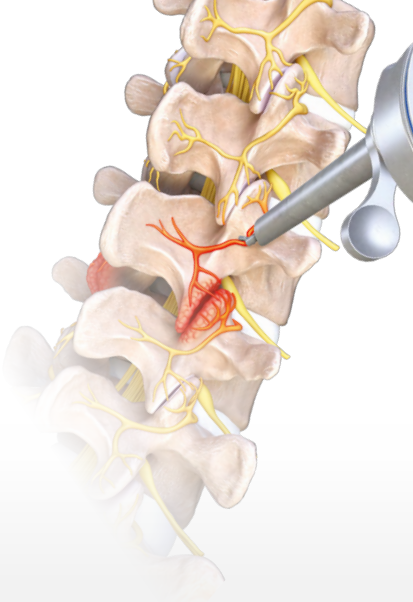
Endoscopic Spine: Medial Branch Nerve Transection

Scientific Update



Lumbar facet pain, most commonly caused by facet arthropathy, accounts for 15%-45% of all lower back pain.[1] An endoscopic approach to medial branch nerve transection (MBT) can lead to relief from pain caused by facet joint arthropathy. MBT has been shown to have better long-term outcomes than the traditional treatment method of radiofrequency ablation (RFA), with the median pain-free period being twice as long for MBT compared to RFA.[2] Combining 4K visualization with minimally invasive techniques allows surgeons to view and treat pathology while maintaining surgical precision and reducing postoperative complications.[3,4]

MEDIAL BRANCH NERVE TRANSECTION

Facet joint syndrome: from diagnosis to interventional management.

Romain Perolat, Adrian Kastler, Benjamin Nicot, Jean-Michel Pellat, Florence Tahon, Arnaud Attye, Olivier Heck, Kamel Boubagra, Sylvie Grand, Alexandre Krainik

- Lumbar facet joints constitute a common source of pain, accounting for 15%-45% of lower back pain
- Facet arthrosis is the most frequent form of facet pathology
- There are no effective correlations between clinical symptoms, physical examination, and degenerative spinal changes
- Diagnostic positive facet joint block / medial branch block can indicate facet joints as the source of pain

> **Takeaway:** Facet joint syndrome, a common cause of lower back pain, presents challenges in diagnosis due to the lack of effective correlations between clinical symptoms and degenerative spinal changes. Facet joint blocks serve as a key diagnostic tool for identifying the source of pain for interventional management.

Insights Imaging. 2018;9(5):773-789. doi:10.1007/s13244-018-0638-x

Lumbar facet joint osteoarthritis: a review.

Leonid Kalichman, David J Hunter

- The facet joints play an important role in load transmission. They provide posterior load-bearing, stabilizing motion in flexion and extension and also restricting axial movement to avoid the potential for over-rotation.
- Studies have shown improvement of function and decreases in pain may last 6-12 months following lumbar medial branch ablation

> **Takeaway:** Facet joints are crucial for load transmission, providing posterior loadbearing and stabilizing flexion and extension motions and limiting excessive axial rotation. Studies show that enhancements in function and pain reduction following lumbar medial branch ablation can persist for a duration of 6-12 months.

Semin Arthritis Rheum. 2007;37(2):69-80. doi:10.1016/j.semarthrit.2007.01.007

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Endoscopic rhizotomy for facetogenic back pain: a review of the history, financial considerations, patient selection criteria, and clinical outcomes.

Daniel Streetman, Joshua G Fricker, Garrett L Garner, Adam L Webb, Noah Pierzchajlo, Neal A Patel, Nicholas A Howard, Ellen M Hardin, Triston E Smith, Alana J Hagley, Moshe Shalom, Nolan J Brown, Julian L Gendreau

- Endoscopic rhizotomy for the treatment of lumbar facet joint pain costs approximately 4 times more than traditional RFA. This is due to the cost of training, longer intraoperative time (twice that of RFA), and special equipment and instrumentation.
- However, long-term outcomes for rhizotomy appear to be superior to those of RFA, with a median pain-free duration twice that of RFA
- Some studies have based inclusion criteria on refractory lower back pain that has been resistant to physical therapy and NSAID treatment for longer than 2 months. Other studies suggest even more rigorous nonsurgical treatment, such as the use of opioids, before operative intervention.
- Three different studies required >80% symptom relief with steroid injections for inclusion. In two studies, MacNab scores at 12 months post-op measured 97.8% and 96.7% of patients with “excellent” or “good” outcomes, respectively.
- One study measured a 0% “excellent” or “good” outcome MacNab score for conservative therapy, including NSAIDs and physical therapy, while the comparison intervention was RFA, which achieved a rate of 70% of patients with “excellent” or “good” outcomes

> **Takeaway:** Endoscopic rhizotomy, though 4 times more expensive than traditional RFA for lumbar facet joint pain, exhibits superior long-term outcomes with a doubled median pain-free duration, emphasizing stringent inclusion criteria and notable success rates compared to conservative therapies.

