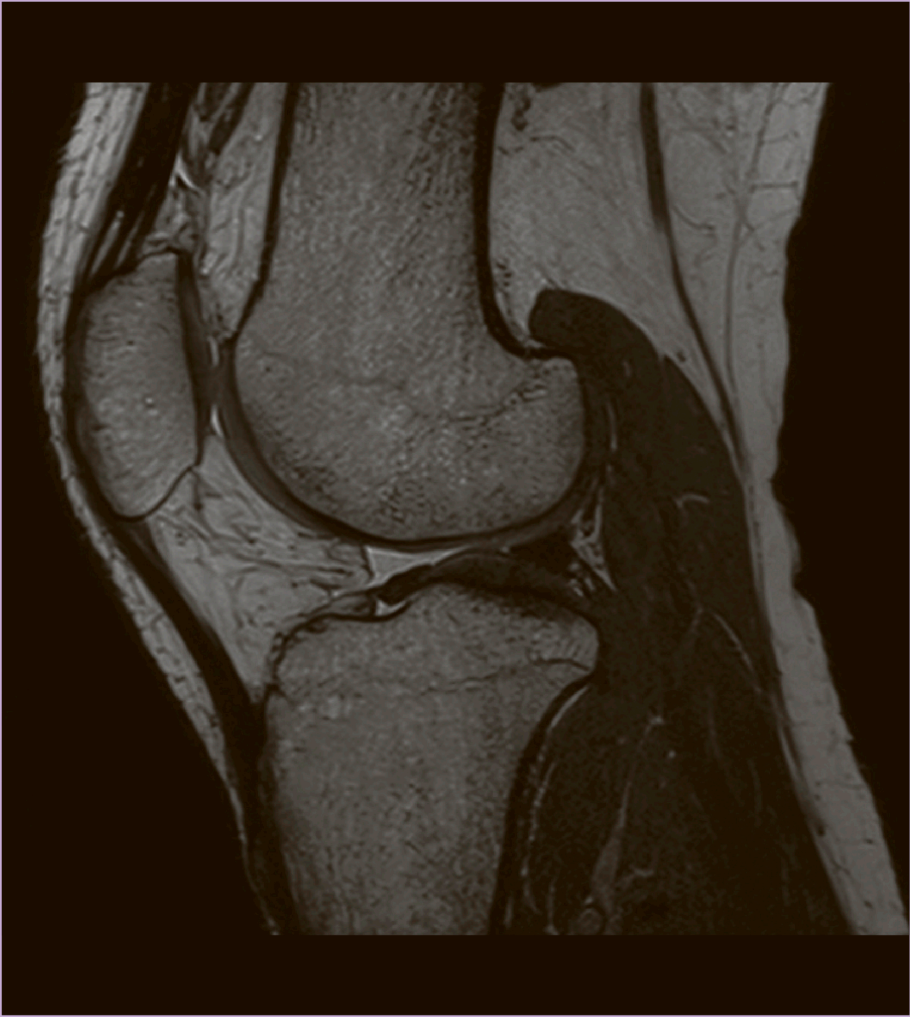
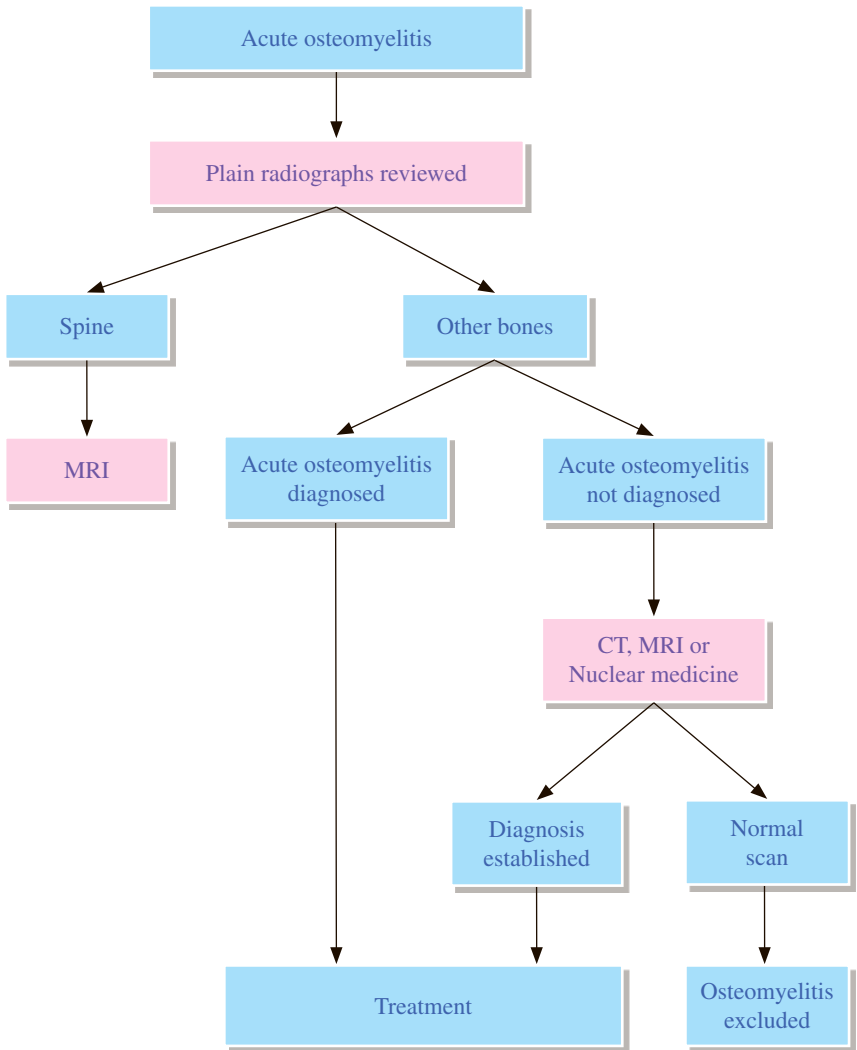


