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CASE REPORT

Cervical spondylolysis : A case report

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Cervical spondylolysis is defined as a corticated cleft between the superior and inferior articular facets of the articular pillar, the cervical equivalent of the pars interarticularis in the lumbar spine. Of primary importance is its recognition to avoid confusion with more clinically significant abnormalities such as fracture or dislocation.
This case report describes bilateral spondylolysis and associated dysplasia of C5 in a 31-year-old female. We describe the radiographic presentation of this anomaly, stressing the importance of computed tomography for correct diagnosis.
A review of the literature on this interesting abnormality and a complete differential diagnosis are presented.

Keywords : cervical spine ; spondylolysis ; spondylolisthesis ; radiography ; computed tomography ; magnetic resonance imaging.

INTRODUCTION

Spondylolysis with or without spondylolisthesis is a rare condition in the cervical spine, characterised by the presence of a corticated cleft between the superior and inferior articular facets on the articular mass. Although the diagnosis is often suggested by the plain film, demonstration of the typical computed tomographic findings is often necessary to reach a final diagnosis. MR imaging can be most helpful in cases with neurological involvement. Awareness of this condition and its relevant radiological features would aid in the diagnosis of a relatively innocuous condition, thus preventing inappropriate treatment and unnecessary surgery.

We present a case of this anomaly as imaged with plain radiography, computed tomography and MRI. Differential diagnosis and a brief review of the literature are discussed.

CASE REPORT

A 31-year-old woman was referred by her general practioner to our hospital, with neck and right shoulder pain. This had started 7 years previously without any identifiable trauma or other precipitating event. She was then treated conservatively with analgesics. Three months prior to her consultation, her neck pain worsened, without any neurological deficit. On physical examination weakness of abduction of the right shoulder was noted. Palpation of her neck revealed mild tenderness over the mid-cervical spine with painful limitation of

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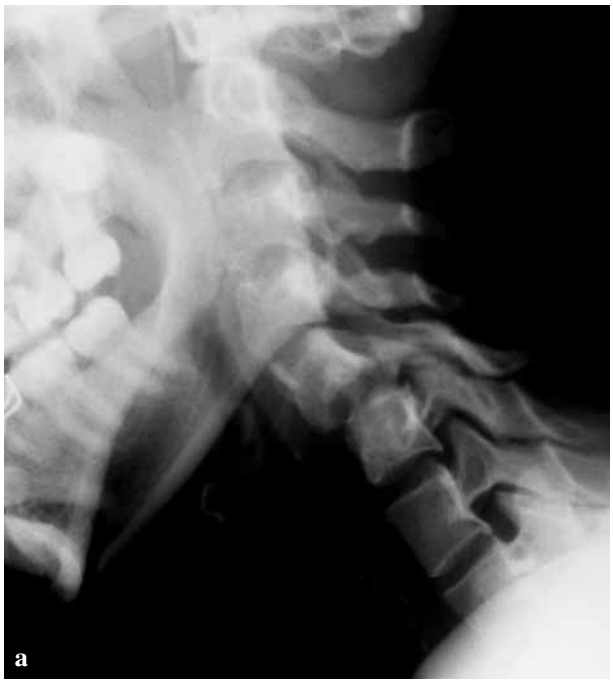


