Direct and Indirect Signs of Imagistic Diagnosis in Prolactinomas

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ABSTRACT Nowadays, imagistic methods constitute a real progress in pituitary adenoma diagnosis. Computer tomography is a valuable device in appreciating both the direct and indirect signs of the imagistic diagnosis of the sellar region pathology of pituitary adenoma type. Possibility for that bony structures frequently presented in the cases of the pituitary adenoma should be correctly evaluated constitutes an important favor of that method. Also, acquisitions in a coronal plane with reconstruction in a sagittal, axial and 3D planes give that imagistic method an important play as concerning a correct diagnosis working out with consequence at implications in the subsequent therapy. The present study show the computer tomographic aspects in the prolactin secreting pituitary adenomas.

KEY WORDS pituitary, adenoma, direct signs, indirect signs

Introduction

Prolactinoma is the most frequent pituitary tumor in a percentage of 25-30% of the total pituitary tumors. On the other hand, hyperprolactinemia is determined by many causes and the computer tomography exam is essential in establishing the diagnosis of secreting prolactin adenoma(1,2,5). Besides the dosage in dynamic of the prolactin values, the periodic imagistic evaluation appreciates the response to the treatment. More than that it can more precisely give a prognostic of the disease evolution, when the treatment has been interrupted(4,6).

Imagistic exam of adenoma extension can explain, in many cases, clinical manifestations given by the mass effect and their evolution under the treatment.

Material and methods

The present study was performed within the Laboratory of Medical Imagistic of Craiova, on a period of 2 years, 2006-2008, using a CT AURA PHILIPS.

A number of 31 patients, 25 of which females and 6 males, diagnosed with prolactin secreting pituitary adenoma, with PRL values> 100ng/ml, was available for our study.

For an exact catching of the anatomical structures of the sella turcica, we achieved sections stepped between 1 and 2 mm, coronally, with a photonic flow of 300-700mA and 110-130KV voltage, which allows a good contrast for soft tissues. Scanning time was of 2-3 seconds for each section. The study of pituitary gland is very time started with native exam, which is subsequently repeated after intra-venous contrasting substance injection.

After the coronally scanning of the entire hypophysis we performed 2 planes computer reconstructions, such as:
- one axially sectioned through the middle of the sella turcica
- another three sagittal ones: one right parasagittal, the second left parasagittal and the third medial-sagittal planes

They allowed us to perform the analysis of the sella bony outline (anterior cvadrigeminalis plate wall thickness and continuity)

Coronal acquisitions in the bony window allowed us to appreciate the sellar floor (inclining, outline and thickness) whereas those in the parenchimatous window followed
- hypophysis homogeneity
- hypophyseal upper surface
- hypophyseal height
- hypophyseal sheath trajec

Results

CT exam with a contrasting substance followed two types of signs, such as:
- Direct signs: revealing the pituitary node, usually hypodense compared to the adjacent
pituitary; the former’s size, were studied in the coronal sections, its homogenous or non-homogenous character and iodophilia.

Indirect signs: we followed the bony structures integrity and outline delimiting the turkish sella (sellar floor, anterior wall cvadrigeminalis plate, anterior and posterior clinoid processes). The height and the upper surface of the pituitary gland, traject and thickness of the pituitary gland.

The existence of a pituitary adenoma is suggested by the following signs:
- pituitary gland height increase (more than 8 mm)
- pituitary upper pole convexity
- delaying the gland enhancement
- bony changes (thinning, sellar floor obliquetion; anterior qall or cvadrigeminalis plate sampling, erosion verticalization)
- pituitary sheath moving (obliquetion)

In macroadenoma with parasellar extension cases, we followed the mass effect on the surrounding soft tissues (optic chiasma, optochiasmatic groove, optic nerves, cavernous and petrous sinuses) and the invasion degree of the adjacent bony structures.

From the point of gender grouping view, macroadenomas clearly favored the female with a sex ratio of 4,16:1 females versus males; namely females presented a percentage of 80,64% of the total and the rest of 19,35% were males of the set studied by us. It was reported in literature and it was considered that 70% percentage of all thePRL secreting pituitary adenomas appeared in females; the explanation for it is a simple and obvious one: estrogenous hormones were responsible of untumoral hyperprolactinemia, of the increase of the prolactin secretion to secretogagous stimuli but also they were responsible of the greater incidency of prolactinomas in women.

Analyzing the distribution on age groups it shows a higher incidency overlapped on the period of maximum fertility in women aged between 26-30; the cases were preponderantly grouped between 21 and 40.

In males, the numbers of cases is reduced and distributed almost equally on age groups and presented a „peak” between 31 and 35.

Starting symptoms were, in most of the cases, bound to the amenorrhea-galactorrhea syndrome in women but there existed some cases where the diagnosis was made due to the tumoral mass effect, therefore we have met secondary amenorrhea in 50% of all the cases, menstrual disturbances in 32,5%, galactorrhea 25%, primary amenorrhea 6,25%, visual disorders 6,25%, HIC 1,25%.

Though it seems that the earliest hyperprolactinemia symptom in males is the libido decrease and studies showed that sexual dysfunctions affected 80-90% of the patients with prolactinomas, the most annoying symptom the males complained when presented to a doctor was cephalea in a 72,73% rate; sexual dynamics disorders constitute a signal symptom in 36,36% of patients.

