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TRANSSPHENOIDAL SURGERY IN COMPLEX TREATMENT OF PITUITARY ADENOMA

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Summary

Objective: to compare the results of a different type of surgical treatment of pituitary adenomas, to report the efficacy and safety of microsurgical removal of adenomas via transsphenoidal surgery. **Methods:** 67 patients with pituitary adenomas underwent surgical treatment in the department of neurosurgery of Institute of Neurology and Neurosurgery from January 2005 through December 2009. Postoperative results were classified uniformly during the period of the study. Surgical intervention with use of standard transnasal transsphenoidal approach was performed on 45 patients. 22 patients were operated via transcranial approach mainly using of right subfrontal approach. **Results:** According to hormonal activity operated adenomas were spread as following: prolactinomas -16, 3%, somatotropinomas- 27, 8%, corticotropinomas – 8, 2%, thireotropinomas -0, 5%, and hormonally inactive tumors – 47, 2%. Among operated patients were 36 (53, 7%) males and 31(46, 3%) females. The mean age was 37, 6 ± 5, 4 years. Male/female rate was 1, 2:1. There were 50 macroadenomas (76%) and at 11 patients tumor invaded one or both cavernous sinuses. The overall rate of surgical success in transsphenoidal surgery was 65%, compared to 34% in transcranial surgeries. The surgical outcome was better in microadenomas treated with transsphenoidal approach than in macroadenomas treated with transcranial route (82% and 51% respectively), whereas tumors invading the cavernous sinus had a poorer outcome. In patients with nonfunctioning pituitary adenomas no residual adenomas were present in 62% cases. Normalization of visual defects occurred in 22 (52%) of 45 patients with visual disturbances. One patient died as a consequence of surgery (1, 4%).

Introduction

Pituitary tumours represent one of the neoplasms of endocrine system in humans, with basic manifestation in hormone hyper secretion of anterior hipophisys or by symptoms due to direct compression of adjacent structures of hypothalamic-hypophysar region [1, 2, 4, 5, 7].

Studying the problem of diagnosis and treatment of pituitary tumours, it is necessary to emphasize that the implementation of new diagnostic techniques, particularly of radioimmune methods of appreciation of blood hormones, CT scan and MRI, allows to diagnose the tumours at the stage of micro adenomas, to study anatomical and topographical peculiarities of tumour growth in detail, and based on obtained data to make an optimal planning of surgical intervention and to adequately plan a target for an eventual postoperative radiation [3,4,6,23].

The aim of treatment of pituitary adenomas is reversal of endocrine dysfunction with preservation of normal pituitary function [9,17,19,20]. Moreover, decompression of the nervous structures and control of tumour growth become increasingly important when large tumours are considered, as well as to avoid tardive recurrence, preserving the function of the anterior pituitary. Therapeutic options in patients with pituitary adenomas include surgery, radiotherapy, and medical treatment. The choice of more appropriate treatment in the individual patient rests mainly on the tumour type, age and clinical status of the patient [1, 2, 3, 5, 6, 9, 11].

The latest developments advances in hormonal and imagistic diagnosis, improvement of surgical methods of treatment, have changed dramatically the tactic of patient treatment, especially in cases of massive invasive adenoma [1, 3, 4, 7]. Taking in to consideration the possibilities of early diagnosis of microadenomas, the transsphenoidal method is gaining more importance. It's worth to emphasize that indication for using this approach in surgery of macroadenomas as well as in other skull base tumours, has enlarged significantly. Minimal traumatization and low complication rate makes it the first choice approach in surgical treatment of pituitary tumours with endo and infrasellar growth, as well as in cases of symmetric suprasellar growth tumours. In western clinics transsphenoidal approach is most frequently used in removal of pituitary tumour. Transsphenoidal approach is considered in 70% of all publications where surgical treatment of pituitary tumours is discussed, in 12% of publications – transcranial approach – in 18 % of publications; a combination of transcranial and transsphenoidal approach is discussed.

