ALL NODES LEAD TO LYMPHOMA - A Multimodality Refresher of Extranodal Lymphoma

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Learning objectives

The learning points for this exhibit are:

1. To review the main imaging findings of both primary and secondary extranodal manifestations of lymphoma
2. To provide a multimodality review of extranodal lymphoma.
3. To illustrate some rarer case examples encountered within our practice of extranodal lymphoma

Background

The lymphoproliferative disorders can be divided into two Hodgkin disease and non-Hodgkin’s lymphoma (NHL), the former being distinguished from other subtypes by the presence of Reed-Sternberg cells on microscopy. There is an increasing incidence of these relatively common malignant diseases, however the 5 year survival rate is also increasing. The World Health Organisation has sub-classified NHL on the basis of precursor cell type (T cell or B cell). When determining treatment strategies, considering whether the lymphoma type is indolent or aggressive is useful clinically.

Staging of lymphoma is via the Modified Ann Arbor Staging system, which stages as following: stage I (single lymph node group); stage II (multiple lymph node groups ipsilateral to the diaphragm), stage III (lymph node group involvement on both sides of the diaphragm), stage IV (disseminated extralymphatic organ involvement). There is further subcategories for splenic (e.g. stage IIIS) or localised extranodal (e.g. Stage IIE) involvement, as well as additional staging variables if the patient is asymptomatic or has B symptoms (e.g. fever, weight loss, night sweats).

The diagnosis of lymphoma is usually considered with widespread lymphadenopathy. Extranodal lymphoma can occur with nodal involvement (secondary) or less commonly without other lymphadenopathy (primary). Of the two, extranodal lymphadenopathy is more likely to occur in NHL. The extranodal manifestations can mimic various other pathologies and constitutes an important differential in mass lesions.

Definitive diagnosis of lymphoma still requires biopsy, either of an accessible lymph node, mass or bone marrow, however imaging is important in establishing extent and staging disease as well as location for biopsy and treatment response or surveillance. Ultrasound is useful for certain sites, and may be where abnormalities are first demonstrated however cross sectional imaging better characterises lesion size, morphology and extension.
CT is the most commonly used tool due to ease of availability for lymphoma staging. However, CT is limited as it utilises size criteria for nodal involvement, and CT is not ideal for marrow and extranodal involvement. PET-CT with the use of $^{18}$Fluorodeoxyglucose (FDG) has greater accuracy and sensitivity and improves baseline staging for lymphoma. PET-CT can also demonstrate the overall metabolic activity through the use of standardised uptake values, with indolent lymphoma having low FDG uptake and higher uptake in more aggressive lymphoma. In particular, lymphomas with variable FDG uptake such as extranodal marginal zone lymphoma or T cell cutaneous lymphoma need a baseline PET CT as follow-up scans with FDG uptake will be difficult to interpret. Detection is limited in primary CNS and testicular lymphoma due to normal physiological uptake, and limited in gastric lymphoma which may have no uptake.

Findings and procedure details

CNS, HEAD AND NECK

As with other sites, CNS lymphoma can be primary or secondary, the latter being more common. Primary CNS lymphoma accounts for only 1% of malignant CNS lesions, so is very rare. When it is present, CT typically finds hyperdense lesions with contrast enhancement. Imaging characteristics on MR reflect the contents of the lesion with high cellularity and low water content. Thus on T1 MR imaging, lesions are iso or hyperintense and iso to hypointense to grey matter on T2 imaging with marked homogenous contrast enhancement and restricted diffusion (Fig. 1 on page 31). They are usually supratentorial and in contact with subarachnoid surfaces. Primary CNS lymphoma is thought to originate from periadventitial cells in vessels that traverse the Virchow Robin spaces. Multiple lesions are more common in immunodeficient patients and due to necrotic central regions contrast enhancement may be peripheral and mimic abscess formation complicating diagnosis. The vast majority of lesions are Diffuse large B-cell lymphoma (DLBCL) and high grade Burkitt B-Cell lymphoma. Low grade lesions may be deeper and spinal involvement is more common. Furthermore they do not display the vivid contrast enhancement of high grade lesions. Secondary CNS lymphoma, however, is more likely to present as leptomeningeal disease, with only a third of secondary CNS lymphoma cases presenting with parenchymal disease. It can present with headache, cranial nerve palsies and altered mental state. Imaging displays similar features to other malignancies with leptomeningeal spread with MR imaging displaying leptomeningeal, dural or cranial nerve enhancement. When parenchymal involvement is observed it can have similar appearances to primary CNS lymphoma, however accompanied by leptomeningeal enhancement. As dural enhancement is seen, lymphoma should also be considered on any enhancing extradural mass alongside meningioma.
Fig. 1: Axial T2 weighted MRI demonstrating high T2 signal in the left cerebellar hemisphere (white arrow) with mass effect in a patient with Diffuse Large B cell Lymphoma