# Musculoskeletal Radiology



Hong Kong College of Radiologists



## 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

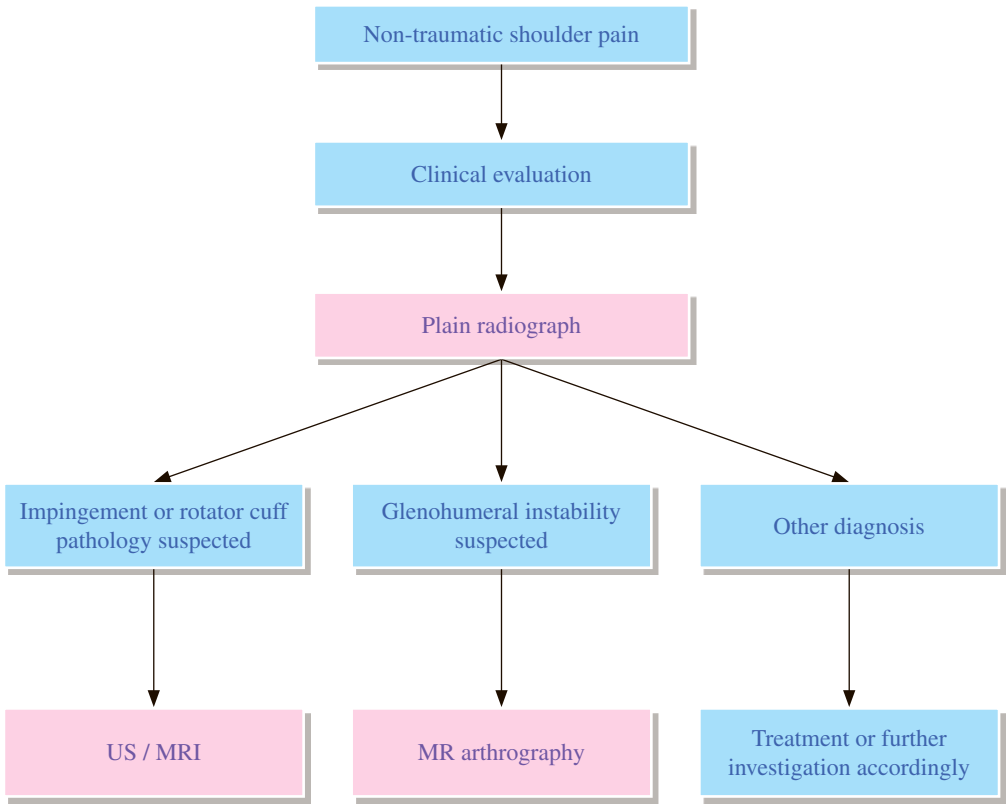
- 3.1 CT is useful to accurately define sequestra, soft tissue abscesses and bone destruction, and to guide biopsy.
- 3.2 Sequestra, cortical destruction, periosteal reaction and intraosseous gas undetected on MRI can be well seen on CT.

