

PRESURGICAL DIAGNOSIS OF HYPOPHYSIAL TUMOURS

¹M. POPESCU, ²C. MIHALACHE, ³V. SĂCELEAN, ⁴G. M. POPESCU, ⁵E. PEDA, ⁶V. GRIGOREAN

¹County Hospital of Pitești, ²County Hospital of Galați, ³Eldery Hospital Hostel of Sibiu, ⁴Sf. Ioan Hospital of Bucuresti, ⁵Elim Medical Centre of Pitești, ⁶Bagdazar Arseni Hospital of București

Abstract: Presurgical diagnosis requires the collaboration of a medical team including the attending physician, the endocrinologist, the radiologist and the ophthalmologist. It includes the pituitary hormonal levels certifying the secretory or non-secretory character of the tumour, the neuroradiological aspect with triplanar MRI T1WI, T2WI and with gadolinium injection. In conclusion, hormonal and neuroradiological diagnosis is compulsory for the preoperative diagnosis, as well as for the choice of the surgical technique and postoperative follow-up.

Keywords: pituitary adenomas, surgical techniques

Rezumat: Bilanțul preoperator necesită colaborarea unei echipe compusă din medicul curant, endocrinolog, radiolog și oftalmolog. El cuprinde bilanțul hormonal hipofizar care certifică aspectul secretant sau nonsecretant al tumorii hipofizare precum și dozajul hormonilor hipofizari în stare bazală și prin teste de stimulare și frenare, aspectul radiologic are ca primă indicație RMN, efectuându-se mai multe secvențe în funcție de patologia suspectată. În concluzie bilanțul hormonal și imagistic sunt obligatorii pentru stabilirea indicației chirurgicale, a tehnicii operatorii și pentru urmărirea postoperatorie.

Cuvinte cheie: adenom pituitar, tehnici chirurgicale

The presurgical diagnosis requires the collaboration of a medical team including the attending physician, the endocrinologist, the radiologist and the ophthalmologist. It includes a clinical detailed examination that will allow the detection of signs of hyperhormonemia specific for the prolactin secreting adenomas, Cushing disease or acromegaly or those suspecting a pituitary insufficiency or the diabetes insipidus or growth disorders. The examination will also allow the identification of the hormonal hypersecretion effects on the cardiac function, blood pressure etc.

The study of the visual function will be carefully examined through the examination of the visual field and of the visual acuity. In the old patients, this examination will be very accurate, having in view the frequent co-existence of the ophthalmologic problems simultaneously.

It happens quite often that the clinical examination be totally negative and the hypophysial lesion is discovered by chance, as a result of a cerebral radiological examination suggested for other reasons (traumatism, headaches, dizziness).

HYPOPHYSIAL HORMONAL DIAGNOSIS

It comprises the study and the dosage of all basal pituitary hormones through dynamic tests of stimulation. This biological diagnosis allows us to certify the secretory or non-secretory character of a pituitary tumour, the importance of the secretion that is already a first factor of therapeutic prognostic and its influence on the pituitary function. This hormonal diagnosis also represents the first stage in the substitutive pharmacological treatment if it is proved that the pituitary function is deficient.

Regarding the Cushing diseases, the biological diagnosis must be extremely accurate, so that to be able to certainly recognize the pituitary origin of the disease.

IMAGING

Pituitary imaging (1-3) should be of an excellent quality, as it is essential for the therapeutic strategy. Pituitary reference imaging technique is the nuclear magnetic resonance imaging (MRI). Computerized tomography is also used in certain indications.

MRI

It may be accomplished only in the absence of contraindications (absolute: pacemaker, intracranial or intraorbital metallic foreign bodies; relative: claustrophobia).

A number of sequences are associated taking into account the suspected pathology.

- sagittal and coronal T1-weighted images (sequences) (Spin Echo) of 3 mm in thickness at 03 mm with a field of exploration of 24 cm/24 cm in sagittal and 24 cm/18 cm in coronal, a matrix of 512/256 and 2 or 3 excitations;
- Coronal T2-weighted images (Fast Spin Echo) of 3 mm in thickness at 03mm, exploration field of 24 cm/18 cm, matrix of 512/256, 2 or 3 excitations;

CLINICAL ASPECTS

- Dynamic sequence in coronal incidence: 4 sequences of 3 mm at 03 mm, T1-weighted (Fast Spin Echo), exploration field of 20/15 cm, matrix of 256/192, one excitation. The sequence lasts 15 seconds. It is 5 times repeated, once before the injection with gadolinium and then 4 times after the injection with gadolinium bolus, in a dose of 01 ml/10 kg body weight.
- After the injection with gadolinium (01/10 kg body weight), coronal and sagittal T2 weighted images identical with those accomplished before the injection with gadolinium or T1-weighted volumetric acquisition (Fast SPGR), angle = 20 degrees in the coronal incidence: 24 to 60 images of 1mm in thickness according to the volume of the studied tumour, exploration field of 24/18 cm, matrix of 512/256, 2 excitations with reconstruction in sagittal or axial plane.

If it is not looking for a pituitary microadenoma, the protocol will comprise the following:

- Before the injection with the contrast product (gadolinium), T1 and T2-weighted sagittal and coronal images;
- Dynamic acquisition in the coronal incidence without contrast injection;
- Volumetric acquisition in coronal incidence after the injection with the contrast product with sagittal reconstruction.

