgery of pituitary tumours

Inamullah Khan, Muhammad Shahzad Shamim

### Abstract

Surgical techniques for resection of pituitary tumours have come a long way since it was first introduced in late 18th century. Nowadays, most pituitary surgeries are performed through trans-nasal trans-sphenoidal approach either using a microscope, or an endoscope. Herein the authors review the literature and compare these two instruments with regards to their outcomes when used for resection of pituitary tumours.

**Keywords:** Surgical techniques, pituitary tumours, Microscope, Endoscope.

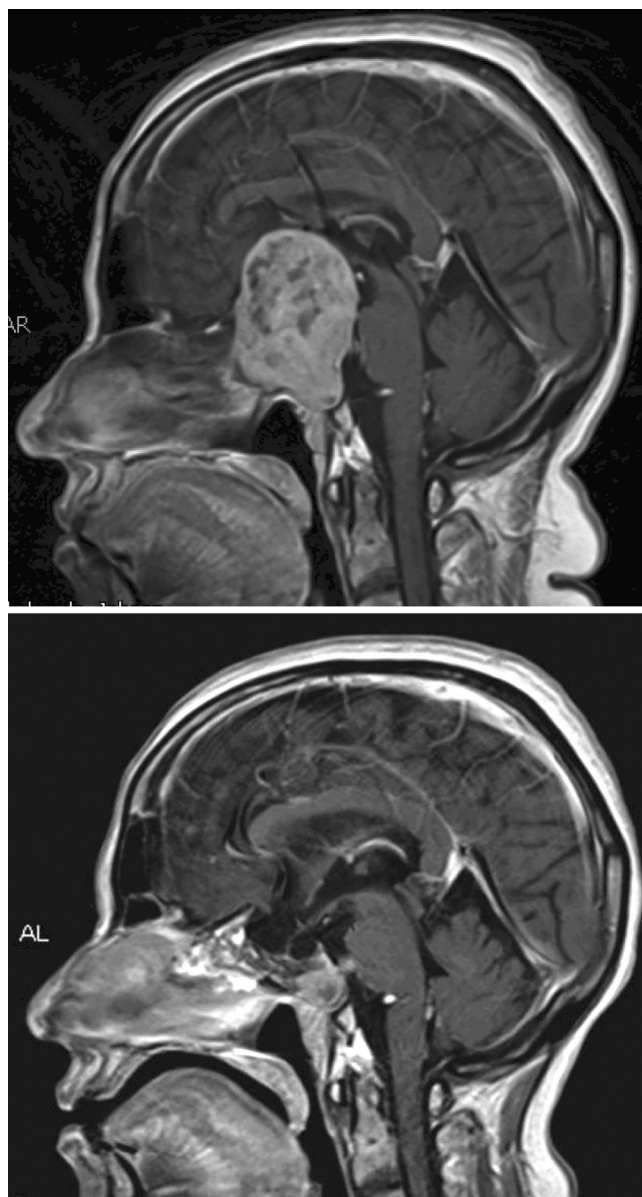
### Introduction

Pituitary tumour resection was first reported by Sir Victor Horsley in 1887 who performed it through a craniotomy.<sup>1</sup> It was not until early 19th century that the trans-nasal, trans-sphenoidal approach was first described by Hirsch and Halstead.<sup>2</sup> To avoid the external incision, Harvey Cushing modified it and described the sub-labial trans-septal trans-sphenoidal approach.<sup>3</sup> In the 1960s, Hardy introduced the use of operative microscope for the resection of pituitary tumours and for a very long time the trans-septal and trans-labial approaches remained the standard, with low rates of complication and mortality.<sup>4</sup> In light of its use in nasal sinus procedures, Jankowski in 1992 introduced the endoscope for pituitary tumour resection, using the same trans-sphenoidal route.<sup>5</sup> In this review, we discuss the current evidence comparing microscopic and endoscopic approaches for pituitary tumours.

