

Radiation-Induced Brachial Plexopathy: A Rare Pain Syndrome Managed with Interscalene Blocks and Botulinum Toxin Injections

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Introduction

Radiation-induced brachial plexopathy (RIBP) is a rare but severe pain syndrome, most often seen after high-dose radiotherapy for breast or thoracic malignancies. Incidence is less than 1.5% of patients^[1,2]. RIBP is characterized by progressive neuropathic pain, sensory loss, and motor dysfunction making pain management often challenging. This case **highlights a multimodal, interventional approach to RIBP pain using ultrasound-guided interscalene nerve blocks and botulinum toxin injections.**

Case Description

41-year-old female with a history of left triple positive breast cancer (diagnosed 2020), treated with neoadjuvant TCHP, proton radiation (completed April 2021), and bilateral mastectomy who developed persistent, severe neuropathic pain and numbness in the left anterior chest wall radiating to the medial left upper extremity and fourth and fifth digits. Symptoms were only partially responsive to cyclobenzaprine, acetaminophen, ibuprofen, venlafaxine, amitriptyline, and pregabalin. She completed multiple physical therapy courses and continued a home exercise program.

MRI of the left brachial plexus as seen in Figure 1. **Due to refractory pain, a multimodal interventional approach was used.** A left pectoralis I and II block provided partial relief. OnabotulinumtoxinA injections into multiple muscles (Table 1) improved anterior and lateral chest pain, but not trapezius pain or arm numbness. Interscalene nerve blocks provided significant, though temporary, relief. **The combination of interscalene block and botulinum toxin injections offered the best overall pain and functional improvement.**



Figure 1: MRI of the brachial plexus demonstrating asymmetrically increased T2 signal and minimal enhancement of left brachial plexus consistent with post-radiation neuritis.

Muscle	Dose (units)	Adverse Effects
Pec Major	30	None
Pec Minor	30	None
Latissimus Dorsi	30	None
Serratus Anterior	20	None
Trapezius	90	None

Table 1: Botulinum Toxin Injection Sites and Doses

Intervention	Patient Reported Effect
Pec I/II block	Partial relief of chest wall pain
Botulinum toxin	Improved anterior/lateral chest wall pain
Repeat botulinum toxin injection x 2	Similar benefit for 2 months each
Interscalene block	In combination with botulinum injections, most significant benefit

Table 2: Timeline of Interventions and Outcomes

Discussion

RIBP presents a unique challenge for pain management due to its complex pathophysiology and limited response to standard therapies^[1,2]. In this case, a multimodal interventional approach was required for pain relief and functional improvement. **Ultrasound-guided interscalene nerve blocks interrupted pain transmission at the plexus level, while botulinum toxin injections targeted myofascial pain and muscle spasticity^[3,4].** The combination of regional nerve blockade and targeted chemodenervation may be promising for refractory RIBP pain, though further research is needed to define optimal protocols and outcomes.

References

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