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MALT Lymphomas : Radiological Spectrum of Disease

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Introduction

The broad category of non-Hodgkin's lymphoma includes a large variety of different diseases, including indolent as well as aggressive lymphomas. MALT lymphoma (mucosa associated lymphoid tissue lymphoma) arises in the extranodal, mucosal lymphoid tissue and represents as many as 7.6% of all lymphomas (1). This type of lymphoma has only been recognized as a distinct entity in the recent years (2). It affects one or several extranodal structures such as the eye, stomach, pharynx, lung and salivary gland. The lymphoma is generally of low grade and has indolent course. However, approximately 10% of cases will have regional lymph nodes and bone marrow involvement. The aim of this exhibit is to demonstrate the most common radiological patterns of MALT lymphoma, with endoscopic and pathologic correlations.

Mucosa-Associated Lymphoid Tissue (MALT)

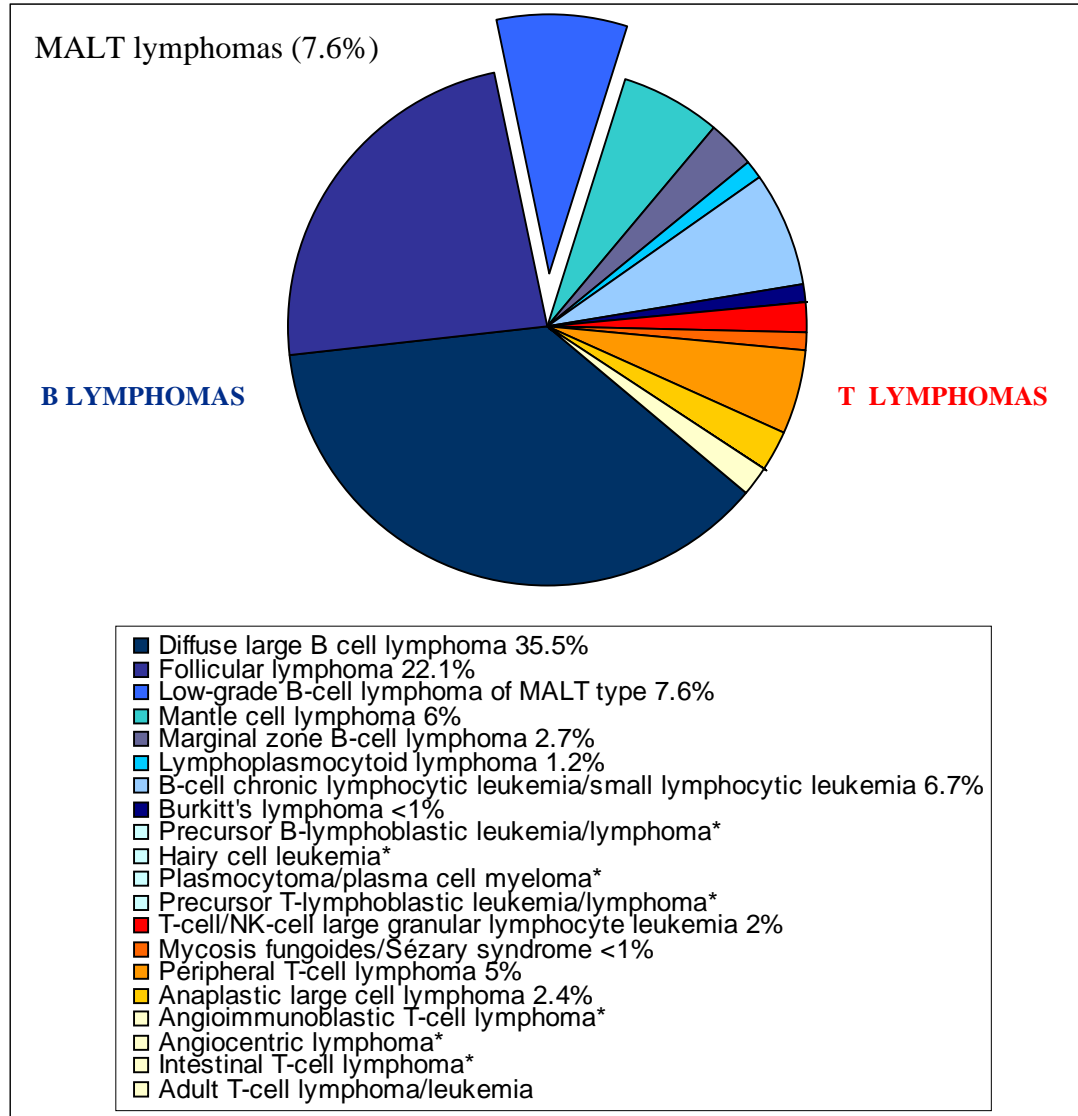
Lymphoma is a malignancy involving primarily the lymph nodes and certain other organs where lymphocytes normally develop, including the spleen, thymus, and liver. In addition to discrete lymphoid organs, malignant lymphoma may also arise at extranodal sites, in areas where chronic inflammation is often present, such as gastrointestinal tract, respiratory tract, salivary and lacrimal glands, so called mucosa associated lymphoid tissue (MALT). Each of these organ systems may be a potential site of a MALT lymphoma.

