

# American Society of Interventional Pain Physicians®

## "The Voice of Interventional Pain Management"

81 Lakeview Drive, Paducah, KY 42001

Phone: (270) 554-5394 - Fax: (270) 554-5394

[www.asipp.org](http://www.asipp.org)

---

February 10, 2023

Robert Mandel, MD, MBA, President

AIM Specialty Health

8600 West Bryn Mawr Avenue

South Tower – Suite 800

Chicago IL 60631

[mandel@aimspecialtyhealth.com](mailto:mandel@aimspecialtyhealth.com); [robertm@aimspecialtyhealth.com](mailto:robertm@aimspecialtyhealth.com)

Re: Comment on Aim Specialty Health. Clinical Appropriateness Guidelines. Musculoskeletal Program: Appropriate Use Criteria: Interventional Pain Management

To Whom it May Concern:

On behalf of American Society of Interventional Pain Physicians (ASIPP), we thank you for publishing the latest guidelines to be effective from 4/9/2023 for Appropriate Use Criteria for Interventional Pain Management. It appears that this version was created on 5/9/2022. We had no opportunity to comment.

As stakeholders of interventional pain management and performing interventional techniques, we would like to comment.

As you are aware, interventional pain management is defined as, “the discipline of medicine devoted to the diagnosis and treatment of pain related disorders principally with the application of interventional techniques in managing subacute, chronic, persistent, and intractable pain, independently or in conjunction with other modalities of treatment” (<http://www.cms.hhs.gov/transmittals/Downloads/r1779b3.pdf>).

Interventional pain management techniques are defined as, “minimally invasive procedures including, percutaneous precision needle placement, with placement of drugs in targeted areas or ablation of targeted nerves; and some surgical techniques such as laser or endoscopic discectomy, intrathecal infusion pumps and spinal cord stimulators, for the diagnosis and management of chronic, persistent or intractable pain”. (<https://permanent.fdlp.gov/lps21261/dec2001PainManagement.pdf>)

In general, the guidelines are very well done. Our comments are related to paravertebral facet joint injection/medial branch nerve block/neurolysis/therapeutic facet joint interventions.

### **Therapeutic Facet Joint Interventions**

Therapeutic intraarticular facet joint injections and thermal medial branch radiofrequency neurotomy are described. However, therapeutic medial branch blocks are excluded.

As you know, intraarticular injections are technically difficult and also require steroids with complications related to the technical component of the procedure and steroids. Further, it may require deeper sedation levels. In contrast, medial branch blocks are easily performed, more patients are comfortable, and may not require much sedation. Consequently, by removing this option, access will be affected significantly and negatively.

Medial branch blocks have been covered throughout the history of LCDs and medical policies. Evidence for medial branch blocks has been evaluated extensively and well published.

Most recent evidence synthesis provided by ASIPP guidelines (1) analyzed the evidence for all facet joint interventions including intraarticular injections, medial branch blocks, and radiofrequency thermoneurolysis. The evidence for therapeutic facet joint interventions has been shown as follows (2-25):

#### **Lumbar Spine:**

- The level of evidence is II with moderate strength of recommendation for therapeutic lumbar facet joint nerve blocks with inclusion of 3 relevant randomized controlled trials (3,4,11), with long-term improvement.
- The evidence is IV with weak strength of recommendation for lumbar facet joint intraarticular injections with inclusion of 9 relevant randomized controlled trials (2,9,10,12-17), with majority of them showing lack of effectiveness without the use of local anesthetic.

#### **Cervical Spine:**

- The level of evidence is II with moderate strength of recommendation for therapeutic cervical facet joint nerve blocks with inclusion of one relevant randomized controlled trial (7) and 3 observational studies (8,23,24), with long-term improvement.
- The level of evidence is V with weak strength of recommendation for cervical intraarticular facet joint injections with inclusion of 3 relevant randomized controlled trials (21,22,25), the majority showing lack of effectiveness, whereas one study with 6-month follow-up (25), showed lack of long-term improvement.

