Closing the Treatment Gap for Lumbar Disc Herniation Patients with Large Annular Defects: A Systematic Review of Techniques and Outcomes in this High-risk Population

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Abstract

Lumbar disc herniation (LDH) is one of the most common spinal pathologies and can be associated with debilitating pain and neurological dysfunction. Discectomy is the primary surgical intervention for LDH and is typically successful. Yet, some patients experience recurrent LDH (RLDH) after discectomy, which is associated with worse clinical outcomes and greater socioeconomic burden. Large defects in the annulus fibrosis are a significant risk factor for RLDH and present a critical treatment challenge. It is essential to identify reliable and cost-effective treatments for this at-risk population. A systematic review of the PubMed and Embase databases was performed according to Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines to identify studies describing the treatment of LDH patients with large annular defects. The incidence of large annular defects, measurement technique, RLDH rate, and reoperation rate were compiled and stratified by surgical technique. The risk of bias was scored for each study and for the identification of RLDH and reoperation. Study heterogeneity and pooled estimates were calculated from the included articles. Fifteen unique studies describing 2,768 subjects were included. The pooled incidence of patients with a large annular defect was 44%. The pooled incidence of RLDH and reoperation following conventional limited discectomy in this population was 10.6% and 6.0%, respectively. A more aggressive technique, subtotal discectomy, tended to have lower rates of RLDH (5.8%) and reoperation (3.8%). However, patients treated with subtotal discectomy reported greater back and leg pain associated with disc degeneration. The quality of evidence was low for subtotal discectomy as an alternative to limited discectomy. Each report had a high risk of bias and treatments were never randomized. A recent randomized controlled trial with 550 subjects examined an annular closure device (ACD) and observed significant reductions in RLDH and reoperation rates (>50% reduction). Based on the available evidence, current discectomy techniques are inadequate for patients with large annular defects, leaving a treatment gap for this high-risk population. Currently, the strongest evidence indicates that augmenting limited discectomy with an ACD can reduce RLDH and revision rates in patients with large annular defects, with a low risk of device complications.

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Reducing the incidence of reherniation and reoperation in skeletally mature patients with radiculopathy (with or without back pain) attributed to a posterior or posterolateral herniation, and confirmed by history, physical examination and imaging studies which demonstrate neural compression using MRI to treat a large anular defect (between 4-6 mm tall and between 6-10 mm wide) following a primary discectomy procedure (excision of herniated intervertebral disc) at a single level between L4 and S1.

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