Besides the study of the pituitary macroadenoma or the postoperative follow up, the necessary sequences are the following:

- Before the contrast, T1-weighted sagittal images, T1 and T2-weighted coronal images; in the case of voluminous tumours, the sequences may be thicker (4 mm at 0,5 mm);
- After the injection with the contrast product - the volumetric acquisition in volumetric incidence with sagittal or axial reconstructions.

Tomodensitometria

It preserves some of the indications in the exploration of the pituitary tumours, revealing the following:

- In case MRI is contraindicated, the examination will be performed before and after the injection with the contrast product in bolus in the direct coronal incidences, exploring the ensemble of the selar lodge.
- The images will be taken in the parenchimatous window with or without contrast, the same as in the bone window;
- Searching for extra information besides that given by the MRI: tumoral calcifications, erosions and bones deformations. The examination will be made without the contrast injection in direct coronal incidence, the images being studied in the bone window;
- Certain clinical syndrome. Certain pituitary apoplexies bring about images of meningeal haemorrhage, suggesting the computerized tomography as a first therapeutic intention. The

examination will accomplish only axial images, exploring the ensemble of encephalon, allowing the elimination of the diagnosis of subrahanoidian haemorrhage and a few fine images centred on hypophysis, visualizing the pituitary apoplexy under the form of an intraselar spontaneous hyperdensity. In this case, the examination will be completed with the help of the MRI.

The analysis of the radiological data may give us indications on the characteristics of the adenoma:

- size; micro: below 10 mm or macro above 10 mm;
- the existence of a lateral expansion towards the cavernous sinus, upper towards the optochiasmatic cisterns and lower towards the sphenoidal sinus;
- the importance of the contrast substance that makes us suspect a fibrous adenoma;
- the existence of a cystic or hemorrhagic transformation;
- the possibility of breaking the selar diaphragm marked by the irregular character of the upper pole;
- the existence of a tight gullet between the interstellar adenoma and its expansion, the cause of an incomplete exeresis transphenoidally;
- including the intra-cavernous carotid in the adenoma – formal witness of the invasion of the cavernous sinus bringing about the impossibility of a complete exeresis;

Imaging analysis should inform us about certain essential anatomic details:

- intra-cavernous carotid position;
- pneumatization of the sphenoidal sinus;
- existence of intraselar arachnoids, mostly empty, LCR fistula source.

The analysis of these imagistic data allows us to foresee:

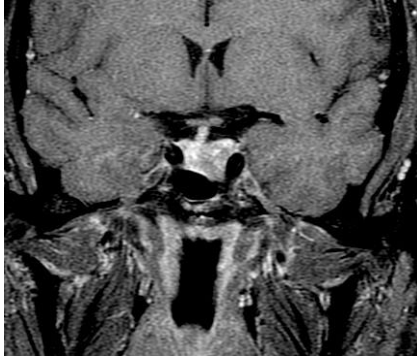
- the included or invasive character of the adenoma, which is very important in case of a total or incomplete exeresis, the phsycian and the patient being informed about this;
- possible difficulties in the accomplishment of exeresis;
- a minor alteration of the surgical technique;
- this accurate analysis represents the warranty for a safe surgery and for the prevention of possible complications.

Regarding these investigations, in most of the cases, the type of pituitary tumours may be identified, as well as the secretory or non-secretory character, the size and the hormonal influence being also mentioned. The morphological and anatomical features of the lesions are detected, especially in relation with the adjacent nervous, vascular and cerebral structures.

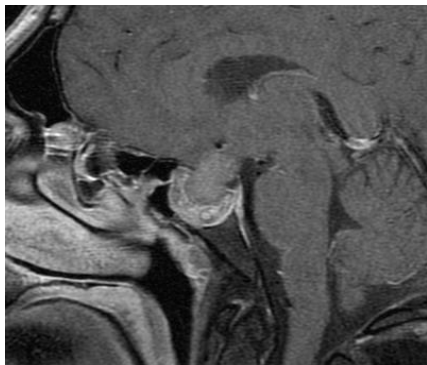
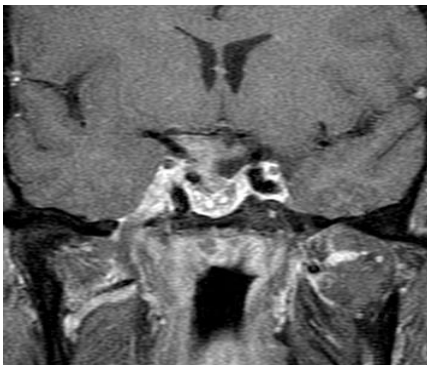
In case of a craniopharingioma whose radiological diagnosis in the absence of calcification may be difficult, or in case of a necrosed pituitary adenoma or in case of Rathke's pouch cyst, the anatomical limits of the lesions may condition the surgical approach.

CLINICAL ASPECTS

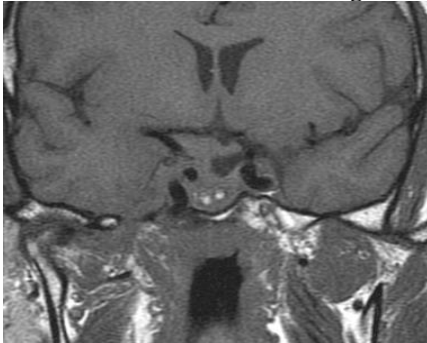
Picture no. 1. Expansion towards the sphenoid sinus



Picture no. 2. Extension at the level of the pituitary stalk, right hemichiasma, cavernous sinuses, sphenoid sinus.



Picture no 3. Intra-tumoral haemorrhages



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