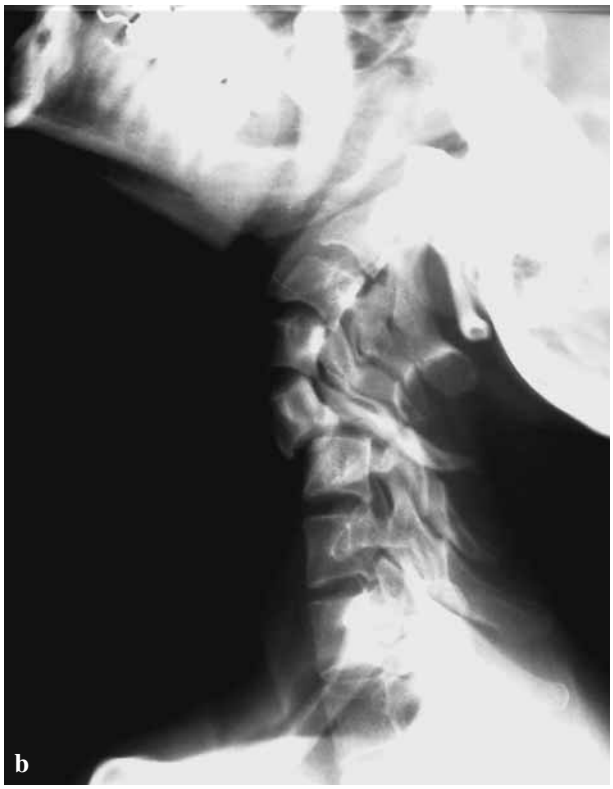
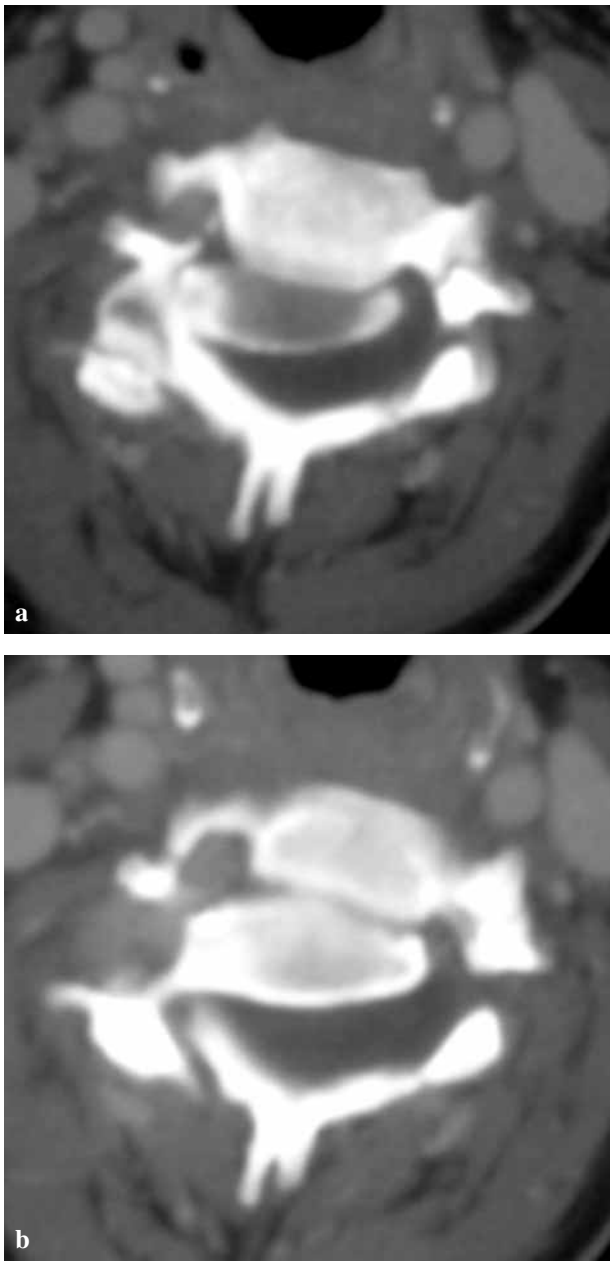


Fig. 1. — Lateral radiographs of the cervical spine : flexion (1a) and extension (1b) views demonstrating spondylosis and instability at C5/6 with dysplastic changes of the articular pillars at C5.

movement. On initial cervical spine radiographs, she was diagnosed as having a fracture through both facets of C5 with olisthesis of C5 over C6. The absence of effective reduction by halo traction suggested a misdiagnosis, and the radiological findings were reviewed, which led to the correct diagnosis. An axial computed tomography (CT) revealed hypoplastic C5 facets with bilateral pars defects suggestive of congenital spondylolysis. Other abnormalities included hyperplasia of the adjacent articular processes, dysplastic posterior elements and hypoplasia of the left pedicle. The spinal cord was enlarged with intramedullary radiolucent zones suggestive of syringomyelia. Advanced imaging with 3-D computed tomography and multiplanar (coronal and sagittal) reformatted (MRP) imaging was helpful in visualising and clarifying the abnormality. MRI was performed to assess the spinal cord and cervical roots. This MRI showed a Chiari malformation and an associated cervico-thoracic syringomyelia without hydrocephalus. The patient underwent operative fixation by anterior interbody fusion without drainage of the syrinx. She had no neurological deficit after surgery and made an uneventful recovery, being discharged 4 days after surgery.

