Computed Tomographic Demonstration of the Posterior Pituitary

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*AJNR Am J Neuroradiol* 1985, 6 (6) 889-892

http://www.ajnr.org/content/6/6/889
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From a series of 700 thin, axial, contrast-enhanced CT scans of the sellar region, the posterior lobe of the pituitary was studied. Empty sellae and pituitary lesions larger than 8 mm in diameter were excluded from the study. Of the 320 remaining axial contrast-enhanced CT scans, the posterior lobe of the pituitary was apparent in 124 (39%) as an oval lucency 3–4 mm thick, located medially or paramedially just in front of the dorsum sellae. Normally, the anterior limit of the posterior lobe is always regularly convex forward, but in the presence of a microadenoma of the anterior lobe it may be compressed. The lesser enhancement of the posterior lobe probably correlates with the different volumes of the interstitial spaces in the anterior and in the posterior lobes. The normal picture of the posterior lobe of the pituitary must not be confused with a posteriorly located microadenoma.

The development, histology, blood supply, and function of the posterior lobe of the pituitary gland are very different from those of the anterior lobe. While the anterior lobe is derived from the ectoderm of the stomodeum, the neurohypophysis is derived from the neural ectoderm of the floor of the forebrain. The neurohypophysis is composed of the posterior lobe, the neural part of the stalk, and the expanded upper end of the stalk, which is the median eminence [1]. The object of this report is to describe our computed tomographic (CT) observations of the posterior lobe of the hypophysis.

Materials and Methods

We reviewed 1600 thin coronal and/or axial CT examinations of the pituitary gland, including 700 thin axial CT examinations. In our department, CT of the pituitary gland is performed with a GE CT/8 8800 or 9800 scanner, mainly using 1.5 mm, thin, coronal sections; for the past 2 years CT has been performed in the dynamic mode after intravenous injection of 60 ml of a 32% iodinated contrast medium [2, 3]. Axial sections are only obtained in special conditions. If they are needed, a perfusion of 100 ml of contrast material is given intravenously after the bolus injection to maintain the plasma iodine level during the procedure. The head of the patient is positioned so that the petrous bones are not included in the sections (–10° to –20° to the orbitomeatal line). The gantry is generally not angulated. All images were targeted. Of the 700 cases, 320 constitute the material of this study of posterior pituitary gland.

Results

From a series of 700 thin, axial, contrast-enhanced CT studies of the pituitary gland, we eliminated all patients whose scans showed an empty sella or a pituitary adenoma more than 8 mm in diameter; as a result, 320 patients were analyzed in this study of the posterior lobe of the pituitary. The posterior lobe was clearly identified as a well defined oval lucency in 124 patients (39%). This area of low attenuation is located in the posterior part of the sella, just in front of the dorsum.
When clearly identified (124 cases), the posterior lobe measured 5-6 mm by 3-4 mm (fig. 1) in all cases. In 26% of the selected procedures, the posterior lobe of the pituitary was poorly seen so that its size could not be measured accurately. In 34% of the procedures the posterior lobe was not identified at all. When demonstrated the posterior pituitary was generally apparent on only one or two 1.5-mm-thick contiguous sections. We were never able to identify the posterior lobe on the uppermost cut through the pituitary (figs. 2A and 2B). This may be explained in part by the fact that the top of the posterior lobe is covered by some tissue of the pars anterior [1] and by partial-volume averaging of the posterior lobe at the sellar diaphragm level. Sagittally reformatted images (fig. 2C) may also show the posterior lobe well.

The anterior limit of the posterior lobe of the pituitary is always regularly convex forward in normal cases (fig. 3) and is invested by dorsal extension of the anterior lobe on each side. In the presence of a microadenoma of the anterior lobe, the anterior limit of the posterior lobe may or may not be compressed (figs. 4 and 5). The posterior lobe border is often
Fig. 4.—Flattening of right side of posterior lobe (small arrows) by right intrasellar prolactinoma (large arrow).

Fig. 5.—Left intrasellar microadenoma (large arrow) without any change of posterior lobe (small arrows).