It is to be noticed a coexistence degree of the initial symptomatology, cephalea frequently joining the other types of manifestations. Though there was not any reason to present to a doctor, gynecomasty was remarked in a patient when clinically examined.

From total cases, 70% of all were microadenomas where the indirect signs had been decelated; 30% were microadenoma type lesions where CT evaluation compared to MR exam correctly caught extrasellar extension of those space replacing processes.

Indirect signs were represented by the changes of the pituitary sheath in 90% cases; under the mass effects of both the tumoral formation and sellar floor the pituitary sheath used to move and the sellar floor would bear consequences.

So, in 81%cases, the sheath was controlaterally deviated by the tumoral process; in 2% cases it was elongated and thin by empty sella coexistence; in 4% cases it was short and thickened due to the cranial evolution of the tumoral process; in 1/3 cases to sheath kept a straight direction corresponding to microadenomas with a transversal diameter of 7,3% mm.

Table 1 Correlation coefficients between indirect signs and presence of pituitary adenoma

<table>
<thead>
<tr>
<th>INDIRECT SIGN</th>
<th>R²</th>
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<tbody>
<tr>
<td>PITUITARY SHEATH</td>
<td>0,982</td>
</tr>
<tr>
<td>SELRAR FLOOR</td>
<td>0,897</td>
</tr>
<tr>
<td>CVADRIGEMINALIS PLATE</td>
<td>0,682</td>
</tr>
<tr>
<td>ANTERIOR WALL</td>
<td>0,124</td>
</tr>
<tr>
<td>CONVEXITY</td>
<td>0,325</td>
</tr>
</tbody>
</table>

Changes of sellar floor slope, outline and thickness were the most frequent indirect sign met in the examined CT and it appeared both in micro- and macroadenomas; the floor was normal in only 3%cases (2 patients; one of them, without initial adenoma revealing, possibly with lactotrophic cell hyperplasia; the other one, with average 3mm diameter), as it was oblique especially in microadenomas; it became oblique and thin in encapsulated macroadenomas and even interrupted in local or global invasive macroadenomas toward the sphenoid sinus (figure1).
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Figure 1 Coronal CT images- chances of sellar floor by mass effect of pituitary adenoma

Cvadrigeminalis plate is the second bony wall of sella, influenced (according to the incidence) by the prolactin secreting pituitary adenoma evolution; as the most of the lactotrophic cells are found into the hypophyseal anterior lobe predominantly posterolaterally and posteromedially, as a consequence, it’s reasonable that the prolactinomas should develop in those parts of hypophysis and, by mass effect chance the sellar posterior wall.

Figure 2 Sagittal CT reconstruction -Bone destruction of cvadrigeminalis plate (1) and the anterior thinned(2) wall of a perisellar extended invasive tumoral process(3)

Excepting two adenomas situated on the medial line, all the rest of them developed into the lateral wings of the anterior hypophysis, in the group studied by us.

Tumoral effects on the cvadrigeminalis plate were variable according to the position and antero-posterior diameter of adenoma: from its slop changing to vertical position, to minimal erosive (sampling) or important (thinning up to bone destruction changes)( figure 2).

The anterior wall is the least influenced by the tumoral mass effects. Erosive changes amplitude was also variable, from the simple sampling to the bony outline interrupting in the invasive, a macroadenoma cases, having a normal aspect in 82% cases, a thinned aspect in 14% cases, sampled aspect in 2% and bone destruction aspect in 2% cases.

Discussions

From the analysis on the group studied we established the simultaneous presence of the hormone changes, meaning the PRL values increase, and the presence of both the direct and indirect sign, thus showing a lesion having as a starting point a hypophyseal one. Predominance of female gender is explained by the relative short period between the symptologic signs and patient’s presentation to a doctor: in those situations, lesions were of microadenoma type; PRL secreting macroadenomas have been evaluated in order to determine their extrasellar extension leading to a correct therapeutic attitude of surgery, radiotherapy or drug types. Most of the adenomas presented supra- and lateral-sellar extensions, just one case presented the cavernous sinus invasion.

Indirect signs which were reveled in the group studied by us presented some correlations to the existence of a space replacing process of microadenoma type( table 1).

From the analysis of the above correlation coefficients it resulted that the pituitary sheath changes namely, its movement on the both sides of the medial line/middle constitutes a significant prediction factor for the presence of a pituitary adenoma. Sellar floor anomalies can be also considered as having predictable value for the imagistic diagnosis of adenoma type hypophyseal lesion, the rest of the indirect signs did not reveal significant correlations to the existence of a pituitary adenoma.

Changes of the pituitary sheath represented the indirect sign with the highest incidence of 90%.

Conclusions

1 In the case of the pituitary microadenomas, indirect signs lead to a correct diagnosis working out.

2 Pituitary macroadenomas are correctly evaluated by means of computer tomography

3 Feminine gender is predominant in the pituitary pathology of PRL secreting adenoma

4 Imagistic diagnoses, by computer tomography of pituitary adenomas, is an important part of the complex diagnosis of those lesions, besides the endocrinology, ophthalmologic and paraclinic diagnosis.
References

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