References: Royal London Hospital - Whitechapel/UK

Spinal involvement is rare at only 3% of all CNS lymphoma. When encountered it is most likely to be within the vertebral body, followed by extradural, intradural extramedullary and intradural intramedullary, and when seen is usually part of disseminated NHL (Fig. 2 on page 41). The cervical cord is the most common intramedullary location. Leptomeningeal or dural disease can also be encountered within the spine.
Fig. 2: Sagittal view (MIP image) demonstrating intense metabolically active deposits in the spine in a patient with B Cell Lymphoma. In addition there is intense metabolically active soft tissue disease in the abdomen, pelvis and inguinal region. References: Royal London Hospital - Whitechapel/UK

Within the head and neck, lymphoma represents 5% of encountered pathologies and is found in 15% of patients who have systemic lymphoma, with NHL being more common than Hodgkin’s lymphoma. Most frequently, Waldeyer’s ring is involved, followed by the paranasal sinuses and nasal cavity. Involvement of the salivary gland, orbits and thyroid are also encountered.

Waldeyer’s ring is the lymphatic tissue of the adenoid, tubal tonsils, palatine tonsils and lingual tonsils. Radiologically, a submucosal mass which can protrude over the nasopharynx and extend into the nasal cavity. It is normally homogenous with contrast enhancement.

Sinonasal lymphoma tends to be aggressive, usually resulting in intraorbital extension and CNS extension is commonly encountered. MRI demonstrated iso or hypointense T1 signal and iso or hyperintense T2 signal with homogenous enhancement. Lymphoma in this location tends to originate from the nasal cavity, whereas squamous cell carcinoma originates in the paranasal sinuses and has heterogenous signal characteristic secondary to haemorrhage.

Salivary gland involvement is rare, but when involved it is typically bilateral and involves the parotid gland (Fig. 3 on page 44). Patients with Sjögren’s syndrome may be affected and enlarging glands should be investigated carefully. US reveals small multiple nodule cystic lesions with hypervascularity on colour Doppler. CT displays a focal hyperdense lesion with homogenous enhancement, whilst MR signal characteristics are T1 hypointense, T2 hyperintense.
Primary orbital lymphoma is one of the most common orbital tumours and thus account for up to 15% of all extranodal lymphomas (Fig. 4 on page 47, Fig. 5 on page 47 & Fig. 6 on page 32). Most commonly it is a mucosa-associated lymphoid tissue (MALT) lymphoma. Patients often present with swelling, proptosis, diplopia and abnormal ocular movements, which is characteristically painless. CT demonstrates a homogenous density mass with only mild enhancement. MRI has iso to hypointense T1 and iso to hyperintense T2 signal, with homogenous contrast enhancement and restricted diffusion.
Fig. 4: Axial, Coronal and Sagittal Unenhanced CT images showing a bilateral homogenous soft tissue mass (white arrows) in the superior aspects of both orbits that was proven to be MALT lymphoma

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Fig. 5: MIP image demonstrating Increased PET avidity in the orbital region in the same patient as Figure 4 which was biopsy proven as MALT lymphoma

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References: Royal London Hospital - Whitechapel/UK

The presence of a rapidly enlarging goitre with associated lymphadenopathy should include thyroid lymphoma on the differential. In particular, those with Hashimoto thyroiditis are at risk. Ultrasound may demonstrate a nodule hypoechoic mass or diffuse mixed
echotexture. MRI demonstrates iso or hyperintense T1 and T2 signal with linear low signal that represents fibrous pseudocapsules.

Lymphoma within the oral cavity is more common in patients with HIV and Burkitt's lymphoma and is seen as a mandibular mass, that is associated with the Epstein-Barr virus. Occasionally, other sites of head and neck involvement are encountered (Fig. 7 on page 33).

