Transforaminal Endoscopic Lumbar Decompression and Foraminoplasty (TELDF)

One single surgeon performed transforaminal endoscopic sequestrectomy from February 2013 to July 2016 for lumbar disk herniation in 44 patients. Demographic as well as perioperative, clinical, and radiologic data were analyzed from electronic records. Furthermore, we investigated complications, intraoperative change of the procedure to microsurgery, and reoperations. The postoperative course was analyzed using the Macnab criteria, supplemented by a questionnaire for follow-up. Pre- and postoperative magnetic resonance imaging volumetric analyses were performed to assess the radiologic efficacy of the technique.

The study population had a median age of 52 years. The median follow-up was 15 months, and the median length of hospital stay was 4 days. Median duration of surgery was 100 minutes with a median blood loss of 50 mL. Surgery was most commonly performed at the L4-L5 level (63%) and in caudally migrated disk herniations (44%). In six patients, surgery was performed for recurrent disk herniations. The procedure had to be changed to conventional microsurgery in four patients. We observed no major complications. Minor complications occurred in six patients, and in four patients a reoperation was performed. Furthermore, a significantly lower Oswestry Disability Index score ($p = 0.03$), a lower Short Form 8 Health Survey (SF-8) score ($p = 0.001$), a lower visual analog scale (VAS) lower back pain score ($p = 0.03$) and VAS leg pain score ($p = 0.0008$) at the 12-month follow-up were observed in comparison with the preoperative examination. In MRI volumetry, we detected a median postoperative volume reduction of the disk herniation of 57.1% ($p = 0.02$).

The transforaminal endoscopic sequestrectomy can be safely implemented in a university hospital setting in selected patients with primary and recurrent lumbar disk herniations, and it leads to good clinical and radiologic results. However, learning curve, caseload, and residents' microsurgical training requirements clearly affect the implementation process [1].

The technique of TELDF differs from endoscopic or conventional lumbar foraminotomy because it focuses on the liberation of the foraminal part of the nerve by mobilising it from local tethering, removing the impingement upon the nerve by the superior foraminal ligament and incarceration by the remaining foraminal ligaments and perineural scarring. The technique undercuts the foramen and thereby removes hypertrophic facet joint capsule, facet joint osteophytes and osteophytes on the vertebral rim and the facet joint itself, interrupts the anterior articular nerve to the facet joint and allows the descending epidural nerve to be mobilised from the surface of the medial facet. Compression or irritation arising from the disc wall or disc contents is reduced by means of discectomy or herniectomy. The procedure enlarges the foraminal volume and reduces compression and irritation of the exiting nerve in particular [2].

Aware state Transforaminal Endoscopic Lumbar Decompression and Foraminoplasty (TELDF) offers a direct aware state means of localizing and treating neuro-claudicant back pain, referred pain and weakness associated with stenosis failing to respond to conventional rehabilitation, pain management or surgery.

For 10 years prospective data were collected on 114 consecutive patients with multilevel spondylosis and neuro-claudicant back pain, referred pain and weakness with or without failed back surgery whose symptoms had failed to respond to conventional rehabilitation and pain management and who

underwent TELDF. The level responsible for the predominant presenting symptoms of foraminal stenosis, determined on clinical grounds, MRI and or CT scans, was confirmed by transforaminal probing and discography. Patients underwent TELDF at the spinal segment at which the predominant presenting symptoms were reproduced. Those that required treatment at an additional segment were excluded. Outcomes were assessed by postal questionnaire with failures being examined by the independent authors using the Visual Analogue Pain Scale (VAPS), the Oswestry Disability Index (ODI) and the Prolo Activity Score.

Cohort integrity was 69%. 79 patients were available for evaluation after removal of the deceased (12), untraceable (17) and decliners (6) from the cohort. VAP scores improved from a pre-operative mean of 7.3 to 2.4 at year 10. The ODI improved from a mean of 58.5 at baseline to 17.5 at year 10. 72% of reviewed patients fulfilled the definition of an “Excellent” or “Good Clinical Impact” at review using the Spinal Foundation Outcome Score. Based on the Prolo scale, 61 patients (77%) were able to return and continue in full or part-time work or retirement activity post-TELDF. Complications of TELDF were limited to transient nerve irritation, which affected 19% of the cohort for 2 - 4 weeks. TELDF was equally beneficial in those with failed back surgery.

TELDF is a beneficial intervention for the long-term treatment of severely disabled patients with neuro-claudicant symptoms arising from spinal or foraminal stenosis with a dural diameter of more than 3mm, who have failed to respond to conventional rehabilitation or chronic pain management. It results in considerable improvements in symptoms and function sustained 10 years later despite co-morbidity, ageing or the presence of failed back surgery.

The long term outcome of TELDF in severely disabled patients with neuro-claudicant symptoms arising from foraminal stenosis which had failed to respond to conventional rehabilitation, surgery or chronic pain management suggests that foraminal pathology is a major cause of lumbar axial and referred pain and that TELDF should be offered as primary treatment for these conditions even in the elderly and infirm. The application of TELDF at multiple levels may further widen the benefits of this technique [3].

Indications

Transligamentous extruded nucleus pulposus with foraminal stenosis.

[1]
Bender M, Gramsch C, Herrmann L, Kim SW, Uhl E, Schöller K. Implementation of Transforaminal Endoscopic Lumbar Sequestrectomy in a German University Hospital Setting: A Long and Rocky Road. J Neurol Surg A Cent Eur Neurosurg. 2019 Aug 29. doi: 10.1055/s-0039-1694040. [Epub ahead of print] PubMed PMID: 31466103.

[2], [3]
Knight MT, Jago I, Norris C, Midwinter L, Boynes C. Transforaminal Endoscopic Lumbar Decompression & Foraminoplasty: A 10 Year prospective survivability outcome study of the treatment of foraminal stenosis and failed back surgery. Int J Spine Surg. 2014 Dec 1;8:1-22. doi: 10.14444/1021. eCollection 2014. PubMed PMID: 25694924; PubMed Central PMCID: PMC4325492.