



ORIGINAL ARTICLE / *Head and neck imaging*

Peripharyngeal space tumors: Can magnetic resonance and multidetector-row computed tomography help predict location, malignancy and tumor type?



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KEYWORDS

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Parapharyngeal
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Schwannoma;
Paranglioma

Abstract

Purpose: The goal of this study was to assess the performances of magnetic resonance imaging (MRI) and multidetector-row computed tomography (MDCT) in determining tumor location, suggesting the specific diagnosis of tumors involving the peripharyngeal space and identifying findings suggestive for malignancy using histopathological findings as standard of reference.

Material and methods: The MDCT and MRI examinations of 99 patients with a total of 102 tumors located in the retropharyngeal, carotid and parapharyngeal spaces were retrospectively reviewed. MDCT and MRI examinations were independently analyzed for tumor location and specific histological type of tumor. Finally, benign or malignant criteria were evaluated. Agreement between imaging features and final histopathological diagnosis that served as the standard of reference was assessed with the Kappa statistic.

Results: Regarding tumor location almost perfect agreement was obtained between imaging findings and histopathological findings (kappa = 0.86 and 0.92 for MDCT and MRI, respectively). Agreement between the results of imaging and histopathological findings regarding malignancy was substantial for MDCT (Kappa = 0.73), MRI (Kappa = 0.65). A definite histopathological diagnosis was suggested on the basis of imaging findings for 84 tumors and in agreement with the final histopathological diagnosis in 77/84 tumors (92%).

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Conclusion: MDCT and MRI provide accurate information to localize and characterize peripharyngeal tumors. These two examinations provide complementary data to identify imaging criteria that suggest malignancy.

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The peripharyngeal space contains the carotid space, the fatty parapharyngeal space and the retropharyngeal space. The parapharyngeal space has a shape of an inverted pyramid extending from the base of the skull to the hyoid bone [1]. The styloid process divides the parapharyngeal space into two compartments: the carotid space, posteriorly and the fatty parapharyngeal space, anteriorly [2,3]. The retropharyngeal space is located posteromedially within the medial margin of the internal carotid. Peripharyngeal tumors represent less than 0.5% of all neck and head tumors [3,4]. Most peripharyngeal tumors develop from the salivary glands or nerves [2]. Although mostly benign, these tumors usually require surgery. Surgery is challenging because of the depth of these spaces and the close relationships with vascular and nerve structures.

The goal of preoperative imaging is to accurately localize peripharyngeal space and approach a histological diagnosis in order to guide the therapeutic approach. In this regard, depending on imaging findings, complementary imaging investigations such as thoraco-abdominal multidetector-row computed tomography (MDCT) or positron emission tomography (PET) CT, additional genetic investigation, pretreatment embolization, specific surgical approach, additional radiotherapy, or ordinary follow-up may be required. Currently, the preoperative assessment is based on MDCT and magnetic resonance imaging (MRI) examinations.

The goal of this study was to assess the performance of MDCT and MRI to accurately localize these tumors, suggest a histological diagnosis and identify imaging criteria suggestive for malignancy using histopathological findings as standard of reference.

Material and method

Patients

From January 2004 to February 2015, patients who had been followed-up or had undergone surgery for a mass of the suprahyoid spaces were identified in the database of the university hospital of Nantes. A total of 99 patients who presented with a mass of the carotid, parapharyngeal or retropharyngeal space were included in this retrospective study. There were 59 men (59.6%) and 40 women (40.4%), with a mean age of 45.9 years (range: 4 months–88 years).

Exclusion criteria were:

- no imaging examinations available on the picture archiving and communicating system (PACS) of our institution;
- no final histopathological diagnosis available;
- relapse of an initial pathology;
- imaging examinations obtained after treatment;

- metastatic lymph nodes secondary to known ear, nose and throat (ENT) squamous cell carcinoma – however, we included metastatic lymph nodes initially without identified cause but later shown to be ENT tumor metastases;
- pseudotumors (abscess, thrombosis, aneurysm).

A total of 102 tumors were analyzed (3 patients had bilateral tumors), all involving one of the three above-mentioned spaces.

All imaging examinations were extracted from the PACS of our institution. Among the 75 patients who had MDCT, 39 had also MRI imaging. For 24 patients, only MRI was performed, without MDCT.

Imaging protocol

MDCT examinations covered the neck and brain regions after intravenous administration of iodinated contrast material except for two children who only had unenhanced MDCT examination. Unenhanced phase was also obtained in 33 patients. Additional MDCT acquisitions during the arterial phase were obtained for all patients with paragangliomas ($n=24$).

All MRI examinations included at least one T1-weighted and one T2-weighted sequence (with or without fat-suppression) and T1-weighted sequences after intravenous administration of a gadolinium chelate in the transverse plane and an additional plane. MR angiography of the supra-aortic trunks was obtained when paragangliomas were suspected.

Image analysis

Images were reviewed by a radiologist with 10 years of experience in ENT imaging. When patients had both MDCT and MRI examinations, MDCT was reviewed first, and MRI afterwards. Patients were divided into 3 groups. The MDCT group (75 patients) corresponded to the patients who had at least one MDCT examination. The MRI group (24 patients) corresponded to the patients who had only MRI examination. The MDCT-MRI group (39 patients) corresponded to the patients who had both MDCT and MRI, with MRI performed after MDCT examination.

Tumor presentation was recorded, including morphology (size, homogeneity, margins) and enhancement patterns. Tumor location was determined based on the projection of the center of the tumor and the displacement of the adjacent structures (internal and external carotids, internal jugular vein, parapharyngeal fat and styloid process). The reader was asked to suggest a definite diagnosis and then determine if the lesion was whether benign or malignant (Table 1).

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