Single-level Posterolateral Arthrodesis, With or Without Posterior Decompression, for the Treatment of Isthmic Spondylolisthesis

In this issue, we examine a study published in 1997 in the Journal of Bone and Joint Surgery, American Volume, that investigated whether the addition of decompression to arthrodesis, performed with or without instrumentation, for the treatment of low-grade isthmic spondylolisthesis in patients who do not have a serious neurological deficit would improve the result.

This study comprised 42 patients diagnosed with lumbar spondylolisthesis, 18 of whom (7 women, 11 men) were managed with decompression and 24 of whom (9 women, 15 men) were managed without decompression.

Inclusion criteria were: a grade I or II isthmic spondylolisthesis at the most caudal mobile lumbar segment, age older than 18 years, persistent pain in the back and lower extremities despite nonoperative treatment for at least 6 months, normal findings on a diskogram or a T2-weighted magnetic resonance image of the immediately cephalad intervertebral disk, no previous operation on the spine or coexisting spinal deformity, no signs or symptoms of cauda equina, and no more than a trace weakness on test of motor function of the fifth lumbar and first sacral muscle groups.

In the study, patients were randomized to treatment with posterolateral arthrodesis only or to treatment with posterolateral arthrodesis and decompression. All smokers received management with instrumentation and all non-smokers received arthrodesis only. Both groups had placement of autogenous bone graft from the iliac crest.

Decompression involved removal of the free lamina and decompression of the fifth lumbar nerve root and thecal sac. In the group managed with instrumentation, no attempt was made to reduce the degree of the slip or the angle of the spondylolisthesis other than by using the prone position. All patients wore a Boston-type wraparound brace postoperatively for at least 6 weeks with instructions to wean themselves from it during the next 6 weeks.

Preoperatively, back and lower-extremity pain were assessed with use of a 10-point visual analog scale (VAS), where 0 = no pain and 10 = pain so severe that it cannot be tolerated for more than a few minutes.

Follow-up examinations occurred at 2, 6, 12, and 24 weeks and 1 and 2 years by telephone or at the clinic. Patients were asked about the medication they were taking for back or radicular pain, their work status, and their satisfaction with the result of the surgery. Back and lower-extremity pain, as well as activity level, were assessed using the 10-point VAS.

At most recent follow-up (minimum, 3 years; mean, 4.5 years), anteroposterior and lateral radiographs of the lumbar spine with the patient standing, and Ferguson radiographs of the lumbosacral junction were taken.

Fusion was considered to have occurred in patients managed without instrumentation if there was a trabeculated mass between the transverse processes of the cephalad and caudal segments and <2° of motion as seen on the radiographs of the spine in flexion and extension.

Fusion was assessed in a similar manner in patients managed with instrumentation if there was a trabeculated mass between the transverse processes of the cephalad and caudal segments and <2° of motion as seen on the radiographs of the spine in flexion and extension.
All of the 24 patients managed with an arthrodesis with decompression had a successful fusion. Six of the 18 patients managed with decompression and 1 of the 24 managed without it had an unsatisfactory result.

There was a trend toward better scores in all categories, particularly pain in the lower extremities and use of medication, for patients managed without decompression. One poor result was reported in a patient who had a solid fusion after an arthrodesis with instrumentation.

Of the patients who had an arthrodesis without instrumentation, those patients who had been managed with decompression had poorer mean scores in all categories. No patient who had an arthrodesis without either instrumentation or decompression had a poor result.

The authors of the study concluded that the addition of decompression to arthrodesis, with or without instrumentation, for the treatment of low-grade isthmic spondylolisthesis in patients without a serious neurological deficit does not appear to improve the outcome and may significantly increase the rates of pseudarthrosis and clinical failure.

Reference

Review
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Much has transpired in spine care and surgery since Carragee’s article in 1997 on single-level arthrodesis for grade 1/2 isthmic spondylolisthesis, with or without posterior instrumentation or decompression. A systematic review of 120 published papers was assessed.

Since 1997, spine surgery has seen an increased use of anterior lumbar interbody fusion (ALIF), posterior lumbar interbody fusion (PLIF), transforaminal lumbar interbody fusion (TLIF), and minimally invasive procedures. A review of these procedures comparing them to the then-accepted gold standard as published in 1997 was performed. Fusion rates for TLIF varied from 90% to 100%, ALIF from 83% to 100%, PLIF from 72% to 100%, and posterolateral fusion (PLF) from 56% to 100%. Six studies (1 randomized prospective study) comparing PLIF to PLF showed clear superiority in both fusion rates and outcomes for the PLIF procedure. Comparing instrumentation to no instrumentation for PLF showed no differences. Two comparative studies of ALIF vs TLIF showed no differences, although the TLIF procedure showed superiority at L4-S and ALIF at L5-S1. One study comparing mini-TLIF to open TLIF demonstrated equal results, although the former exhibited less blood loss, decreased hospitalization, and less pain, but more irradiation exposure. One meta-analysis revealed improved results for both fusion and functional outcomes for anterior/posterior procedures. A second meta-analysis demonstrated that PLF surgery was significantly better than nonoperative care and that anterior/posterior surgery and PLIF were equal. The addition of decompression in this review generally resulted in mildly worse results.

Swan et al1 compared PLF with instrumentation to anterior/posterior fusion with instrumentation, and the latter demonstrated superiority, although results evened out by 6 months postoperatively.

There appears to be no gold standard as of 2011. Circumferential (anterior/posterior) fusion appears to result in improved fusion rates and, in some studies, superior clinical outcomes. The choice of surgical procedure should be guided by the patient’s radiographic picture and clinical findings, as well as by complications and other risk-benefit considerations.

Reference

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