### Review of Evidence

Sheehan et al., in 1999 published his data of a retrospective comparison of patients with non-functioning pituitary adenoma (NFPA) treated either with an endoscope, or with a sub-labial approach.<sup>6</sup> Despite a small sample size (26 and 44 patients respectively) they noticed a significantly lower operative time with endoscope compared to the sub-

labial approach ( $p < 0.001$ ), without any difference in extent of resection, post-operative pituitary function,



**Figure-1,2:** Pre and post-operative MRI T1WI mid-sagittal sections with contrast, showing a giant pituitary adenoma resected through microscopic trans-sphenoidal approach.

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visual field alterations or complication rates. Similarly Koren et al., also reported shorter operative time, lower hospital stay, and no nasal or denture related problems with the two approaches.<sup>7</sup> White et al., in 2004 in a retrospective case-control study reviewed fifty cases each of endoscopic and sub-labial trans-septal pituitary tumour resection and also reported no significant difference in the rates of cerebrospinal fluid (CSF) leak, meningitis, loss of visual acuity, ophthalmoplegia, intracranial haemorrhage, diabetes insipidus, or death between the two groups.<sup>8</sup> However, they found a relatively higher risk of total complications per patient ( $p= 0.005$ ), postoperative epistaxis ( $p= 0.031$ ), lip anaesthesia ( $p= 0.013$ ), and deviated septum ( $p= 0.028$ ) for sub-labial trans-septal group. They also found a significantly lower requirement of nasal packing ( $p < 0.001$ ) and lumbar drainage ( $P= 0.007$ ) in addition to lower length of hospital stay ( $p < 0.001$ ) in the endoscopic approach group.

In another retrospective analysis Higgins et al., reported 48 patients who underwent surgical resection of sellar and suprasellar masses.<sup>9</sup> Nineteen of these were operated via trans-nasal endoscopic approach while twenty-nine underwent trans-septal microscopic resection. Among the resected masses, prolactinomas was the commonest pathology, followed by NFPA. Endoscopic approach was associated with significantly lower operative time, post-operative pain, requirement of lumbar drain, blood loss and hospital stay, even though the rates of cavernous sinus invasion and perioperative complications were similar in both groups. Atkinson et al., in 2008 retrospectively analyzed clinical record data for 42 adult patients who underwent surgical resection of pituitary microadenoma.<sup>10</sup> In half of the patients resection was approached by sub-labial trans-septal trans-sphenoidal microsurgery and endoscopic trans-sphenoidal microsurgery was used in the other half. Over a median follow-up of 2.5 years for the endoscopic group and one year for the sub-labial microsurgical group, they found no difference in the cure and complications including CSF-leak and transient diabetes insipidus. Whereas, shorter anaesthesia time, shorter hospital stay and lower blood loss was associated with endoscopic approach.

Zaidi et al., in 2016 enrolled 135 patients in a prospective comparison of fully endoscopic binostril trans-sphenoidal surgery to uni-nostril microscopic surgery for pituitary adenoma resection.<sup>11</sup> Fifty-five of the patients were included in the endoscopic group with 80 matched patients in the microscopic group. The extent of resection was comparable between the two

groups, with gross-total resection rate of 78.2% for endoscopic group and 81.3% for the microscopic group ( $p = 0.67$ ). In addition to lower combined complication and re-admission rate ( $p= 0.02$ ), the incidence of posterior gland dysfunction was reported lower in the endoscopic group ( $p= 0.04$ ). More recently, Li et al. published a comprehensive systematic review and meta-analysis involving four prospective and 19 retrospective studies covering 2,272 patients with pituitary adenoma.<sup>12</sup> They reported higher rates of gross total removal in the endoscopic compared to the microscopic trans-sphenoidal group (OR: 1.52; 95% CI: 1.11-2.08;  $p= 0.009$ ). Endoscopic surgery was associated with 22% reduction in risk of diabetes insipidus and also a lower risk of septal perforation (OR: 0.29; 95%CI: 0.11-0.78;  $P=0.014$ ).

## Conclusion

An instrument is only as good as the person using it. Pituitary surgery through the trans-nasal trans-sphenoidal route is safe and effective regardless of the instrument used, and even though the choice of instrument is best left to the operating surgeons' comfort and expertise, the literature suggests that the use of endoscope provides superior visualization, better extent of resection, and fewer approach related complications, with no additional risk of morbidity compared to the microscopic approach.

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