#### **Thoracic Spine:**

- The level of evidence is II with moderate strength of recommendation for thoracic therapeutic facet joint nerve blocks with inclusion of 2 randomized controlled trials (5,18) and one observational study (6) with long-term improvement.
- The level of evidence is III with weak to moderate strength of recommendation for thoracic intraarticular facet joint injections with inclusion of one randomized controlled trial with 6 month follow-up (18), with emerging evidence.

More recent evidence after the publication of guidelines includes the following:

In the publication by Manchikanti et al (26), 295 patients met inclusion criteria with 132 patients receiving cervical medial branch blocks and 163 patients with cervical radiofrequency neurotomy. 107 patients in the cervical medial branch group and 105 patients in the radiofrequency group completed one year follow-up.

There was significant improvement in both groups from baseline to 12 months with pain relief and proportion of patients with  $\geq 50\%$  pain relief.

Cost utility analysis showed average cost for quality-adjusted life year (QALY) of \$4,994 for cervical medial branch blocks compared to \$5,364 for cervical radiofrequency neurotomy.

Six of 132 patients (5%) in the cervical medial branch group and 53 of 163 (33%) patients in the cervical radiofrequency neurotomy group were converted to other treatments, either due to side effects (6 patients or 4%) or inadequate relief (47 patients or 29%).

The authors concluded that outcomes of cervical therapeutic medial branch blocks compared with radiofrequency neurotomy demonstrated significantly better outcomes.

In the publication by Manchikanti et al (27), 326 patients met the inclusion criteria with 99 patients receiving lumbar facet joint nerve blocks (lumbar facet joint nerve blocks with L5 dorsal ramus block) and 227 receiving lumbar radiofrequency neurotomy. Forty-eight patients in the facet joint nerve block group and 148 patients in the radiofrequency group completed one-year follow-up.

Patients experienced significant improvement in both groups from baseline to 12 months with significant pain relief ( $\geq 50\%$ )

Cost utility analysis showed average costs for quality-adjusted life year (QALY) of \$4,664 for lumbar facet joint nerve blocks and \$5,446 for lumbar radiofrequency neurotomy.

Twelve patients (12%) in the lumbar facet joint nerve block group and 79 patients (35%) in the lumbar radiofrequency group were converted to other treatments, either due to side effects or inadequate relief.

In the randomized controlled trial by van Eerd (28), the authors compared comparative value of local anesthetic blocks with radiofrequency neurotomy in patients with clinically diagnosed cervical facet joint pain showing pain treatment success of 61.1% in both groups, either with local anesthetic alone or local anesthetic and radiofrequency neurotomy with a single lesion at 3 months, 55.6% of the denervation group and 51.3% in the bupivacaine alone group at 6 month follow-up with no significant difference among the groups, once again reinforcing long-term relief of local anesthetic injections.

In the systematic review by Baroncini et al (29) conducted according to the PRISMA statement concluded that injections of chronic low back pain deriving from facet joints arthritis are encouraging especially when considering medial branch blocks. In this systematic review, the authors considered all the randomized clinical trials of injection treatments for chronic low back pain. The outcomes assessment included Oswestry Disability Index (ODI) and the Numeric Rating Scale (NRS). They reviewed data from 587 patients with a mean follow-up of  $12.4 \pm 10.5$  months. The methodologic quality assessment showed very low selection bias, detection bias, attrition and reporting bias.

In this narrative review by Mazmudar (30), economic value was assessed for facet joint interventions. The authors discussed that even though evidence is noted to be limited, most systematic reviews failed to demonstrate the therapeutic utility of intraarticular facet joint injections in low back pain because of high study heterogeneity. A few good quality studies and systematic reviews describe moderate evidence for the utilization of therapeutic medial branch blocks and radiofrequency neurotomies in alleviating facet joint pain.