### 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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## 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

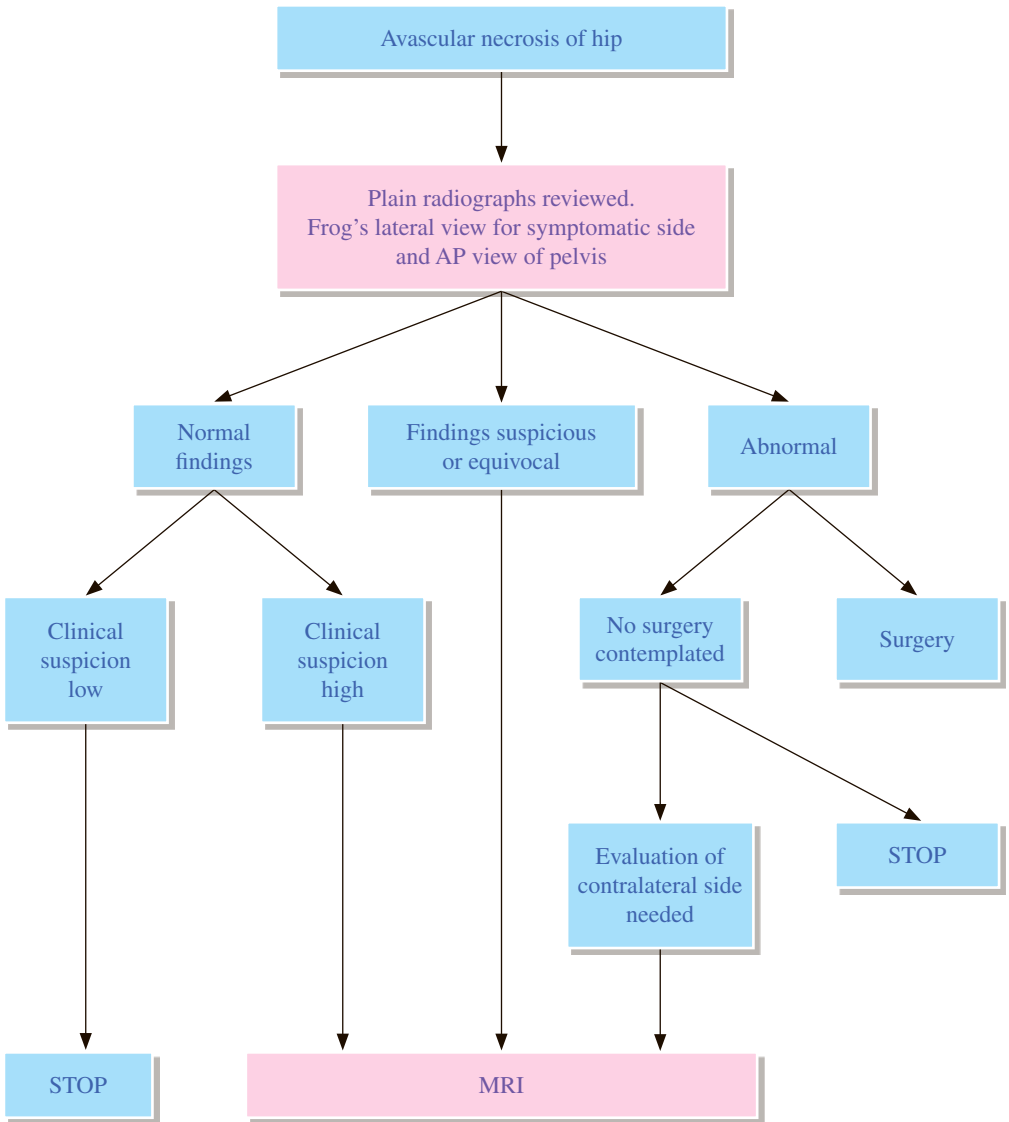
- 4.2.1 Direct arthrography technique has the benefits of intraarticular distention by contrast with excellent anatomical details of glenoid labrum and biceps anchoring site.