DISCUSSION

Spondylolysis with or without spondylolisthesis is exceptional in the cervical spine (*1*). One-hundred-and-four cases have been described in the world literature (*6, 10, 12*), since it was first reported by Perlman and Hawes in 1951 (*10*). Cervical spondylolysis (CS) is defined as a corticated cleft between the superior and inferior articular facets on the articular pillar, the cervical equivalent of the pars interarticularis in the lumbar spine (*2, 9*). The sixth cervical vertebra is the most common site of involvement, which accounts for 70% of the reported cases. It has been reported to occur at any level with the exception of C1 and C7 (*5, 12*). Review of



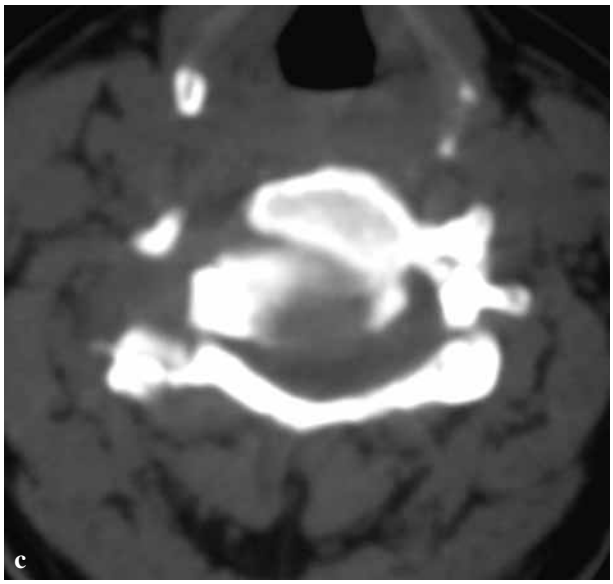
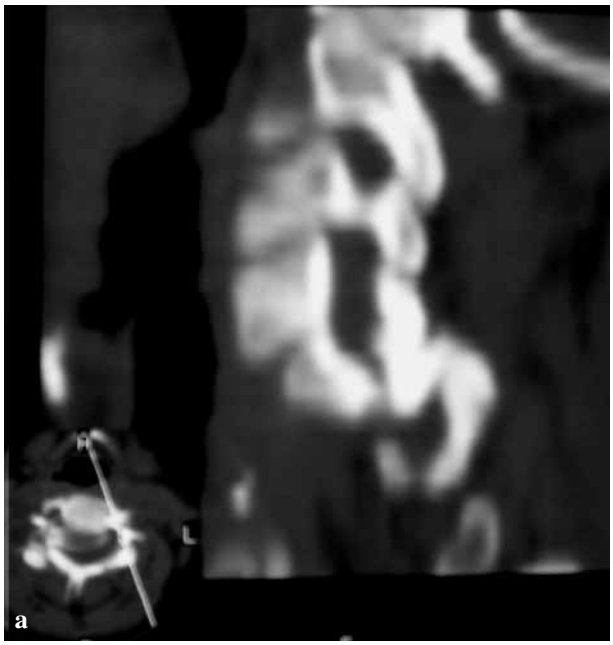


Fig. 2. — Three contiguous axial computed tomographic images of the C5 vertebra imaged in bone algorithm, showing bilateral corticated defects in the articular mass, bilateral dysplastic lamina and hypoplasia of the left pedicle.

literature shows a preponderence in men (2:1) and on the left side in unilateral lesions. Bilateral involvement occurs in up to two-thirds of cases (*12*). The age at presentation varies between 20 months and 81 years (*3, 12*).

Clinically the lesion is asymptomatic more often than not and it is quite often a fortuitous discovery, generally in a trauma victim. It has also been discovered in patients presenting with torticollis or neck pain and rigidity. Radiculalgia associated with signs of deficit especially in the C7 territory is not uncommon. Conversely, signs of spinal cord compression appear to be exceptional with only 4 cases reported in the literature (*5*).

The aetiology of cervical spondylolysis is unknown. The frequent association with other dysplastic changes such as spina bifida in the cervical spine strongly supports its congenital origin. Spondylolysis was never reported in still born foetuses or in newborns, therefore, it should be considered an acquired condition. However, the familial occurrence of spondylolytic patients and the high incidence of spina bifida indicate a congenital or developmental predisposition (*11*). Morvan *et al* (*8*) proposed that this condition was caused by repetitive microtrauma resulting in stress fracture to the pars region similar to the process proposed in lumbar spondylolysis. They further proposed C6 to be the commonest site to be affected as it is a transitional vertebra and is subjected to stress more often. Martin *et al* (*7*) reported CS in two children



