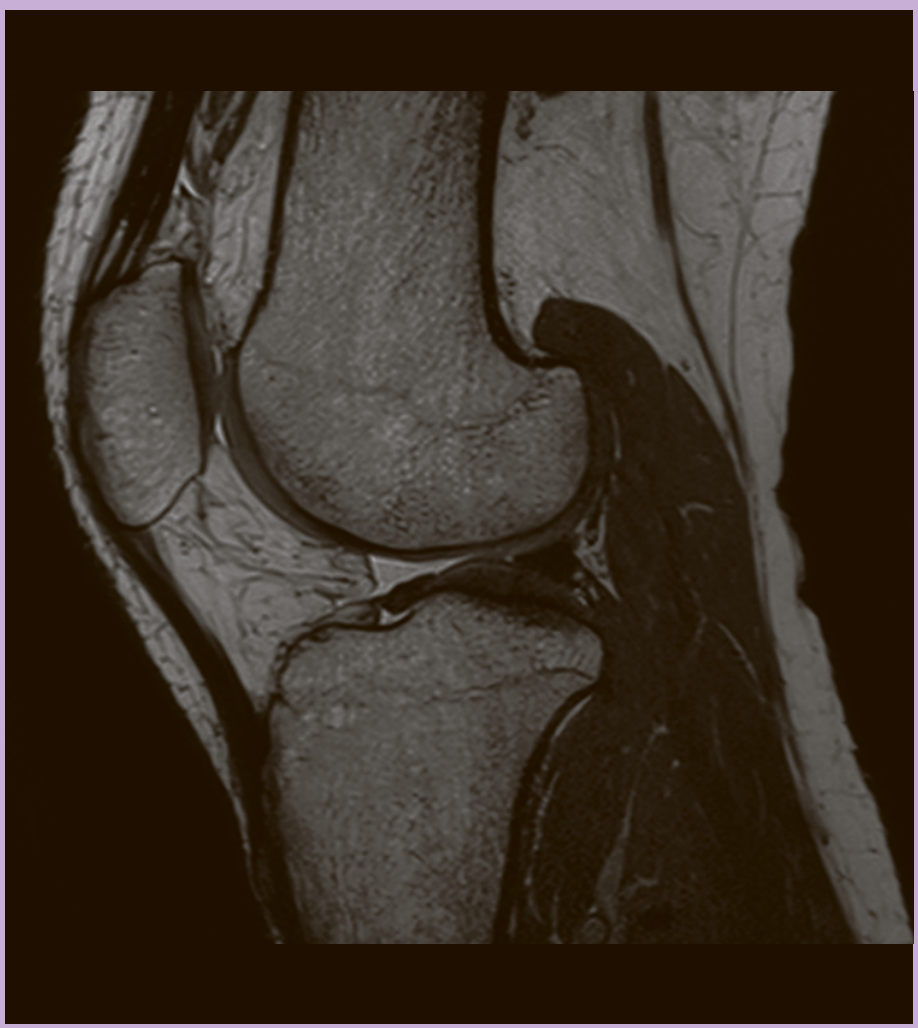
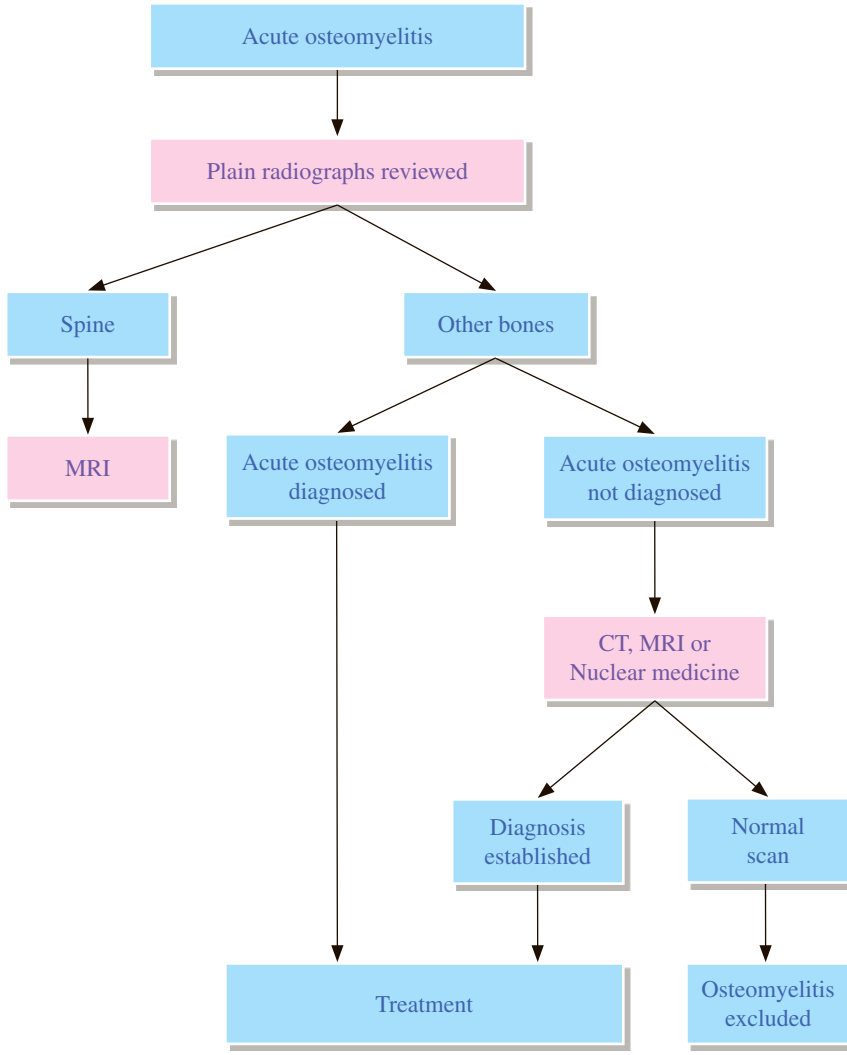
Musculoskeletal Radiology