Frequently involved sites

As seen above, MALT lymphomas affects one or several extranodal organ systems. From a practical standpoint, we have divided MALT lesions into gastrointestinal, respiratory, and head and neck lesions. Other lesions less common will be also briefly discussed.

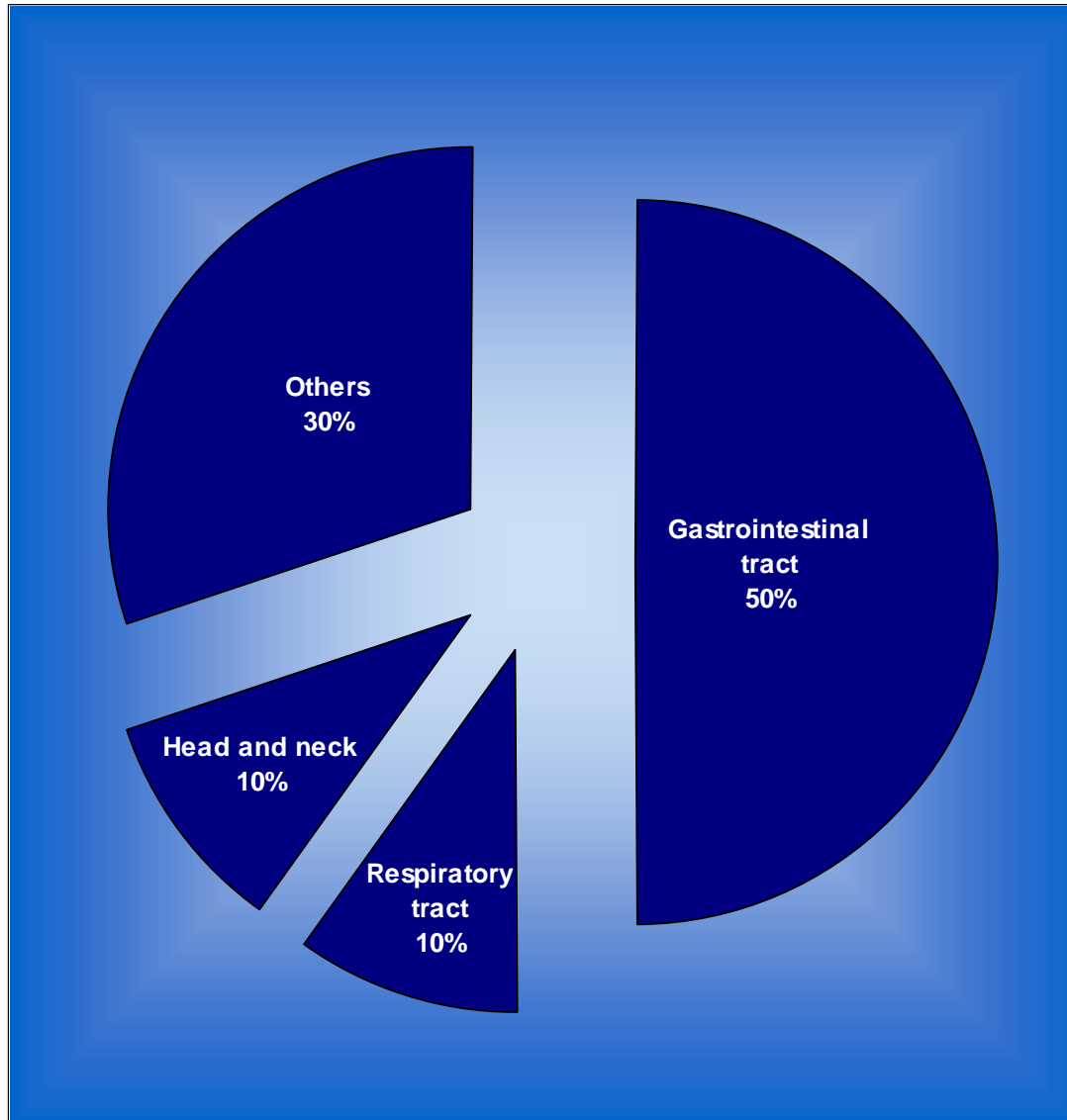
The non-Hodgkin's lymphoma classification project.

A clinical trial of the International Lymphoma Study Group classification of non-Hodgkin's lymphoma. Blood 1997; 89: 3909-18.