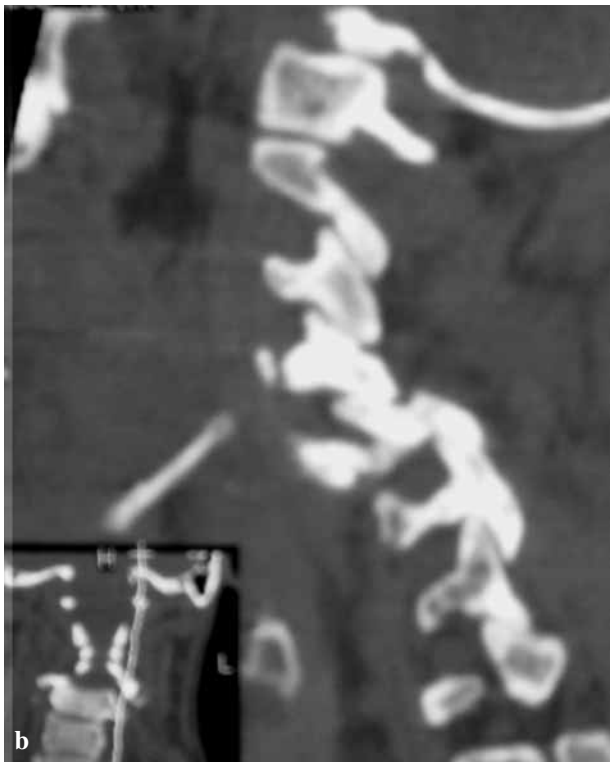


Fig. 3. — Standard (3a), and curved (3b) multiplanar reformatted images confirm the spondylolisthesis and clarify the lesions.

with osteopetrosis and believe that this condition might be present more often in children with osteopetrosis than has previously been recognised.

The radiological criteria of CS are now well established (*5*). The radiography protocol includes a lateral and oblique view of the lower cervical spine and a CT scan. In cases where spondylolysis is evident on plain radiographs, the computed tomographic scan is essential to fully evaluate bony abnormalities at that level (*4*). Characteristic radiological features include 1) a well marginated cleft between the facets (*10*), a triangular configuration of the pillar fragments on either side of the spondylolytic defect (*6*), posterior displacement of the dorsal triangular fragment (*12*), hypoplasia of the ipsilateral pedicle (*9*), spina bifida of the involved level, and 2) compensatory hyper or hypoplasia of the ipsilateral articular pillar, at the level above and/or below the defect (*11, 13*). The cleft is oriented obliquely to the plane of the facet joint ranging from vertical to perpendicular to the joint (*13*). The spondylolisthesis is usually grade 1 and less than 3 mm (*5*). Differentiation from a chronic fracture

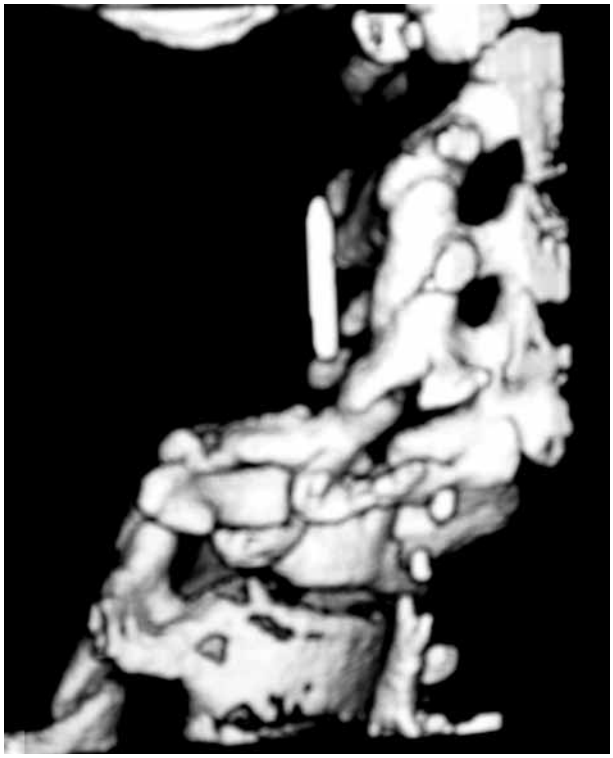


Fig. 4. — Three dimensional computed tomography, lateral view improving identification of the abnormalities.