![Fig. 7: Pre and post contrast T1 weighted axial images at the level of the orbits demonstrating right temporalis (white arrows) soft tissue mass that shows mild enhancement. There is also a soft tissue mass in the right inferolateral orbit (black arrows). This was biopsy proven to be lymphoma.](image)

**References:** Royal London Hospital - Whitechapel/UK

**THORACIC**

Mediastinal nodal involvement is common in both Hodgkin and NHL, found in 60% and 20% of patients respectively. The distribution of lymphadenopathy can help lead the clinician to diagnosis, classically Hodgkin disease involves anterior mediastinal lymph nodes, whereas NHL involves subcarinal and paraoesophageal lymph node groups. CT demonstrates soft tissue density mass with smooth or lobulated contours and low density regions within it and classically calcification is seen post-treatment. Lymphoma comprises 2% of chest wall tumours, and most of these are extension from mediastinal disease.
Lung parenchyma can be involved in lymphoma, however, when considering this group of patients, it is important to keep in mind that patients with lymphoma can get atypical superadded infections and interstitial changes secondary to drug reactions which can complicate diagnoses. Primary pulmonary lymphoma remains rare, however when it occurs it is usually MALT. Secondary pulmonary lymphoma is relatively common. The HRCT patterns are numerous and non-specific, meaning a multidisciplinary approach to diagnosis is essential, however they include parenchymal and pleural based masses, cavitatory nodules, interlobular septal thickening and persistent consolidation have all been demonstrated (Fig. 8 on page 34 & Fig. 9 on page 48). In addition, patients who undergo treatment with bone marrow transplant are at additional risk of post-transplant lymphoproliferative disorder and should be considered. Ancillary features, such as pleural effusion or nodal involvement may help the diagnosis. Pleural effusions are typically reactive and when sampled do not have malignant cells. Instead the pleural effusion is secondary to thoracic duct obstruction from nodal disease, resulting in impaired lymphatic drainage. Lymphomatous involvement of the pleura itself is not uncommon in systemic lymphoma, whereas primary pulmonary lymphoma is extremely rare. Pleural involvement can be bilateral, but if it is unilateral it is more likely to occur on the left. DLBCL is the most frequently involved, followed by follicular lymphoma. Radiologically this will present either as a solitary nodule or diffuse infiltration.
Fig. 8: 1mm axial CT slices demonstrating bilateral heterogeneous lung deposits in multiple lung lobes which was the presenting finding in a patient with relapsed DLBCL.  

References: Royal London Hospital - Whitechapel/UK
Fig. 9: 1mm axial and coronal reformatted images of a patient with persistent cavitating consolidation that had no response to antifungal treatment with new pulmonary nodules which proved to be DLBCL.

References: Royal London Hospital - Whitechapel/UK

At autopsy, almost 30% of patients with systemic non-Hodgkin's lymphoma will demonstrate myocardial involvement. Primary myocardial and pericardial lymphoma is rare, accounting for around 1% of cardiac tumours and 0.5% of all extranodal lymphoma. Patients may be subclinical or present with non-specific cardiac symptoms such as dyspnoea or chest pain and examination may reveal pericardial effusions and arrhythmias. On echocardiography, lymphomatous involvement presents as a hypoechoic mass, whereas CT demonstrated an ill-defined, infiltrating myocardial or epicardial mass that is iso or hypodense to adjacent normal cardiac tissue, which demonstrated heterogenous enhancement post-contrast. There is typically an associated pericardial effusion, which occasionally is haemorrhagic. Lymphoma may extend along the epicardial surface of the heart to encase coronary arteries and the aorta.

Primary breast lymphoma accounts for approximately 0.5% of all breast malignancies. The breast is involved in approximately 2% of extranodal NHL, with DLBCL found most commonly at histopathology (Fig. 10 on page 46 & Fig. 11 on page 35). It is bilateral in between 5-11% of patients, and bilateral involvement is more likely to occur during pregnancy or post-partum. Lymphoma may originate from lymphatic tissue within the breast or from intra-mammary lymph nodes. Treatment of primary breast lymphoma is usually combined radiotherapy and chemotherapy with mastectomy offering no increase in survival or decrease in recurrence rate. Imaging findings are non-specific
with mammography demonstrating a mass or diffusely increased parenchymal density - sonography will also show a solid hypoechoic mass.

**Fig. 10:** Mammogram of 72 year old patient with DLBCL demonstrating a well defined ovoid mass in the upper outer aspect of the right breast

**References:** Royal London Hospital - Whitechapel/UK
Fig. 11: US image of the right breast in the patient in figure 5 corresponding to the lymphomatous breast deposit which is hypoechoic with a heterogeneous echotexture and mild peripheral vascularity on colour Doppler

References: Royal London Hospital - Whitechapel/UK

GASTROINTESTINAL AND SOLID ABDOMINAL VISCERA

In oesophageal lymphoma, this is typically secondary to cervical or mediastinal lymph node invasion. Primary oesophageal involvement is predominantly B cell type, usually MALT lymphoma. Barium studies may demonstrate submucosal infiltration, masses or ulceration, with CT useful for determining the extent of disease.