In the article by da Rocha (31), patients receiving controlled medial branch blocks, 52% demonstrated  $>50\%$  improvement in pain after the blockade. All patients underwent a sham injection with sodium chloride, followed by a controlled medial branch block. Fifty-four patients, or 52%, demonstrated  $> 50\%$  improvement after 3 months. However, lumbar pain returned in 18 individuals after 3 months. This study shows diagnostic procedures themselves may be effective as long as 3 months.

Based on this evidence, for all regions of the spine, therapeutic facet joint nerve blocks should be covered with the same indications as therapeutic intraarticular facet joint injections.

### **Exclusion of Thoracic Facet Joint Interventions**

There is emerging evidence showing appropriate diagnosis and management of thoracic facet joint pain.

Diagnosis of thoracic facet joint pain has been established with dual diagnostic blocks with criterion standard of 80%. The evidence in thoracic spine is Level II with moderate strength of recommendation. Based on 3 relevant diagnostic accuracy studies, with controlled comparative local anesthetic blocks, with concordant pain relief, with a criterion standard of 80%, the prevalence rate was shown to be 34% to 48%, whereas false positive rates varied from 42% to 58% (32-34).

The evidence for therapeutic facet joint interventions is also present (5,6,35).

As shown above, thoracic spine does have moderate evidence with thoracic facet joint nerve blocks, whereas evidence is weak to moderate with Level III for radiofrequency neurotomy and intraarticular facet joint injections.

- The level of evidence is III with weak to moderate strength of recommendation with emerging evidence for thoracic radiofrequency ablation with inclusion of one relevant randomized controlled trial (36) and 3 observational studies (37-39).
- The level of evidence is II with moderate strength of recommendation for thoracic therapeutic facet joint nerve blocks with inclusion of 2 randomized controlled trials (5,18) and one observational study (6) with long-term improvement.
- The level of evidence is III with weak to moderate strength of recommendation for thoracic intraarticular facet joint injections with inclusion of one randomized controlled trial with 6 month follow-up (18), with emerging evidence.

In addition to this, since the publication of ASIPP guidelines, the following publications assessed effectiveness of radiofrequency neurotomy with 2 of the 3 studies showing positive results (40-42).

### **Sacroiliac Joint Injections**

- Therapeutic intraarticular sacroiliac joint injections are performed with the use of corticosteroid with or without the use of anesthetic
- Total injection volume should be limited to 2.0 cc to minimize extravasation of the injectate outside of the sacroiliac joint

Injections are limited with 3 months of relief with a maximum of 3 injections in a 12-month period.

In conformance with Medicare LCD and the available literature, along with your requirement of 3 months of relief, it would be appropriate to allow maximum of 4 injections instead of 3 in a 12-month rolling period, which starts after the diagnostic blocks.

### **Spinal Cord Stimulation**

Under the indications for spinal cord stimulator, we request you please add diabetic neuropathy and other types of peripheral neuropathies.

Thank you for consideration of our request. If you have any questions, please feel free to contact us.

### **Laxmaiah Manchikanti, MD**

Chairman of the Board and Chief Executive Officer, ASIPP and SIPMS

Director, Pain Management Centers of America

Ambulatory Surgery Center and Pain Care Surgery Center

Clinical Professor

Anesthesiology and Perioperative Medicine

University of Louisville, Kentucky

Professor of Anesthesiology-Research

Department of Anesthesiology, School of Medicine

LSU Health Sciences Center

Shreveport, LA

2831 Lone Oak Road

Paducah, KY 42003

Phone: 270-554-8373 ext. 4101

Fax: 270-554-8987

E-mail: [drm@asipp.org](mailto:drm@asipp.org)

<https://www.linkedin.com/in/laxmaiahmanchikanti>

<https://www.linkedin.com/company/american-society-of-interventional-pain-pain-physicians>

To view some of Dr. Manchikanti's publications go to:

<https://pubmed.ncbi.nlm.nih.gov/?term=Manchikanti+L%5BAuthor%5D&sort=date>

“The most entrenched conflict of interest in medicine is a disinclination to reverse a previous opinion.”  
*Yudkin JS et al. Lancet 2011*

