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ENDONASAL TRANSPHENOIDAL ACCESS IN SURGICAL TREATMENT OF PITUITARY ADENOMA

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Abstract

Pituitary tumors are a group of benign, malignant, and less often malignant tumors of the anterior (adenohypophysis) lobe of the gland. They make up about 15–25% of all neoplasms of the intracranial zone. This pathology equally often affects both men and women, whose average age is 30–40 years. Benign pituitary tumors (or adenomas) prevail over malignant pituitary pathology and allow complete surgical removal with minimal risk of disease recurrence [1].

Introduction

The diagnosis of pituitary adenoma (PA) is established on the basis of clinical manifestations, indicators of the patient's endocrine status and various radiological diagnostic methods, such as magnetic resonance imaging (MRI). Depending on the functional activity of the glands, they are distinguished:

– hormonally active (or secreting);
– hormonally inactive (non-secreting) pituitary adenomas.

Based on the size of the tumor, they are distinguished:

– microadenomas (up to 1 cm);
– macroadenomas (more than 1 cm);
– large adenomas (more than 3 cm);
– giant pituitary adenomas (more than 5 cm).

Treatment of hypertension depends on the hormonal activity of the tumor, its size and direction of growth, neurological symptoms and includes:

– conservative;
– radiation (or radiosurgery);
– traditional surgical; – combination therapy.

Until the end of the 19th century, pituitary adenomas were removed externally - by craniotomy, which often led to postoperative complications and was combined with damage to adjacent intracranial structures. In recent decades, in surgery of the skull base, in particular the pituitary gland, preference has been given to the endonasal transsphenoidal approach using rigid optical instruments.

The first step in the preoperative preparation of the patient is a detailed study of the MRI results. This study makes it possible to differentiate adenoma tissue from the pituitary gland, optic nerves, internal carotid arteries, cavernous sinuses and other surrounding structures. Studying the patient's

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computed tomogram gives an idea of the possible nuances of access to the sella turcica. When studying the bone structures of the nasal cavity, you need to pay attention [2, 3, 11,13]:

– for the presence of curvatures of the nasal septum (especially bone "spikes");
– abnormalities in the development of the turbinates (such as "bullous" turbinate);
– the presence of additional cells in the structure of the sphenoid sinus (Onodi cells) [4, 12];
– condition of the intra-axillary septum (incomplete formation of the sphenoidal septum or abnormal location of the latter occurs);
– degree of pneumatization of the sphenoid sinus.

According to the classification of Hamberger (1961): there are:

– presellar pneumatization (the sinus does not extend beyond the tubercle of the sella turcica);
– sellar (the sinus reaches the back of the sella turcica);
– postsellar (the sinus reaches the border with the occipital bone or extends to its basilar part) pneumatization of the sphenoid sinus.

A feature of the latter type of structure is the absolute proximity of the optic nerve canal, cavernous sinus, internal carotid artery, III–IV pair of cranial nerves, and the ventral surface of the brain stem to the area of surgical intervention due to their location protruding into the sinus cavity [5, 14,18].

The endonasal transsphenoidal approach to pituitary adenoma surgery is divided into several successive stages. Usually, for small tumors, the surgeon uses only one half of the nose as access. The first step is to move the 0° endoscope along the nasal septum. In case of gross deviation of the latter, correction of the nasal septum is performed with submucosal removal of the deformed area of cartilage or bone. The middle turbinate is then identified and mobilized, which serves as a guide for advancing optical instruments to the natural anastomosis with the sphenoid sinus.

Upon reaching the sphenoethmoidal space, the next, sphenoidal stage of the surgical intervention begins. A window measuring 15x20 mm is formed on the anterior wall of the sphenoid sinus, followed by resection of the intrasinus septa that prevent access to the saddle. The bottom of the sella turcica is visualized. The mucous membrane in the intervention area is separated, and trepanation of the sellar floor is performed. The trepanation window in the bottom of the sella is performed in the projection of the tumor and is formed in such a way as to optimally safely remove the tumor. The dimensions of the trepanation window vary widely depending on the size of the tumor, direction of growth, and access features.After creating a trepanation window, the dura mater (DRM) is dissected and proceed to the stage of tumor removal. After opening the dura mater, using various curettes, biopsy forceps and aspirators with different manipulation angles, the tumor masses are removed within the intact tissue.

Sometimes, for neoplasms that are dense in consistency, an ultrasonic disintegrator is used.

After tumor removal, hemostasis is performed. In this case, the hemostatic material SergicelFibrillar, the SergiFlo matrix with thrombin, and other hemostatic agents are used.

The final stage involves plastic surgery of the bottom of the sella turcica, closing the defect with a fibrin-thrombin plate, autologous tissue, and glue. If liquorrhea is suspected, the intervention area is sealed floor by floor using surgical glue [6, 15, 19, 22].

