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Spina bifida occulta in isthmic spondylolisthesis: a surgical trap

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Abstract An 11-year-old girl presented with symptomatic grade IIB isthmic type spondylolisthesis, with an elongated pars, confirmed on magnetic resonance imaging (MRI). Posterolateral in situ fusion of L5/S1 was performed. At surgery, a significant bony defect in the posterior aspect of S1 was noted. Awareness of this possible co-existence is paramount if iatrogenic damage to neural elements is to be avoided during surgery.

Keywords Isthmic spondylolisthesis · Spina bifida · Posterolateral fusion · MRI

Introduction

Spondylolisthesis is a common aetiology of back pain in children and adolescents. Surgical treatment is frequently instituted to manage symptoms. Spina bifida occulta, which has an incidence of 5% in the general population, has been reported in one-third of patients with the isthmic type of spondylolisthesis [10]. This possible co-existence should be examined prior to surgery by pelvic outlet views, computed tomographic (CT) scanning or magnetic resonance (MR) imaging. If this is not done, significant risk exists for inadvertent damage to the dura and dural sac elements during the approach to the posterior spine.

Case report

An 11-year-old girl presented with progressive limitation of activities as a result of low back pain. Recurrent hamstring injury prevented sporting activities and ballet. Clinical examination revealed exaggerated lumbar lordosis, hamstring muscle spasm and marked restriction of forward flexion of the lumbar spine. Neurological examination was normal.

Fig. 1A,B Anteroposterior and lateral projection of lumbosacral spine showing grade II slip. Midline posterior elements of S1 appear open

Fig. 2A,B Right and left oblique radiographs showing elongated pars interarticularis consistent with type IIB spondylolisthesis

Fig. 3 Sagittal view of magnetic resonance imaging (MRI) study of the whole spine confirming findings

Radiographs (Fig. 1) revealed a grade 2 L5/S1 slip (Meyerding grading). Oblique views (Fig. 2A) revealed an elongated pars interarticularis, consistent with an isthmic type IIB spondylolisthesis

Fig. 4 Transverse MR image showing normal canal and no posterior defect

(Wiltse classification [9]). MRI (Fig. 3, Fig. 4) showed normal spinal canal and no apparent posterior bony defect.

Following failed conservative measures, posterolateral in situ fusion was performed. Through a midline skin incision, the para-vertebral muscles were stripped from the spinous processes of L5 downwards. A sudden dural leak alerted attention to the large left posterolateral defect in the body of the S1 vertebra, 1.5×3 cm in diameter, consistent with a spina bifida lesion. The dural tear was repaired and the defect covered with a fascial graft. Alar-transverse fusion was carried out using iliac bone graft. Postoperatively, the patient was immobilised in a pantaloone-type body cast for 3 months and made an uneventful recovery.

Discussion

Spina bifida occulta is associated with spondylolysis of the lumbar spine in 11.8–35% of patients [2, 5, 7]. There have been reports of increased incidence of posterior spine defects in association with isthmic spondylolisthesis [9, 10], although no aetiological connection has been recognised [4].

Blackburne and Velikas [1] and Hennrikus [4] found that the risk of a progressive vertebral slip was greater in patients with a midline lumbosacral defect. They proposed that this happened due to the lack of attachment of the multifidus muscles resulting from deficient spinous processes, which thereby decreased their stabilising effect. The presence of dysplastic or deficient posterior elements in the spina bifida defect may put increased loading on the pars [2, 6, 8]. In our patient, a similar mechanism may have led to elongation of the pars and the presence of a grade II slip at the time of presentation.

The importance of such a coexistent lesion lies in the danger of nerve root damage posed by surgical exposure.

To conclude, we feel that in high-grade slips, when the arch of S1 cannot be visualised on standard radiographs,

an outlet view of the pelvis or CT/MRI scans with oblique cuts should be obtained to visualise the S1 arch [3].

Secondly, it is much safer to perform the alar transverse fusion by a bilateral paravertebral muscle splitting exposure. If the spine has been exposed by a midline exposure, as in our case, it is important to be aware of a possible posterior arch defect. Surgical dissection must begin

on the lateral aspect over the facet joint line and pars interarticularis and then move on to prepare the midline. Any defect encountered is best covered with a fascial or fat graft [2]. The fusion needs to be protected with spinal instrumentation or, alternatively, with spica immobilisation, as in our case, to increase stability.

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