### 5 CT arthrography

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

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## 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

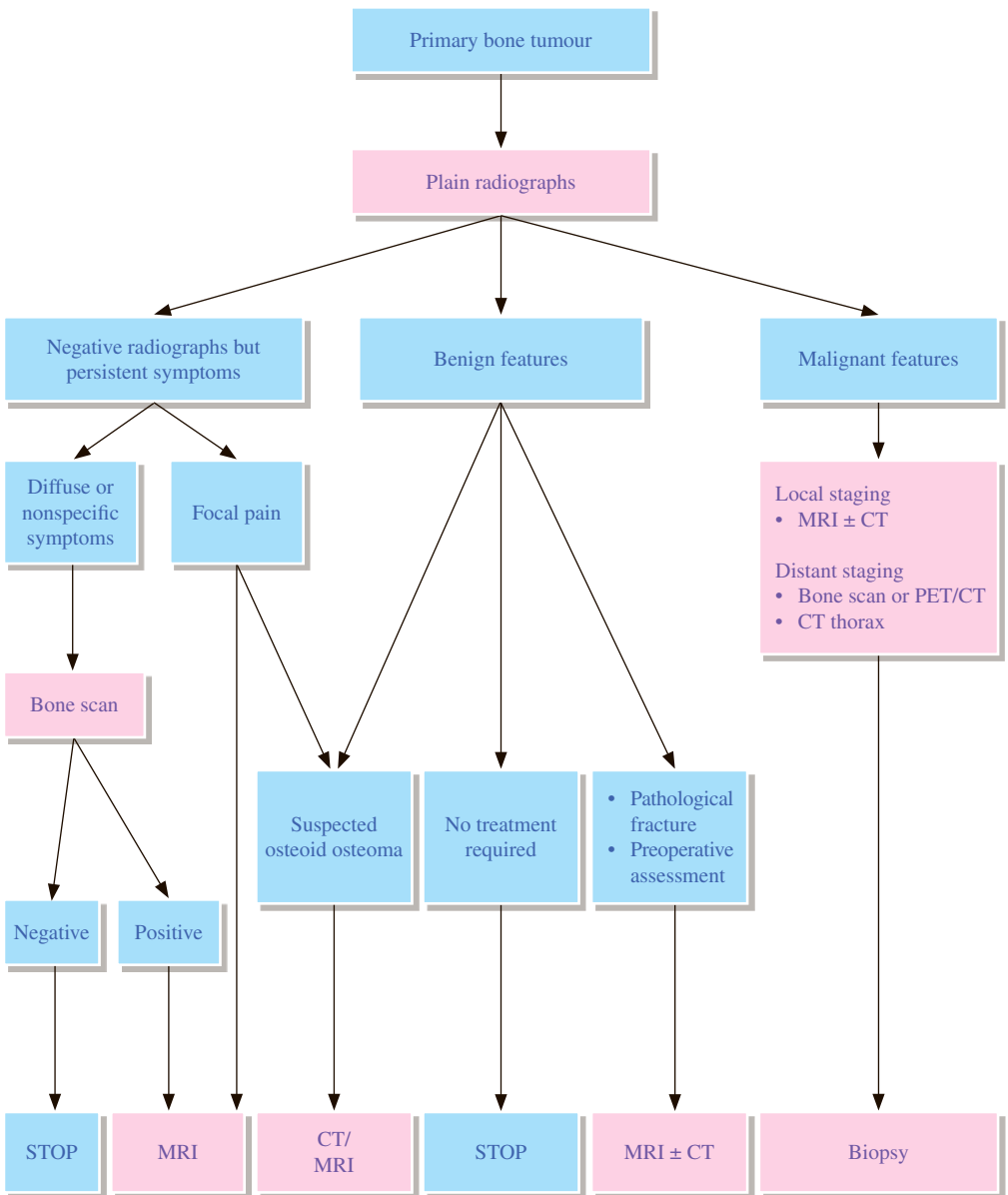
- 3.1 CT detects avascular necrosis of hip earlier than plain radiographs but it is less sensitive than both MRI and bone scan.
- 3.2 Its major role is to determine the severity of secondary degenerative changes and the extent of femoral head collapse.

