

# RADIOLOGICAL CASE

## CLINICS IN DIAGNOSTIC IMAGING (1)

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SINGAPORE MED J 1994; Vol 35: 638-640

### CASE PRESENTATION

A 41-year-old Chinese woman presented with recurrent pain in the thoracolumbar region of the spine. The pain had been increasing in severity over the past two years and was associated with gradual kyphotic deformity. She had a history of chronic low back pain as a teenager. However, her back symptoms had been quiescent for several years until the current presentation.

On examination, there was stiffness of her thoracic and lumbar spine. A focal area of tenderness was palpable at the thoracolumbar vertebral junction. Cervical spine, hip and other peripheral joints were unaffected. Chest expansion measured only 2cm.

Anteroposterior (AP) (Fig 1) and lateral (Fig 2) radiographs of the lumbar spine were performed. What do these and computerised tomograms (CT) of the thoracolumbar junction (Fig 3) show? What is the diagnosis?

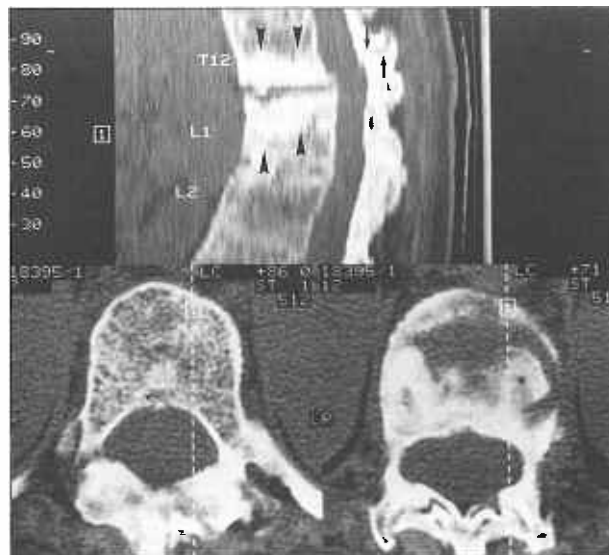
Fig 1 – AP radiograph of the lumbosacral spine



Fig 2 – Lateral radiograph of the lumbar spine



Fig 3 – CT scan of T12 and L1 vertebrae, with left parasagittal reformatted images



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### IMAGE INTERPRETATION

The lumbar radiographs (Fig 1 and 2) demonstrated bridging of multiple levels of the intervertebral discs by syndesmophytes, producing the 'bamboo' spine appearance of ankylosing spondylitis. Lateral radiograph also showed squaring of the lumbar vertebral bodies while AP radiographs revealed fusion of both sacro-iliac joints (Grade IV sacro-iliitis). More significantly, there was irregular destruction of the T12/L1 disc space, with prominent sclerosis of the adjacent vertebral bodies. The extent and diagnosis of pseudoarthrosis was confirmed on CT. The posterior element break (small arrows) and paradiscal sclerosis (arrowheads) were better demonstrated on parasagittal CT images (Fig 3).

#### Correct Diagnosis:

Ankylosing Spondylitis with Complication of Pseudoarthrosis

#### Clinical Course

Because of progressive pain and deformity, the patient underwent excision of the T12/L1 pseudoarthrosis with anterior spinal fusion (Fig 4). She was nursed post-operatively in a plaster body cast and recovered satisfactorily. However, she developed recurrent back pain a year later. This was due to non-healing of the posterior pseudoarthrotic segment for which posterior spinal fusion with Rochester compression was performed. She made a good post-operative recovery and was well at follow-up three and a half years post-surgery. Repeat radiographs demonstrated healing at the site of previous pseudoarthrosis (Fig 5).

### DISCUSSION

Ankylosing spondylitis is a seronegative spondyloarthropathy that principally affects the axial skeleton. The 'classic' form is commoner in males, with spinal and sacro-iliac disease usually developing in teenagers and young adults. The most frequent presenting symptoms are low back pain and stiffness, which persists, progresses and ascends the spine. Peripheral joint involvement, especially of the hips, usually manifests late in the disease course. Sacro-iliac and early vertebral involvement is often detected on initial radiographs. The grading of sacro-iliitis, in fact, forms part of the standard clinical criteria for the diagnosis of ankylosing spondylitis<sup>(1)</sup>.

The development of pseudoarthrosis should be suspected when a patient with established ankylosing spondylitis develops severe focal back pain after a long, quiescent period. In the natural course of the disease, the spinal symptoms tend to diminish with progressive ossification of the vertebrae. The affected patient may give a history of recent minor trauma. Besides deformity and pain, other possible sequelae of pseudoarthrosis include neurological deficit and death, particularly if the cervical spine is involved.

The commonest site of pseudoarthrosis is the thoracolumbar junction, being a site of stress concentration in the ankylosed spine<sup>(2)</sup>. Pseudoarthrosis can be defined as a mobile segment of non-union which occurs transversely through the disc space or, less commonly, the vertebral body of a fused spinal segment. Pseudoarthrosis is classified as the 'non-inflammatory' type of destructive disco-vertebral (or Andersson) lesion seen in late ankylosing spondylitis, in contradistinction to the 'inflammatory' type present in early stages of the disease<sup>(3)</sup>. A posterior element defect, in the form of a recent fracture or unfused facet joint at the level of the pseudoarthrosis, is an essential component in the development of the anterior vertebral lesion<sup>(4)</sup>. The 'mechanical' aetiology of this lesion is now generally accepted<sup>(2-6)</sup>.

Fig 4 – Lateral lumbar spine radiograph shows good position of the bone graft (arrows), placed after excision of T12/L1 pseudoarthrosis.