In the world literature [7–10, 16, 17], there are various methods of hemostasis and reconstruction of the formed window between the sphenoid sinus and the sella turcica. A number of authors

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propose layerby-layer closure of the intracranial communication using a freely moved flap with mucous membrane, a flap on a vascular pedicle from the septum, fascia lata, a layer of fat and hemostatic material [7–10, 20, 21].

Thus, patients who have undergone endonasal transsphenoidal removal of a pituitary adenoma require special care and dynamic monitoring.

Purpose of the study

To study the features of the endonasal transsphenoidal approach in the treatment of pituitary adenoma.

Material and research methods

UsAn analysis was conducted of patients who underwent endonasal transsphenoidal removal of a pituitary adenoma in 2018–2023. We observed 12 patients diagnosed with pituitary adenoma with infra- and suprasellar growth. All patients underwent the following studies:

– collection of medical history and complaints;
– examination by a neurosurgeon;
– examination by an otorhinolaryngologist (in the preoperative period, on the 7th, 30th, 90th day after surgery);
– endoscopy of the nasal cavity and nasopharynx using rigid endoscopes (study of the sphenoethmoidal space);
– magnetic resonance imaging;
– computed tomography;
– cytological examination in the postoperative period (on the 7th and 30th days)

As a surgical intervention, patients underwent endoscopic endonasal transsphenoidal removal of the pituitary adenoma.

Research results

In the period from 2016 to 2017, 12 patients were examined with a diagnosis of pituitary adenoma with infra- and suprasellar growth. Among the subjects there were 10 women and 2 men, the average age was 38 years.

During the preoperative examination, patients presented the following complaints: headache without clear localization, non-systemic dizziness of a periodic nature, progressive decrease in vision. In cases of hormone-producing tumors, changes associated with endocrinopathy have been observed.

All patients underwent endoscopic endonasal transsphenoidal removal of the pituitary adenoma under general anesthesia using mechanical ventilation and fluoride-containing anesthetics in the supine position. During the nasal phase of the surgery, nasal dilators and a 0°-rigid endoscope were used. Using endoscopic instruments, in all cases, the middle turbinate was identified and mobilized in the lateral direction, the mucous membrane of the posterior part of the nasal septum in front of the rostrum was coagulated and mobilized in the contralateral direction. In 9 patients, a natural anastomosis with the sphenoid sinus was found. In other cases, a hole was formed in the anterior wall of the sphenoid sinus. After removal and mobilization of the rostrum of the sphenoid

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bone and visualization of the bottom of the sella turcica, the sphenoidal stage of the surgical intervention was completed. Trepanation of the sellar floor was performed and the dura mater was opened. The tumor was removed with various curettes, biopsy forceps and aspirators with different manipulation angles. At the end of the operation, all patients underwent hemostasis using Surgicel Fibrillar hemostatic materials, which were used to cover the removed tumor bed. The formed defect in the dura mater and bone was reconstructed using the hemostatic fibrin-thrombin plate "Tachocomb" floor by floor and Evicel surgical glue.

An endoscopic examination by an otolaryngologist was carried out on the 7th day after surgery. 12 patients were prescribed local irrigation therapy with saline solution due to existing reactive inflammatory phenomena in the nasal cavity. In 8 patients, topical antibiotic therapy was added. According to the results of a cytological examination of scrapings from the nasal mucosa, a picture of severe acute inflammation with the presence of neutrophilic leukocytes was revealed in 6 out of 12 patients. Signs of incomplete phagycytosis were observed. In 4 patients, no signs of inflammation were found; cytological smears were dominated by cells of unchanged prismatic epithelium without signs of atypia.

Among the restrictions of the regimen: all patients were advised to refrain from actively blowing their nose for 14 days for professional purposes.lactic liquorrhea and do not use nasal decongestants for a month to prevent ischemic cerebrovascular accidents.

Over time, there was an improvement in the endoscopic picture of the nasal cavity in 8 out of 10 patients who complained of a runny nose with cloudy discharge from the nasal cavity. During the survey, the prevailing complaint was increased crust formation. The nasal cavity was toileted without the use of decongestants. It was recommended to continue irrigation therapy for another 14 days.

Conclusions

The endonasal endoscopic transsphenoidal approach in surgery for pituitary adenoma is the most preferable from the point of view of minimal trauma to adjacent structures and reducing the rehabilitation period for patients.

Preoperative preparation of the patient with a detailed analysis of magnetic resonance imaging data, computed tomography data and the results of examination of related specialists - otorhinolaryngologists, ophthalmologists, neurologists - plays a decisive role in surgery of the bottom of the sella turcica.

Postoperative rehabilitation of patients should include irrigation therapy, and in the event of otorhinolaryngological complaints, examination by an appropriate specialist with the selection of topical antibiotic therapy.

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