Absence of unanimity in treatment tactics of pituitary tumours and choice of surgical approach, lack of optimised algorithm and use of endoscopic technique in transsphenoidal surgery, as well as uncertainty in evaluation of the treatment results reported in literature emphasize the importance of a deeper clinical research in this direction [10,12,15,16,17,].

Material and method

The 67 patients with pituitary adenomas underwent surgical treatment in the department of neurosurgery of the Institute of Neurology and Neurosurgery. To solve the pre-established problems, patients were divided into groups according to the chosen treatment method, type of surgical approach, used surgical technique and conservative treatment scheme. 45 operations were performed through transsphenoidal route and 22 via transcranial route. All patients underwent a full clinical evaluation for the establishment of precise clinical diagnosis. All patients were evaluated before surgery and 3-7 days after surgical treatment. Full evaluation was performed before surgical intervention including all types of clinical diagnostic tests (general clinical and laboratory tests, evaluation of other specialists, MRI and CT scan of chiasmatal sellar region, X-ray of the sellar region, evaluation of hormonal profile, including a series of special tests). Preoperative evaluation was enlarged in cases of necessity depending from indications. Follow up data were studied in 57 (85%) patients during 1-6 years after surgical intervention. Among operated patients were 36 (53, 7%) men and 31(46, 3%) women. The age of patients ranged from 15 to 68 years. The mean age was 37, 6 ± 5, 4 years. Male/female rate was 1, 2:1.

According to the hormonal activity, operated adenomas were spread as following: prolactinomas -16, 3%, somatotropinomas- 27, 8%, corticotropinomas – 8, 2%, thireotropinomas -1, 5%, and hormonally inactive tumors – 46, 2%.

In operated patients big and giant adenomas were appreciated in 16, 4% (11 patients). To big adenomas were attributed lesions with one of diameters more than 40mm (7 patients), and to the giant type, tumors with one or few diameters more than 50mm (4 patients).

Surgical intervention with use of standard transnasal transsphenoidal approach was performed in 45 patients. 22 patients were operated via transcranial approach, mainly using the right subfrontal approach.

Results

The group of patients with pituitary adenomas is very non-uniform. Patients differ based on the level of hormonal activity of the tumor, character of clinical manifestation, spread and invasion of tumor growth, expression of neurological and visual disturbances. Despite the brutal disabilities of visual functions seen in every third patient, expressed hormonal disturbances, the majority of patients are admitted to hospitalization in relatively compensated condition (82% of patients gain a 70 points Karnofsky score, and other 15%- more than 60 points). Only a small percentage of patients (about 3%) are admitted in decompensated condition. Although we find considerably big tumors in the majority of patients. Such a compensation of the general condition is due to growth peculiarities of the tumor (lent and benign evolution, graduate adaptation of the brain, possible invasion outside the cranial cavity).

A great number of patients (60 patients- 90%) showed different neurological symptoms. Headache was the main complain (85% of patients). Focal neurological deficit was determined in 11 patients-16, 5%, and was mainly presented by oculomotory, trigeminal and olfactory nerve palsy, as well as with diencephalic manifestations.

Different types of endocrinological disturbances were appreciated in 73% of patients, and in 72% of them it was a manifestation of hyper production of hormones and in 10% cases as hypopituitary disfunctions. It was a prevalence of sexual and reproductive disturbances, metabolic disturbances and disturbances of psychological and emotional field. Hormonal evaluation of pituitary trope hormones allowed to precisely verify the character of the tumor and to determine treatment perspectives.

Besides general neurological and hormonal symptoms, 28 patients (42%) were diagnosed with visual disturbances. Loss of visual acuity and narrowing of visual field was appreciated in 18 (27%) patients. Presence in more than a third of patients of expressed visual disturbances testifies about late diagnosis of pituitary tumor and must be closely examined.

