

6. Sellar/Parasellar Neoplasms

Most pituitary microadenomas are asymptomatic/nonfunctioning. Those that are hormonally active are typically brought early to medical attention. Microadenomas (< 10 mm in diameter) appear as low to moderate SI focal lesions on T1WI, with variable SI on T2WI (Fig. 6.1 A). This appearance, visualized against the moderate SI of the pituitary, render microadenomas often difficult to visualize without contrast. Early (< 5 minutes) post-contrast MR well demonstrates the minimally-enhancing adenoma against the brightly-enhancing normal pituitary gland (white arrows, Fig 6.1 B, C). On delayed post-contrast scans, the adenoma may be iso- to hyperintense to the gland. Contrast administration is essential pre-operatively and when Cushing disease is suspected, as ACTH (adrenocorticotrophic hormone) secreting tumors tend to be the smallest of the microadenomas. MR is not useful for distinguishing the various types of adenomas, although both prolactinomas—the most common functioning adenoma—and growth hormone secreting adenomas tend to occur in the lateral aspects of the gland. 3 T offers substantial advantages for imaging of pituitary microadenomas, making possible acquisition of images with a slice thickness ≤ 2 mm. Recently, compressed sensing has been employed to provide high resolution dynamic imaging of the pituitary, during IV contrast administration, improving visualization and characterization of pituitary lesions. In Fig. 6.2, images are presented using GRASP (Golden-angle Radial Sparse Parallel) (A) shortly after contrast arrival and (B) at a later phase. A small area of delayed contrast uptake (arrow) is visible in the pituitary on the right, inferiorly, consistent with a microadenoma. The lesion is not well seen in (B) due to delayed enhancement and relative iso-intensity of the lesion to the normal pituitary at this time point.

By definition, a pituitary macroadenoma is a lesion over 10 mm in diameter. These may be asymptomatic or present due to mass effects or hormonal imbalance. Diagnostically, macroadenomas are rarely problematic even for CT. MR is nevertheless markedly preferred for diagnosis given its superior ability to evaluate suprasellar extent, cavernous sinus invasion and carotid artery encasement. Macroadenomas are low to intermediate SI on T2 and T1WI (Fig 6.1 D, E). As lesions grow, their blood supply becomes more tenuous leading to necrosis and hemorrhage which can manifest as areas of high SI depending upon the age of blood products. Chronic findings of hemorrhage (a rim of hypointensity on T2WI) will not be seen, however, as the pituitary's lack of a blood-brain barrier allows macrophages to successfully remove hemosiderin. Necrosis may lead to confusion in the differentiation of a pituitary adenoma from an inferiorly extending craniopharyngioma, but only adenomas enlarge the sella. Cystic changes also occur and are evident as low SI on

