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Primary nasopharyngeal non-Hodgkin's lymphoma: imaging patterns on MR imaging☆,☆☆

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Abstract

Objectives: To summarize the distinct imaging features of different subtypes of primary nasopharyngeal non-Hodgkin's lymphomas (NHLs). **Materials and methods:** Clinical data and magnetic resonance imaging findings of 71 patients with histologically proven primary nasopharyngeal NHLs were retrospectively reviewed. The tumor distribution, signal intensity, lesion texture, contrast enhancement properties, extra-chamber involvement, regional structure invasion, and cervical lymphadenopathy were evaluated and compared between different subtypes of NHLs. **Results:** Of the patients, 70.4% had B-cell lymphomas; 64.8% had symmetrical and diffuse involvement of nasopharynx walls; and 19.7% had superficial ulcerations. Extra-chamber involvement and regional structure invasion occurred in most patients. The frequency of neck node involvement was up to 83.10%; 62.7% of them were bilateral involvement. Patients with T-cell or nature killer/T-cell NHLs had a higher incidence of superficial ulcerations, nasal cavity, and paranasal sinus invasion than B-cell NHLs ($P<.05$). Patients with B-cell NHLs had a higher incidence of cervical lymphadenopathy specifically in Level VA and parotid region than T-cell or nature killer/T-cell (NK/T-cell) NHLs ($P<.05$). **Conclusion:** Primary nasopharyngeal NHLs had some characteristic imaging features and different subtypes of nasopharyngeal NHLs had some distinct imaging features.

Keywords: Non-Hodgkin's lymphoma; Nasopharynx; Extranodal; Magnetic resonance imaging

1. Introduction

Waldeyer's ring consisting of lymphoid tissues of nasopharynx, palatine tonsils, base of tongue, and oropharyngeal wall is the most common site of extranodal non-Hodgkin's lymphomas (NHLs) [1]. Primary NHLs from the nasopharynx are relatively rare and represent only 10–28% of Waldeyer's lymphomas [2,3]. The clinical, pathological features, treatment, and prognosis of primary NHLs in nasopharynx have been reported. These neoplasms have a male predominance [2] and are usually highly aggressive with a strikingly poor prognosis [4,5]. It has been reported that this tumor has distinct treatment and prognosis in contrast to the most frequent malignant tumors in nasopharynx, e.g., nasopharyngeal carcinomas (NPCs) [2,6].

The endoscopic examination with multiple site biopsies of nasopharynx is a well-established method in the histologic diagnosis of nasopharyngeal diseases. The sensitivity of endoscopic findings and biopsy specimens in detecting malignancy before treatment were 94.2% in diagnosis of NPCs [7]. Malignancy would be missed in 5.8% of patients even though multiple site biopsies were taken. In this situation, computed tomography (CT) and magnetic resonance imaging (MRI) are valuable tool for the evaluation of

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nasopharyngeal diseases and for the indication of a repeat biopsy. However, few literatures have reported the imaging features of primary nasopharyngeal NHLs [8–11]. Moreover, in these limited literatures, most of them have reported the imaging features of NHLs in Waldeyer's ring as a group [8,9,11], only focus on the CT findings [9], or just have a small sample [10]. To the best of our knowledge, no literatures have reported the MRI features of primary nasopharyngeal NHLs in a large series, although MRI is preferred for the assessment of extension of lymphomas to different fascial spaces and intracranial extension compared with CT. Furthermore, B-cell lymphomas usually have a better prognosis than NK/T-cell lymphomas [12]. Determination of different subtypes of non-Hodgkin's lymphoma of nasopharynx using an imaging modality will help the radiologists with their differential diagnosis.

In this study, we retrospectively analysis MR features of 71 cases of primary nasopharyngeal NHLs. The aim of this study is to identify the distinct imaging patterns of primary nasopharyngeal NHLs and to identify the imaging features in different histological subtypes of primary nasopharyngeal NHLs which is useful for radiologists with their differential diagnosis.

