Fat-Containing Masses of the Prestyloid Parapharyngeal Space: Unusual Case Series

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Introduction

Fat containing tumors of the prestyloid parapharyngeal space are very uncommon. Intrinsic masses of the prestyloid parapharyngeal space (PPS) represent <0.5% of all head and neck neoplasms. Approximately 70% of lesions in the PPS are benign and 30% malignant. The most common PPS masses are extrinsic extension into the PPS, ectopic salivary gland tumors and neurogenic tumors. Intrinsic fat-containing masses are exceedingly uncommon. This scientific exhibit presents 9 cases of fat-containing masses within the prestyloid parapharyngeal space. Most lesions were benign. In our series, benign cases include 3 isolated lipomas, 1 case each of teratoma, fat containing heterotopic ear pinna, Proteus syndrome, and lipoblastoma. Two malignant liposarcomas were seen.

Educational Objectives

The objectives of this exhibit are:
1. To clearly define the anatomy of the prestyloid parapharyngeal space (PPS).
2. To describe novel techniques for imaging fat-containing lesions of the PPS, such as IDEAL MRI.
3. To illustrate unusual congenital, developmental, benign, and malignant fat-containing PPS masses.

Anatomy

Borders of the PPS

Superior: Skull base
Anterior: Pterygopalatine fossa
Posterior: Stylopharyngeal spondausis (Carotid Space)
Anterolateral: Intercarotid fascia (Mediastinal Space)
Lateral: Deep soft parotid fascia (Periparotid Space)
Medial: Bucopharyngeal fascia (Pharyngeal Musculature Space)
Inferior: Confluence of styloglossus muscle fascia

Contents of the PPS

Fat
Minor salivary glands
Ascending pharyngeal artery
Ascending palatine A and V
Pharyngeal venous plexus
Nerve to tensor vall palatini
Tensor-styloid fascia
- Surgical landmark
- Nerves and vessels (including those of the carotid space) are deep to this structure.

Pharyngeal paraspinal muscle

Masticator Space

Medial: Buccopharyngeal fascia
Superior: Skull base
Anterior: Pterygomandibular raphe

Imaging Techniques for H&N Masses: IDEAL

In the head and neck, chemical shift imaging and fat suppression are problematic secondary to erroneous signal suppression by local magnetic field (B0) or radiofrequency (B1) inhomogeneities and nonspecific suppression of short T1 signal when it approximates that of fat.

Iterative Decomposition of water and fat with Echo asymmetry and Least-Squares estimation (IDEAL) is a chemical shift based water-fat separation method for robust and uniform fat suppression. It can provide both fat images, fat-suppressed water images, and field-corrected water-fat images.
- IDEAL acquires three or more images at arbitrary echo times in order to separate water from fat.
- It uses an iterative method to determine the B0 field inhomogeneity map, followed by demodulation of the phase shifts created by the inhomogeneities from the initial source images.
- The resulting source images are then decomposed into separate water and fat images using a least-squares estimator.

IDEAL source images are reconstructed using a reconstruction algorithm that uses a region growing method to avoid water-fat separation method for robust and uniform fat suppression. It can provide both fat images, fat-suppressed water images, and field-corrected water-fat images.

Teratoma

Teratomas are present at birth and consist of tissue from at least two different germ cell layers. These well encapsulated lesions may contain various proportions of all of these tissue types. These tissues, though primarily nontender, are not uncommon in children but may be quite different from different germ layers. PPS masses are considered benign and calcify, especially helpful in making this diagnosis.

Liposarcoma

Initial contrast-enhanced CT images (not shown) revealed a complex mass, primarily fat-containing retropharyngeal and prestyloid PPS mass. Initial surgical excision revealed the pathology to be dermato leiomyosarcoma protuberans. These follow-up axial (A-C) and coronal (D) CT scans obtained three years later revealed a complex mixed solid (arrow) and fatty (open arrow) mass within the retropharyngeal and prestyloid parapharyngeal spaces. Repeat surgical excision confirmed dermato leiomyosarcoma.

Heterotopic Parapharyngeal Space Pinna of the Ear

Parapharyngeal Space Lipoma

Myxoid Lipoblastoma

References

5. Myxoid lipoblastoma. Lipoblastoma and lipoblastomatosis are benign tumors arising from embryonal fat cells, which usually occur in infancy and early childhood. Males are affected more than females in a 3:1 ratio. These tumors usually arise in extremities. Involvement of neck is rare with only 10 cases reported so far in the English literature.