Hong Kong College of Radiologists


Acute osteomyelitis
Plain radiographs reviewed
Spine
Other bones
MRI
Acute osteomyelitis diagnosed
Acute osteomyelitis not diagnosed
CT, MRI or Nuclear medicine
Diagnosis established
Normal scan
Treatment
Osteomyelitis excluded

REMARKS

1 Plain radiograph

1.1 Regional radiographs should be the initial examination to determine whether there is any underlying pathological condition.

1.2 Typical findings of bone destruction and periosteal reaction may not appear until 10-21 days after the onset of infection because 30-50% of bone density loss must occur before radiographs become abnormal.

1.3 Plain radiographs are unreliable to establish the diagnosis of osteomyelitis in patients with violated bone.

1.4 Plain radiographs of spine are not sensitive to detect vertebral osteomyelitis but findings of endplate destruction and progressive narrowing of adjacent disc space are highly suggestive of infection.

2 Nuclear medicine

2.1 Scans should be interpreted with contemporary radiographs.

2.2 Three-phase Technetium-99m methylene diphosphonate (Tc-99m-MDP) bone scan

2.2.1 Bone scan is more sensitive than plain radiography (up to 90% sensitivity).

2.2.2 Bone scan can be positive as early as 3 days after onset of disease (10-14 days earlier than plain radiograph).

2.3 Gallium scan

2.3.1 Gallium scan is helpful as conjunction with a bone scan. Combined gallium and bone scan studies has sensitivity of 81-90% and specificity of 69-100%

