Anterior thigh compartment syndrome after prone positioning for lumbosacral fixation

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Received: 17 November 2011 / Revised: 23 February 2012 / Accepted: 14 March 2012 / Published online: 7 April 2012
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Abstract We report a case of a patient who developed anterior thigh compartment syndrome after being positioned prone for instrumented lumbar spine surgery. Although rare, clinicians should be aware that compartment syndrome is a possible complication of spinal surgery.

Keywords Spinal · Surgery · Complications · Compartment syndrome

Case history

A 47-year-old lady presented to the out-patient department with significant lower back pain and bilateral lower limb pain in the L5 distribution. MR scan demonstrated degenerative spondylolisthesis at L5/S1 with resultant entrapment in the exit foramina of the bilateral L5 nerve roots (Fig. 1).

The patient was initially referred onto a pain management programme, but her symptoms failed to improve with conservative management. After carefully counselling the patient

of the risks and benefits of intervention, a joint decision was made to proceed with surgical management. The patient, therefore, underwent an elective L4-S1 posterolateral instrumented fusion with L5 laminectomy and bilateral L5 nerve root decompression. The procedure was carried out with the patient placed in the prone position on a standard silicon padded Wilson frame with intra-operative fluoroscopy to guide pedicle screw placement. Graduated compression stockings and pneumatic compression boots were used as per the standard practice in the unit. The operation lasted 5 h, but there were no intra-operative complications.

In the immediate post-operative period, as the patient woke up in the recovery room, she started to complain of severe right thigh pain. On examination, the right thigh was found to be swollen, tense and tender to touch. An urgent plain right femoral X-ray did not show any bony injuries. An urgent CT angiogram performed 2 h later revealed normal vessel patency, but there were low density changes within the right vastus intermedius and rectus femoris muscles (Figs. 2, 3).

A clinical decision was made to take patient back to theatre at 4 h post-operatively, and intra-compartmental pressures of anterior, posterior and medial compartments were measured with patient anaesthetised. The compartmental pressures were found to be 150 and 134 mmHg, respectively, in the region of the right vastus lateralis and rectus femoris muscles. Fasciotomy was performed immediately through a lateral incision, and fascial incisions were made to decompress both anterior and posterior compartments. The muscles were viable but swollen and bulged through the fasciotomy wounds. No haematoma or active bleeding was found. Samples were taken and sent for histology and microbiology.

By the first post-operative day the patient had significant improvement in pain. The fasciotomy wounds were

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Fig. 1 Pre-operative sagittal T2 MRI demonstrating grade I degenerative spondylolisthesis at L5/S1

re-inspected and closed after 48 h. Microbiology was negative for organisms, while the histology demonstrated appearances consistent with the clinical diagnosis of compartment syndrome. All the post-operative serological tests were in the normal range, other than anaemia (related to the primary operation). The patient symptomatically improved after transfusion.

Thereafter, there was a slow but progressive recovery with no major complications related to the primary operation site or the fasciotomy wound. Post-operative X-rays were satisfactory (Fig. 4). The patient was discharged home on post-operative day 26.

Discussion

In addition to general complications of spinal surgery [1], there are a number of literature reported specific complications of prone positioning. In recent years, there has been an increased emphasis on the avoidance of mal-positioning in theatre as it has important implications in terms of

Fig. 4 Post-operative lateral radiograph demonstrating L4 to S1 fixation

Figs. 2, 3 Coronal and axial CT images demonstrating low density changes (arrows) in the anterior muscle compartment of the right thigh

associated problems of pressure sores, nerve compression, deep vein thrombosis and compartment syndrome [2]. In our literature search, we did not identify any cases of anterior thigh compartment syndrome. Indeed, we found only one other case, involving the anterior tibial compartment [3].

Prone positioning, in particular, carries with it associated risks of neural and vascular compression [4]. Cases of post-operative visual loss have been reported [5–7] and it has been postulated that this may be related to changes in intra-ocular pressure which occur in the prone position [6]. Vascular complications include fatal ischaemic stroke [8] and femoral artery ischaemia [9]. Finally, bilateral anterior superior iliac spine pressure ulcers have been reported with spinal surgery in the prone position [10].

The patient in this case was significantly overweight with a BMI of about 34. She had a background of asthma and hypertension, but there was no pre-operative history of any muscular or vascular abnormalities. In theatre, the patient was carefully positioned prone following routine departmental precautions, including careful consideration with regards to the eyes and the pressure areas. The operation itself was uneventful, although perhaps it took a little longer than planned. The exact aetiology of the anterior thigh compartment syndrome in this case is not known, although we would postulate a vascular mechanism with relative ischaemia of the lower limb which reversed when the patient was placed in the supine position at the end of the procedure. Thus, the CT angiogram revealed normal vessel patency, but there were changes within the muscle in the anterior compartment of the right thigh. Histology from the muscle sample was normal, excluding the possibility of undiagnosed vasculitis or connective tissue disease. While meralgia paraesthetica [11] was one of the differential diagnoses in the early post-operative phase, this would not account for the muscle changes on CT and compartment syndrome was objectively confirmed when the intra-compartmental pressures were measured.

Although compartment syndrome is clearly an extremely rare complication of prone positioning for spinal

surgery, we wish to make colleagues aware that it is a possibility. Awareness of the condition allows early diagnosis and treatment which may be limb saving.

Conflict of interest None of the authors has any potential conflict of interest.

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