Primary gastric lymphoma accounts for up to 5% of gastric malignancies. Chronic gastritis from H pylori, leads to development of low grade MALT lymphoma, which can transform into a higher grade large cell lymphoma if not treated (Fig. 13 on page 36). Early diagnosis is associated with a much improved outcome. Upper GI contrast examination may reveal multiple polypoid tumours with central ulceration and extensive gastric rugal thickening. Gastric wall thickening is more commonly seen on CT in high grade
lymphoma, and CT may also demonstrate preservation of perigastric fat planes (c.f. gastric adenocarcinoma). Gastric lymphoma should also be on the differential for linitis plastica. Even with significant thickening, patients do not usually present with gastric outlet obstruction.

Lymphoma is the most common malignancy of the small bowel, with the distal ileum the most common site. Small bowel B cell lymphoma may present as a circumferential bulky mass, often extending into the mesentery (Fig. 12 on page 49). There may be a long segment of bowel involved which can ulcerate and form a sterile abscess. Aneurysmal dilatation of the lumen may occur due to replacement of the muscular propria and loss of autonomic function by lymphoma. Small bowel obstruction is uncommon. Barium studies may reveal single or multiple polypoid lesions, segmental or diffuse nodularity or ulceration. On US these tumours are hypoechoic with circumferential wall thickening.
Fig. 12: 3mm axial and coronal reformatted contrast enhanced CT images demonstrating small bowel thickening and dilatation with enteroenteric intussusception (white arrows) in a 30 year old patient with Burkitt's lymphoma.

References: Royal London Hospital - Whitechapel/UK

Primary colorectal lymphoma is most likely to occur in the caecum, and will usually be of B cell origin. The course of the disease can vary, although both mantle cell lymphoma and the more indolent MALT lymphoma can both present with lymphomatous polyposis, thus pathological diagnosis is crucial. Barium enemas or CT may reveal polypoid masses near the ileocaecal valve, circumferential bowel infiltration and intussusception being encountered. Again preservation of fat planes may help differentiate from adenocarcinoma and large bowel obstruction is uncommon. In rectal lymphoma, MR is homogenous intermediate signal on T1 and heterogenous hight signal on T2 imaging.
with mild to moderate contrast enhancement. Rarely appendiceal lymphoma may occur with diffuse enlargement of the appendix but typically maintaining its vermiform shape.

Lymphoma is the most common primary malignancy of the spleen (Fig. 13 on page 36). CT demonstrates homogenous splenic enlargement, and occasionally hypointense lesions. When there is primary splenic lymphoma, it is more likely to be a solitary mass or masses with necrosis and mild enhancement on imaging and restricted diffusion on MRI.

Secondary hepatic lymphoma is common, with 20% of NHL patients and 5% of Hodgkin disease patients having involvement (Fig. 13 on page 36). Imaging reveals diffuse infiltration or a miliary pattern. In contrast, primary hepatic lymphoma is rare and when it does present patients are usually immunocompromised or have a chronic hepatitis. The most common tumour type is DLBCL. US reveals hypoechoic lesions that may have a central hyperechogenicity (target appearance) and increased peripheral vascularity on colour Doppler. CT reveals hypoattenuating lesions, which tend not to enhance relative to the liver on multiphase imaging. MRI demonstrates a hypointense T1 lesion with variable T2 signal and minimal peripheral contrast enhancement with restricted diffusion.

**Fig. 13**: Axial slices of contrast enhanced CT and fused PET CT of the same patient showing intense uptake in the stomach and spleen and a focal intense metabolically active deposit in the liver.
Gallbladder and extrahepatic biliary duct involvement has been described, predominantly in case reports and case series. Patients usually present with symptoms resembling cholecystitis. The most common subtypes are MALT or DLBCL. 50% of patients with gallbladder lymphoma will have evidence of cholelithiasis and it has been suggested that chronic inflammation of the gallbladder may lead to gallbladder lymphoma. Radiological findings include submucosal homogenous wall thickening and gallbladder fossa mass that has low T1 and high T2 signal intensity relative to the background liver.