“There is no limit to what a man or woman can do, or where he or she can go if he or she doesn’t mind who gets the credit.” *Ronald Reagan-modified*

## REFERENCES

1. Manchikanti L, Kaye AD, Soin A, et al. Comprehensive evidence-based guidelines for facet joint interventions in the management of chronic spinal pain: American Society of Interventional Pain Physicians (ASIPP) guidelines. *Pain Physician* 2020; 23:S1-S127.  
<https://www.painphysicianjournal.com/current/pdf?article=NzA1MQ%3D%3D&journal=126>
2. Ribeiro LH, Furtado RN, Konai MS, Andreo AB, Rosenfeld A, Natour J. Effect of facet joint injection versus systemic steroids in low back pain: A randomized controlled trial. *Spine (Phila Pa 1976)* 2013; 38:1995-2002.  
<https://pubmed.ncbi.nlm.nih.gov/23921331/>
3. Manchikanti L, Singh V, Falco FJE, Cash KA, Pampati V. Evaluation of lumbar facet joint nerve blocks in managing chronic low back pain: A randomized, double-blind, controlled trial with a 2-year follow-up. *Int J Med Sci* 2010; 7:124-135.  
<https://asipp.org/wp-content/uploads/2020/11/Ref-11.-Manchikanti-et-al.-Evaluation-of-lumbar-facet-joint-nerve-blocks-in-managing-chronic-low-back-pain.pdf>
4. Manchikanti L, Pampati V, Bakhit C, et al. Effectiveness of lumbar facet joint nerve blocks in chronic low back pain: A randomized clinical trial. *Pain Physician* 2001; 4:101-117.  
<https://asipp.org/wp-content/uploads/2020/11/Ref-12.-Manchikanti-et-al.-Effectiveness-of-lumbar-facet-joint-nerve-blocks-in-chronic-low-back-pain.pdf>
5. Manchikanti L, Singh V, Falco FJE, Cash KA, Pampati V, Fellows B. The role of thoracic medial branch blocks in managing chronic mid and upper back pain: A randomized, double-blind, active control trial with a 2-year follow-up. *Anesthesiol Res Pract* 2012; 2012:585806.  
<https://asipp.org/wp-content/uploads/2020/11/Ref-17.-Manchikanti-et-al.-The-role-of-thoracic-medial-branch-blocks-in-managing-chronic-mid-and-upper-back-pain.pdf>
6. Manchikanti L, Manchikanti KN, Manchukonda R, Pampati V, Cash KA. Evaluation of therapeutic thoracic medial branch block effectiveness in chronic thoracic pain: A prospective outcome study with minimum 1-year follow up. *Pain Physician* 2006; 9:97-105.  
<https://asipp.org/wp-content/uploads/2020/11/Ref-18.-Manchikanti-et-al.-Evaluation-of-therapeutic-thoracic-medial-branch-block-effectiveness-in-chronic-thoracic-pain.pdf>
7. Manchikanti L, Singh V, Falco FJE, Cash KA, Fellows B. Comparative outcomes of a 2-year follow-up of cervical medial branch blocks in management of chronic neck pain: A randomized, double-blind controlled trial. *Pain Physician* 2010; 13:437-450.  
<https://asipp.org/wp-content/uploads/2020/11/Ref-13.-Manchikanti-et-al.-Comparative-outcomes-of-a-2-year-follow-up-of-cervical-medial-branch-blocks-in-management-CNP.pdf>
8. Manchikanti L, Manchikanti K, Damron K, Pampati V. Effectiveness of cervical medial branch blocks in chronic neck pain: A prospective outcome study. *Pain Physician* 2004; 7:195-201.  
<https://asipp.org/wp-content/uploads/2020/11/Ref-14.-Manchikanti-et-al.-Effectiveness-of-cervical-medial-branch-blocks-in-chronic-neck-pain.pdf>
9. Carette S, Marcoux S, Truchon R, et al. A controlled trial of corticosteroid injections into facet joints for chronic low back pain. *N Engl J Med* 1991; 325:1002-1007.  
<https://pubmed.ncbi.nlm.nih.gov/1832209/>
10. Fuchs S, Erbe T, Fischer HL, Tibesku CO. Intraarticular hyaluronic acid versus glucocorticoid injections for nonradicular pain in the lumbar spine. *J Vasc Interv Radiol* 2005; 16:1493-1498.