Appreciating the results of radiological diagnosis of pituitary tumors, we can conclude that MRI is the method of choice for diagnostic of microadenomas, as well as for big tumors of chiasmal sellar region. Sensibility of MRI for diagnosis of macroadenomas reaches 100%. Effectiveness of MRI scan diagnosis of pituitary macroadenomas is significantly higher than with the use of CT scan. Contrast media MRI tomography allowed to visualize even microadenomas of 1-3mm size, as well as to determine their laterality. Sensibility of MRI diagnostic of microadenomas reached 96%

Microadenomas were diagnosed in 17 patients (24%). 50 patients (76%) were with macroadenomas. Among macroadenomas 6 (8, 3%) showed endosellar growth, 44 (70%) were with endo-extrasellar spread. Giant adenomas were determined in 4 (2, 68%) cases. So it can be emphasized that extrasellar growth is characteristic for pituitary tumors, which is met in 2/3 of cases. Relatively diffuse clinical manifestation of the illness lead to late diagnosis of adenomas, when they reach big dimensions. 65% of adenomas have more than 2 cm in diameter and 45%- more than 3 cm

Discussion

In order to evaluate the results of different types of approaches for pituitary tumors, there were created comparable groups on all clinical indices, including size of adenomas and growth direction. Patients with giant and big adenomas were included in the transsphenoidal group in order to compare them with transcranial surgery.[13,14,17,20,22,23] Comparing nearest postoperative results, we noticed that transsphenoidal surgery is more efficient than the transcranial route almost by all criteria in comparable groups [3,6,8,9].

In the group of transphenoidally operated patients the rate of compensated postoperative state was higher (61 vs 27%). And vice versa, in the group of patients operated transcranially, a bigger number of subcompensation was seen (67, 5 versus 38, 1) and decompensated ones (6, 3 vs. 1%). Regression of neurological symptoms in the group of transcranially operated patients was in 48, 5% cases, and in the transsphenoidal group – 86% of cases. Regression of hormonal disturbances was of 51, 3% and 82, 5% of cases accordingly, and visual disturbances of 57 and 75% of all cases.

Statistically reliable clinical symptoms are regressing with increased frequency after transsphenoidal surgery. Summarizing the obtained data we can conclude that transsphenoidal interventions allows to remove the tumor less traumatically, reducing the traumatization of pituitary tissue an particularly its stalk, thus avoiding growth of pituitary disfunctions. In the transcranial approach, the tentative to remove the tumor radically, especially at the level of the third ventricle, frequently lead to traumatization of the pituitary stalk, and as a result to brutal hipotalamic hipopituitary disturbances[2,3,8,13,19,23].

The tumor was removed totally (according to CT scan control data) in 63, 9% cases in the first group, and in 60%- in the second group. Frequency of recurrence that needed reoperation was of 15 and 16% accordingly.

Conclusions

1. The group of patients with pituitary adenomas is very non-uniform. Complex preoperative evaluation of 67 patients with pituitary tumors showed that inactive adenomas are most frequent in neurosurgical practice among different types of tumors, visual disturbances and headaches that require CT scan or MRI. Hormonal active tumors start with the clinical manifestation of hipersecretion of respective hormone.
2. Transsphenoidal surgery is more effective than the transcranial approach in compared groups of patients. Regression of neurological symptoms in transcranial surgery was seen in 45, 8% of cases, and in transsphenoidal operations – 86%, regression of hormonal disturbances was of 51, 2% and 82, 5% and of visual disturbances was of 57 and 75% accordingly.
3. Transsphenoidal approach in the surgery of big and giant adenomas allows to significantly decrease the number of intraoperative complications, compared to transcranial surgery from 23% to 12%, and as well to minimize the number of postoperative complications from 28% to 13% of cases and to dramatically decrease postoperative lethality.
4. Diagnosis of pituitary tumors must include appreciation of hormones profile and activity, neurological exam and radiological findings. The most effective surgical treatment is transsphenoidal surgery. Conservative treatment plays a lead role in the treatment of prolactinomas.
5. Selection of the treatment modality of pituitary adenoma must be performed individually, depending on the spread and invasion of the tumor, its hormonal activity, expression of visual disturbances and general somatic condition of the patient.

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