2.4 White blood cells (WBC) scan

2.4.1 This is sensitive and specific for bone infection and particularly useful in violated bone.

2.5 Flurodeoxyglucose (FDG) PET

2.5.1 It has high accuracy (up to 96%) for confirming or excluding chronic osteomyelitis.

2.5.2 It may be an alternative to MRI if suspecting chronic osteomyelitis.

3 CT

3.1 CT is useful to accurately define sequestra, soft tissue abscesses and bone destruction, and to guide biopsy.

3.2 Sequestra, cortical destruction, periosteal reaction and intraosseous gas undetected on MRI can be well seen on CT.

4 MRI

4.1 MRI is highly effective for detection of bone marrow edema in spine and long bones.

4.2 MRI can reveal the relationship between an infective process in spine, the adjacent spinal canal and soft tissue.

4.3 Contrast MRI is sensitive but should be correlated with other imaging studies.

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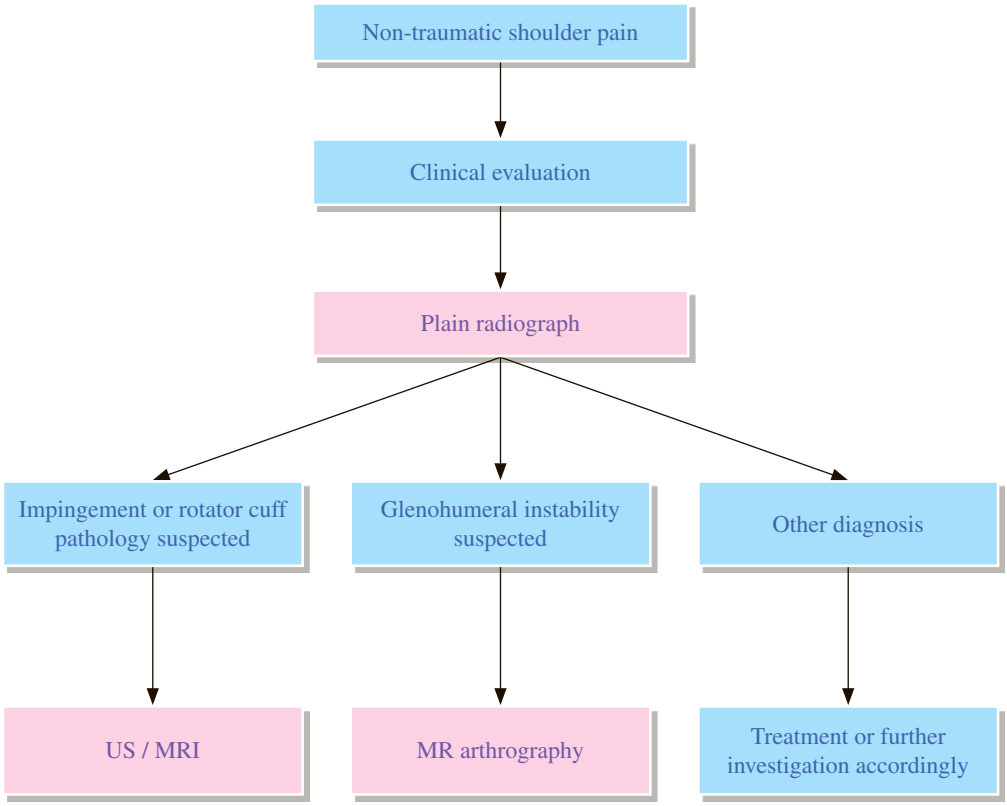
Non-traumatic shoulder pain
Clinical evaluation
Plain radiograph
Impingement or rotator cuff pathology suspected
Glenohumeral instability suspected
Other diagnosis
US / MRI
MR arthrography
Treatment or further investigation accordingly

REMARKS

1 General

1.1 Pain referred to shoulder should always be borne in mind in evaluating shoulder pain. Imaging examinations should be tailored to this regard.

2 Plain radiograph

2.1 Plain radiographs are useful for excluding skeletal abnormalities and calcific tendinitis.

2.2 Depending on site and type of lesion, additional special projections may be required.

3 US

3.1 It is operator-dependent and expertise is required for diagnosing tendinosis, partial or complete tear in cases of rotator cuff injury due to irritation or overuse of those tendons.

3.2 It is also useful for US guided aspiration and injection.

3.3 Bone changes or labral lesions cannot be detected.

4 MRI

4.1 Conventional MRI

4.1.1 MRI is accurate in evaluating rotator cuff pathology.

4.1.2 It also aids in detecting other soft tissue or osseous abnormality.

4.2 MR arthrography

4.2.1 Direct arthrography technique has the benefit of intraarticular distention by contrast with excellent anatomical details of glenoid labrum and biceps anchoring site.

