

54. Neoplasia I

Squamous cell carcinomas are the most common cancer involving the head and neck. These arise from a variety of sites including the paranasal sinuses (Fig. 54.1, in this instance arising from the sphenoid sinus). The lesion in this patient extends to the nasal cavity and middle cranial fossa, demonstrating a heterogeneous appearance on (A) T2WI. On (B) GRE T1WI, the internal carotid arteries exhibit high SI (normal for this imaging technique), highlighting displacement and compression of the left-sided artery. (C) Coronal CE T1WI reveal enlarged (short axis > 1 cm) enhancing bilateral lymph nodes beneath the sternocleidomastoid muscles consistent with metastatic involvement. Although less than 1 cm is considered normal for most head and neck lymph nodes, < 1.5 cm is used as the size criteria for the jugulodigastric node. One right-sided node in this patient exhibits low central SI on (C) CE T1WI, consistent with necrosis—a finding suggestive of neoplastic involvement regardless of size. Other features of malignant lymphadenopathy include lack of hilar fat SI and low ADC values.

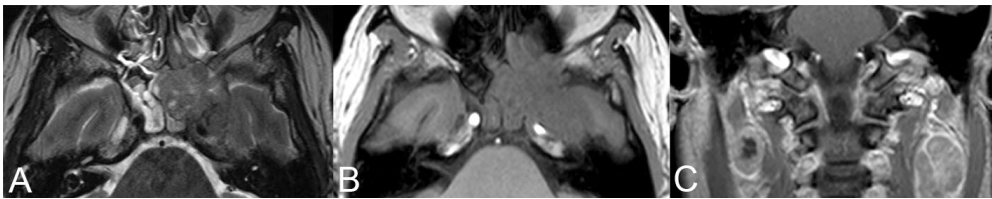


Fig. 54.1

Benign mass-like lesions of the nasopharynx and paranasal sinuses expand rather than destroy bone, with contrast enhancement generally lacking. Such a lesion, an ethmoid mucocele, is illustrated in Fig. 54.2, demonstrating fluid-like SI on (A) T2 and (B) T1WI. (C) There is mild peripheral enhancement post-contrast. By definition, there is expansion of the sinus with smooth remodeling of the walls. Location in the frontal sinuses is most common, followed by the ethmoids.

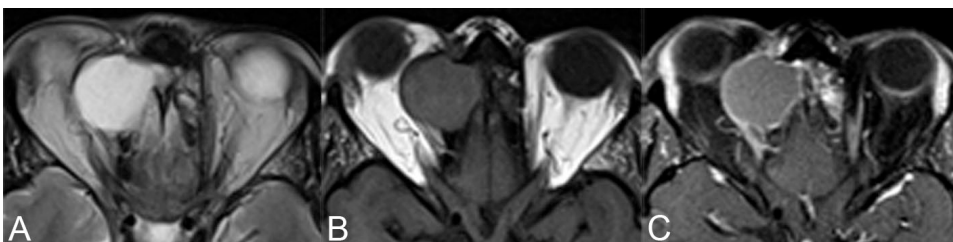


Fig. 54.2

Top differential diagnoses for a mucocele include allergic fungal sinusitis and sinonasal polyposis, which can exhibit a similar MR appearance but typically involve multiple sinuses. Antrochoanal polyps involve both the maxillary sinus and nasal cavity. These dumbbell-shaped lesions arise from the maxillary antrum, extending into the adjacent nasal cavity. SI on unenhanced images is characteristically fluid-like, although on T1WI SI may increase with greater protein content.

