Lesions within and around the Pituitary
Much More than Adenomas …

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Abstract
The pituitary and parasellar region is an anatomically complex area where a number of neoplastic, infectious, inflammatory, developmental and vascular pathologies can occur. Differentiation among various etiologies may not always be easy, since many of these lesions may mimic the clinical, endocrinologic and radiologic presentations of pituitary adenomas. The diagnostics of sellar lesions involves a multidisciplinary effort, and detailed endocrinologic, ophthalmologic and neurologic testing is essential. CT and, mainly, MRI are the imaging modalities to study and characterize normal anatomy and the majority of pathologic processes in this region. This article provides an overview of the relevant radiologic characteristics together with clinical findings of pituitary tumors, vascular, inflammatory and infectious lesions found in the pituitary and parasellar region in order to propose an appropriate differential diagnosis.

Key Words: Adenoma · Infection · MR imaging · Parasellar · Pituitary gland · Vascular · Tumor

Introduction
Radiologic imaging of the pituitary gland and the parasellar region is challenging since the pituitary gland is a very small-volume organ in close neighborhood to many eloquent structures. Furthermore, imaging necessitates high-contrast and topographic resolution not to miss the often very subtle pathologies. Additionally, anatomic variations can render differential diagnosis difficult.
Magnetic resonance imaging (MRI) is the modality of choice to provide multiplanar high-contrast images of the pituitary gland and its adjacent structures.

Computed tomography (CT) is used only for supplementary purposes, i.e., to look for bony changes or to exclude or visualize calcifications. Located in the bony pituitary fossa, the pituitary gland may be morphologically and functionally divided into two parts, the anterior (adenohypophysis) and posterior (neurohypophysis) lobe. Embryologically, the distal part of the adenohypophysis arises from the epithelium of Rathke’s pouch, an invagination of the roof of the oropharyngeal membrane. As part of the brain, the neurohypophysis is composed of the neural stalk (infundibulum) and the neural lobe (infundibular process). The pars intermedia, derived from the posterior wall of Rathke’s pouch, is located between the anterior and posterior lobe and is usually not seen on MRI. The posterior lobe of the pituitary gland and the pituitary stalk receive their blood supply from the superior and inferior hypophyseal branch of the internal carotid artery, whereas the anterior lobe receives its blood supply from penetrating capillary loops from the portal vessels of the hypophyseal-portal circulation, respectively.

The adenohypophysis produces a variety of hormones, i.e., prolactin, growth hormone (GH), thyroid-stimulating hormone (TSH), follicle-stimulating hormone (FSH), and luteinizing hormone (LH). In addition, prohormone precursors of corticotropin (ACTH), and melanocyte-stimulating hormone are secreted, respectively. Thus, lesions of the adenohypophysis may cause hormone deficiency resulting in a variety of clinical symptoms.

The posterior pituitary lobe has no independent secretory function and receives vasopressin (ADH) and oxytocin from the hypothalamic neurons through the capillaries for storage. In newborns, up to 3 months of age, both anterior and posterior pituitary lobes exhibit hyperintensity on T1-weighted imaging [1, 2]. With increasing age, the adenohypophysis seems to lose its hyperintensity gradually, whereas the neurohypophysis remains hyperintense [3].

Experimental studies have shown, that the high signal intensity of the posterior lobe is caused by accumulated neurosecretory granules containing ADH (and not fat, as hypothesized before). Thus, in patients with a central diabetes insipidus, the high signal of the posterior lobe is absent, returning after appropriate medical substitution [4].

A standard protocol for MRI of the pituitary and parasellar region consists of thin-section (2–3 mm) sagittal and coronal T1-weighted images with and without contrast enhancement (Table 1, Figure 1). Angulation of the coronal images can vary, being either perpendicular to the sella turcica or parallel to the pituitary stalk. Thin-sectional T2-weighted imaging can be added to look for cystic lesions. Searching for pituitary pathologies, we administer half the standard dose of Gd-DTPA (0.05 mmol/kg). Additionally, one scan covering the whole brain (T2 or FLAIR) should be supplemented.

CT may become important when supplementary information concerning bony structures or calcifications is required. CT is frequently used in extensively growing pituitary adenomas, invading the sphenoid sinus, nasal cavity or the skull base. Additionally, anatomy of the sphenoid sinus can be evaluated prior to transsphenoidal surgery. To exclude acute pituitary hemorrhage, CT still may be helpful in the emergency situation.

Nowadays, conventional radiography is mainly obsolete in the diag-