* Rare entity not quantified in the study

Repartition of MALT lymphomas by anatomical regions

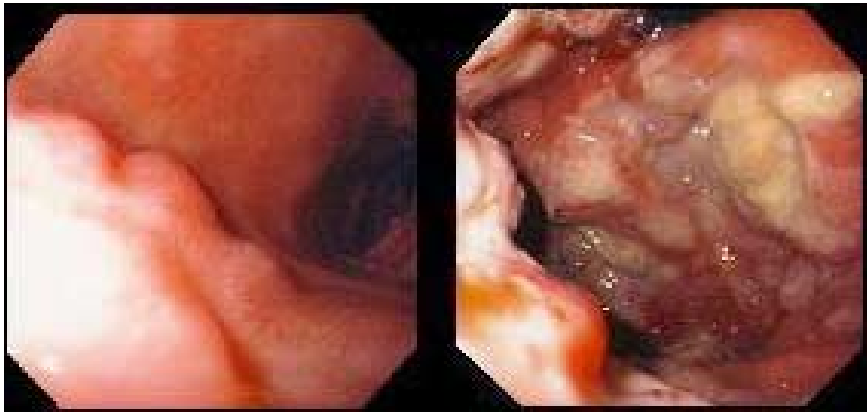


1. Gastrointestinal tract

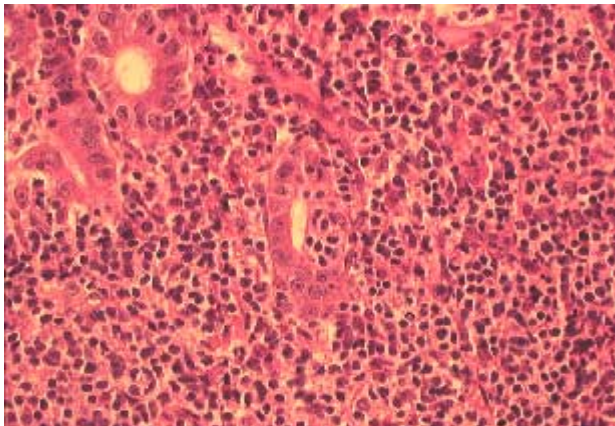
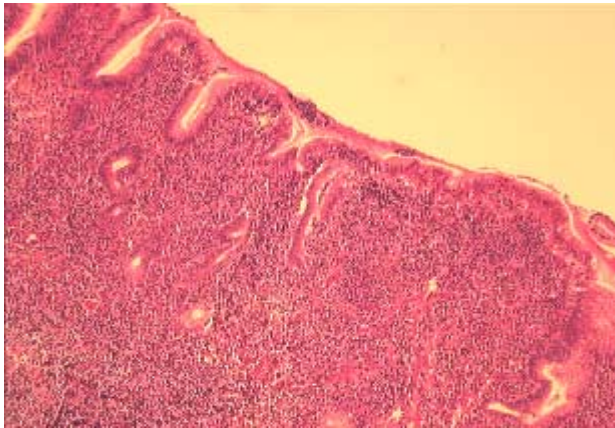
The gastrointestinal tract is the most frequently involved site, as it represents approximately one half of all MALT lymphomas.

The stomach is the main location, followed by the ileum. The presence of a *Helicobacter pylori* infection is present in more than 90% of gastric MALT and is now widely accepted as a major predisposing factor for MALT lymphoma (2,3). Moreover, *Helicobacter* "driven" MALT gastric lymphoma may regress following antibiotic therapy of the *Helicobacter* (4), without additional chemotherapy.

Macroscopically, low grade MALT usually has multiple instances of superficial spreading of lesions without ulceration, whereas high grade MALT exhibits a solitary tumor-forming lesion. The higher the grade of tumor, the larger the tumor size (5). Upper gastrointestinal studies usually reveal rounded, often confluent nodules of varying size, but an ulcerated mass is also possible (6). At CT, MALT lymphoma may be detected pending the stomach is correctly filled with contrast. Various patterns may be observed, ranging from a diffuse or a limited thickening of the wall, a solitary or multiple tumors.



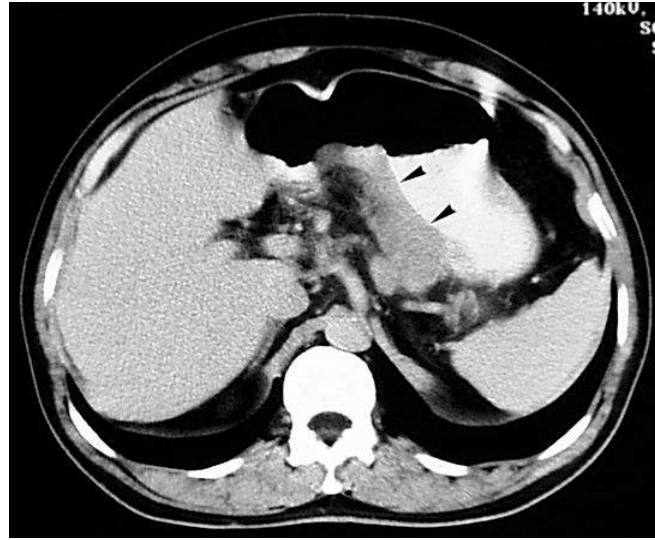
51 year-old woman with a history of nasopharyngeal lymphoma developed pyrosis and odynophagia suggesting esophageal disease. Endoscopy showed no lesion in the esophagus, but revealed this extensive tumor involving the gastric wall. Portions were ulcerated (right), while other portions remained submucosal (left).