5 CT arthrography

5.1 It may be considered if the patient is contraindicated for MRI arthrography.

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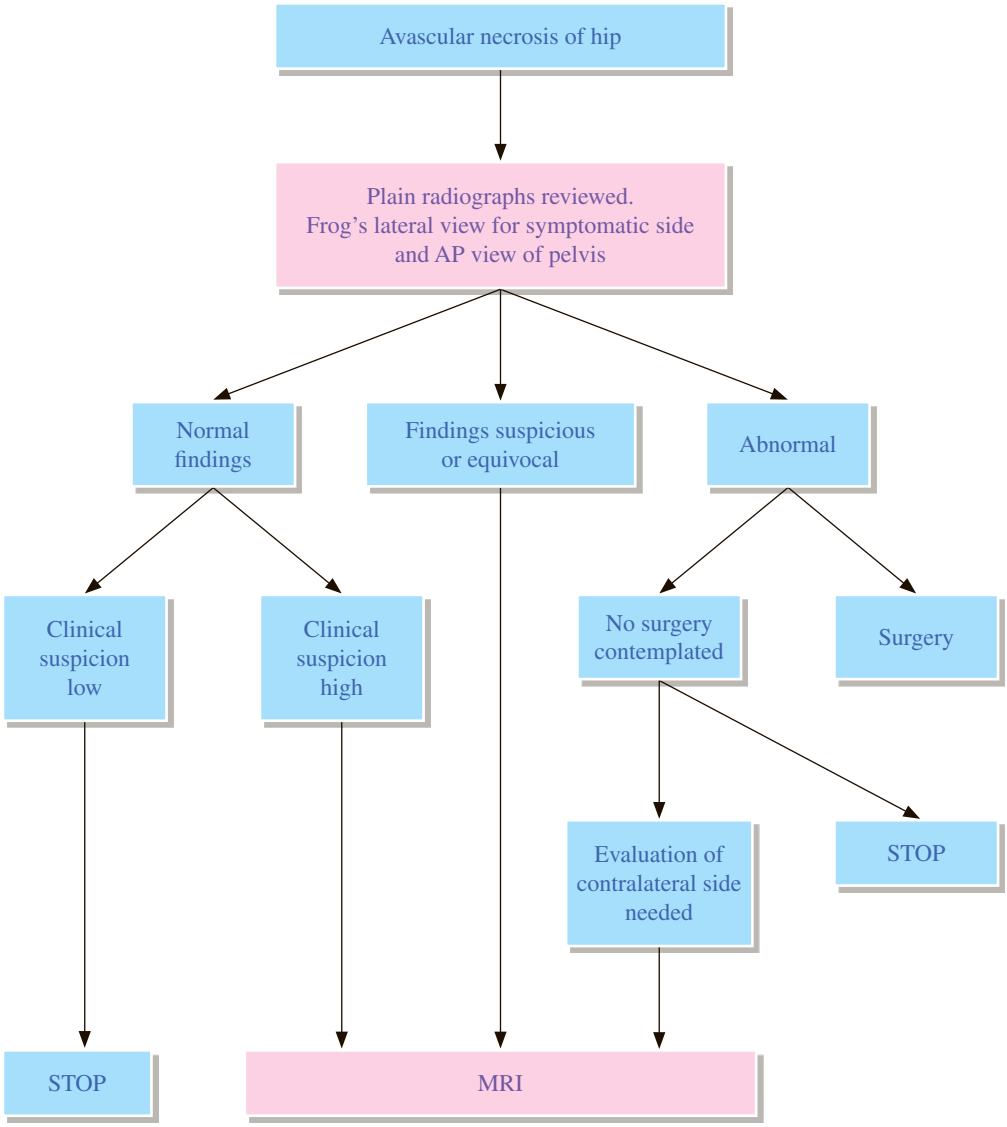
MS 3 Avascular necrosis of hip



REMARKS

1 Plain radiograph

1.1 Plain radiographs should be the initial imaging examination.

1.2 It is useful for staging the disorder from patchy sclerosis and subchondral lucency to collapse of the articular surface, dense bone sclerosis and fragmentation, degenerative changes.