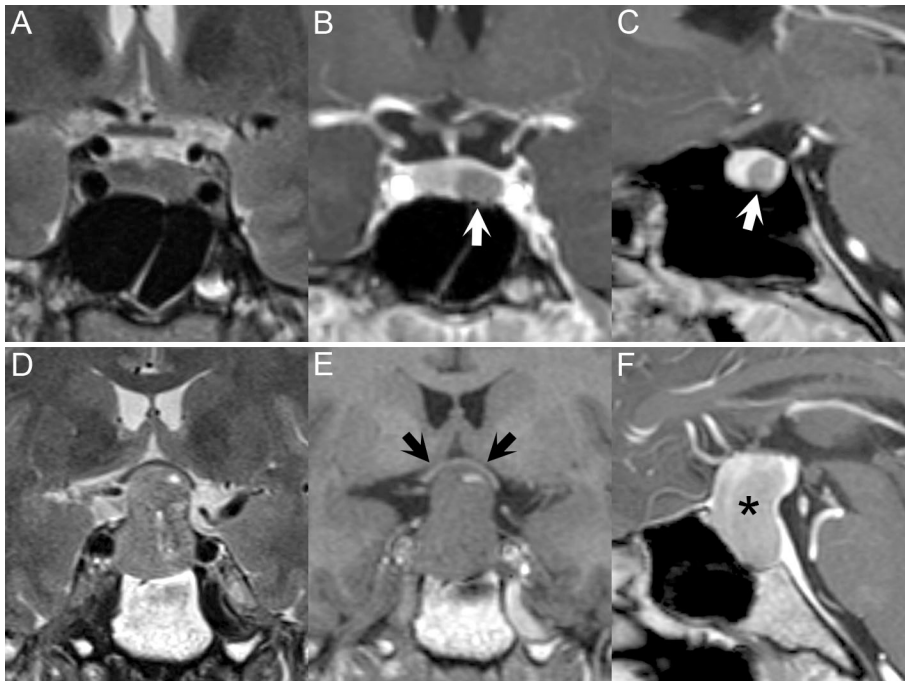


Fig. 6.1

T1WI and high SI on T2WI. As the tumor grows superiorly, splaying and compression of the optic chiasm (Fig. 6.1 E, black arrows) is common. Inferior expansion is also common with enlargement of the sella into the sphenoid sinus. Macroadenomas thus commonly acquire a dumbbell-shaped appearance, with central compression/constriction by the diaphragma sellae (Fig 6.1 D, E). Macroadenomas tend to homogeneously, mildly enhance (Fig 6.1 F, asterisk), although this may be patchy in tumors with prominent necrosis. Enhancement helps define tumor extent, often underestimated in pre-contrast sequences especially with cavernous sinus involvement.

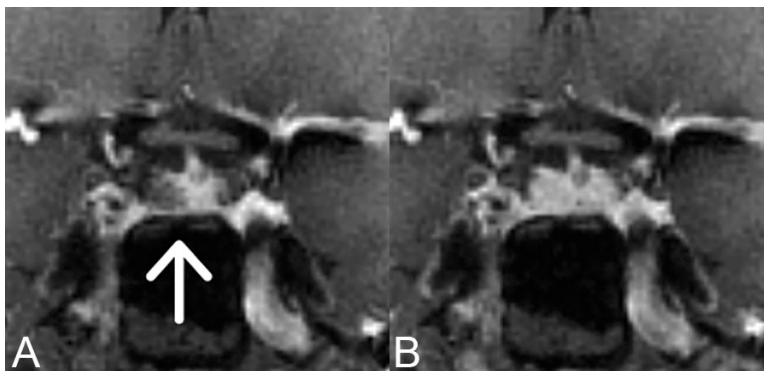


Fig. 6.2

Courtesy of Kai Tobias Block

Craniopharyngiomas are histologically benign (WHO grade I) suprasellar tumors arising from Rathke's pouch. Unlike Rathke's cleft cysts, these lesions typically enhance

heterogeneously, calcify, and present with a concomitant (enhancing) soft tissue mass. Craniopharyngiomas are divided by microscopic features into adamantinomatous (mostly pediatric) and papillary (mostly adults) subtypes. Adamantinomas demonstrate heterogeneous hyperintensity on T2WI (Fig. 6.3 A) and enhance heterogeneously on T1 (Fig. 6.3 B). Cystic components are of high SI on T2WI and low SI on T1WI. Papillary lesions are more likely to be solid. In all types, high cholesterol content or methemoglobin from prior hemorrhage may result in foci of increased SI on T1WI. IV contrast enhancement improves identification of lesion margins and differential diagnosis. Contrast

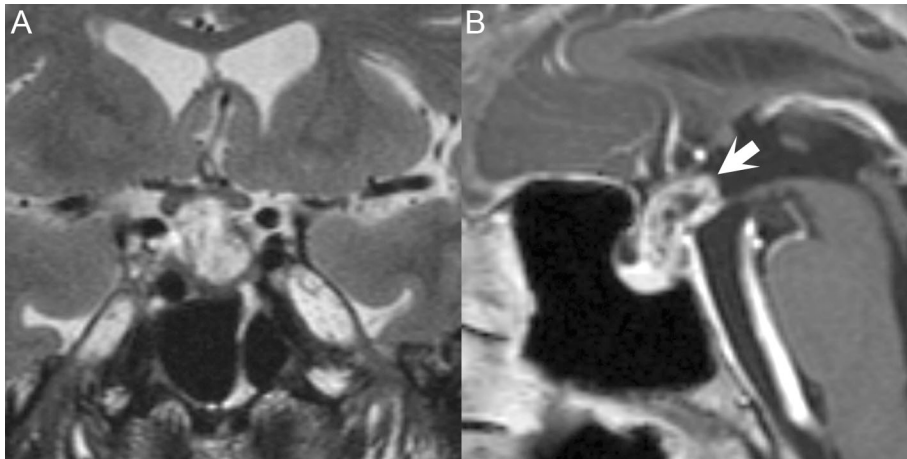


Fig. 6.3

administration can also assist in demonstrating compression of the pituitary, which enhances brightly (Fig 6.3 B, arrow), and well delineates craniopharyngiomas that are not large enough to obliterate the suprasellar cistern (the intensities from these two may not be distinguishable on T2WI). Adamantinomas may have calcified regions, which are not well seen on MR. Lesion location, multilobularity, heterogeneous contrast enhancement, and prominent cystic components are usually sufficient for confident diagnosis of a craniopharyngioma.