

Radiofrequency Ablation and Chronic Thoracic Pain: An Evidence Based Review

Mani Singh, MD[†]; Jay Karri, MD[‡]; Laura Lachman, MD[‡] w; Vwaire Orhurhu, MD[§]; Alaa Abd-Elsayed, MD[◇]

[†] New York-Presbyterian Hospital – Columbia and Cornell, Physical Medicine and Rehabilitation, New York, NY

[‡] Baylor College of Medicine, Physical Medicine and Rehabilitation, Houston, TX

[§] Massachusetts General Hospital – Harvard Medical School, Anesthesia, Critical Care and Pain Medicine, Boston, MA

[◇] University of Wisconsin School of Medicine, Anesthesia, Division of Pain Medicine, Madison, WI

BACKGROUND

- Chronic thoracic pain can cause discomfort and decrease quality of life
- Traditional management includes pharmacologic therapy but can be limited by side effects
- Radiofrequency ablation (RFA), including pulsed and continuous radiofrequency (PRF/CRF), is emerging as a potential treatment modality
- However, the overall safety and efficacy of RFA is not well established

OBJECTIVE

- To analyze the role, safety, and efficacy of radiofrequency ablation in treating chronic thoracic pain syndromes

METHODS

- A literature review was performed utilizing databases such as PubMed, Scopus, AccessMedicine, VisualDx, RefWorks, and Cochrane Library
- **Key words:** radiofrequency ablation, pulsed radiofrequency, chronic thoracic pain, thoracic pain syndromes, intercostal neuralgia, radiofrequency rhizotomy
- Studies were reviewed for pain syndrome, targets, outcome measures, limitations, and conclusions regarding RFA's safety and efficacy
- Results were narrowed to 15 articles

RESULTS

- 5 case series, 8 retrospective or prospective observational studies, and 2 randomized-controlled trials were included (1986-2019)
- Cancer pain was the most common indication for RFA; others included intercostal neuralgia, chronic postsurgical thoracic pain, post-thoracotomy pain, post-thoracic trauma pain, and postherpetic neuralgia
- Frequently targeted nerves included thoracic dorsal root ganglia and intercostal nerves, unilaterally and bilaterally (T1-T12)

Pain Condition	Nerve Targets	Study Design	Sample Size	Consensus for RFA Treatment
¹ Thoracic Cancer Pain	Thoracic Dorsal Root Ganglia (T2-T8)	Randomized Controlled Trial	N=78	<ul style="list-style-type: none">➢ Decreased pain (VAS)➢ Decreased oxycodone and pregabalin use
² Postherpetic Neuralgia	Thoracic Intercostal Nerves (T2-T11)	Randomized Controlled Trial	N=96	<ul style="list-style-type: none">➢ Lower VAS in RFA arm➢ QOL (SF-36) scores higher in treatment group
³ Intercostal Neuralgia	Thoracic Intercostal Nerves (T4-T12)	Case Series	N=6	<ul style="list-style-type: none">➢ 5/6 reported immediate pain relief; 4/6 had continued relief at 6-10 months
⁴ Chronic Post-Surgical Thoracic Pain	Intercostal Nerves and Dorsal Root Ganglia	Retrospective Observational Review	N=49	<ul style="list-style-type: none">➢ PRF of DRG superior to medications and RFA of ICN
⁵ Post-Thoracic Trauma Pain	Thoracic Paravertebral Nerve (T1-T11)	Retrospective Observational Review	N=11	<ul style="list-style-type: none">➢ 80% of patients had > 50% pain relief after PRF➢ Less pain at 6 months (VAS) following PRF

Table 1. Summary of Selected Articles Highlighting the use of RFA in Chronic Thoracic Pain. **Key:** VAS (Visual Analog Scale); QOL (Quality of Life); SF-36 (Short Form Health Survey); DRG (Dorsal Root Ganglia); ICN (Intercostal Nerves)

DISCUSSION

- RFA provided short and long term (followed up to 12 months) relief in patients with refractory thoracic pain
- Patients reported decreased pain, decreased analgesic use, and improved quality of life
- One PRF patient had major post-procedure complications (pneumothorax); PRF and CRF studies both cited transient numbness as a complication
- Limitations include small sample sizes, few high-quality randomized control trials, and lack of uniform outcome measures

CONCLUSIONS

- Chronic thoracic pain is common, can significantly impact quality of life, and is often difficult to treat
- Studies favored RFA for refractory thoracic pain and deemed RFA to be minimally invasive, safe, and efficacious
- Future studies should aim to produce high-quality randomized control trials and analyze the long-term efficacy of RFA, as well as compare PRF versus CRF

REFERENCES

1. Reyad RM, Ghobrial HZ, Shaker EH, et al. Modified technique for thermal radiofrequency ablation of Thoracic dorsal root ganglia under combined fluoroscopy and CT guidance: a randomized clinical trial. *BMC Anesthesiology*. 2019;19:234.
2. Ke M, Yinghui F, Yi J, et al. Efficacy of Pulsed Radiofrequency in the Treatment of Thoracic Postherpetic Neuralgia from the Angulus Costae: A Randomized, Double-Blinded, Controlled Trial. *Pain Physician*. 2013;16:15-25.
3. Engel AJ. Utility of Intercostal Nerve Conventional Thermal Radiofrequency Ablations in the Injured Worker after Blunt Trauma. *Pain Physician*. 2012;15:711-718.
4. Cohen SP, Sireci A, Wu CL, et al. Pulsed Radiofrequency of the Dorsal Root Ganglia is Superior to Pharmacotherapy or Pulsed Radiofrequency of the Intercostal Nerves in the Treatment of Chronic Postsurgical Thoracic Pain. *Pain Physician*. 2006;9:227-236.
5. Yang LQ, Gong WY, Wang XP, et al. Computed Tomography-Guided Percutaneously Controlled Ablation of the Thoracic Paravertebral Nerve Due to Thoracic Neuropathic Pain. *Pain Practice*. 2017;17(6):792-799.



**Weill Cornell
Medicine**

New York-Presbyterian
Rehabilitation Medicine



COLUMBIA UNIVERSITY
Vagelos College of Physicians and Surgeons