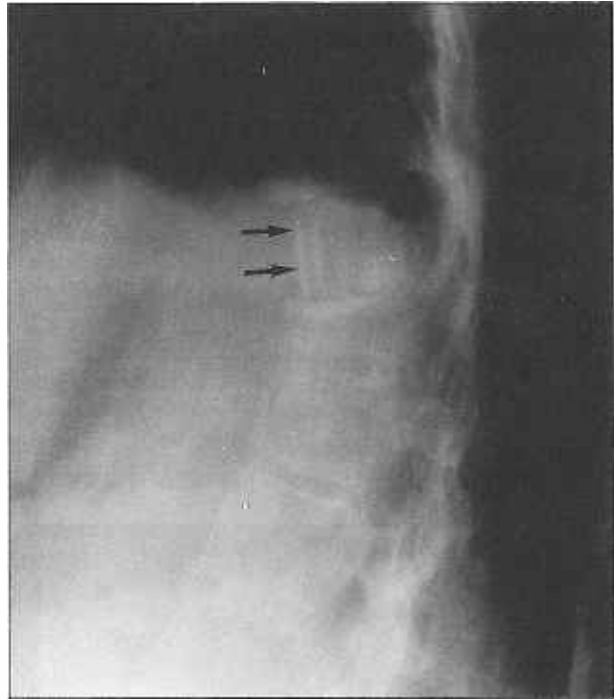
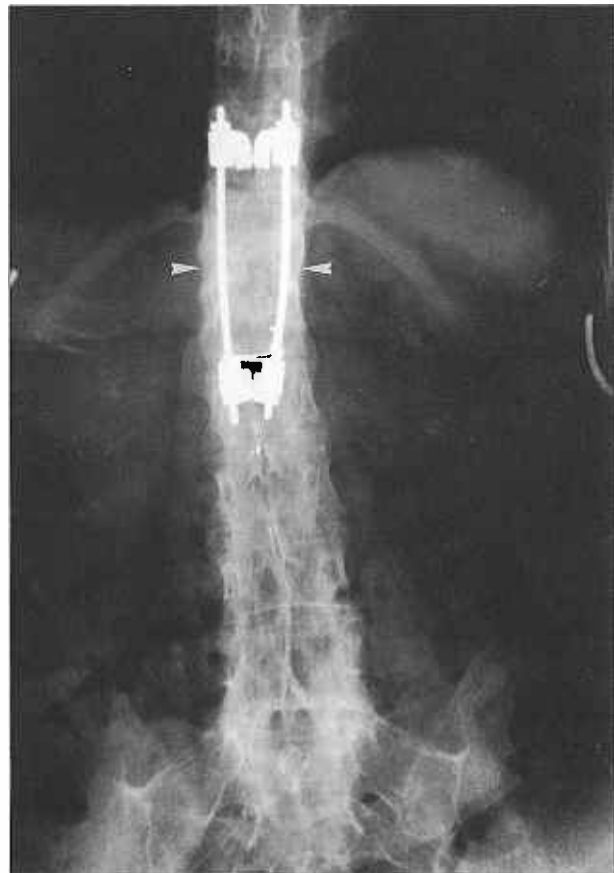


Fig 5 – AP lumbar spine radiograph shows solid fusion at the thoracolumbar junction (arrowheads). Note bilateral Rochester compression rods.



Radiographically, the discovertebral lesion of pseudoarthrosis may be mistaken for malignancy or infections such as tuberculosis. The presence of surrounding sclerosis around the intervertebral area of osteolysis, posterior element defect and background changes of advanced ankylosing spondylitis are helpful distinguishing features. Flexion and extension lateral radiographs may show movement in a previously rigid spine. Isotope bone scans are sensitive in detecting radiographically occult pseudoarthrosis and may also reveal a silent second pseudoarthrotic segment<sup>(7)</sup>. Pseudoarthrosis is demonstrated scintigraphically as two horizontal areas of intense focal uptake on either side of a tracer-poor segment. CT, particularly with the addition of coronal and sagittal reformations, is superior to conventional tomography for characterisation of the pseudoarthrosis, detecting spinal canal stenosis and differentiating posterior element fractures from unfused facet joints<sup>(8)</sup>. Magnetic resonance imaging appearances of pseudoarthrosis have recently been described and may be useful in the early detection of this complication<sup>(9)</sup>.

The initial management of symptomatic patients with pseudoarthrosis is conservative; consisting of bed rest, analgesics, and immobilisation in either plaster jackets or custom-made spinal braces. Imaging plays an important role in determining healing or progression of the lesion in these cases. If conservative treatment fails or if the patient has intractable pain, surgical excision of pseudoarthrosis and anterior spinal fusion is indicated<sup>(10)</sup>. Besides assessment of healing, post-operative

imaging plays a further role in detecting non-union or refracture, particularly of the posterior elements. Another possible complication is development of a migrating pseudoarthrosis. As illustrated in our patient, further stabilisation in the form of a posterior spinal fusion may be necessary to prevent recurrent pseudoarthrosis<sup>(10)</sup>. Early surgery is important as once pseudoarthrosis is established, it is unlikely to heal especially in the presence of progressive destruction.

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#### ABSTRACT

*A 41-year-old Chinese woman with quiescent ankylosing spondylitis presented with increasingly severe, recurrent back pain. The thoracolumbar junction was focally tender on palpation. Radiographs and computerised tomography demonstrated T12/L1 pseudoarthrosis. Excision of pseudoarthrosis, followed by anterior and posterior spinal fusion were performed with good results. The clinical features, pathogenesis, and management of this complication are discussed. Imaging of pseudoarthrosis in ankylosing spondylitis is emphasized.*

**Keywords:** Ankylosing spondylitis, discovertebral lesion, fractures, pseudoarthrosis, spine complications