Primary pancreatic lymphoma is rare, accounting for <2% of extranodal lymphoma and 0.5% of pancreatic tumours. Primary pancreatic lymphoma can have a non-specific presentation and may mimic pancreatic adenocarcinoma. Pancreatic involvement can be either focal or diffuse, with differing imaging characteristics. Focal pancreatic involvement, typically a large mass within the head of the pancreas, displays low T1 signal and heterogenous and intermediate T2 signal intensity on MR imaging, with only subtle enhancement on contrast imaging. The diffuse type has low T1 and T2 signal intensity, with homogenous contrast enhancement, although small foci of reduced contrast uptake may be present within the lesion. Nevertheless, these lesions are difficult to differentiate from pancreatic adenocarcinoma or contiguous spread from surrounding pathological lymph nodes.

Primary adrenal lymphoma accounts for around 3% of primary extranodal lymphoma, although in secondary lymphoma, autopsy has found almost 25% of patients have adrenal involvement, with DLBCL being the most common subtype (Fig. 14 on page 45). Patients may present with adrenal insufficiency, fever and lumbar pain. As imaging advances have been made, increased recognition of adrenal involvement has occurred. Characteristically, CT findings will show either unilateral or bilateral adrenal gland enlargement with maintenance of adrenal shape, although PET imaging is more reliable with lymphoma being FDG avid, whereas adrenal hyperplasia is not.
**Fig. 14:** Coronal reformatted CT showing bilateral homogenous enlarged adrenal glands (left > right) and subsequent PET imaging displaying increased FDG uptake bilaterally in both adrenal glands

**References:** Royal London Hospital - Whitechapel/UK

**GENITOURINARY**

Renal lymphoma is found in up to 60% of patients at autopsy, although it is much less frequently diagnosed during life. Patients with immunodeficiency or ataxia-telangiectasia may be more at risk. The most commonly encountered imaging pattern is multiple masses. MRI shows low T1 and high T2 signal with poor enhancement compared to the background renal parenchyma. Contiguous retroperitoneal extension into the renal hilum may present with hydronephrosis, although the renal arteries and veins remain patent (Fig. 15 on page 43).
Fig. 15: Axial T1 post contrasted MRI demonstrates an enhancing retroperitoneal and perivertebral mass (white arrows) at the L2/L3 vertebral level which is infiltrating the left psoas muscle and the left L2-L3 lateral foramen (involving the left L2 exiting nerve root). This mass is also infiltrating the left renal hilum

References: Royal London Hospital - Whitechapel/UK

Perirenal involvement may be demonstrated by renal sinus infiltration, thickening of Gerota’s fascia and perirenal masses (Fig. 16 on page 50 & Fig. 17 on page 49). Ureteric involvement is best demonstrated on a CT intravenous urogram and is the most sensitive radiological investigation for involvement. Case reports of urethral lymphoma have also been described.
Fig. 16: 1mm axial CT slice showing increased stranding and thickening of the right perirenal fascia (white arrows) in keeping with perirenral lymphoma.

References: Royal London Hospital - Whitechapel/UK
Fig. 17: 1mm axial CT slice showing increased homogenous soft tissue originating form the the left perirenal fascia (white arrows) in a different patient that is in keeping with more extensive perirenal lymphoma.

References: Royal London Hospital - Whitechapel/UK
Lymphomatous involvement of the bladder is extremely non-specific on imaging with features such as wall thickening, and in such cases the patient should be considered to have transitional cell carcinoma until proven otherwise. Similarly prostatic involvement is non-specific with enlargement and differentiation from benign prostatic hypertrophy. Seminal vesicle involvement has been described in case reports and remains rarely encountered (Fig. 18 on page 37).

Lymphoma accounts for 5% of all testicular tumours, however it occurs in <1% of patients with lymphoma. It typically presents as painless testicular enlargement, with or without systemic symptoms, in an older population and is the most common testicular neoplasm in men over 60 years of age. It is the most common bilateral testicular tumour and epidermal and spermatic cord are commonly involved. DLBCL accounts for approximately 80% of cases and extranodal involvement of the contralateral testis, cutaneous tissues, CNS and Waldeyer's ring are common. US reveals testicular enlargement with discrete hypoechoic lesions which can infiltrate the entire testicle. The testis has marked vascularity on colour Doppler.
**Fig. 18:** Fused axial PET CT images demonstrating a tracer avid confluent soft tissue which involves the left seminal vesicle and left pelvic side wall in a 73 year old patient with recurrent MALT lymphoma, originally diagnosed in the orbit.