Fig. 6.—Axial CT section through dorsum sellae (bone window). Imprint of posterior lobe on anterior aspect of dorsum.


Located just in front of a concave imprint of the dorsum (fig. 6). This imprint is midline in only 50% of the cases [4]. In the other cases, the center of the imprint of the dorsum and the center of the posterior lobe can be situated as far as 3 mm from the midline. The findings using dynamic axial CT (figs. 7 and 8), although not part of our 320 cases, are included to
reported in the
mas [5] are, in our opinion, more
a wide superior bony aperture of the
dorsum (fig. 6). We have found that the posterior
demonstrated when it is prominent in size and when there is
pituitary corresponds in
confused with a
In
posterior pituitary
CT scans as a
explain the appearance of the posterior part of the pituitary.
Figures 7 and 8 are from a series of 20 dynamic axial CT
scans obtained in normal patients.

Discussion
Our investigation indicates that in nearly 40% of cases the
posterior pituitary will appear on thin, axial, contrast-enhanced
CT scans as a low-density area in the posterior part of the
sella (figs. 1–4). This area of low attenuation must not be
confused with a posteriorly located pituitary microadenoma.
In addition, we have noted that the position of the posterior
pituitary corresponds in location to the indentation on the
dorsum (fig. 6). We have found that the posterior lobe is best
demonstrated when it is prominent in size and when there is
a wide superior bony aperture of the sella. Low-density areas
reported in the literature as probable incidental microadenomas [5] are, in our opinion, more likely to represent large but
normal neurohypophyses. A normal posterior lobe should
therefore be added to the list of regions of low density on
contrast-enhanced CT scans of the pituitary gland.
The whole pituitary gland resides outside the blood-brain
barrier [6]. After a bolus injection of contrast medium, as
shown by axial dynamic CT (figs. 7 and 8), the intravascular
compartment of the posterior lobe is opacified first, because
of its direct arterial blood supply through the meningohypo-
physeal trunk [7]. This agrees with the observations of Wis-
locki [8]. But, at some time after the injection, when the
contrast medium equilibrates between the intravascular and
extravascular interstitial spaces, less enhancement of the
posterior lobe is present (figs. 7 and 8), which may correlate
with the lesser volume of the interstitial spaces of the posterior
lobe [9]. We believe that these data explain our observations
that the posterior lobe of the pituitary gland appears less
enhanced than the anterior lobe after routine injection of
contrast material.

ACKNOWLEDGMENTS
We thank the technical staff of the Department of Neuroradiology
for their contributions and Michel Gaudron for photographic work.

REFERENCES
York: Churchill Livingstone, 1980:1439–1442
2. Bonneville JF, Poulignot D, Cattin F, Couturier M, Mollet E,
Dietemann JL. Computed tomographic demonstration of the
effects of bromocriptine on pituitary microadenoma size. Radiol-
ogy 1982;143:451–455
3. Bonneville JF, Cattin F, Moussa-Bacha K, Portha C. Dynamic
computed tomography of the pituitary gland: the “tuft sign.”
Radiology 1984;147:145–148
4. Wortzman G, Rewcastle NB. Tomographic abnormalities simu-
ulating pituitary microadenomas. AJNR 1982;3:505–512
5. Chambers EF, Turski PA, LaMasters D, Newton TH. Regions of
low density in the contrast-enhanced pituitary gland: normal and
pathologic processes. Radiology 1982;144:109–113
the central nervous system. AJNR 1983;4:907–906, AJR
1983:141:815–824
7. Xuereb GP, Prichard MML, Daniel PM. The hypophysial portal
8. Wislocki GB. The vascular supply of the hypophysis cerebri of
the rhesus monkey and man. Res Publ Assoc Nerv Ment Dis
1938;17:48–68
9. Roppolo HMN, Latchaw RE. Normal pituitary gland: 2. Micro-
scopic anatomy—CT correlation. AJNR 1983:4:937–944

Fig. 8.—Time-density curves for anterior lobe and posterior lobe of pituitary
gland. Y axis is labeled in Hounsfield units.