

Comparative morphological study of the pituitary gland by computed tomography and magnetic resonance imaging

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Summary

A prospective study was undertaken to compare the morphology of the pituitary gland by computed tomography (CT) and magnetic resonance imaging (MRI) in 27 consecutive patients. CT is an accepted imaging modality but this study suggested that MRI has certain advantages. MRI is proposed as the imaging modality of choice for lesions of the pituitary gland.

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High-resolution computed tomography (CT) with intravenous contrast material is recognised as the method of choice for imaging the pituitary gland. However, there appear to be limitations to the ability of CT to identify micro-adenomas,¹ and magnetic resonance imaging (MRI) is increasingly being recognised as an excellent imaging method for the central nervous system.¹ There is less discomfort for the patient with MRI than with CT and, of course, the use of iodinated intravenous contrast agents is not without hazard.² A study was undertaken to compare the morphology of the pituitary gland using both imaging modalities (Figs 1a and b).

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Subjects and methods

Twenty-seven consecutive patients, 13 men and 14 women, attending the Endocrinology Clinic at Tygerberg Hospital for pituitary problems were examined by both CT and MRI. The time interval between the two examinations was less than 1 month in 21 cases, less than 6 months in 2 cases and more than 6 months in 4 cases. CT examinations were performed on hospitalised patients using a Somatom 2 machine. We have used the technique described by Taylor³ for more than 400 examinations of the pituitary gland and it was used for these patients. Sagittal reconstruction of the image was performed in all cases.

MRI was performed with an Elscint 5000 Gyrex 0,5 Tesla machine at the South African Medical Research Council's facility at Parow, CP. Image acquisition utilised a selective multislice technique with contiguous slices 5 mm thick. Images were reconstructed by the two-dimensional Fourier transformation and were obtained in both coronal and sagittal planes. Spin echo pulse sequence was used and the factors were: TR 600 TE 27 for T₁ weighting and TR 2000 or 2500, TE 27, 120 and 200 for T₂ weighting.

Results

Linear measurements of the gland in both coronal and sagittal views were taken in both the vertical and transverse planes. In 13 patients the measurements were available and were similar (Tables I and II). The superior margin of the gland could not be measured in 2 cases because of empty sella.

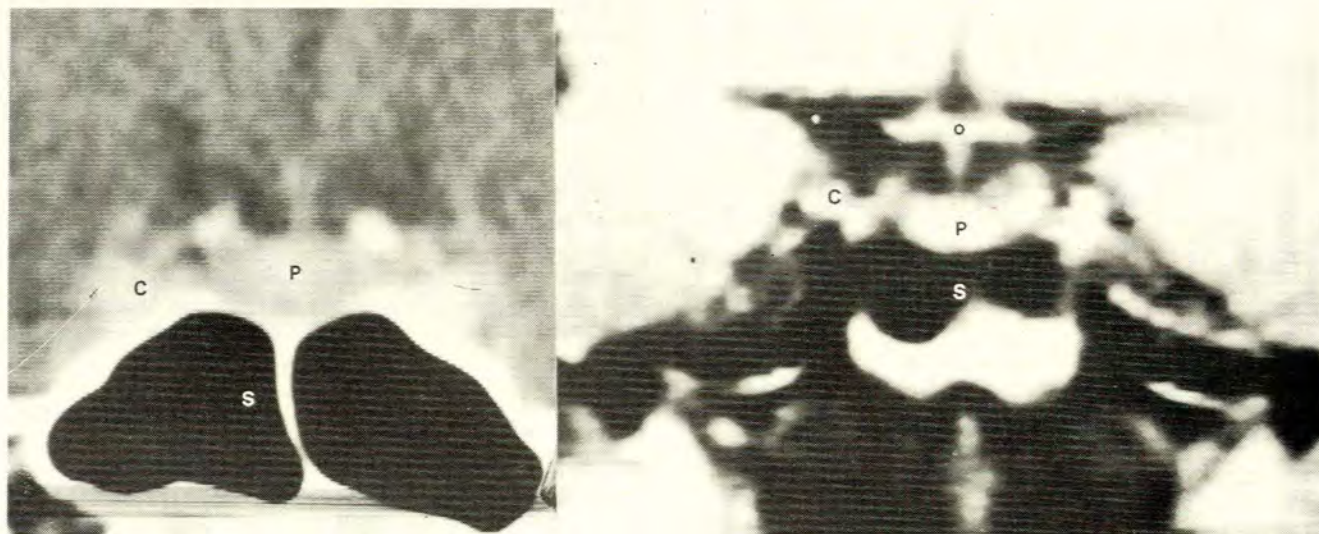


Fig. 1. Coronal view of normal pituitary gland by contrast CT (left) and MRI (right) at mid-fossa level (P = pituitary gland with infundibulum extending superiorly; C = cavernous sinus; S = sphenoid sinus; o = optic chiasm).

TABLE I. COMPARATIVE SCORING ON CT AND MRI

	CT	MRI
Ionising radiation	Present	Absent
Intravenous contrast	Necessary	Not used
Patient discomfort	Present	Insignificant

TABLE II. MORPHOLOGY OF GLAND AND SURROUNDING STRUCTURES

	No. of patients	
	CT	MRI
Optic chiasma and nerves	0/27	27/27
Infundibulum of gland	14/25	14/25
Superior margin of gland	25/25	25/25
Empty sella	2/2	2/2
Pneumatisation of sphenoid sinus	27/27	27/27
Septum in sphenoid sinus	27/27	21/27

Discussion

CT of the pituitary gland has been in use for some years but increasing use is being made of MR for neuro-imaging. It has been proposed that CT be used for evaluation of microadenomas and MRI for macroadenomas.⁴ Because of reported false-negative CT examinations it was decided to undertake this study. Experience shows that MRI has advantages over CT, particularly when the optic chiasm has to be visualised. With CT contrast cysternography is required while MR imaging is non-invasive.

For planning of surgical procedures conventional skull and pituitary fossa views are necessary.

It is concluded that when MRI is available it should be utilised for evaluation of the pituitary gland in preference to CT.

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Ultrasonography should replace intravenous urography in the pre-operative evaluation of prostatism

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Summary

In 48 patients referred for radiological evaluation as part of an investigation for benign prostatism both intravenous urography and ultrasonography were used. Ultrasonography combined with a plain abdominal radiograph was shown to be a better investigation than intravenous urography. Ultrasonography was equally sensitive in detecting changes in the upper tracts and post-micturition residual volume and was more accurate in estimating prostate size. Intravenous urography was slightly more sensitive in detecting bladder wall changes, but this was not of clinical significance.

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Neither the patients' symptoms nor the clinical examination have been shown to be adequate in the assessment of the timing or the nature of the operation to be performed in patients suffering from benign prostatism.¹ There is frequently a lack of correlation between symptoms and the degree of obstruction and the urologist may rely on radiological investigation to assist in making management decisions. Evidence of significant obstruction may indicate immediate catheterisation and early surgery. Accurate assessment of the size of the prostate is important in order to avoid difficulties during suprapubic or retropubic prostatectomy when the gland is smaller than expected, and to minimise the risk of complications during prolonged transurethral resection when the gland is larger than expected.

The radiological procedure most often used has been intravenous urography, during which dilatation of the upper tracts, changes of chronic outlet obstruction (viz. bladder wall thickening, trabeculation, diverticulae and 'fish-hooking' of the ureters), the size of the prostate gland and the post-micturition residual volume have been assessed. Intravenous urography is an uncomfortable procedure since it involves the patient taking a bowel preparation the night before, having nothing by mouth until after the examination, and having an

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