

Surgical Treatment of Intercostal Brachial Nerve Pain after Mastectomy and Axillary Dissection

Justine S. Kim, MD
Alexander M. Spiess, MD

Summary: Postmastectomy chronic pain describes chronic pain in the anterior aspect of the thorax, axilla, and/or upper half of the arm present after surgical treatment of breast cancer and persistent for more than 3 months. The most common cause of this syndrome is damage to the intercostal brachial nerve. Current methods of treatment include medications, physical therapy, and peripheral nerve blocks. The literature lacks data regarding surgical interventions for intercostal brachial nerve pain in the postmastectomy and axillary dissection breast cancer patient. We discuss a case of a 47-year-old woman with left breast cancer status post-nipple-sparing mastectomy and sentinel lymph node biopsy complicated by refractory dysesthesias in the intercostal brachial nerve distribution. Axillary exploration demonstrated a surgical clip with an associated neuroma of a branch of the intercostal brachial nerve. Excision and repair resulted in immediate pain relief in the postoperative period. We propose a comprehensive treatment algorithm to address postmastectomy pain attributed to intercostal brachial nerve pathology. (*Plast Reconstr Surg Glob Open* 2021;9:e3935; doi: [10.1097/GOX.0000000000003935](https://doi.org/10.1097/GOX.0000000000003935); Published online 16 November 2021.)

Breast cancer is the most common cancer in women in the United States. Survival rates are improving secondary to earlier detection and advanced treatments.¹ Breast cancer diagnosis and treatment lead to significant medical and psychological ramifications due to physical, social, emotional, and functional disabilities. Chronic pain is one sequela that affects 20%–60% of women after mastectomy. Postmastectomy chronic pain describes pain in the anterior thorax, axilla, and upper arm after surgical treatment of breast cancer persistent for more than 3 months. The most common cause is damage to the intercostal brachial nerve (ICBN).^{2,3}

Current treatment methods include medications, physical therapy, and peripheral nerve blocks.^{2,4} The literature lacks data regarding surgical interventions for ICBN pain in the postmastectomy and axillary dissection breast cancer patient. We propose a comprehensive treatment algorithm that includes operative procedures to address postmastectomy pain attributed to ICBN pathology.

From the Department of Plastic Surgery, University of Pittsburgh Medical Center, Pittsburgh, Pa.

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CASE REPORT

A 47-year-old policewoman with a history of migraine and left breast cancer underwent left nipple-sparing mastectomy and sentinel lymph node biopsy, with immediate breast reconstruction using a direct-to-implant method and acellular dermal matrix. Her postoperative course was complicated by dysesthesias in the ICBN distribution (Fig. 1). The patient reported difficulty wearing her police vest and was initially advised to monitor the sensory changes. Two months postoperatively, she continued to have persistent symptoms. She was prescribed gabapentin, capsaicin cream, and referred to physical medicine and rehabilitation for physical therapy and desensitization. The pain remained refractory to conservative measures. At 9 months, the patient was referred to a physical medicine and rehabilitation provider who specialized in ultrasound-guided nerve blocks and hydro-dissection. She underwent serial left ICBN injections (1 mL Depo-Medrol 40mg/mL mixed with 2 mL of 2% preservative-free lidocaine). The nerve blocks provided temporary relief and were repeated every 2–3 months.

The patient presented to our clinic for a more permanent solution. On examination, there was a positive Tinel's sign immediately posterior to the anterior axillary fold with tenderness and decreased sensation in the ICBN distribution. The patient was offered an axillary exploration and interrogation of the ICBN, with neurolysis versus excision of neuroma and reconstruction, if indicated. Eighteen months postmastectomy, the patient underwent the proposed procedure.

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Fig. 1. Preoperative marking demonstrating the site of positive Tinel's sign at the anterior axillary fold (arrows), and area of pain and numbness in the medial arm (hash marks).

A 4-cm incision was made at the anterior axillary fold over the site of the positive Tinel's sign. The dissection was carried down to the level of the ICBN as it was found emerging from beneath the pectoralis major muscle at the level of the second intercostal space. Neurolysis of the ICBN was performed through the zone of trauma. Dense adhesions were found surrounding the axillary lymph nodes. Care was taken to preserve the lymph nodes. The main trunk of the ICBN was traced out and found heading toward the axilla; the nerve appeared intact. A small branch of the ICBN was found heading towards the skin overlying the medial arm. A surgical clip was noted on this branch with an associated neuroma (Fig. 2). The neuroma was excised, leaving a 5-mm defect, and sent to pathology for identification. The nerve branch was reconstructed using a nerve conduit (Neuragen nerve guide 1.5 mm × 3 cm, Integra, LifeSciences Corporation) and 8-0 nylon suture in an interrupted fashion (Fig. 3). The patient is nearing 3 months postsurgery, weaning off gabapentin, and reporting that all preoperative symptoms have resolved.