### 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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## 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

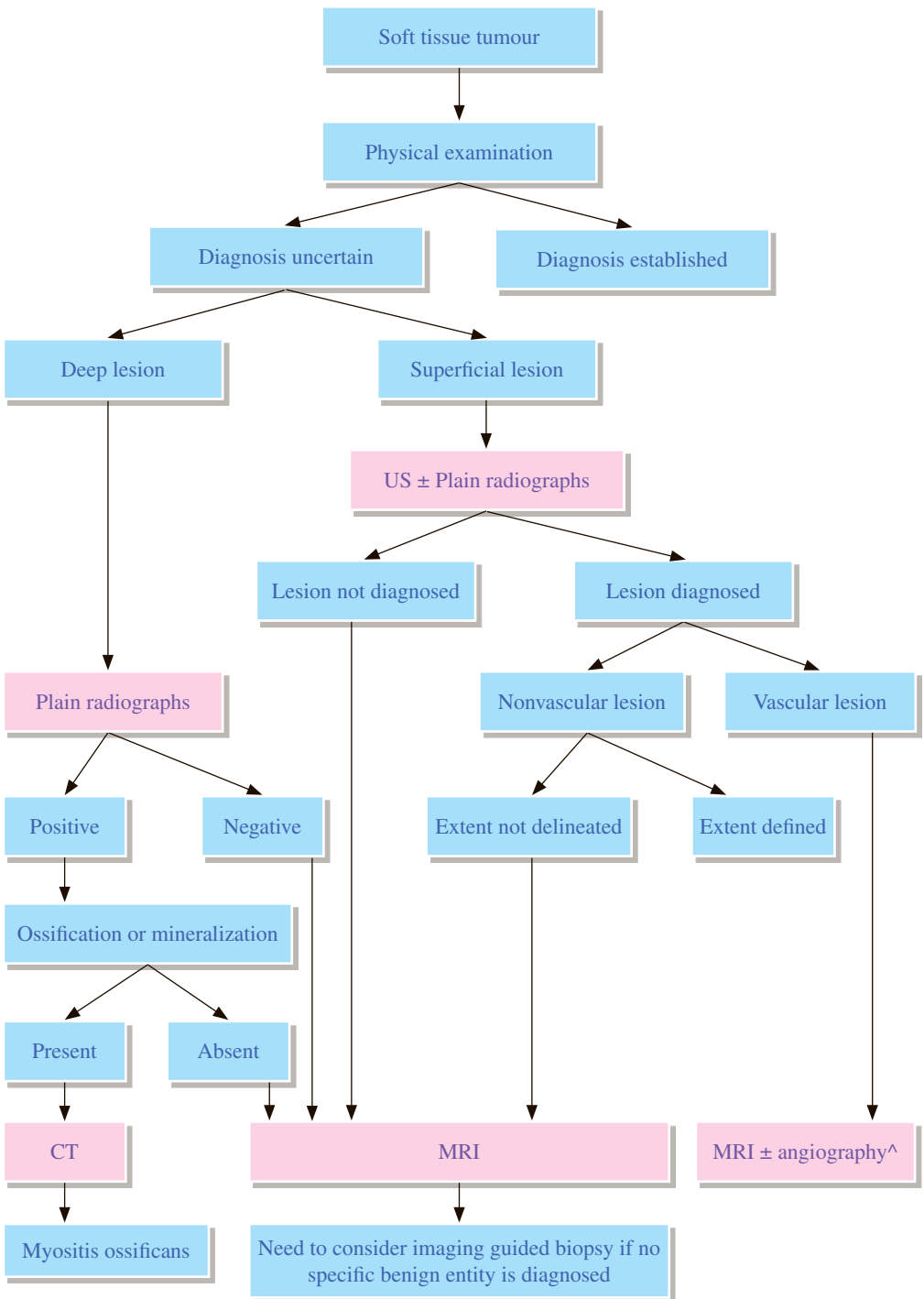
- 5.1 PET/CT has higher sensitivity and specificity than CT, MRI and bone scan for detecting distant metastases (except being less sensitive to pulmonary nodules).
- 5.2 It also has high sensitivity (90%), specificity (96%) and accuracy (95%) for differentiating primary bone tumour from osseous metastases.

