Best Practice & Research Clinical Endocrinology & Metabolism 23 (2009) 677–692

Contents lists available at ScienceDirect

Best Practice & Research Clinical Endocrinology & Metabolism

journal homepage: www.elsevier.com/locate/beem

11

Surgical treatment of pituitary tumours

Michael Buchfelder, MD, PhD *, Sven Schlaffer, MD

Department of Neurosurgery, University of Erlangen-Nürnberg, Erlangen, Germany

Keywords:
complications
pituitary adenomas
technical developments
transcranial approach
transsphenoidal approach
surgical indications
surgical results

The surgical treatment of pituitary tumours underwent considerable evolution during the past centennial. Since Schloffer's first description, excellent surgeons refined the surgical techniques, utilised hormonal measurements and imaging investigations at different times to define surgical success or failure. To date, transsphenoidal surgery is the approach of choice for over 90% of pituitary tumours, but still transcranial operations are needed even in experienced hands when asymmetrical and large pituitary tumours with minor intrasellar components present. When the indication for surgery stands, the complication rate to date is relatively low, particularly if the surgeon and his or her centre have sufficient experience in the field. In microadenomas, the success rate reported from expert authors approaches 90%. Generally speaking, patients with non-functioning pituitary adenomas, acromegaly, thyrotropinomas and Cushing's disease are excellent candidates for primary surgical treatment. Re-operations are generally associated with less favourable outcomes. In prolactinomas, the primary therapy is medical; however, when dopamine agonists are not well tolerated or inefficient, an operative treatment should be considered. Although alternative medical treatments exist in acromegaly and thyrotropinomas, surgical treatment is relatively cheap. The implementation of endoscope-assisted, entirely endoscopic, image-guided surgery and intra-operative magnetic resonance (MR) imaging, particularly in combination with utilisation of the established microsurgical techniques, extends the surgical spectrum. Lesions become surgically accessible, which one did not dare to touch even a century ago. Moreover, it seems that the patient's safety has increased and more patients have their tumours completely resected, which is equivalent to a higher remission rate in hormonally active tumours.

* Corresponding author. Neurochirurgische Klinik mit Poliklinik, Universität Erlangen-Nürnberg, Schwabachanlage 6, D-91054 Erlangen, Germany. Tel.: +49 9131 85 34566; Fax: +49 9131 85 34476.
E-mail address: michael.buchfelder@uk-erlangen.de (M. Buchfelder).

1521-690X/$ – see front matter © 2009 Elsevier Ltd. All rights reserved.
doi:10.1016/j.beem.2009.05.002

Following a century of technical evolution since Schloffer's publication of the first patient who survived a pituitary tumour operation[1], a variety of standard[2–4] and some novel[5–7] surgical techniques are currently available for the surgical treatment of pituitary tumours. We herein essentially refer to pituitary adenomas and craniopharyngiomas. However, in other, less frequent tumours of the sella region, the same approaches may be utilised. The vast majority of pituitary adenomas can be dealt with satisfactorily by using a transsphenoidal approach.[2,8,9] The goal of surgical treatment is the rapid resolution of the tumour mass, decompression of visual pathways and elimination of hormonal oversecretion, whilst the normal pituitary gland is preserved and potential surgical complications avoided.[2] The tumour size, extension, configuration and the magnitude of hormonal oversecretion, respectively, are the essential factors that decide whether all the goals can be reached. Another important factor is the individual skill and experience of the surgeon. Still, several lesions that are mainly developed outside of the sella require transcranial approaches, of which the pterional and subfrontal routes are the most widely used.[4,8] In contrast to many medical treatments, pituitary surgery is a relatively cheap treatment of pituitary tumours. With the introduction of the Diagnosis Related Groups (DRG) reimbursement system in Germany, an uncomplicated transsphenoidal operation costed 6181.60 € and an uncomplicated transcranial operation costed 8467.40 € in 2008, based on a standard base rate of 2789 €, all inclusive, for a health insurance company to be paid to the hospital. With microsurgical techniques and standard approaches, mortality is far below 1% and morbidity is remarkably low.[2,10] The most favourable surgical results are obtained with microadenomas, which, in magnetic resonance (MR), are depicted as distinct low-intensity lesions. Only recently has the recovery of pituitary function following surgery been convincingly demonstrated. With the extended transsphenoidal approaches, lesions become accessible which previously have been considered as contraindications for transsphenoidal surgery. The introduction of new technical gadgets such as neuronavigation, endoscopy and intra-operative imaging opens new avenues and widens the spectrum of accessible lesions even more. Indications for surgery, the preoperative work-up, surgical techniques, results, limitations and new technical developments are briefly reviewed in this article.

Surgical indications

It is generally accepted that symptomatic pituitary adenomas require treatment. Although, in many patients, visual compromise develops quite slowly and gradually, surgical decompression of visual pathways is usually recommended unless the compression can be resolved by medical treatment. Undisputedly, the most rapid and reliable relief from optic nerve and chiasmal compression is being achieved by surgery, which is particularly appreciated if severe loss of vision occurred acutely, as in pituitary apoplexy.[11] In non-secreting, hormonally inactive pituitary tumours, nevertheless no reliable competitive treatment of the space-occupying lesion is available to date. Thus, surgery remains the mainstay in their treatment. Since hormonal oversecretion in patients suffering from Cushing's disease, Nelson's syndrome, thyrotropinomas and also acromegaly is associated with increased morbidity and mortality; the diagnosis of these diseases is generally considered an indication for surgery.[2] Although medical treatments exist for growth hormone (GH)- and thyroid-stimulating hormone (TSH)-secreting pituitary adenomas, surgery is still generally considered the most rapidly acting and cheapest long-term solution for most patients.[12] In adrenocorticotrophic hormone (ACTH)-secreting tumours, medical therapy is certainly not a long-term alternative therapy for most patients and thus, once the diagnosis is made, surgery should be scheduled.[13] However, recent data suggest that hypopituitarism can also be considered an indication for surgery since pituitary function may be improved following decompression of the gland by selective tumour resection.[14,15] A conservative approach is usually recommended in incidentally detected lesions, which became more frequent with the widespread availability of MR imaging. However, the progression of a tumour, which is clearly documented in the MR, is another indication to surgically attack a lesion that has already shown an increase in size.[2] After all, surgical results are strongly related to the size and extension of the lesion and thus, an earlier intervention in a progressive disease is certainly preferrable. After all, the differential diagnosis of an intra- and perisellar lesion is that of non-functioning ones, since secreting adenomas can be recognised by specific clinical syndromes and hormone determinations. However, the mere documentation of an incidentally detected intrasellar lesion is clearly not considered an indication for surgery. Instead, a wait-and-see policy