World Neurosurg. 2023;169:36-41. doi:10.1016/j.wneu.2022.10.020

Endoscopically guided foraminal and dorsal rhizotomy for chronic axial back pain based on cadaver and endoscopically visualized anatomic study.

Anthony Yeung, Satishchandra Gore

- Retrospective, nonrandomized study of 50 patients to assess the efficacy of endoscopic rhizotomy
- At 1-year follow-up, Visual Analog Scale (VAS) improved 6.2 to 2.5 and Oswestry Disability Index (ODI) scores improved from 48 to 28. All patients had VAS improvement that was equal to or greater than that with injection.

> **Takeaway:** In a retrospective study of 50 patients undergoing endoscopic rhizotomy for lumbar facet joint pain, significant 1-year improvements included a decrease in scores from 6.2 to 2.5, an improvement in ODI scores from 48 to 28, and all patients experiencing VAS improvement equal to or surpassing injection-based treatments.

Int J Spine Surg. 2014;8:23. doi:10.14444/1023

Repeat procedures and prescription opioid use after lumbar medial branch nerve radiofrequency ablation in commercially insured patients.

Jordan B Starr, Laura S Gold, Zachary McCormick, Pradeep Suri, Janna Friedly

- The median time to repeat RFA was about 1 year post-op (350-355 days)
- Found that approximately 1 in 3 patients (33.5%) who receive lumbar RFA repeat the procedure within 3 years. Nearly half (45.7%) repeat within 7 years.

> **Takeaway:** Patients undergoing lumbar facet joint treatment with RFA have a median time of approximately 1 year for repeat procedures, with 33.5% choosing to repeat within 3 years and 45.7% within 7 years.

Spine J. 2020;20(3):344-351. doi:10.1016/j.spinee.2019.10.005

Endoscopic radiofrequency facet joint treatment in patients with low back pain: technique and long-term results. A prospective cohort study.

Stefano Meloncelli, Giorgio Germani, Ignazio Urti, Marco Divizia, Maria Rosciano, Filomena Puntillo, Antonella Paladini, Giustino Varrassi

- 40 total patients underwent endoscopic rhizotomy to treat facet joint pain
- Mean age was 61.8 years (39-81), with mean preoperative numeric rating scale (NRS) and ODI scores of 7.18 and 57.95, respectively
- Patients whose treatment was limited to 1-2 joints had significantly better patient-reported pain scores (NRS pre-op 7.05, post-op 1.70) than those with 3 or more joints treated (NRS pre-op 7.30, post-op 3.59)
- Patients younger than 60 years old were found to have significantly better patient-reported postoperative pain scores (ODI pre-op 44.67, post-op 9.78) than those 60 years of age and older (ODI pre-op 68.82, post-op 37.64)
- Study found no clinically significant difference in patient-reported outcomes whether or not the patient had been treated with percutaneous RFA prior to treatment endoscopically

> **Takeaway:** In a study involving 40 patients undergoing endoscopic rhizotomy for facet joint pain, those treated for 1-2 joints and patients younger than 60 years of age reported significantly better postoperative pain scores, while no clinically significant difference was found in patient-reported outcomes based on prior percutaneous RFA treatment.

Ther Adv Musculoskelet Dis. 2020;12:1759720X20958979. doi:10.1177/1759720X20958979

The effectiveness of endoscopic radiofrequency denervation of medial branch for treatment of chronic low back pain.

Sun Yoon Jeong, Jin Sung Kim, Won Suh Choi, Jung Woo Hur, Kyoung Sik Ryu

- Retrospective study of 52 consecutive patients treated between October 2010 and December 2013 with endoscopic radiofrequency denervation of the medial branch nerve of the dorsal ramus
- VAS scores for back pain improved significantly from a pre-op mean of 7.1 to a post-op mean of 2.0 at 2-year follow-up
- Korean ODI improved from pre-op mean of 26.5% to a post-op mean of 7.7% at 2-year follow-up
- 80% of patients reported being satisfied with the procedure and had no postoperative complications

> **Takeaway:** In a retrospective study of 52 consecutive patients who underwent endoscopic radiofrequency denervation for medial branch nerve treatment between October 2010 and December 2013, significant improvements were observed in back pain VAS scores, Korean ODI, and patient satisfaction, with 80% of patients reporting satisfaction and no postoperative complications at 2-year follow-up.