11. <https://pubmed.ncbi.nlm.nih.gov/16319156/>  
Civelek E, Cansever T, Kabatas S, et al. Comparison of effectiveness of facet joint injection and radiofrequency denervation in chronic low back pain. *Turk Neurosurg* 2012; 22:200-206.  
<https://asipp.org/wp-content/uploads/2020/11/Ref-10.-Civelek-et-al.-Comparison-of-effectiveness-of-facet-joint-injection-and-radiofrequency-denervation-in-chronic-LBP.pdf>
12. Lakemeier S, Lind M, Schultz W, et al. A comparison of intraarticular lumbar facet joint steroid injections and lumbar facet joint radiofrequency denervation in the treatment of low back pain: A randomized, controlled, double-blind trial. *Anesth Analg* 2013; 117:228-235.  
<https://pubmed.ncbi.nlm.nih.gov/23632051/>
13. Do KH, Ahn SH, Cho YW, Chang MC. Comparison of intra-articular lumbar facet joint pulsed radiofrequency and intra-articular lumbar facet joint corticosteroid injection for management of lumbar facet joint pain: A randomized controlled trial. *Medicine (Baltimore)* 2017; 96:e6524.  
<https://pubmed.ncbi.nlm.nih.gov/28353611/>
14. Kennedy DJ, Huynh L, Wong J, et al. Corticosteroid injections into lumbar facet joints: A prospective, randomized, double-blind placebo-controlled trial. *Am J Phys Med Rehabil* 2018; 97:741-746.  
<https://pubmed.ncbi.nlm.nih.gov/29734232/>
15. Kennedy DJ, Fraiser R, Zheng P, et al. Intra-articular steroids vs saline for lumbar z-joint pain: A prospective, randomized, double-blind placebo-controlled trial. *Pain Med* 2019; 20:246-251.  
<https://pubmed.ncbi.nlm.nih.gov/30541041/>
16. Annaswamy TM, Armstead C, Carlson L, Elkins NJ, Kocak D, Bierner SM. Intra-articular triamcinolone versus hyaluronate injections for low back pain with symptoms suggestive of lumbar zygapophyseal joint arthropathy: A pragmatic, double-blind randomized controlled trial. *Am J Phys Med Rehabil* 2018; 97:278-284.  
<https://pubmed.ncbi.nlm.nih.gov/29261533/>
17. Yun DH, Kim HS, Yoo SD, et al. Efficacy of ultrasonography-guided injections in patients with facet syndrome of the low lumbar spine. *Ann Rehabil Med* 2012; 36:66-71.  
<https://pubmed.ncbi.nlm.nih.gov/22506237/>
18. Lee DG, Ahn SH, Cho YW, Do KH, Kwak SG, Chang MC. Comparison of intra-articular thoracic facet joint steroid injection and thoracic medial branch block for the management of thoracic facet joint pain. *Spine (Phila Pa 1976)* 2018; 43:76-80.  
<https://asipp.org/wp-content/uploads/2020/11/Ref-19.-Lee-et-al.-Comparison-of-intraarticular-thoracic-facet-joint-steroid-injection-and-thoracic-medial-branch-block.pdf>
19. Chang MC. Effect of pulsed radiofrequency treatment on the thoracic medial branch for managing chronic thoracic facet joint pain refractory to medial branch block with local anesthetics. *World Neurosurg* 2018; 111:e644-e648.  
<https://asipp.org/wp-content/uploads/2020/11/Ref-21.-Chang.-Effect-of-pulsed-radiofrequency-treatment-on-the-thoracic-medial-branch-.pdf>
20. Park KD, Jee H, Nam HS, et al. Effect of medial branch block in chronic facet joint pain for osteoporotic compression fracture: One year retrospective study. *Ann Rehabil Med* 2013; 37:191-201.  
<https://asipp.org/wp-content/uploads/2020/11/Ref-20.-Park-et-al.-Effect-of-medial-branch-block-in-chronic-facet-joint-pain-for-osteoporotic-compression-fracture.pdf>
21. Barnsley L, Lord SM, Wallis BJ, Bogduk N. Lack of effect of intra-articular corticosteroids for chronic pain in the cervical zygapophyseal joints. *N Engl J Med* 1994; 330:1047-1050.  
<https://pubmed.ncbi.nlm.nih.gov/8127332/>
22. Park SC, Kim KH. Effect of adding cervical facet joint injections in a multimodal treatment program for long-standing cervical myofascial pain syndrome with referral pain patterns of cervical facet joint syndrome. *J Anesth* 2012; 26:738-745.  
<https://pubmed.ncbi.nlm.nih.gov/22648287/>
23. Hahn T, Halatsch ME, Wirtz C, Klessinger S. Response to cervical medial branch blocks in patients with cervicogenic vertigo. *Pain Physician* 2018; 21:285-294.

