Incidental findings within the sinuses are commonly seen on head and neck MRI performed for other reasons. Mucous retention cysts most commonly occur in the maxillary sinuses and are asymptomatic unless they disrupt mucociliary clearance. The typical appearance is illustrated in Figs. 53.1A,B where bilateral lesions exhibit high and low SI on (A) axial T2WI and (B) contrast-enhanced T1WI, respectively. A large lesion can be confused with an air-fluid level, leading to a false diagnosis of sinusitis. The nondependent location of the retention cysts in Figs. 53.1A,B aids in this distinction, but dependent mucous retention cysts are more problematic: a convex border with surrounding air suggests a retention cyst versus the concave up borders of an air fluid level. Evaluation of the lesion in multiple planes can further aid in differentiation. Polyps are also typically asymptomatic and exhibit variable SI based on their relative protein content. Such lesions are not reliably distinguished from mucous retention cysts by their MRI appearance. Mucosal thickening is often asymptomatic, and is defined as thickening of the lining of the maxillary and ethmoid sinuses greater than 4 and 2 mm, respectively. Figures 53.2A and 53.2B demonstrate left maxillary sinus mucosal thickening: compared with the right sinus wall, added moderate and high SI is present on the left in (A) T1WI and (B) T2WI, respectively. Such findings correlate with inflammatory edema or hyperplasia. Abnormal SI within the ethmoid air cells has been shown to alternate from the left to right side over the course of the day as part of a normal nasal cycle.

Sinusitis, further discussed in Chapter 56, constitutes the major differential consideration with the findings above, air fluid levels being the most reliable marker of acute disease. Clinically, acute sinusitis is symptomatic for less than 4 weeks and subacute between 4 and 12 weeks. On a subacute or chronic basis, secretions may become inspissated—a finding correlating with hyperdensity and proliferative bone formation (i.e., osteitis) on CT. Inspissation increases the protein content of contained sinusoidal fluid, leading to alterations in MRI SI. Increases in fluid protein concentration up to 25% aid T1 relaxation, manifest as increased SI on T1WI. This appearance is illustrated in Figs. 53.3A,B,C in a patient who had undergone resection of a pituitary macroadenoma, with fat placed during surgery within the sphenoid sinus. On the (A) T1WI, high SI
material (white arrow) predominates posteriorly within the left sphenoid retention cyst, correlating with increased protein concentration. Hypointensity remains on the left more anteriorly, correlating with lower protein content. With increasing protein concentrations, SI of sinusoidal secretions on T2WI initially remains high; however, concentrations eventually become so high so as to facilitate proton-proton interactions, aiding T2 relaxation. As such, the proteinaceous area of the inspissated secretions in Fig. 53.3A correlates with a low SI on the (B) axial T2WI, with the surrounding low protein content fluid exhibiting expected hyperintensity. An additional, similar appearing, inspissated secretion containing, retention cyst (white arrow, Fig. 53.3B) is also present. The protein concentration in the periphery of this smaller lesion is actually low enough to not alter significantly the T1WI of this fluid, allowing partial SI suppression by the inversion recovery pulse utilized to obtain (C) FS FLAIR images. This is not the case with the peripheral fluid within the larger lesion that remains hyperintense. Protein concentrations greater than 25% result in macromolecular crosslinking, the resulting rigid structure inhibiting T1 relaxation with resulting hypointensity on both T1WI and T2WI—an appearance similar to that of a normally aerated sinus.

Tornwaldt cysts, arising from the notochordal remnant in the posterior nasopharyngeal vault along the midline, are common incidental findings in the parapharyngeal space. As in Figs. 53.4A,B these lesions tend to exhibit homogeneous hyperintensity on (A, axial) T2WI. This lesion also exhibits high SI on (B) sagittal T1WI, a finding correlating with its
increased protein content. SI on T1WI of these lesions is variable, and lesions often exhibit faint wall enhancement. Differential considerations include pharyngeal space mucosal retention cysts—which may be multiple or occur laterally but do not enhance—and cystic adenoidal hyperplasia. Of neoplastic entities in this space, squamous cell carcinoma is by far the most common, followed by minor salivary gland tumors and lymphoma. Infectious entities like tonsillitis as well as locally extending or remote metastatic lesions are additional considerations for mass lesions in this region.