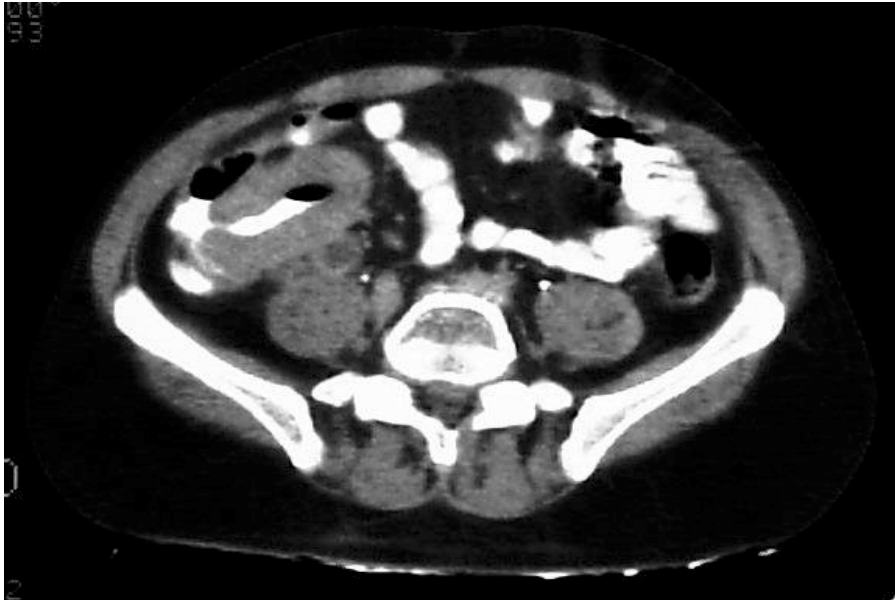
Biopsies confirmed MALT lymphoma of the stomach. Gastric mucosa is infiltrated by tumoral cells (left x100). At a higher magnification (x 400) lymphoepithelial lesions are better demonstrated, with evidence of infiltration and destruction of crypt and gland epithelium by aggregates of centrocyte-like cells (right).



Single-contrast upper gastrointestinal study demonstrated thickened nodular folds in the gastric antrum.



46 year-old woman with a history of several weeks of dyspepsia. Endoscopy (left) revealed this bilobed mucosal swelling in the proximal gastric body, which was soft and grossly appeared benign. Histology on the resected specimen was consistent with a low grade B cell malignant lymphoma of the mucosa associated lymphoid tissue (MALT) type. Contrast-enhanced CT scan (right) shows a thickening of the gastric body (arrowheads). Filling the stomach with diluted barium or iodine allows a better delineation of the tumor.

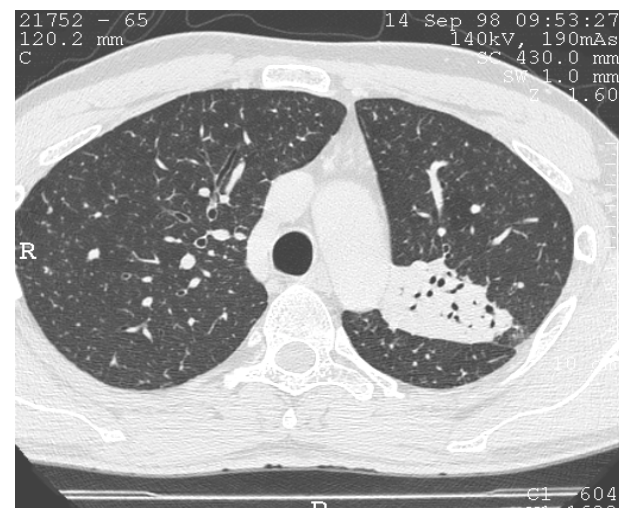


52-year-old woman with a history of low grade lymphoma of the stomach. Abdominal CT scan reveals a thickening of the ileon wall bulging in the caecum. Endoscopy revealed a mucosal swelling at the ileocaecal junction. Histology on the resected specimen diagnosed a MALT lymphoma.