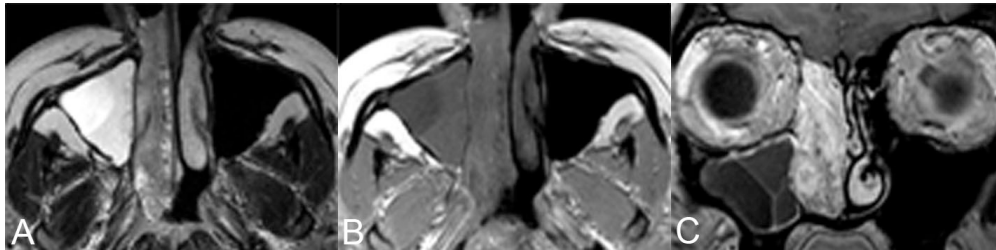


Fig. 54.3

Inverted papillomas are benign but locally aggressive tumors. The most common presentation is that of an enhancing mass centered in the middle meatus, with local bone remodeling and sinus obstruction. A small percent degenerate into or coexist with squamous cell carcinoma. The lesion illustrated in Fig. 54.3 extends posteriorly into the nasopharynx and superiorly into the ethmoid air cells, as seen on axial (A) T2, (B) T1, and coronal (C) CE T1WI. Ostiomeatal obstruction, which is typical, has resulted in fluid accumulation in the right maxillary sinus. The brighter, more lateral secretions possess lower protein content than their medial counterparts as evidenced by the lower and higher SI of the latter on, respectively, (A) T2 and (C) T1WI. Convoluted, cerebriform enhancement is characteristic, as illustrated.

Juvenile angiofibromas arise specifically at the sphenopalatine foramen, occurring most frequently in adolescent boys. These infiltrative but benign tumors exhibit multiple flow voids, resulting in heterogeneous high SI on T2WI, and demonstrate avid lesion enhancement, due to high vascularity. Prominent adenoidal soft tissue is within the differential diagnosis, as well as a hemangioma (which is quite rare), but neither enhance as prominently and both differ in presentation.

Squamous cell carcinoma is the most frequent cancer of the lower face, tongue, oropharynx, and larynx. Evaluation of adjacent spaces is critical for surgical planning and well-assessed on MR. Locally invading carcinoma involving the mandible presents with loss of normal marrow hyperintensity on T1WI, and enhancement post-contrast on images obtained with fat suppression. Fig. 54.4 presents images from a patient with squamous cell carcinoma of the tongue. A mass is noted within the tongue on the left, hyperintense on (A)

the coronal FS T2-weighted scan, of intermediate signal intensity on (B) the T1-weighted axial scan pre-contrast, and enhancing on (C) the post-contrast scan with fat suppression. The lesion approaches, but does not cross the midline. Note that the tumor can be distinguished from normal adjacent tongue, even on the pre-contrast T1-weighted scan, with the normal tongue demonstrating mild fatty changes.

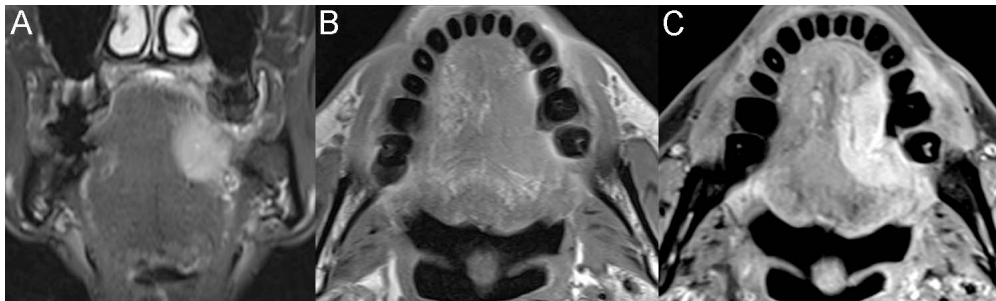
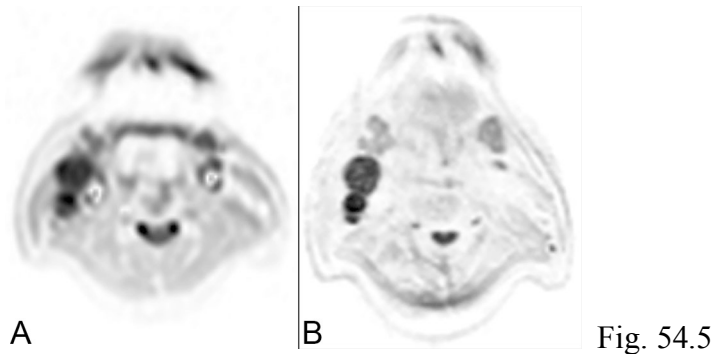


Fig. 54.4

Congenital lesions of the head and neck tend to be cystic, including cystic hygromas (lymphatic malformations), thyroglossal duct cysts, and branchial cleft cysts (with second branchial cleft cysts most common). A ranula is a retention cyst that results from trauma or inflammation involving most commonly the sublingual gland.