- <https://asipp.org/wp-content/uploads/2020/11/Ref-15.-Hahn-et-al.-Response-to-cervical-medial-branch-blocks-in-patients-with-cervicogenic-vertigo.pdf>
24. Lee DW, Huston C. Fluoroscopically-guided cervical zygapophyseal therapeutic joint injections may reduce the need for radiofrequency. *Pain Physician* 2018; 21:E661-E665.  
<https://asipp.org/wp-content/uploads/2020/11/Ref-16.-Lee-and-Huston.-Fluoroscopically-guided-cervical-zygapophyseal-therapeutic-joint-injections.pdf>
25. Lim JW, Cho YW, Lee DG, Chang MC. Comparison of intraarticular pulsed radiofrequency and intraarticular corticosteroid injection for management of cervical facet joint pain. *Pain Physician* 2017; 20:E961-E967.  
<https://pubmed.ncbi.nlm.nih.gov/28934800/>
26. Manchikanti L, Kosanovic R, Pampati V, Sanapati MR, Hirsch JA. Outcomes of cervical therapeutic medial branch blocks and radiofrequency neurotomy: Clinical outcomes and cost utility are equivalent. *Pain Physician*. 2022; 25(1):35-47.  
<https://pubmed.ncbi.nlm.nih.gov/35051143/>
27. Manchikanti L, Kosanovic R, Pampati V, Sanapati MR, Soin A, Knezevic NN, Wargo BW, Hirsch JA. Equivalent outcomes of lumbar therapeutic facet joint nerve blocks and radiofrequency neurotomy: Comparative evaluation of clinical outcomes and cost utility. *Pain Physician* 2022; 25(2):179-192.  
<https://pubmed.ncbi.nlm.nih.gov/35322977/>
28. van Eerd M, de Meij N, Kessels A. Efficacy and long-term effect of radiofrequency denervation in patients with clinically diagnosed cervical facet joint pain: A double-blind randomized controlled trial. *Spine (Phila Pa 1976)*. 2021; 46(5):285-93.  
<https://pubmed.ncbi.nlm.nih.gov/33534439/>
29. Baroncini A, Maffulli N, Eschweiler J, Knobe M, Tingart M, Migliorini F. Management of facet joints osteoarthritis associated with chronic low back pain: A systematic review. *Surgeon*. 2021; 19(6):e512-e518.  
<https://pubmed.ncbi.nlm.nih.gov/33582054/>
30. Mazmudar A, Nayak R, Patel AA. Therapeutic Facet Joint Interventions in the Lumbar Spine: An Economic Value Perspective. *Clin Spine Surg*. 2020; 33(10):411-417.  
<https://pubmed.ncbi.nlm.nih.gov/32657844/>
31. Rocha ID, Cristante AF, Marcon RM, Oliveira RP, Letaif OB, Barros Filho TE. Controlled medial branch anesthetic block in the diagnosis of chronic lumbar facet joint pain: the value of a three-month follow-up. *Clinics (Sao Paulo)*. 2014 Aug;69(8):529-34.  
<https://pubmed.ncbi.nlm.nih.gov/25141111/>
32. Manchikanti L, Singh V, Pampati VS, Beyer CD, Damron KS. Evaluation of the prevalence of facet joint pain in chronic thoracic pain. *Pain Physician* 2002; 5:354-359.  
<https://pubmed.ncbi.nlm.nih.gov/16886012/>
33. Manchikanti L, Boswell MV, Singh V, Pampati VS, Damron KS, Beyer CD. Prevalence of facet joint pain in chronic spinal pain of cervical, thoracic, and lumbar regions. *BMC Musculoskelet Disord* 2004; 5:15.  
<https://pubmed.ncbi.nlm.nih.gov/15169547/>
34. Manchukonda R, Manchikanti KN, Cash KA, Pampati V, Manchikanti L. Facet joint pain in chronic spinal pain: An evaluation of prevalence and false-positive rate of diagnostic blocks. *J Spinal Disord Tech* 2007; 20:539-545.  
<https://pubmed.ncbi.nlm.nih.gov/17912133/>
35. Manchikanti L, Singh V, Falco FJ, Cash KA, Pampati V, Fellows B. Comparative effectiveness of a one-year follow-up of thoracic medial branch blocks in management of chronic thoracic pain: A randomized, double-blind active controlled trial. *Pain Physician* 2010; 13:535-548.  
<https://pubmed.ncbi.nlm.nih.gov/21102966/>
36. Joo YC, Park JY, Kim KH. Comparison of alcohol ablation with repeated thermal radiofrequency ablation in medial branch neurotomy for the treatment of recurrent thoracolumbar facet joint pain. *J Anesth* 2013; 27:390-395.  
<https://pubmed.ncbi.nlm.nih.gov/23192698/>