### 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**

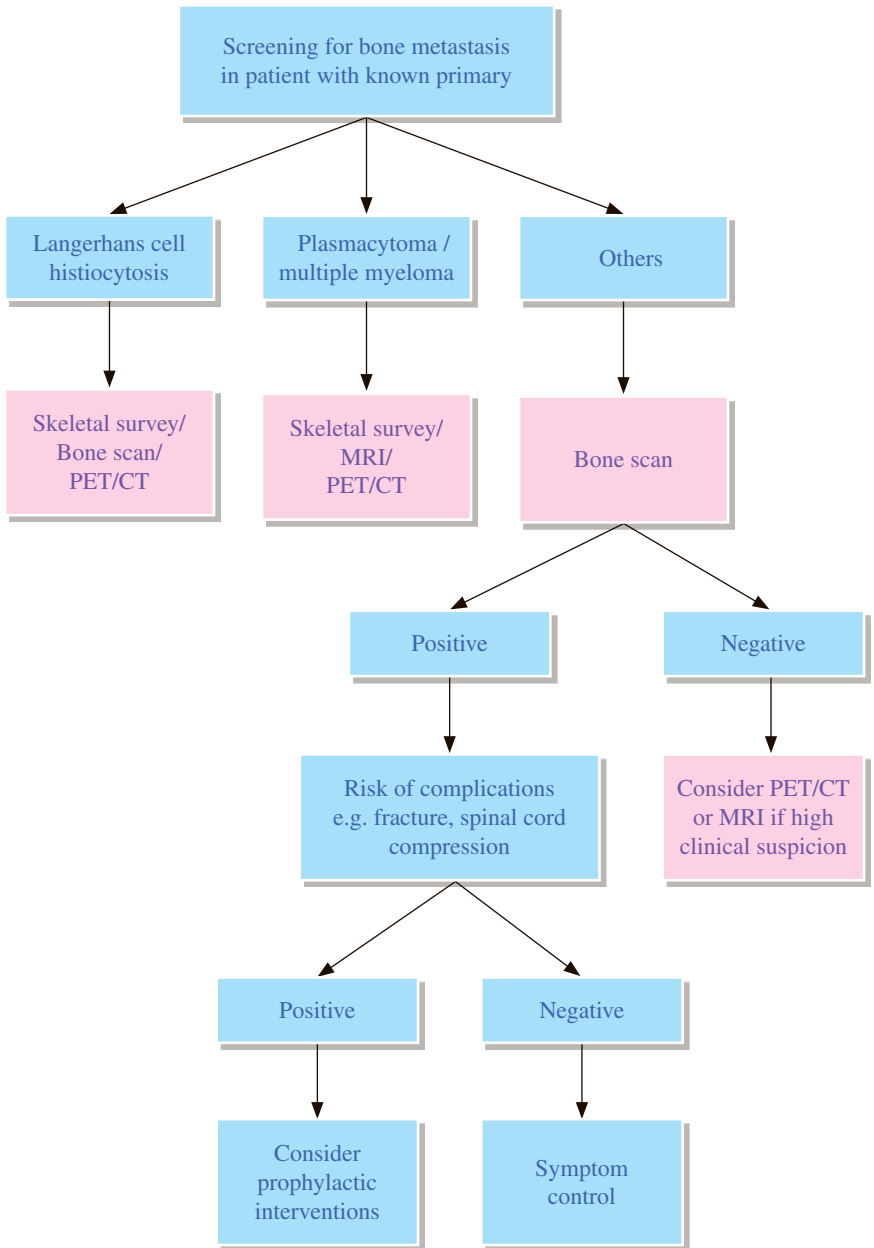
- 5.1 PET is useful for staging and monitoring treatment response of the tumour.
- 5.2 It identifies nodal and osseous metastatic disease.
- 5.3 It may direct biopsy of those metabolically active areas in the tumour.

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## MS 6 Screening for bone metastasis with known primary malignancy

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## **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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