2. Materials and methods

2.1. Patients

Seventy-one consecutive patients with untreated primary nasopharyngeal NHLs at the Sun-Yat Sen University Cancer Center were enrolled between May 2004 and March 2010. The histological diagnosis was made by using primary nasopharynx tumor biopsy. The inclusion criteria were the following: previously untreated, histologically proven NHLs of the nasopharynx and presence of symptoms related to a nasopharyngeal tumor and the bulk of tumor was located in nasopharynx [4,10]. Secondary nasopharyngeal involvement of a systemic disease was excluded. The study was conducted under the approval of the institutional review broad of our hospital, and written informed consent from the enrolled subjects was waived. All patients had nasopharynx and neck MR scans before the start of the treatment. All patients were staged according to the modified Ann Arbor system for extranodal lymphoma [10]. Clinical and imaging data were reviewed.

2.2. MRI

MRI was performed on a 1.5-T unit (Signa, General Electric, CV/i) by using a head and neck synergy coil. Imaging sequences included axial, coronal and sagittal fast spin-echo T1-weighted imaging and axial T2-weighted imaging and axial and sagittal contrast enhanced T1-weighted imaging, and coronal contrast enhanced fat-suppressed T1-weighted imaging. T1-weighted images were obtained with a TR/TE of 420-450ms/Min full, 2 excitations, a 22-cm field of view (FOV), a 320×224 matrix, a 5.0-mm-thick section, and a 1.0-mm intersection gap. T2-weighted images were obtained with a TR/TE of 3200–3500/85ms, two excitations, a 22-cm FOV, a 320×224 matrix, a 5.0-mm-thick section, and a 1.0-mm intersection gap. Contrast-enhanced T1-weighted images and fat-suppressed T1-weighted images were obtained with a TR/TE of 320–350ms/Min full, 1 excitations, a 22-cm FOV, a 512×224 matrix, a 5.0-mm-thick section and a 1.0-mm intersection gap after intravenous bolus injection of gadopentetate dimeglumine (Magnevist, Schering, Berlin, Germany) at a dosage of 0.1–0.2 mmol/kg.

2.3. Image analysis

MR images were analyzed by two experienced radiologists blinded to clinical data by consensus. All MR images were rendered on a picture archiving and communication system workstation monitors (Centricity RA1000 Workstation V.3.0, GE Healthcare). MRI features including tumor distribution (symmetrical involvement or asymmetrical involvement nasopharyngeal walls), signal intensity (compared with adjacent muscles), lesion texture (homogeneous or heterogeneous, necrosis, superficial ulceration), and contrast enhancement properties (homogeneous or heterogeneous; poor, moderate and intense, defined as poor if the degree of enhancement is similar to that of skeletal muscle, moderate if greater than skeletal muscle, intense if similar to the mucosa) were assessed. Extra-chamber involvement and regional structure invasion were also evaluated. Extra-chamber involvement was defined as a mucosa-based tumor that extends beyond nasopharynx cavity, e.g., nasal cavity, paranasal sinus, oropharynx, laryngopharynx, lingual tonsil and palatine tonsils. Regional structure invasion was defined as tumor extension to the deep structures of nasopharynx including parapharyngeal muscles, parapharyngeal space, or bone marrow of skull base.

According to the determined tumor distribution and regional structure invasion, the imaging patterns of tumors were classified into two types: Type 1, a circumscribed mucosa-based mass with symmetrical and diffuse involvement of nasopharyngeal walls but absent of deep structure invasion (Type 1a) or present of deep structure symmetrical invasion (Type 1b) or present of deep structure asymmetrical invasion (Type 1c); Type 2, a mass with asymmetrical involvement of nasopharyngeal walls (i.e., diffuse involvement of all walls which was asymmetrical or focal involvement of only few of the walls) but without deep structure invasion (Type 2a) or with deep structure invasion (Type 2b).

The size and signal intensity features of the cervical lymphadenopathy were also evaluated. The diagnosis of nodal involvement was defined according to the following radiological criteria: central necrosis, extranodal spread, and size criteria [13,14].