DISCUSSION

The ICBN is a cutaneous nerve that originates from the lateral cutaneous branch of the second intercostal nerve and provides sensation to the lateral chest, axilla,

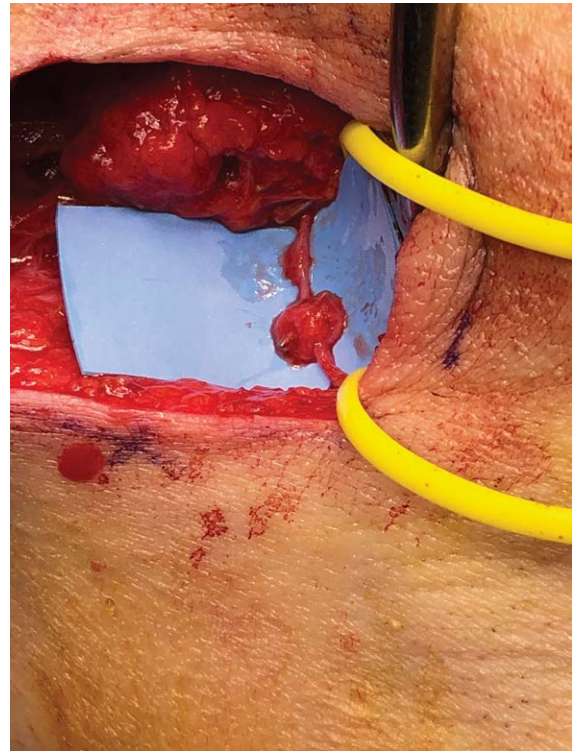


Fig. 2. Intraoperative photograph of dense adhesions within the area of the axillary lymph nodes with a surgical clip and associated neuroma along a branch of the intercostal brachial nerve innervating the medial arm.

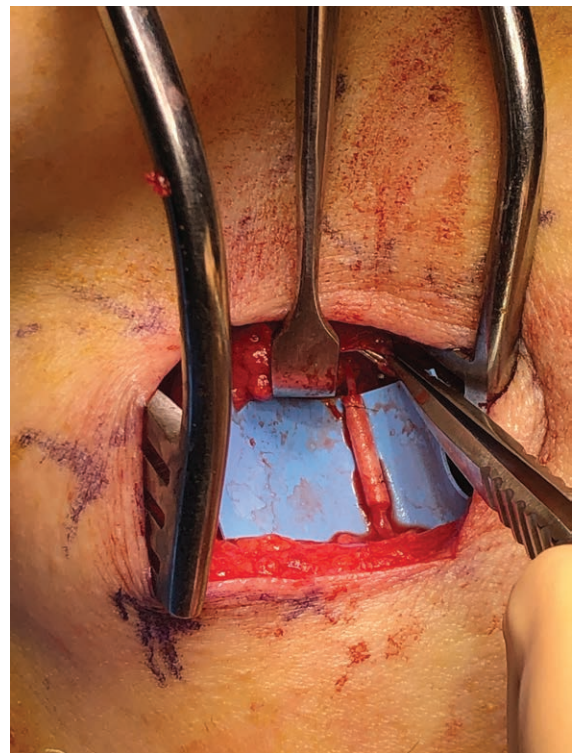


Fig. 3. Neuroma excised and repaired with a nerve conduit and 8-0 nylon suture.

and medial upper arm. It courses through the superficial breast tissue, lateral chest, axilla, and posteromedial aspect of the arm. There is increased risk of iatrogenic injury to the ICBN during axillary lymph node dissection associated with breast cancer surgery, within the axilla in proximity to the lymph nodes, anterior to the long thoracic and thoracodorsal nerves. Studies have shown that the ICBN demonstrates anatomic variation, most commonly identified as a single trunk (47%) versus a bifurcated nerve (42%).⁵ Injury to the nerve can occur with prolonged pressure from retraction, transection from electrocautery or sharp dissection, surgical clips, scar tissue, infection, chemotherapy, and radiotherapy.^{5,6}

Postmastectomy chronic pain occurs in 20%–68% of cases after breast cancer procedures.^{2,3,5,6} It can be seen early in the postoperative period with injury to sensory nerves, including the ICBN. Risk factors for postmastectomy pain include preoperative factors such as age less than 40 years, diagnoses of pain syndromes (eg, headache, low back pain), long-term use of analgesics for pre-existing chronic pain, higher BMI due to more difficult surgical dissection, low activity status, anxiety, and depression. Intra- and postoperative risk factors include axillary surgery, higher pain scores 6 hours after surgery, radical mastectomy, axillary lymph node dissection, postoperative hematoma, chemotherapy, and radiotherapy.^{2,6,7}