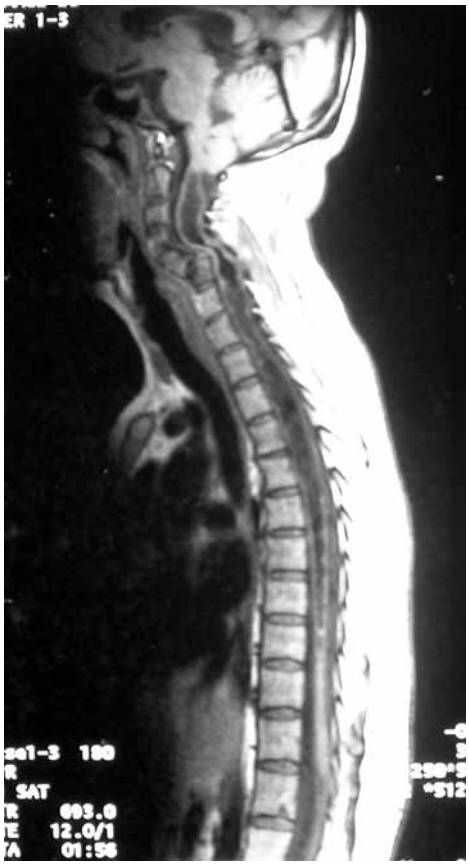


Fig. 5. — Mild sagittal T1 weighted MR imaging demonstrating a Chiari I malformation and an associated cervico-thoracic syringomyelia.

can be difficult but corticated margins and associated congenital anomalies favour spondylolysis (*5, 6*). However, these images can be difficult to interpret because of the complexity of the disorder. Advanced imaging with three dimensional computed tomography and curved/standard multiplanar reformatted images allow to achieve a more complete understanding of the patient's anomaly. Magnetic resonance (MR) imaging is infrequently performed and has been reported to be unhelpful for the diagnosis of spondylolysis (*2*). MR Imaging is more useful when it is necessary to evaluate the spinal cord rather than the osseous anatomy. Although the defect may be difficult to identify on MRI, absence of the spinous process on sagittal sequences should raise the suspicion of the abnormality. The defect itself may be visible with the use

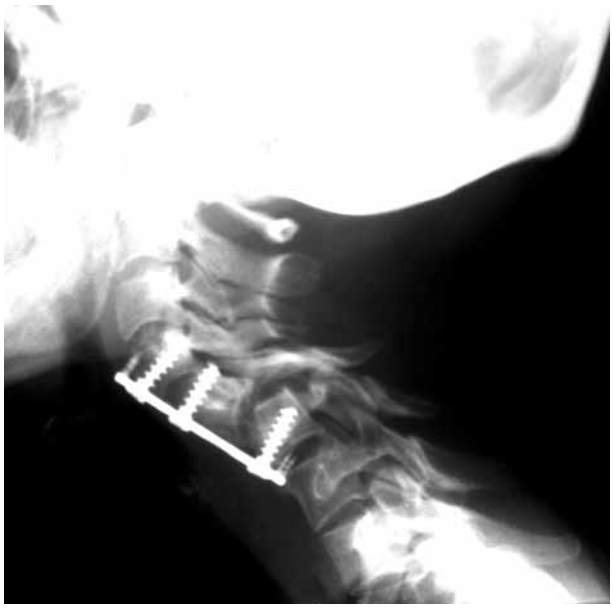


Fig. 6. — Postoperative lateral radiograph of the cervical spine demonstrating successful fusion.

of thinner sections (*12*).

Awareness of this entity and its specific radiological features will help to differentiate this relatively benign cervical anomaly from other, more ominous, unstable causes of CS. The most frequent confusion arises in the context of acute trauma when the CS may be mistaken for an articular mass dislocation or fracture which may require acute surgical intervention. The vast majority of patients with radiographically proven CS can be treated confidently with conservative measures (*11*). Surgical intervention should be reserved for those who fail non operative management or who exhibit neurological compromise referable to an unstable spondylolitic defect as in our case. Radiographic follow-up is indicated al least yearly to detect any evidence of progression.

CONCLUSION

Spondylolysis with or without spondylolisthesis is a rare condition in the cervical spine. Patients usually have mild problems and the presence of spondylolysis is evident in plain radiographs. These plain radiographs should be followed by

computed tomographic scan to fully identify the bony structures and a potentially hazardous condition. MR imaging can be most helpful in cases with neurological involvement. Awareness of this condition and its relevant radiological features would aid in the diagnosis of a relatively innocuous condition, thus preventing inappropriate treatment and unnecessary surgery.

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