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Unilateral psoas abscess following posterior transpedicular stabilization of the lumbar spine

Received: 28 January 2000
Revised: 17 May 2000
Accepted: 22 May 2000

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Abstract A case of unilateral psoas abscess in a 58-year-old patient, shortly after posterior lower spine stabilization and fusion for spinal stenosis using transpedicular spine fixation is reported. The diagnosis was delayed because the patient's symptoms were referred to the thigh and the plain roentgenograms were negative for pathology. The technetium scintigram and computed tomography (CT) helped localization, diagnosis and treatment of the psoas abscess. Percutaneous CT-guided drainage was followed by recurrence of the abscess, and open surgical evacuation was performed success-

fully in combination with antibiotic treatment for 8 weeks. Psoas abscess should always be suspected when recurrent pain is associated with fever and elevated erythrocyte sedimentation rate after instrumentation of the lumbar spine. Hardware of a low profile and volume should be used to decrease dead space in the fusion area, and the volume of bone substitutes should be limited for the same reason.

Key words Psoas abscess · Twinflex · Transpedicular spinal fixation

Introduction

Psoas abscess is actually a retrofascial abscess [6, 10], but its origin is not fully understood because the drainage pathway is not well known and therefore the choice of treatment is often not clear.

The symptoms associated with psoas abscess are not specific and are usually localized in the course of abscess extension and rarely to its origin. A three-phase scintigram usually helps considerably in the diagnosis and localization of the site of infection. Computed tomography CT identifies the abscess location and its extension, and can be used for needle-guided percutaneous drainage of the abscess.

We report a patient with unilateral psoas abscess that developed shortly after Twinflex [9] transpedicular lumbar spine fixation.

Case report

A 58-year-old male patient presented with a 2-year-history of low back pain and bilateral sciatica, because of degenerative spinal stenosis (Fig. 1, Fig. 2). Myelography showed notable L4–L5 stenosis, and decompression combined with transpedicular fixation from L4 to L5 using Twinflex [9] (Eurosurgical, Paris, France) was performed. The fusion was completed with coralline hydroxyapatite Pro Osteon-5002 (Interpore International, Irvine, Calif., USA) mixed with autogenous bone graft taken during laminectomy and facet decortication. No wound drainage was placed to avoid excessive blood loss from the decorticated fusion area. The postoperative course was uneventful. The patient was mobilized on the 1st postoperative day, and was discharged 3 days later. One month postoperatively, the patient reported mild pain at the medial site of his right thigh associated with a fever of 38–39 °C. Physical examination provoked pain at the antero-medial surface of the right thigh on forced extension, and simultaneous internal rotation of the right hip. There was no tenderness on either side of the lumbar spine. Ultrasonic examination over the instrumented area was negative for fluid collection. Roentgenograms of the spine showed no changes from the postoperative period (Fig. 3, Fig. 4). The patient's blood count analysis revealed 11,000 white cells, and the sedimentation rate was 58 mm in 1 h. A technetium bone scan re-

Fig. 1 Anteroposterior roentgenograms of the lumbar spine in a patient with spinal stenosis

Fig. 2 Lateral plain view of the lumbar spine in the patient shown in Fig. 1

Fig. 3 Postoperative roentgenogram showing the Twinflex in situ with fusion in progress over the transverse processes

Fig. 4 Lateral plain roentgenogram showing the position of the transpedicular screws at the level L4-L5. Note the restoration of segmental L4-L5 lumbar lordosis because of the flexibility of the Twinflex hardware

Fig. 5 Computed tomography scan shows the psoas abscess on the right. There is no posterior subcutaneous mass with the same density

vealed increased uptake at the right lower lumbar area. CT of the lumbar spine revealed a unilateral increase in the size of the right psoas (Fig. 5). There was no subcutaneous fluid collection over the instrumented area on CT either. CT-guided percutaneous drainage of the right-sided psoas was performed, with evacuation of 600 ml pus, which was sent for culture and isolation of bacteria. Antibiotics (cephalosporine second generation, combined with an aminoglycoside) were then intravenously administered. An open drainage of the psoas abscess was not performed at this time, because the patient refused such an intervention. Twenty hours after the percutaneous evacuation of the abscess, the fever dropped to 37°C; however, 48 h postoperatively, the patient's temperature rose again to 39°C. The first culture was negative for pathogenic bacteria. Open surgical drainage of the recurrent abscess was performed, using a right retroperitoneal approach. The sheath of the right psoas was found to be thick, and it was split longitudinally. Approximately 50 cc of fluid material was evacuated from the psoas mass, and two tubes were inserted for irrigation and drainage of the collection. Twenty-four hours later, there was still fever of 38°C, and the psoas was therefore punctured under fluoroscopy for collection: 2 ml of pus was aspirated, and it was sent for culture. Fistulography (combined anterior plus posterior simultaneous injection) using iodinated contrast material showed no communication between posterior and anterior infection. Three days after the anterior operation, the instrumented lumbar spine was revised posteriorly and a collection of approximately 15 ml of pus, which was located deep in the paravertebral muscles on the right side, was evacuated. The left side of the instrumented lumbar spine was found to be unaffected. The anchorage and stability of the posterior instrumentation was tested, and found unaffected; it was therefore left in situ. The coralline hydroxyapatite graft was meticulously removed. Continuous irrigation was applied for a total of 5 days. Autogenous bone graft taken from the iliac crest was applied on the posterior elements of the instrumented spine. The culture from the as-

