Solitary Fibrous Tumor of the Sinonasal Cavity: CT and MR Imaging Findings

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Solitary Fibrous Tumor of the Sinonasal Cavity: CT and MR Imaging Findings

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ABSTRACT

SUMMARY: SFT is a rare lesion of the sinonasal cavity. We retrospectively reviewed 5 patients with histopathologically proved sinonasal SFTs to determine their CT and MR imaging features. All patients underwent paranasal sinus CT and MR imaging. Four SFTs occurred in the nasal cavity, and 1, in the maxillary sinus. All SFTs had well-defined margins, and the mean maximum diameter was 55 mm. On nonenhanced CT, 5 SFTs appeared homogeneously isoattenuating to gray matter. The most common manifestations of bony involvement were bony remodeling and thinning. On MR imaging, 5 SFTs were isointense to gray matter on T1-weighted images, and the lesions were isointense in 3 and hypointense in 2 patients on T2-weighted images. The lesions showed heterogeneously marked enhancement on postenhanced MR images. Four patients underwent dynamic contrast-enhanced MR imaging, and the TICs showed a washout pattern. A familiarity with the imaging findings of sinonasal SFT may help to diagnose this entity.

ABBREVIATIONS: Bcl-2 — B-cell lymphoma 2; HU — Hounsfield unit; SFT — solitary fibrous tumor; TIC — time-intensity curve

SFT, first reported in the pleura by Klemperer and Rabin in 1931,1 is an uncommon spindle cell tumor of mesenchymal origin. This tumor usually arises in the pleura but can also arise in the head and neck, including the sinonasal cavity, orbit, nasopharynx, larynx, parapharyngeal space, oral cavity, and thyroid. SFTs of the sinonasal cavity are rare, with fewer than 30 cases reported in the English literature to date.2–20 Although several case reports and clinical studies have mentioned imaging findings of SFTs in this region,6,12,15 the specific imaging characteristics of sinonasal SFT have not been detailed in the literature. We present the CT and MR imaging features of 5 patients with sinonasal SFTs proved by histopathology.

MATERIALS AND METHODS

Patients

This study was approved by the institutional review board. Five patients with histopathologically confirmed sinonasal SFTs diagnosed during an 8-year period (March 2004 to May 2012) were retrospectively reviewed. The female/male ratio was 1:4. The average age was 43.2 years (range, 36–55 years). All 5 patients underwent surgical removal of SFTs by endoscopic sinus surgery. Their clinical presentations, physical and nasal endoscopy examinations, and treatment plans were extracted from the medical records.

CT Technique

All 5 patients underwent paranasal sinus unenhanced CT. Images were obtained in both the axial and coronal planes in all 5 patients by using a LightSpeed 16-section CT scanner (GE Healthcare, Beijing, China) or a Brilliance 64-section CT scanner (Philips Healthcare, Best, the Netherlands). The imaging parameters were as follows: voltage, 120 kV; current, 200 mA; matrix, 512 × 512; and section thickness, 2 mm. These images were reconstructed by using both a bone algorithm (window width of 2000 HU at a window level of 200 HU) and a soft-tissue algorithm (window width of 400 HU at a window level of 40 HU). Reformations were performed from the superior wall of the frontal sinus to the inferior wall of the maxillary sinus in the axial plane and from the anterior wall of the frontal sinus to the posterior wall of the sphenoid sinus in the coronal plane.

MR Imaging Technique

Paranasal sinus MR imaging was performed in all 5 patients before surgery. The MR imaging examinations were performed on a...
SFTs are characterized by the proliferation of spindle cells arising from mesenchymal fibroblast-like cells. On the basis of ultrastructural and immunohistochemical studies, SFTs have been shown to arise from mesenchymal fibroblast-like cells. The definitive diagnosis of the entity depends on the characteristic histopathologic features and specific immunohistochemical markers and patterns of reactivity. Histopathologically, SFTs are characterized by the proliferation of spindle cells arranged in a whorled or patternless fashion within a background collagen stroma and have prominent vascularity in a hemangiopericytoma-like vascular pattern. Histopathologically, SFTs show a strong positive expression for CD34 and moderately positive expression for vimentin and Bcl-2. However, they are usually negative for cytokeratin, antiantiendomysial antibody, S-100 protein, smooth muscle actin, and desmin; these findings may help to exclude some lesions, such as epithelial tumor, hemangiopericytoma, fibrosarcoma, and neurogenic tumor. Immunoreactivity with the marker CD34 was present in all 78 SFTs of the head and neck region reported by Abe et al.13