[published correction appears in *J Korean Neurosurg Soc.* 2014 Nov;56(5):454]. *J Korean Neurosurg Soc.* 2014;56(4):338-343. doi:10.3340/jkns.2014.56.4.338

Pain-free survival after endoscopic rhizotomy versus radiofrequency for lumbar facet joint pain: a real-world comparison study.

Tao Du, Guang Lu, Junchi Li, Bing Ni, Wei Shu, Tao Sun, Dou Yang, Hongwei Zhu

- Both groups showed significant decreases in scores
- Endoscopic rhizotomy showed better efficacy than radiofrequency in NRS, ODI, and Global Impression of Change (GIOC) scores
- The pain-free survival curves showed that median pain-free duration was 20 months for endoscopic rhizotomy and 10 months for radiofrequency
- This study showed a mean cost of $3964 +/- $154.9 USD for endoscopic rhizotomy versus a mean cost of $979.1 +/- $99.0 USD for RFA. Results indicated that endoscopic rhizotomy costs nearly 4 times as much as RFA and offers twice the median pain-free duration.

> **Takeaway:** Preventing repeat RFAs could influence long-term cost assessments, given the procedure's tendency to recur within a year and require subsequent interventions.

Pain Physician. 2022;25(1):E87-E94.

Factors determining the success of radiofrequency denervation in lumbar facet joint pain: a prospective study.

Konrad Streitberger, Tina Müller, Urs Eichenberger, Sven Trelle, Michele Curatolo

- Prospective study of 41 patients who received radiofrequency denervation to treat lumbar facet joint pain between January 2006 and June 2008. Patients were followed through their 1-year post-op consultation.
- Success was defined as at least 50% pain reduction at 7-21 days, 6 months, and 1 year after treatment
- Success rate 7-21 days post-op was 76% (33 of 41 patients), 32% (13 of 41) at 6 months post-op, and 22% (9 of 41) at 1 year post-op. Median success duration was 17 weeks.
- Complete pain relief of at least 1-year post-op was achieved in just 4 patients (10%)
- 22% of patients felt significant pain reduction through their 1-year postoperative follow-up

> **Takeaway:** In a prospective study of 41 patients receiving radiofrequency denervation for lumbar facet joint pain, postoperative success rates (defined as at least 50% pain reduction) were 76% at 7-21 days, 32% at 6 months, and 22% at 1 year, with a median success duration of 17 weeks. Only 10% of patients achieved complete pain relief lasting at least 1 year, while 22% experienced significant pain reduction throughout the 1-year follow-up.

Eur Spine J. 2011;20(12):2160-2165. doi:10.1007/s00586-011-1891-6

SACROILIAC JOINT DENERVATION

Full-endoscopic sacroiliac joint denervation for painful sacroiliac joint dysfunction: a prospective 2-year clinical outcomes and predictors for improved outcomes.

Saqib Hasan, Dia Radi Halalmeh, Yusuf-Zain Ansari, Amy Herrera, Christoph P Hofstetter

- Full-endoscopic sacroiliac joint denervation (FE-SJD) is a novel technique for the management of pain secondary to sacroiliac joint dysfunction
- 47 patients with pain secondary to sacroiliac joint dysfunction underwent uniportal FE-SJD through the posterior approach, where a retrospective analysis of perioperative parameters, complications, and clinical outcomes were obtained prospectively
- Significant improvement was noted in preoperative VAS (back) and ODI scores at 3, 6, 12 months, and 2 years ($P <$ .001). Thirty-four patients (72.3%) returned to normal functioning with an average of 82% pain relief and a satisfaction rate of 78.7% at a mean follow-up of 18.2 ± 13.1 months.

> **Takeaway:** Endoscopic denervation of the dorsal rami branches supplying the sacroiliac joint represents a safe, effective, and durable option to address pain secondary to sacroiliac joint dysfunction.

Neurosurgery. 2025;96(1):213-222. doi:10.1227/neu.0000000000003053

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