2 Nuclear medicine

2.1 It is highly sensitive in detecting avascular necrosis with further improvement of its accuracy by the addition of single photon emission computed tomography (SPECT).

3 CT

3.1 CT detects avascular necrosis of hip earlier than plain radiographs but it is less sensitive than both MRI and bone scan.

3.2 Its major role is to determine the severity of secondary degenerative changes and the extent of femoral head collapse.

4 MRI

4.1 MRI is the preferred method for detection of early occult avascular necrosis. It is also useful for disease staging.

4.2 It detects avascular necrosis in the contralateral hip.

4.3 It also shows other possible causes of hip pain.

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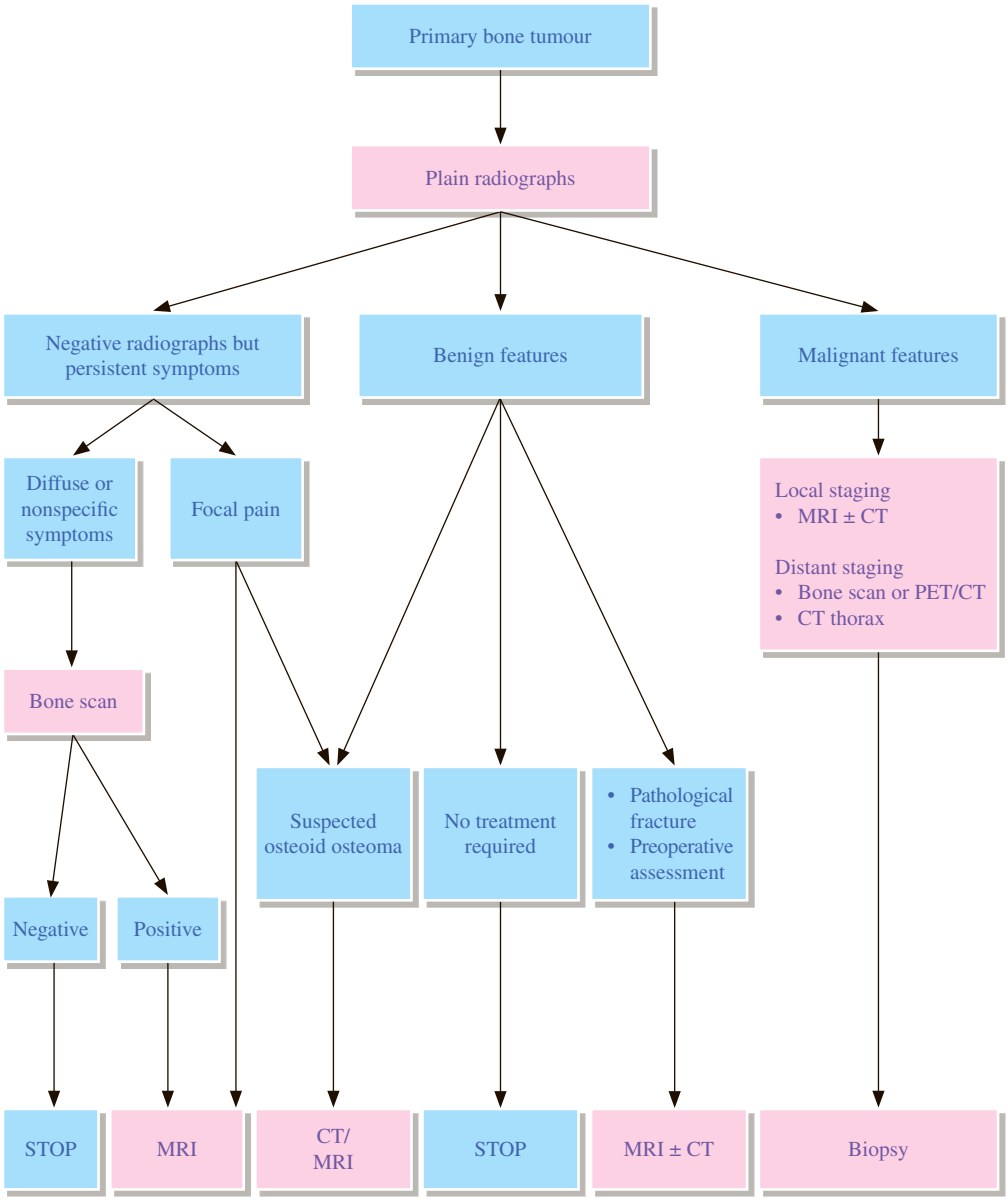
MS 4 Primary bone tumour