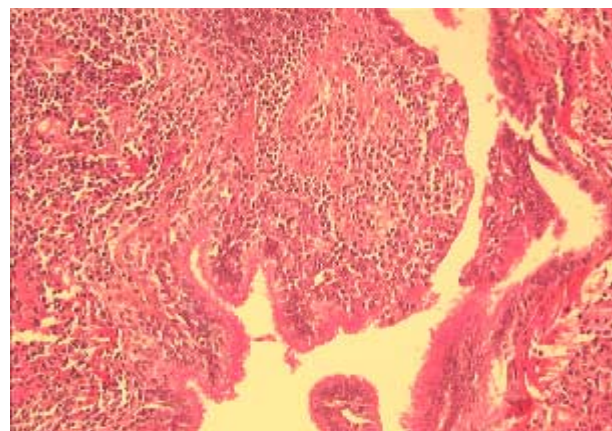
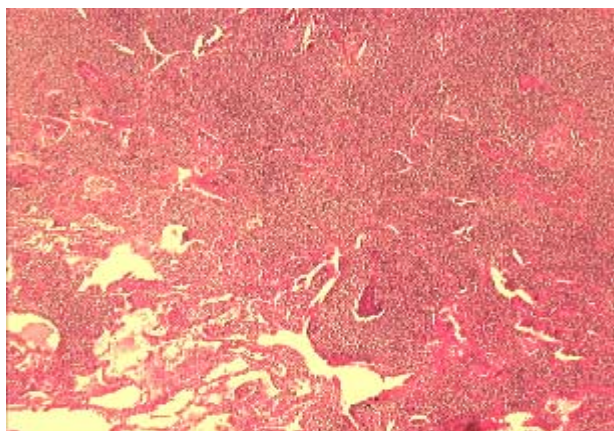
2. Respiratory tract

MALT lymphoma of the lung, also called BALT (bronchus-associated lymphoid tissue) lymphoma, represent 10% of all the MALT lymphomas and 60% of primary pulmonary lymphomas. BALT lymphomas are more frequent in case of lupus erythematosus, Hashimoto thyroiditis, multiple sclerosis and Sjögren syndrome (7). Histopathologically, MALT-associated lesions exhibit interstitial and peribronchial/perivascular space involvement. Radiologically, MALT lymphomas do not differ from the other lymphomas in the lung, and may display various patterns:

- a solitary mass or an area of consolidation, with bronchogram is the most common pattern
- in 25-30% of cases, multiple bilateral lesions, mainly nodules, are observed
- peribronchovascular infiltrates is the last possible pattern.



38-year-old male in whom a pneumonia was disclosed on routine chest X-ray. Chest CT examination evidenced a solitary mass developed in the left upper lobe. The lesion is limited posteriorly by the major fissure. A bronchogram is clearly seen within the lesion.



Histopathology on bronchoscopic specimens shows a destruction of the lung parenchyma (left x 40). At a higher magnification (right x 400), lymphoepithelial lesions are better seen, with destruction of the bronchi epithelium by tumoral cells.

3. Head and neck

MALT lymphomas of the head and neck may involve the orbit, the thyroid gland, the salivary glands and the Waldeyer ring. They may be associated with autoimmune disorders, such as Sjögren's syndrome, a destructive chronic inflammation of salivary and lacrimal glands (2,3). Often plasmacytoid in appearance, the cytologically low grade MALT lymphomas microscopically resemble a rare type of lymphoma arising in lymph node sinusoids, simulating the benign condition, Toxoplasma lymphadenitis

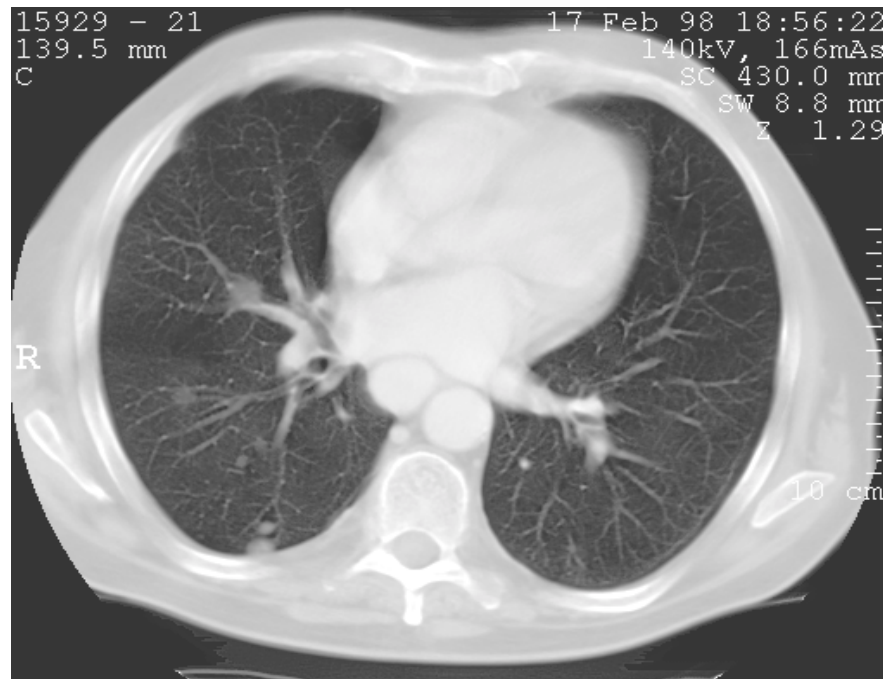
a) Orbit

Conjunctival/orbital MALT lymphomas mainly involve the eyeball tunicas (30%) and the lacrimal glands (30%). They are usually of low grade, with an indolent course (3). Histologically, it may be difficult to differentiate these lymphomas from benign lymphoid hyperplasia, especially in the context of an underlying immune disease. Lacrimal gland involvement is more likely to be detected at CT or MRI. The most common pattern is a uni or bilateral enhancing mass. The eyeball tunicas involvement is usually not detectable radiologically. Eyelids involvement is less common.