DISCUSSION

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Precontrast sagittal (A), axial (B), and coronal (C) T1 FSE images demonstrate a large complex fat-containing left prestyloid parapharyngeal space mass (arrow) in a 4-year-old child. The lesion presented as a slowly enlarging nontender neck mass that failed to respond to antibiotic therapy. The mass involves the parotid, masticator, and prestyloid parapharyngeal spaces. The mass displaces the parotid gland laterally, widens the stylopharyngeal muscle (arrowhead), and extends to the level of the temporomandibular joint. The lesion is seen to compress and displace the pharyngeal airway (arrowheads). Note the involvement of the carotid space (arrow).

Postcontrast sagittal (A), axial (B), and coronal (C) T1 FSE images demonstrate a large complex fat-containing prestyloid PPS mass containing fat. The lesion is seen to compress and displace the pharyngeal airway (arrowheads). Note the involvement of the carotid space (arrow).

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Chemically selective postcontrast fat-suppressed T1 FSE image (A) demonstrates post, non-uniform fat suppression (arrow). There is a distinct demarcation of areas of poorly suppressed fat on the non-IDEAL image from the enhancing tissue (arrowheads) as compared to the IDEAL postcontrast water-only (B) T1 FSE image. The IDEAL postcontrast fat-only (C) image is seen to suppress areas of contrast enhancement (open arrows) so that the fatty components of the lesion are better seen.

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Postcontrast sagittal (A), postcontrast chemically selective fat-suppressed FSE, and IDEAL fat-suppressed T1 FSE (C) sagittal images. The IDEAL images demonstrate more uniform fat suppression (arrow), less blurring of the lesion interfaces due to chemical shift artifacts, and less artifact arising from dental hardware.

As a result, these lesions most frequently occur in the fifth and sixth decades of life with a slight female sex predilection. Isolated lipomas may be painless and, mobile masses that enlarge slowly. If totally excised, the lesion are better seen.

Noncontrast axial (A-C), coronal (D), and sagittal (E) CT images demonstrate a primarily fatty mass (arrowheads) involving the prestyloid PPS extending through a defect of the superior pharyngeal constrictor muscle (arrows). A small solid portion of the mass is seen (open arrow), somewhat concerning for a malignant portion of the lesion.

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Myxoid Lipoblastoma

Noncontrast axial (A-C), coronal (D), and sagittal (E) T1 FSE MR images demonstrate a primarily fatty mass (arrowheads) involving the prestyloid PPS extending through a defect of the superior pharyngeal constrictor muscle (arrows). A small solid portion of the mass is seen (open arrow), somewhat concerning for a malignant portion of the lesion.

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DISCUSSION

Precontrast axial (A-C), coronal (B), and sagittal (C) T1 FSE-contrast corrected images demonstrate nearly uniform loss of T1 hypointensity throughout the mass with fat suppression. A small enhancing solid portion of the mass is seen posteriorly (arrowheads) (open arrow), somewhat concerning for a malignant portion of the lesion.

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Noonan syndrome is a hematromuscular syndrome involving all 3 germ layers. It is often associated with subcutaneous tumors such as lipomas, hemangiomas, and lymphangiomas. The T1-weighted MRI images (A-B) in this patient reveal extensive left facial lipomatosis and a small lipoma within the prestyloid PPS (arrow).

Isolated perial and periparotid lipomas are uncommon. These lesions occur most frequently in the fifth and sixth decades of life with a slight female sex predominance. Isolated lipomas are typically tender, painless, and mobile masses that enlarge slowly. If totally excised, these lesions show no tendency to recur. Multiple head and neck lipomas have also been observed in neurofibromatosis, Noonan syndrome, multiple familial lipomatosis, Gardner syndrome, HIV spotty lymphadenopathy, Maffucci’s disease, and enchondroplacental lipomatosis. Lipomas in these syndromes, however, rarely involve the prestyloid PPS.

Case 1 (A-B) demonstrates an extensive right prestyloid PPS lipoma (arrow) extending into the parotid space. Case 2 (C-D) reveals a small prestyloid PPS lipoma (arrowheads) involving the parotid space.