Sinosal SFTs typically present as a slowly growing painless mass. Previous case series suggest that SFTs in this region show no sex predilection and tend to present after the fourth decade of life,10,15,17 while our series had a male predominance. Patients generally present with progressive nasal obstruction, rhinorrhea, and epistaxis. Other symptoms, such as anosmia, headache, facial pain, exophthalmos, and visual decrease, may also be present. On nasal endoscopy, SFTs typically appear as a reddish mass with a smooth surface.

According to the literature5,7,9,11–16,18–20 and the present 5

cases, most SFTs originated from the nasal cavity and only a minority of cases arose from the paranasal sinuses. Sinonasal SFTs characteristically appear as an oblong well-defined soft-tissue mass. On unenhanced CT, these lesions tend to show homogeneous isoattenuation compared with gray matter, and they usually have marked enhancement after the administration of contrast material. Occasional internal calcifications can be detected, as in case 2 in the present study. Bone remodeling, thinning, local absorption, and even reactive sclerosis can be noted in large sinonasal SFTs. Although this CT pattern is
often seen with sinonasal SFTs, it is nonspecific for soft-tissue tumors of this region.

Compared with CT, MR imaging can demonstrate characteristic features and can be useful in the diagnosis of sinonasal SFTs. These lesions are usually homogeneously isointense to gray matter on T1-weighted images and generally appear heterogeneously isointense or hypointense on T2-weighted images. Predominant low signal on T2-weighted images is unusual for other nasal lesions; this feature is an important diagnostic clue for SFT. Marked enhancement of sinonasal SFTs is generally noted due to their high vascularity, just as 2 of our cases showed multiple flow voids within the tumors, which is also an important MR imaging feature. The typical signal characteristics on T2-weighted images are likely due to fibrous tissue with high collagen content in SFTs. SFTs typically develop in the sinonasal cavity but may show evidence of local extension into the orbit, pterygopalatine and infratemporal fossa, skull base, or intracranial cavity.

Dynamic contrast-enhanced MR imaging may aid in the specific diagnosis of head and neck lesions and predicts their biologic behavior. TICs of the 4 patients in the present study showed a washout pattern (type III), which is similar to that of the internal carotid artery. This demonstrates that SFT is a markedly hypervascular lesion and this TIC pattern is unusual for nasal lesions except for juvenile angiofibroma. The TICs of sinonasal SFTs may be related to the hemangiopericytoma-like area identified histopathologically and to a hypervascular arterial phase blush present on angiography. This technique may give an important clue to diagnose a suspected SFT in the sinonasal cavity.

The main differential diagnosis of sinonasal SFT includes inverted papilloma, hemangioma, juvenile angiofibroma, angiomatous polyps, and hemangiopericytoma. Inverted papilloma typically shows a convoluted cerebriform pattern on both T2-weighted and enhanced T1-weighted MR images. Hemangioma reveals obviously high signal intensity on T2-weighted MR images, with marked enhancement. Juvenile angiofibroma occurs almost exclusively in male adolescent patients. The lesions generally arise in or near the sphenopalatine foramen and thus often are located in the posterior nasal cavity with extension into the nasopharynx. The typical imaging findings include bony remodeling and destruction and marked enhancement associated with multiple flow-void signals on enhanced T1-weighted images. Angiomatous polyps often arise in the choanal region. The lesions usually show hyperintense signal on T2-weighted images and marked enhancement on enhanced T1-weighted images. Hemangiopericytoma is an uncommon tumor in the nasal cavity, which often occurs in the posterior nasal cavity. Bony compression, hyperintense signal on T2-weighted images, and marked enhancement on enhanced T1-weighted images are typical manifestations of hemangiopericytoma.

**CONCLUSIONS**

Although sinonasal SFT as an uncommon entity, its typical imaging characteristics, including bony remodeling and thinning, isointense or hypointense signal on T2-weighted images, marked enhancement on contrast-enhanced T1-weighted images, and a washout TIC pattern may help to suggest this diagnosis preoperatively.

**REFERENCES**