REMARKS

1 Plain radiograph

1.1 Regional radiographs are necessary for suspected bone tumour and remain the initial technique for the detection and characterization of tumours and tumour-like lesions.

1.2 For typical benign lesions, no further imaging is required unless there is a suspected complication or surgery is being considered.

2 Nuclear medicine

2.1 Bone scan is helpful when bony metastasis is suspected.

2.2 Baseline bone scan can exclude multicentricity.

3 CT

3.1 CT is the preferred method for assessment of cortical involvement, cortically-based tumours, flat bones with little marrow, and demonstration of tumour mineralization or calcification. It is complementary to MRI in this regard.

3.2 CT is indicated for confirmation and pre-surgical localization of osteoid osteoma following positive radiograph or bone scan.

4 MRI

4.1 MRI is the imaging modality of choice for assessment of bone marrow, soft tissue, juxta-articular and neurovascular involvement (i.e. local staging).

5 PET/CT

5.1 PET/CT has higher sensitivity and specificity than CT, MRI and bone scan for detecting distant metastases (except being less sensitive to pulmonary nodules).

5.2 It also has high sensitivity (90%), specificity (96%) and accuracy (95%) for differentiating primary bone tumour from osseous metastases.

6 Pathological diagnosis

6.1 Staging of the primary tumour should be completed first before any biopsy.

6.2 Biopsy should be carried out in close consultation with the orthopaedic surgeon planning the definitive treatment.

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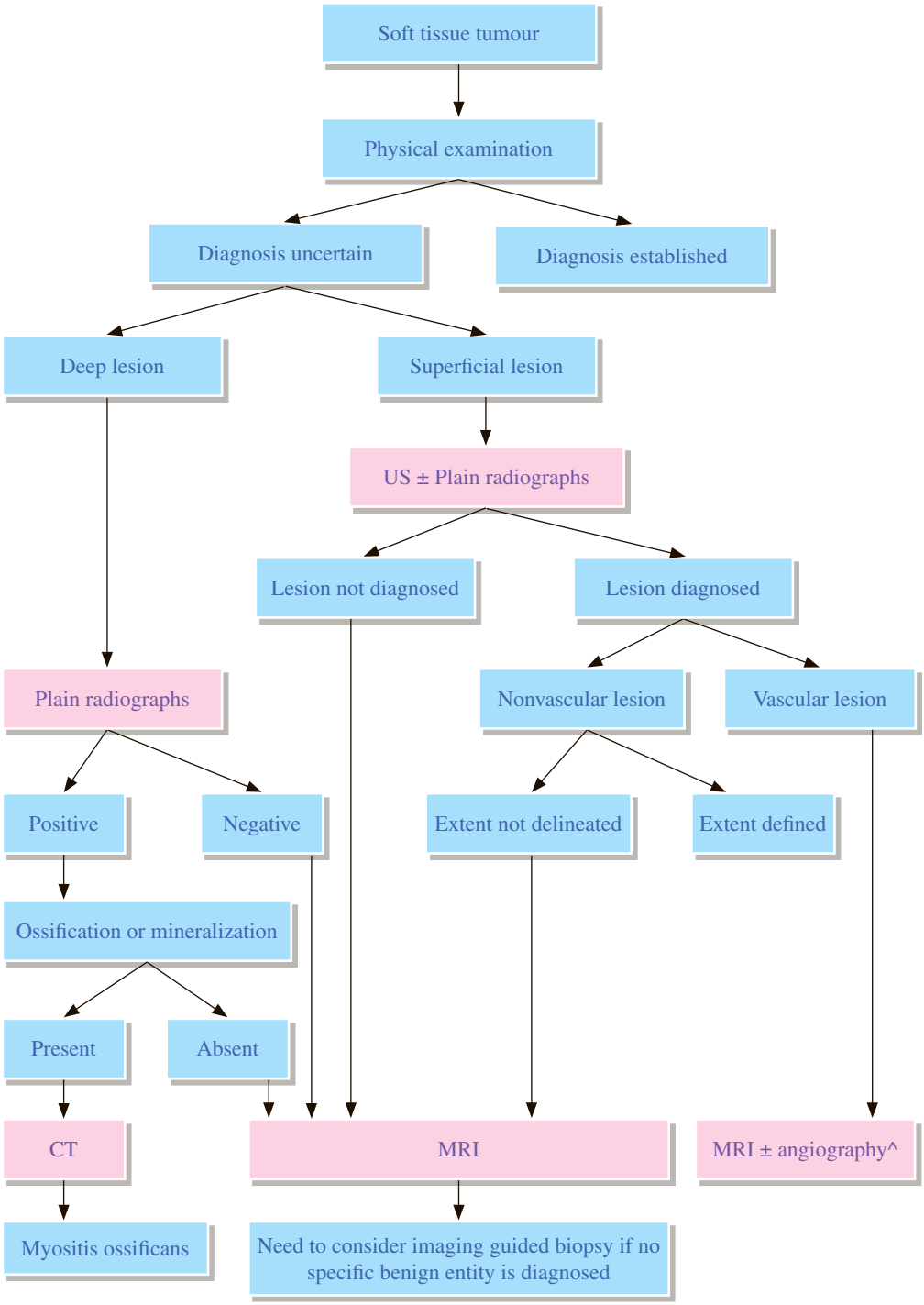

^Remarks: Use angiography for subsequent treatment after the non-invasive diagnosis and mapping

REMARKS

1 Plain radiograph

1.1 Regional radiograph should be the initial imaging examination in evaluating soft tissue tumour, especially deep and nonpalpable one.

1.2 Radiograph helps to identify any underlying skeletal deformity (e.g. callus), exostosis (which simulates a soft tissue mass), coexisting osseous involvement (remodeling, periosteal reaction or overt destruction) and soft tissue calcification (e.g. phlebolith in haemangioma).

1.3 Low kV technique is preferred to enhance radiographic density of differences between soft tissue such as fat and muscle.

2 US

2.1 US is useful for superficial mass.

2.2 It can differentiate a localized mass from diffuse edema and solid from cystic lesion.

2.3 The role of US is to confirm the presence of a suspected lesion, identify its size, determine its internal characteristics, and guide percutaneous biopsy.

