

The efficacy of radiofrequency neurotomy in the treatment of thoracic T4-T8 facet-related pain

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INTRODUCTION

Thoracic spine pain is a disabling condition that can negatively impact patient’s quality of life. It is estimated that the prevalence of thoracic spine pain in the general population is about 13% (1,2). A list of potential pain generators include intravertebral disc disruption, nerve root irritation, vertebral fracture, facet joint degeneration, and myofascial pain syndrome.

For facet-related pain, a common interventional treatment is radiofrequency neurotomy (RFN) of the medial branch nerve that innervates the joint (3). The anatomical locations of these nerves have been widely accepted since its proposal by Bogduk et al (4) in pain medicine. However, recent cadaver studies by Joshi et al. and Ischizuka et al. disagreed with the Bogduk’s locations. They reported that about 90% of the articular branches to the T4-T8 facet joints branch off the dorsal rami rather than the medial branches. Additionally, it arises close to the intervertebral foramen and does not contact any osseous structure to allow percutaneous needle placement (5,6,7).

If this is true, patients receiving medial branch RFN between T4 to T8 would be ineffective. Thus, we hypothesize that T4-T8 medial branch RFN is ineffective (<50% pain relief or >50% pain relief for <6 months) in the treatment of T4-T8 facet-related pain.

OBJECTIVES

This retrospective study aims to compare the efficacy of medial branch RFN between C7-T3, T4-T8, and T9-L1 in the treatment of thoracic facet-related pain.

METHODS

This study is a retrospective chart review of patients that underwent C7 to L1 medial branch block and RFN at an academic tertiary care center (Mayo Clinic, Rochester, Minnesota, USA) for the treatment of chronic thoracic pain between June 1, 2018, to December 25, 2022. This study was approved by the Institutional Review Board (IRB# 22-012906). The requirement for written consent was waived.

RESULTS

- A total of 87 subjects were identified during the study time-frame and met the inclusion criteria. This sample consisted of 50 females and 37 males whose age ranged between 38-95 years, with a mean of 68.
- 23 (26%) subjects failed to meet Center for Medicare and Medicaid Services (CMS) requirements for successful facet joint denervation, which are defined as obtaining > 80% pain relief with at ≥ 2 diagnostic medial branch blocks and 50% pain relief for > 6 months following thermal facet joint RFN [8].
- There were a total of 140 thoracic medial branch RFN between C7 to L1. Of these, 105 (75%) were effective and allowed patients to obtain significant pain relief.
- 40 (30%) RFN occurred between T4-8. 73% were determined to be effective (> 50% pain relief for > 6 months).
- RFNs at each thoracic sub-segment were > 60% effective.

Table 1: Patient demographics and characteristics

			C7-T3	T4-8	T9-L1
Gender	Females	57% (n = 50)	n = 4	n = 16	n = 14
	Males	43% (n = 37)	n = 3	n = 7	n = 14
Age (Mean ± SD)	67.7 ± 12		61.9 ± 8	66.7 ± 12	68.2 ± 12
BMI (Mean ± SD)	29.3 ± 6		32.9 ± 5.6	28 ± 5	28.8 ± 7
Hx of previous thoracic surgery		16% (n = 14)	n = 3	n = 3	n = 3
Hx of thoracic compression fraction		30% (n = 26)	n = 0	n = 10	n = 7

The median BMI excludes two patients whose medical records omitted information regarding their physical exam

Table 2: Thoracic medial branch RFN efficacy by thoracic pain diagnosis

Spondylosis without history of thoracic surgery	74% (51/69)
Spondylosis with history of thoracic surgery	67% (16/24)
Spondylosis with scoliosis	40% (2/5)
Spondylosis with vertebral compression fracture	86% (36/42)

Table 3: Efficacy of thoracic medial branch RFN at each thoracic sub-segment

Thoracic Levels	Number of RFN	% Effective	Duration of >50% pain relief Range (Average)	Duration between procedure and repeat Range (Average)
C7-T3	13	62	2-14 M (8.5)	9-17 M (12.5)
Upper Overlap (T3-5)	4	100	8-13 M (10.5)	10 M
T4-8	40	73	2-12 M (8.25)	8-28 M (14.5)
Lower Overlap (T6-L1)	45	80	5-12 M (6.7)	6-11.5 M (8.3)
T9-12	38	74	1.5-12 M (6)	6-19 M (12)

In the evaluation of radiofrequency ablation at thoracic levels, treatment efficacy was determined by CMS requirements

CONCLUSIONS

- This study does not support the hypothesis that medial branch RFNs between T4-T8 are ineffective.
- Medial branch RFNs between T4-T8 were effective for the treatment of T4-T8 facet-related pain. The level of effectiveness is the same as medial branch RFNs between C7-T3 and T9-L1.
- Despite recent literature pointing to a different anatomical course of the medial branch nerves between T4-T8 compared to other thoracic spine levels, medial branch RFN should be considered as an effective treatment modality for facet-related pain between T4-T8.

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