50-year-old female with right exophthalmia. Axial and coronal contrast-enhanced CT scans. There is an enhancing mass in the right lacrimal gland without underlying bony destruction. The differential diagnoses include metastasis, or less likely primary lacrimal tumor such as adenoid cystic carcinoma or benign process such as Graves or Sjogrens syndrome, but those are typically bilateral.

Chest CT examination obtained two years later in the same patient revealed multiple central and subpleural pulmonary nodules. Thoracoscopic resection of one nodule diagnosed MALT lymphoma metastatic to lung.



4. Other sites

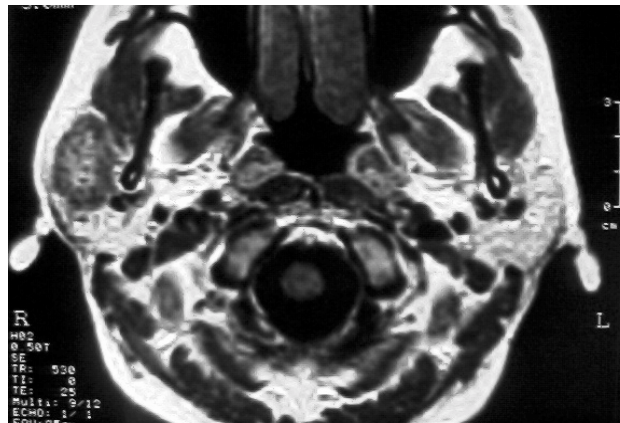
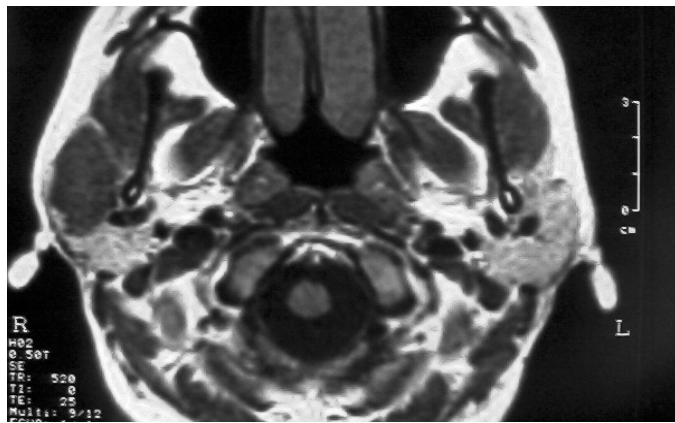
Kidney and the urogenital tract (prostate, uterus, Fallopian tubes), liver are among the various mucosal sites involved in mucosa-associated lymphoid tissue lymphoma (12-14). Less commonly involved are the breasts, the pancreas and the gallbladder (12-14). The radiological patterns of these lesions are non specific. Masses or nodules are the most commonly reported signs, as in the gastrointestinal and respiratory tract. Lastly, skin lesions (mainly nodules or erythematous patches) may be associated with all the previously described lesions.

b) Salivary glands

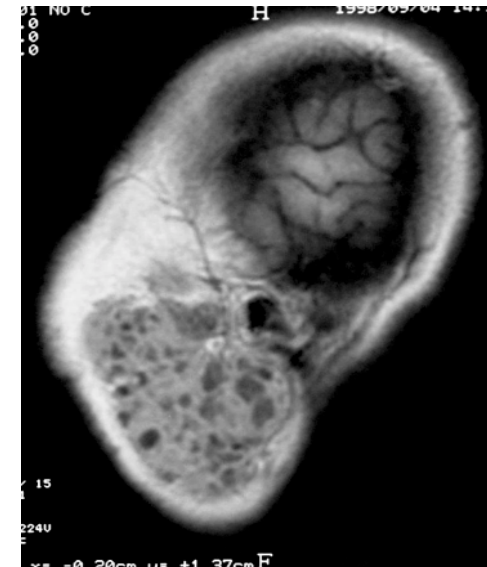
Salivary glands involvement in MALT lymphoma is associated in 10% of cases with Sjögren syndrome. Parotid is the most frequently involved salivary gland (70%), followed by submandibular gland (30%). Primary parotid NHL represent 1% of all NHL and 8.6% of all parotid neoplasms (8). The most frequent imaging finding is an enlarging parotid mass simulating a pleomorphic adenoma or a Warthin tumor. In some cases, a cystic pattern may be observed. Intraglandular lymph nodes are common in parotid glands. Lymphomas arising from these lymph nodes are not MALT lymphomas but low-grade follicular lymphomas, typically without involvement of the salivary tissue.

