Surgical Treatment of Symptomatic Bertolotti’s Syndrome in Post-Fusion Patients

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Bertolotti’s syndrome is a common congenital anomaly that is present when a large L5 transverse process articulates with the sacrum, pelvis, or both, producing sacralization of L5. This pseudoarticulation may occur unilaterally or bilaterally and usually remains asymptomatic. Since it was first described by Bertolotti in 1917, overall incidences have been reported in the general, asymptomatic population of up to 14%. This article presents two patients with Bertolotti’s syndrome who developed new onset saccroiliac joint dysfunction after lumbar interbody fusion.

**SURGICAL TECHNIQUE**

The L5 transverse process and sacral ala were exposed via a lateral muscle-splitting approach. The enlarged L5 transverse process was subsequently osteomized with a high-speed burr or small osteotome. Kerrison rongeurs and curettes were used to complete the resection of the transverse process sacral pseudoarticulation (Figure 1). Bone wax was rubbed into the exposed cancellous bone. Average blood loss during the operation was approximately 50 cc and surgical time was 55 minutes. Patients stayed in the hospital overnight for observation and were discharged the subsequent day requiring minimal pain medication.

**CASE REPORTS**

**Case 1**

A 41-year-old woman presented with severe, unrelenting back and leg pain of 2 years' duration. Diskography was positive at L3-L4 and L4-L5 for reproduction of concordant back pain. Anterior interbody fusion at those levels resulted in complete relief of her back and leg pain (Figure 2). Three months postoperatively, the patient reported a sharp stabbing pain in her right sacroiliac joint. These symptoms were not present preoperatively.

On radiographs, Bertolotti’s syndrome was noted on the right side with significant spur formation over the pseudoarticulation (Figure 2). Initial nonoperative therapy consisted of an aggressive exercise program, nonsteroidal anti-inflammatory drugs (NSAIDS), and injections of a mixture of 3 cc lidocaine 1% and 1 cc steroid (Triamcinolone acetonide, 40 mg/mL) placed under radiographic guidance into the symptomatic sacroiliac joint and pseudoarticulation. These injections were diagnostic as they temporarily relieved the symptoms of sacroiliac pain. However, after 6 months of failed nonoperative treatment, the patient underwent resection of her right-sided L5-S1 pseudoarticulation. One year after osteotomy, she remains symptom-free.

**Case 2**

A 35-year-old woman presented with disabling low back pain of 2 years’ duration that was unresponsive to nonoperative treatment. She was diagnosed with a degenerative L4-L5 disk and a large right-sided L5 transverse process, articulating with the sacrum (Figure 3). After an anterior interbody fusion at the L4-L5 level, the patient was initially pain-free (Figure 3).

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with a restricted, painful right sacroiliac joint. Nonoperative treatment, including aggressive physical therapy, medications, and injections failed to resolve her symptoms for 6 months. She underwent resection of the right L5 transverse process sacral pseudoarticulation (Figure 3). She continues to remain pain-free from sacroiliac joint dysfunction >1 year postoperatively.

**DISCUSSION**

The extension of L5 transverse processes articulating with the sacrum, pelvis, or both, described as Bertolotti’s syndrome, can be related to low back pain and sacroiliac joint dysfunction. In a cohort of patients with low back pain, a 7% incidence was reported by Elster, and Stinchfield et al reported a 10.9% incidence in patients who underwent spinal fusion for chronic low back pain. Bertolotti’s syndrome initially has no clinical significance and is merely an anomaly to be noted at the time of radiographic interpretation.

Lumbar interbody fusion changes the biomechanics in the spine, causing stress transfer to the next functional neuromotion segment. Accelerated degeneration of segments adjacent to a previous lumbar fusion has been reported. Pseudoarthrosis between the L5 transverse process and Bertolotti’s syndrome presumably renders the L5-S1 disk relatively stress-shielded. In our patients with Bertolotti’s syndrome, this was revealed by normal L5-S1 disk morphology on magnetic resonance imaging, while the L4-L5 disk demonstrates degenerative changes. We believe low lumbar fusion also transfers forces to the sacroiliac joints, which can become dysfunctional and inflamed.

Sacroiliac joint dysfunction is a debated topic, however, it has been described by various authors and is known to cause severe low back pain. Characterizing symptoms are a sharp, stabbing pain located over the involved joint and restricted motion of the ipsilateral hemipelvis in relation to the spine. This can be tested with either a forward bend test (Piedallu sign) or Gillet’s test.

Most cases of sacroiliac joint dysfunction are successfully resolved with physical therapy, NSAIDS, and occasionally local injections into the joint with a mixture of steroids and local anesthetics.

Patients with sacroiliac joint dysfunction who also have Bertolotti’s syndrome usually respond favorably to nonoperative intervention. Occasionally, a few patients demonstrate therapy-resistant sacroiliac joint dysfunction. In the present cases, fusion and immobilization of the neuromotion segments cephalad to the transitional vertebra caused significant biomechanical stress transfer to the adjacent segments, including the sacroiliac joints below. In both cases, the pseudoarticulation demonstrated radiographic evidence of degeneration prior to fusion. Specifically, sclerosis and osteophyte formation were noted at the pseudoarticulation, suggesting micromotion existed at the pseudoarticulation prior to fusion.

Stress transfer, produced by the interbody fusion, caused inflammation of the previously asymptomatic degenerative process. This resulted in restriction, inflammation, and ipsilateral sacroiliac joint pain. Osteotomy of the large L5 transverse process articulating with the sacrum and hemipelvis diminished forces transferred to the sacroiliac joint. Thus, the sacroiliac joint became and remained mobile, functional, and pain-free.

The majority of patients who develop sacroiliac joint dysfunction with concurrent Bertolotti’s syndrome either post-fusion or post-traumatic do not require surgery. In the described cases, the invasive procedure was only performed after all nonoperative options had been exhausted. Some authors recommend sacroiliac joint fusion in such cases. We successfully treated these few patients with osteotomy of the L5 transverse process. The pseudoarticulation excision procedure provides a simpler, less biomechanically damaging answer to otherwise intractable severe sacroiliac pain.

**REFERENCES**

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