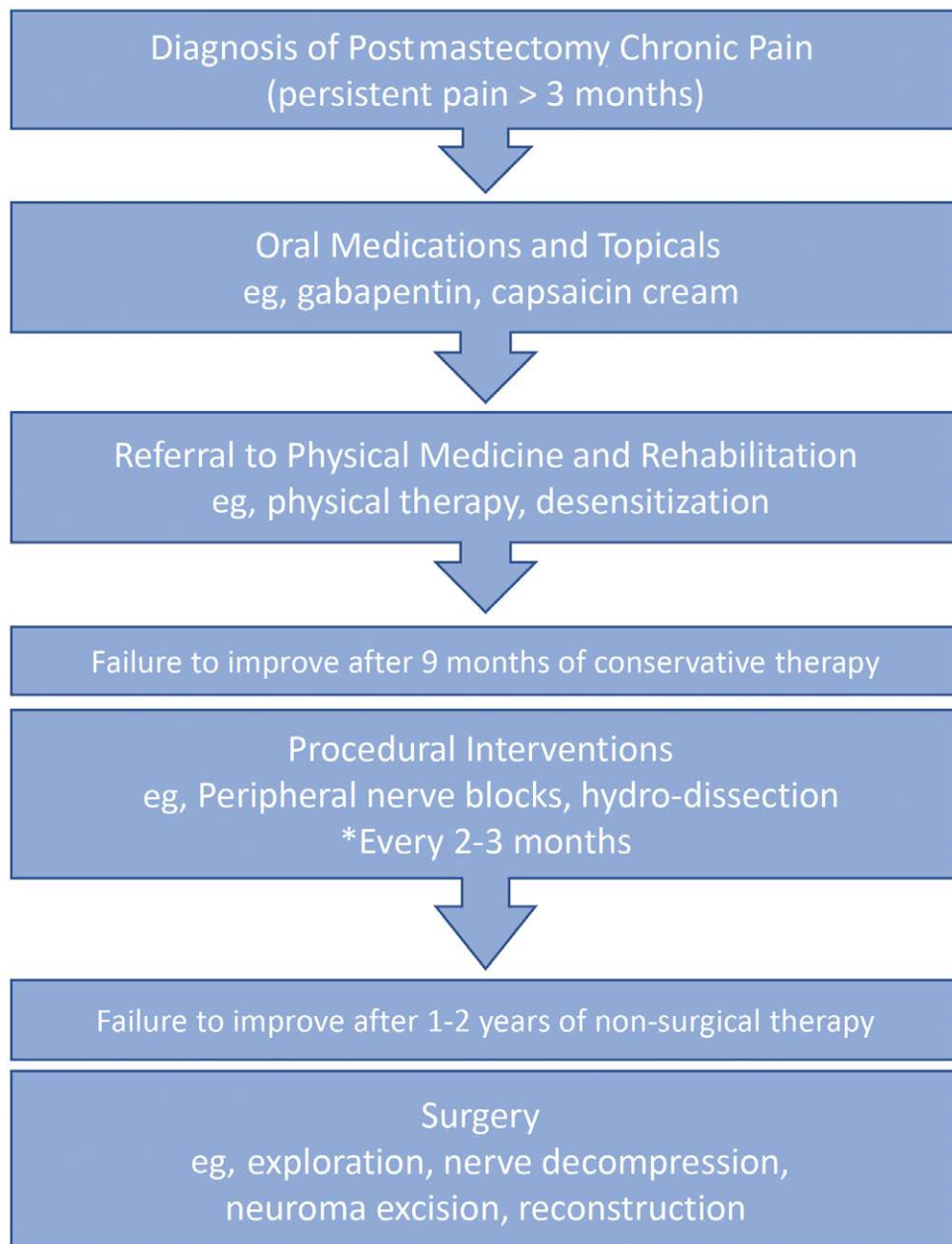


Fig. 4. Comprehensive treatment algorithm of intercostal brachial nerve pain after mastectomy and axillary dissection.

Existing literature recommends a variety of treatment options. These include medications (antiinflammatory agents, antidepressants, narcotics, topical capsaicin, lidocaine patches, gabapentin, N-methyl-D-aspartate-receptor antagonists, glucocorticoids, muscle relaxers) and physical therapy for strength, range of motion, and flexibility. Interventional options include specific nerve blocks, including a serratus plane block, intercostobrachial perineural injection, stellate ganglion block, epidural injections, and implantable spinal cord stimulators. Axillary fat grafting is another surgical option hypothesized to result in scar remodeling, tissue regeneration, and inhibition of inflammation.²

We recommend surgical intervention for refractory ICBN pain. Axillary exploration and investigation of the ICBN can demonstrate nerve compression secondary to scar tissue and neuroma formation, among other pathologies. Techniques typically employed in neuroma management following excision can be applied in this setting. These include hollow tube reconstruction and auto- or allograft reconstruction for neuromas in continuity, and submuscular implantation, end-to-side neuroorrhaphy, targeted muscle reinnervation, and regenerative peripheral nerve interface for neuromas with no identifiable distal end.⁸

CONCLUSIONS

Patients with ICBN pain resistant to conservative, nonsurgical interventions are candidates for operative procedures utilized in neuroma management (Fig. 4). Patients with focal pain on examination and relief with specific peripheral nerve blocks may receive longer-term relief with neuroma excision and reconstruction. These methods may also be used at the time of mastectomy and

axillary dissection for patients considered high risk as a prophylactic measure.

Justine S. Kim, MD

Department of Plastic Surgery
3550 Terrace Street
664 Scaife Hall
Pittsburgh, PA 15261
E-mail: kimjs4@upmc.edu

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