c) Thyroid

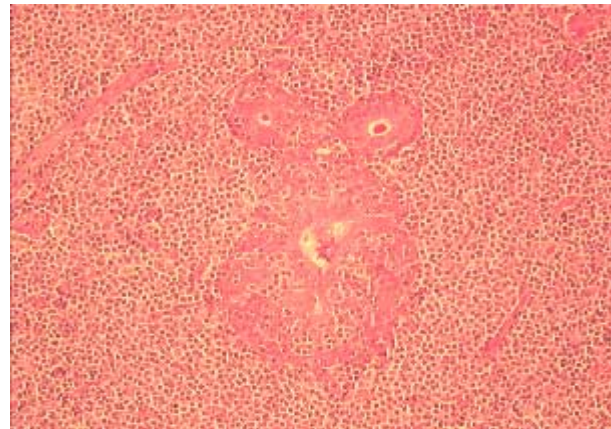
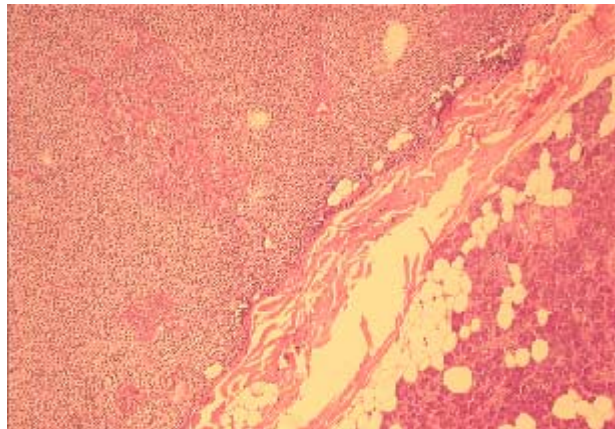
MALT lymphoma of the thyroid is associated with autoimmune disorders or chronic inflammation (2), as is the case in primary thyroid lymphoma where the lymphomas are associated with Hashimoto thyroiditis. The successful treatment of gastric MALT lymphomas by eliminating the *Helicobacter pylori* infection through the use of antibiotics may suggest a parallel strategy in the treatment of thyroid lymphomas. Surgical removal of the thyroid gland would be expected to remove the antigenic material prompting the lymphoid proliferation (9). Radiologically, MALT lymphomas of the thyroid may present as a diffuse enlargement of the gland, or as large nodules hypoechoic at sonography and hypoattenuating at CT.



43-year-old patient who presented a swelling of the right parotid gland suggestive of a pleomorphic adenoma. T1-weighted MR images show a well-delineated lesion hypointense to normal parotid gland, which enhances heterogeneously after injection of Gadolinium. The lesion was slightly hyperintense on T2-weighted images. At surgery, a MALT lymphoma of the parotid gland was diagnosed.



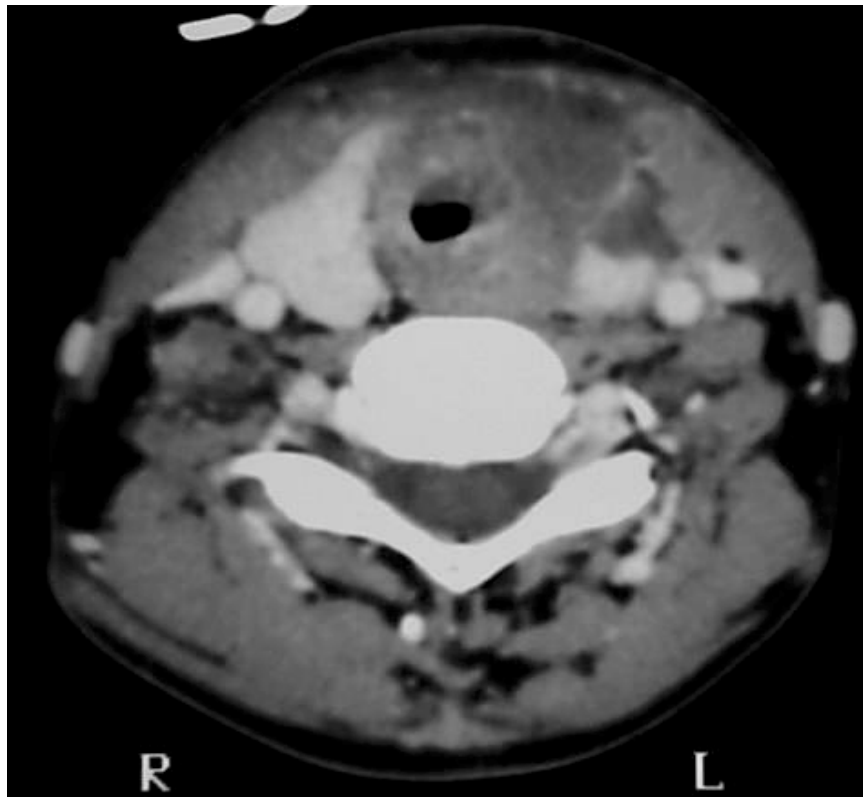
60-year-old patient with a Sjögren syndrome who developed a MALT lymphoma in the parotid glands. Sagittal T1-weighted MR image shows multiple cysts within an enlarged parotid gland.