3 CT

3.1 CT is complementary to MRI in detecting soft tissue calcification or ossification and subtle bony abnormality.

3.2 Zonal pattern of mineralization of early myositis ossificans can be seen on CT allowing early diagnosis.

4 MRI

4.1 MRI is the examination of choice in imaging soft tissue lesion.

4.2 It is also useful in post-treatment follow-up.

4.3 It can be difficult to differentiate benignancy from malignancy with imaging alone.

5 PET

5.1 PET is useful for staging and monitoring treatment response of the tumour.

5.2 It identifies nodal and osseous metastatic disease.

5.3 It may direct biopsy of those metabolically active areas in the tumour.

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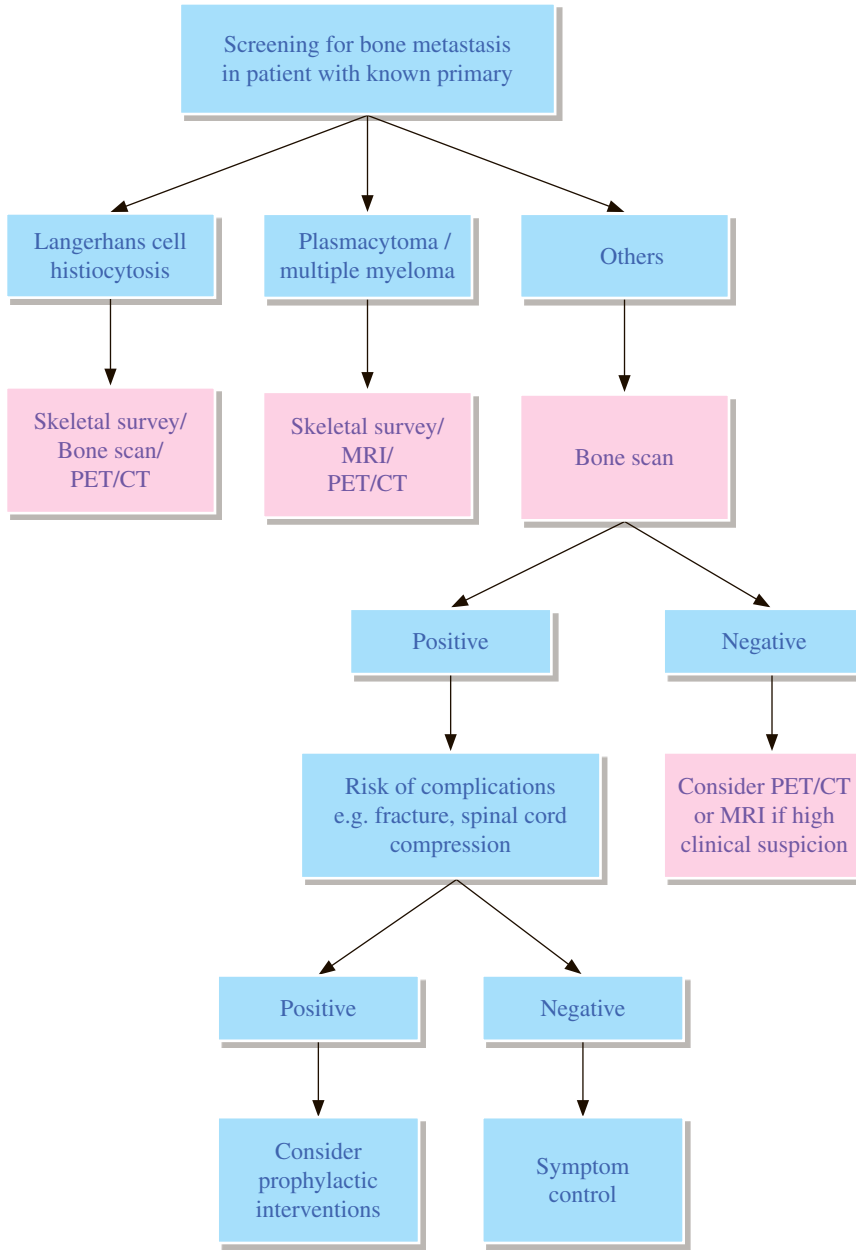
MS 6 Screening for bone metastasis with known primary malignancy



REMARKS

1 Plain radiograph

1.1 Plain radiograph should be taken selectively corresponding to scintigraphically positive osseous region.

1.2 Skeletal survey should only be performed in Langerhans cell histiocytosis, plasmacytoma and multiple myeloma.

2 Nuclear medicine

2.1 Bone scan is a sensitive, cheap and widely available imaging modality for detection of skeletal metastasis.

2.2 False negative bone scan results may occur in cases of Langerhans cell histiocytosis, plasmacytoma, multiple myeloma and renal cell carcinoma.

2.3 PET/CT is valuable in evaluating multiple myeloma and Langerhans cell histiocytosis.

3 CT

3.1 CT is useful in defining the degree of bone destruction and therefore should only be used in specific situations.

4 MRI

4.1 MRI is useful in specific situations such as marrow based lesions.

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