Of skull base processes, metastatic disease, as well as primary tumors of bone can involve any of its portions. Sinonasal carcinomas and esthesioneuroblastomas frequently involve the anterior base, whereas sella lesions, pituitary tumors, chordomas, and chondrosarcomas—the latter two arising centrally and off laterally respectively—involve the central skull base. The importance of MR in the skull base is on delineation of lesion extent (i.e. orbital, brain parenchymal, sinonasal) rather than determination of tissue type. Contiguous as well as perineural spread of tumors to the skull base frequently occurs. Perineural tumor spread with adenoid cystic carcinoma occurs in up to 50% of patients. Close inspection of the neck for metastatic lymph nodes is an important part of image interpretation in cases where head and neck cancer is suspected. DWI aids substantially in this process, although discussion continues in regard to the specificity of restricted diffusion for identification of lymph nodes involved by metastatic disease. DWI images can be inverted in terms of gray scale for presentation, as shown with Figs. 54.5 and 54.6, providing a display somewhat similar to that of PET. Recent technical developments have substantially improved the image quality of DWI for the evaluation of metastatic lymph nodes, as specifically shown in Fig. 54.5. Here results with (A) single shot EPI are compared to (B) that with integrated slice-specific shimming and frequency adjustment in combination with RESOLVE EPI (read-out segmented EPI), which together offer a marked

improvement in spatial accuracy and substantially reduced artifacts. Presumed metastatic involved lymph nodes are seen on the patient's right.



Courtesy of Sergios Gatidis

Today, in several clinical circumstances, screening of the whole body by MR in cancer patients is recommended (for detection of metastatic involvement), specifically with the inclusion of whole body DWI. Presented in Fig. 54.6 are whole body MR images in a 22 year old with a relapse of non-Hodgkin lymphoma. Scans are presented (A) before and (B) after treatment, with nodal involvement highlighted by diffusion restriction in (A) and complete response with resolution across all body regions in (B).

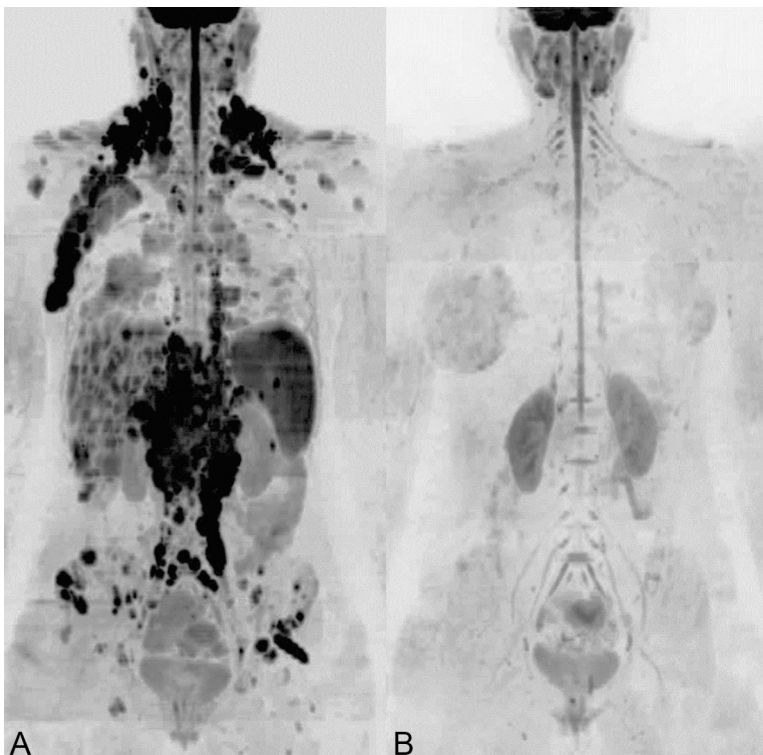


Fig. 54.6
Courtesy of Giuseppe Petralia