37. Chang MC. Effect of pulsed radiofrequency treatment on the thoracic medial branch for managing chronic thoracic facet joint pain refractory to medial branch block with local anesthetics. *World Neurosurg* 2018; 111:e644-e648.  
<https://pubmed.ncbi.nlm.nih.gov/29294395/>
38. Gungor S, Candan B. The efficacy and safety of cooled-radiofrequency neurotomy in the treatment of chronic thoracic facet (zygapophyseal) joint pain: A retrospective study. *Medicine (Baltimore)* 2020; 99:e19711.  
<https://pubmed.ncbi.nlm.nih.gov/32243409/>
39. Rohof O, Chen CK. The response to radiofrequency neurotomy of medial branches including a bipolar system for thoracic facet joints. *Scand J Pain* 2018; 18:747-753.  
<https://pubmed.ncbi.nlm.nih.gov/30001215/>
40. Speldewinde GC. Thoracic zygapophysial joint thermal neurotomy: A cohort revealing additional outcomes by specific joint groupings. *Pain Med* 2021; 22:273-281.  
<https://pubmed.ncbi.nlm.nih.gov/33045088/>
41. Akgul MH, Akgun MY. Effect of radiofrequency denervation on pain severity among patients with cervical, thoracic or lumbar spinal pain: A clinical retrospective study. *Heliyon* 2022; 8:e10755.  
<https://pubmed.ncbi.nlm.nih.gov/36193536/>
42. Hambræus J, Hambræus KS, Persson J. Radiofrequency denervation improves health-related quality of life in patients with thoracic zygapophyseal joint pain. *Pain Med* 2018; 19:914-919.  
<https://pubmed.ncbi.nlm.nih.gov/29741743/>