

Operative Approaches for Lumbar Disc Herniation: A Systematic Review and Multiple Treatment Meta-analysis of Conventional and Minimally Invasive Surgeries

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Introduction

Open discectomy (OD) and micro-discectomy (MD) are considered the gold-standard surgical approach for lumbar disc herniation. During the last 2 decades, minimally invasive surgery (MIS) techniques have emerged as viable and safe alternatives, including percutaneous (PD), percutaneous endoscopic (PED) and tubular discectomy (TD).

Methods

We conducted a systematic review and multiple treatment meta-analysis of the available literature using the PRISMA guidelines. The techniques were compared with regards to patient-reported outcomes including Oswestry Disability Index (ODI) and Visual Analogue Scale (VAS), surgical outcomes and complications.

Results

1707 patients (14 studies) were analyzed, with 782 (45.81%) undergoing OD/MD, 491 (28.76%) undergoing TD, 235 (13.76%) patients undergoing PD and 199 (11.65%) undergoing PED. OD/MD was found to be associated with significantly longer duration of stay (MD 2.96, $p=0.04$), more blood loss (MD 30.53, $p<0.001$), worse ODI scores at last follow-up (2-5 years) (MD 2.61, $p=0.03$) and less revision-surgery (OR 0.53, $p<0.001$). On the other hand, TD was found to be associated with better ODI score at last follow-up when compared to MD/OD (MD -1.70, $p=0.005$). TD was also found to have higher rate of overall complications (OR 1.49, $p=0.002$), dural tears (OR 1.72 $p=0.04$) and recurrent disc-herniation (OR 2.09, $p<0.001$) when compared to all others. Finally, PED was found to have significantly less complications when compared to MD/OD (OR 1.62, $p=0.04$) and TD (OR 2.05, $p=0.006$) as well as less dural tears compared to all approaches (OR 0.28, $p=0.04$). Our analysis could not detect any difference in VAS leg pain and VAS back pain scores among all approaches.

Conclusions

Our analysis revealed that while MD/OD is associated with less complications like dural tears and recurrent herniations, MIS techniques have superior long-term ODI-scores at last follow up as well as significantly less length of stay and blood loss.

Learning Objectives

MIS techniques yield significantly better ODI score at last follow-up, when compared to MD/OD.

OD/MD is associated with longer duration of stay and more blood loss.

TD is associated with higher overall complications, higher incidental dural tears and recurrent herniations.

PED yields lower overall complications, lower incidental dural tears and lower recurrent herniation.