**References:** Royal London Hospital - Whitechapel/UK

Ovarian involvement can be unilateral or bilateral and there is peritoneal involvement in 50% of cases. Differentiating from other ovarian malignancies is difficult, although MRI may reveal high T2 signal with peripheral linear arrangement of small cysts. In large masses, determining the organ of origin can be challenging and biopsy is usually required. Uterine involvement may have symmetrical diffuse enlargement of the uterus, with preservation of endometrial lining and normal uterine architecture. Most primary uterine lymphomas arise from the cervix, however in most cases both are seen. Significant contrast enhancement has been reported which is different to lymphoma in other solid abdominal organs. Cervical involvement is non-specific and can mimic adenocarcinoma of the cervix. Vaginal lymphoma is infiltrative or lobular and may have contiguous spread into the cervix (Fig. 19 on page 46). An intact mucosa is found and in the infiltrative form there is diffuse thickening of the vaginal wall. Endometrial lymphoma is particularly rare and can present as diffuse thickening of the endometrium without myometrial involvement or a polypoid lesion. There are case reports of fallopian tube involvement with no specific imaging findings described.

**Fig. 19:** Left to Right - T2 sagittal, axial T2 small FOV of cervix, axial T1 and axial T1 post Gadolinium MRI imaging in a patient with diffuse vaginal wall thickening (white arrows) with homogenous T1 and intermediate T2 signal with relatively homogenous enhancement. Biopsy of the lesion revealed this to be DLBCL.

**References:** Royal London Hospital - Whitechapel/UK
Osseous involvement in lymphoma can be anywhere within the skeletal bones, however particular attention should be given to the spine, ribs, pelvis and both femurs. Typically early bone lesions are lytic with permeative bone destruction and breach of the cortex and adjacent soft tissue swelling (Fig. 20 on page 39), however a solitary dense vertebral body should also raise the suspicion of lymphoma. On T1 weighted images, lymphoma within marrow demonstrates low signal, but high T2 and STIR signal (Fig. 21 on page 38 &. Fig. 22 on page 43) Bone scintigraphy will demonstrate distribution of disease, however are non-specific. PET will demonstrate increased uptake in both bony lesions and marrow involvement.

Fig. 20: Lateral and AP views of the right forearm demonstrating ill-defined lucency in the proximal third of the right ulna and further ill-defined lucencies in the distal shaft of the right radius in a 69 year old male patient with relapsed DLBCL
Fig. 21: Coronal STIR sequence MRI image demonstrating STIR positive signal within the left glenoid and scapula blade (white arrows) in a 72 year old with anaplastic large cell lymphoma

References: Royal London Hospital - Whitechapel/UK
**Fig. 22**: 56 year old female with relapsed follicular lymphoma. Sagittal T1 and fat suppressed T1 MRI images of right foot demonstrating extensive lymphomatous infiltration of the talus (white arrows) with destruction of part of the talus anteriorly with a small degree of paraosseous soft tissue.

**References**: Royal London Hospital - Whitechapel/UK

Muscular involvement is much less common, and occurs either from systemic lymphoma involvement, local extension of bone and nodal disease or as a primary site of involvement, the latter being rarely seen. The thigh and upper arm are the most common sites of involvement (Fig. 23 on page 40). US is non-specific with heterogenous hypoechoic masses. CT is also non-specific with tumour attenuation similar to skeletal muscle with variable enhancement post-contrast. MRI is iso or hyperintense to normal muscle and intermediate signal on T2 with diffuse homogenous peripheral thick band or marginal septal enhancement.
Fig. 23: Axial fused PET CT image in a patient with intense metabolically active intramuscular deposits in the right thigh in a patient with DLBCL

References: Royal London Hospital - Whitechapel/UK

Cutaneous involvement is a common extranodal site after the GI system. Mycosis fungoides is a cutaneous T cell lymphoma. Imaging is non-specific, however one should be aware of features with the right clinical context. US shows a well-defined hypoechoic nodule and homogenous hyperechoic dermal thickening, whereas CT may show diffuse skin thickening.

Images for this section:
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Conclusion

Extranodal lymphoma is an important differential diagnosis in any mass lesion. We have described some of the imaging findings and given examples from our own practice.

Whilst it is uncommon and many of the imaging findings can be non-specific, an appreciation of described findings is useful for all radiologists and this refresher will remind readers to consider this in their future differentials due to the the variety of organs that can be involved.

Personal information

References