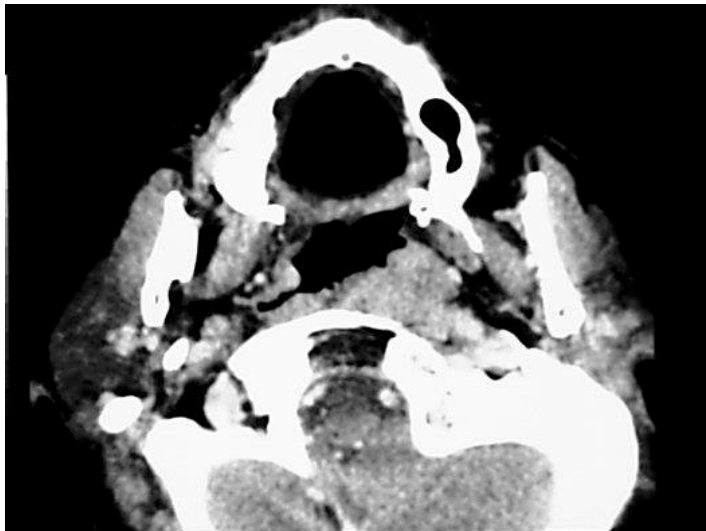
Histopathology in the same patient shows destruction and replacement of parotid gland by tumor (left x100). At a higher magnification (x 200) lymphoepithelial lesions are better demonstrated, with evidence of infiltration of epimyoeipithelial islands and duct epithelium by neoplastic cells.

d) Waldeyer ring

MALT lymphomas represents less than 20% of lymphomas arising in the Waldeyer ring. They are associated with digestive lesions in 10 to 20% of cases (10,11). The most common sites are the palatine and lingual tonsils (50-60%), followed by the nasopharynx (25-30%). Less common are the lesions involving the paranasal sinuses and the base of tongue (10,11). Radiologically, MALT lymphoma lesions do not differ from lesions caused by more aggressive lymphomas or Hodgkin's disease. The most common pattern is a asymmetric thickening of the pharyngeal mucosa, or a solitary mass. Lesions are better demonstrated by axial and coronal contrast-enhanced CT or MR examinations.



63-year-old female who presented with a swelling of the thyroid region. Sonography revealed a hypoechoic infiltrating mass of the left lobe. Contrast-enhanced CT scan confirms the lesion which appears hypodense and poorly delineated. Histopathology diagnosed a MALT lymphoma of the thyroid gland.



37-year-old patient presenting with a left conductive deafness. Examination of the ENT revealed a swelling of the nasopharyngeal mucosa, without ulceration. Contrast-enhanced CT examination in both axial and coronal planes shows a nasopharyngeal mass extending toward the left parapharyngeal space. Histopathology showed MALT lymphoma.

Discussion

In the largest published series, one hundred eight patients with MALT lymphoma were studied (13). Fifty-five patients (51%) had GI involvement and 53 patients (49%) had another involved extranodal site: 13 orbit; 11 lung; 10 skin; 7 parotid; 6 thyroid; 3 Waldeyer's ring; 2 breast; and 1 pancreas involvement. At diagnosis, 47 patients (44%) had stage IE, 26 (24%) had stage IIE, and 35 (32%) had disseminated disease. No significant difference in the clinical or biologic characteristics was observed between GI and non-GI patients. MALT lymphoma is therefore an indolent disease that usually presents as localized extranodal tumor without accompanying adverse prognostic factor, and these patients have a good outcome. However, in the series of Thieblemont et al including 108 patients, non-GI patients seem to progress more often than GI patients.

The course of MALT lymphomas differs from that of nodal lymphomas. Firstly, MALT lymphomas remain long confined to the initial location, as opposed to low grade nodal B lymphomas which are often disseminated at the time of diagnosis. Secondly, in case of progression, they tend to spread toward the other tissues of MALT type. This could be due to the peculiar circulation of lymphocytes and their "homing" (15). Lastly, high grade MALT lymphomas rarely disseminate.

From a practical standpoint, the radiologist should add the MALT lymphoma to the list of possible diagnoses when suggestive lesions are detected in a patient undergoing a routine CT examination. In case of previously known MALT lymphoma, attention should be paid to the other sites since associated lesions are common.

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