piration and the retrieved material revealed, 24 h postoperatively, *Streptococcus viridans*, with sensitivity to vancomycin, which was given intravenously for 6 weeks. The drainage tubes in the psoas were removed 7 days after their insertion. By 3 days after the operation, pain had completely disappeared. A CT scan performed 2 months postoperatively showed regression of the psoas abscess, with an erythrocyte sedimentation rate of 8 mm in 1 h. Two years after the last intervention, a routine examination showed no pain, the roentgenograms showed a solid fusion in the instrumented area and the sedimentation rate was 15 mm in 1 h. The patient at this last evaluation was satisfied with the result of the decompressive operation and fusion.

Discussion

The reported infection rate for spinal fusion is 0.7–11.6% [3, 11, 13]. *Staphylococcus aureus* remains the most common organism responsible for these infections. The addition of instrumentation increases the risk of infection from 1.9 to 3.6% [8]. Looking specifically at fusion with pedicle screws, infection rates range from 2.6 to 7.5% [2, 14]. The consequence of this is a rise in the pseudarthrosis rate from 11.5 to 29.7% when infection is present [8].

Twinflex [9] is a flexible posterior pedicle-screw instrumentation. The infection rate in a consecutive series of 87 patients operated in our department was 2%. The presence of a large volume of hardware combined with coralline hydroxyapatite should have increased the dead space posteriorly, and thus may have contributed to

hematoma formation and its subsequent contamination and infection. To the authors' knowledge, deep infection following use of coralline hydroxyapatite (Pro Osteon) has not been previously reported [1].

The creation of retroperitoneal or psoas abscesses can be a conversion to an infection of other avascular space-occupying lesions, such as chronic seroma, hematoma, or even a lymphocele, which in most cases are created by trauma, either blunt or sharp. In this instance, certainly there was the possibility, with the instrumentation being utilized, that the intertransversalis membrane between the transverse processes had been violated, either intentionally or accidentally, thus connecting the posterior space to the psoas space. If a probe or a screw had slipped into the paravertebral space, this may have caused some localized trauma in bleeding, which was unrecognized at the time of surgery. Certainly, the roentgenograms showed that the final positioning of the pedicle fixation was satisfactory.

The three most important clinical findings for suspecting psoas abscess – pain in internal hip rotation, fever and lack of hip extension – were present in this patient as well as in the patients previously reported [3, 12].

The delay in the diagnosis of the right-sided psoas abscess was due to the uneventful postoperative course, the unspecific complaints of the patient, and referred pain in the thigh, which led to misinterpretation of the symptoms. Plain roentgenograms may show loss of psoas shadow, but visualization is often difficult, either because of laterally placed graft over the transverse processes of degenerative changes in the lumbar spine, as in scoliosis, or because of the implant.

In this patient, the postoperative roentgenograms showed no paravertebral shadow, probably due to the rel-

atively wide surface of the hardware and the presence of graft substitute over the transverse processes.

Ultrasonic examination has been previously used for direct percutaneous catheterization and abscess evacuation [3], and it may therefore be useful in detecting psoas abscess. Ultrasound failed to diagnose the abscess in the present case, probably because of the artifacts due to the presence of a large volume of hardware in the instrumented area. CT with simultaneous intravenous injection of iodinated contrast material permitted visualization of the psoas abscess in the present case. Coronal magnetic resonance imaging usually demonstrates well the exact extent of a psoas abscess [7], but such an examination was not possible because of the stainless steel in the Twinflex instrumentation. Fistulography, using iodinated contrast material, showed no communication between the posterior and anterior infection, and this supports the hypothesis of contamination via muscle tissue of the right psoas following posterior abscess formation unilaterally.

This case emphasizes that infection after internal fixation of the lumbar adult spine should be considered as a cause of recurrent pain associated with fever and limitation of internal rotation and lack of extension of the hip. Hardware with a low profile and small volume, as well as a minimal amount of graft substitute, should be used to decrease the dead space. CT permits rapid diagnosis and treatment in most cases. If the psoas abscess persists, open evacuation of the abscess can be successfully performed. Intravenous antibiotics should be given for a period of at least 6 weeks and/or until normalization of blood count analysis.

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