**Endoscopic pituitary surgery: a systematic review and meta-analysis**


**CRD summary**
This review concluded that evidence supported safety and short-term effectiveness of endoscopic pituitary surgery, but long-term research was required to determine tumour control. Limitations with the literature search, lack of validity assessment and limited statistical analyses suggested that the authors' conclusions should be interpreted with caution. The recommendation for further long-term studies appears appropriate.

**Authors' objectives**
To assess the safety and effectiveness of endoscopic pituitary surgery compared with traditional microscope-based approaches.

**Searching**
MEDLINE was searched from inception to April 2006 for articles published in English. Search terms were reported and the related articles function was used to locate relevant articles. References of retrieved articles were searched. Institutional series carried out by the senior authors of the review were included.

**Study selection**
Randomised, retrospective and observational studies, and case series (with more than 10 patients) were eligible for inclusion if they used endoscopic approaches to the pituitary gland in the intervention arm. Control arms could include endoscopic assisted or microscopic approaches.

Included studies were conducted in Taiwan, Italy, Poland and USA. Operations were performed between 1993 and 2006. Some studies reported results for a control group of sublabial trans-sphenoidal surgery. Mean age of patients ranged from 39 to 51 years. Most studies included a higher proportion of women. Mean duration of surgery ranged from 102 to 255 minutes. Where reported, some patients had undergone previous operations. Where reported, tumour types varied. Outcome measures included extent of gross tumour removal (complete versus subtotal), hormone resolution for secreting adenomas (adrenocorticotropic, growth, prolactin and overall) and resolution of visual symptoms. Perioperative complications (cerebrospinal fluid leak, neurovascular injury, new onset anterior pituitary dysfunction, new onset cranial nerve and visual deficits, nasal septum perforation, epistaxis, meningitis, medical complications and death) were reported, as was length of hospital stay.

The authors stated that two reviewers independently performed the search. It was unclear whether screening of studies for inclusion was classed as part of the search.

**Assessment of study quality**
The authors did not state that they assessed validity.

**Data extraction**
Two reviewers independently extracted the number of patients who experienced postoperative outcomes and complications to estimate percentage rates. Where four or more studies reported a given result, summary rates and their 95% confidence intervals (CIs) were calculated. Means and standard deviations (SDs) were calculated for length of hospital stay. Zero occurrences were assumed where data on major complications were not reported.

**Methods of synthesis**
A fixed-effect model was used to pool rates and their 95% CIs for outcomes and complications. Where statistical heterogeneity was evident, a random-effects model was used. In instances where 100% success rates and/or 0% complication rates were reported, variances were estimated as the pooled variances obtained from other studies with success rates less than 100% and complication rates above 0%. Statistical heterogeneity was assessed using the Q statistic.
Results of the review
Nine studies (n=821) were included in the review. Sample sizes ranged from 30 to 300 patients.

The proportion of surgeries with gross tumour removal was high: 78% (95% CI 67% to 89%; seven studies). Rates were high for the proportion of hormonal resolution for adrenocorticotrophic hormone secreting tumours (81%, 95% CI 71% to 91%; four studies), growth hormone secreting tumours (84%, 95% CI 76% to 92%; five studies), prolactin (82%, 95% CI 70% to 94%; six studies) and overall hormone resolution (79%, 95% CI 71% to 88%; six studies). There was evidence of statistical heterogeneity between studies that assessed gross tumour removal rates (p<0.0001), prolactin hormone resolution (p=0.003) and overall hormone resolution (p=0.01).

Complication rates were not statistically significant and were reported in the review. Two deaths occurred (0.24%) as a result of vascular injury. Length of hospital stay ranged from 1.4 to 4.4 days.

Authors’ conclusions
The evidence supported safety and short-term effectiveness of endoscopic pituitary surgery. Long-term research was required to determine tumour control.

CRD commentary
The review question was clear, but the supporting explicit inclusion criteria for patients and outcomes were somewhat limited. The literature search was restricted to one electronic database and two other sources. The search was restricted to those in English, which meant that language bias could not be ruled out. The authors did not formally assess validity of included studies, but they did mention certain quality issues with using non-randomised observational studies. Appropriate methods were used to conduct study selection and data extraction in duplicate, which minimised potential for reviewer error and bias. Appropriate methods were used to assess statistical heterogeneity, but as few patients characteristics were reported; it was unclear whether pooling of the data were appropriate. The statistical analyses was somewhat limited by inadequate reporting of control groups to allow direct comparison with other interventions (as acknowledged by the review authors). The authors’ conclusions appeared to support the evidence available, but the above limitation should be borne in mind. The recommendation for further long-term studies appears appropriate.

Implications of the review for practice and research
Practice: The authors did not state any implications for practice.

Research: The authors stated that large prospective studies were needed to to assess long-term outcomes to overcome the limitations of using observational data. Further research was required to investigate any gradual improvements in outcomes that may occur as experience in use of endoscopic pituitary surgery increased over time.

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Record Status
This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.