



Platelet Rich Plasma Injection as A Treatment for Intercostal Neuralgia: A Case Report

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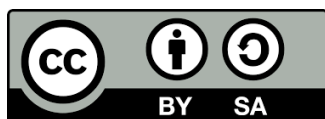
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Intercostal Neuralgia; Platelet-Rich Plasma; Neuropathic Pain; Post-Traumatic Pain; Nerve Regeneration.

Abstract

Intercostal neuralgia is a neuropathic pain condition that may persist following rib fractures, adversely affecting sleep quality and daily functioning. Conventional pharmacological and interventional treatments may provide insufficient pain relief, prompting interest in regenerative therapeutic approaches. This case report aimed to describe the clinical outcomes of ultrasound-guided perineural platelet-rich plasma (PRP) injections in a patient with refractory posttraumatic intercostal neuralgia. A 52-year-old woman presented with persistent pain along the distribution of the left tenth intercostal nerve following a rib fracture sustained 10 months earlier. Previous conservative treatment, cryoablation, and prolotherapy had failed to provide meaningful symptom relief. Autologous PRP was prepared using a double-spin centrifugation technique and administered perineurally under ultrasound guidance. Two injections were performed at a two-week interval. Pain intensity and symptom improvement were assessed using the Numeric Rating Scale (NRS) and clinical symptom evaluation. At baseline, the patient reported a pain intensity of 3–4 on the NRS, with breakthrough pain episodes reaching 6 and occurring three to five times daily, accompanied by sleep disturbances and limitations in daily activities. Following the first injection, the patient reported approximately 50% pain relief, followed by complete pain relief after the second injection. These clinical observations may be consistent with the proposed anti-inflammatory and neuroregenerative effects of PRP, although the underlying mechanisms were not directly investigated. Ultrasound-guided perineural PRP injections may represent a potential therapeutic option for refractory posttraumatic intercostal neuralgia. However, controlled clinical studies using standardized treatment protocols, objective outcome measures, and longer follow-up periods are necessary to establish their efficacy and safety.



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INTRODUCTION

Intercostal neuralgia is a neuropathic pain condition characterized by pain along the dermatomal distribution of the intercostal nerves. The pain may be described as aching, sharp, radiating, stabbing, burning, or tingling and may be accompanied by paresthesia. Intercostal neuralgia may result from mechanical nerve injury, infections such as herpes zoster, or neoplastic processes. Reported mechanical causes include rib fractures, chest wall surgery, and

chest tube insertion (Fazekas et al., 2026). No universally effective treatment for intercostal neuralgia has been established. Conservative management includes analgesics, tricyclic antidepressants, anticonvulsants, and nonpharmacological interventions such as psychological and behavioral therapies, transcutaneous electrical nerve stimulation (TENS), and acupuncture. However, intercostal neuralgia can be refractory to conventional treatment. Several interventional approaches have been proposed, including intercostal nerve blocks, prolotherapy, platelet-rich plasma (PRP) injections, nerve ablation, neurolysis, and surgical interventions (Fazekas et al., 2026). Perineural PRP has been proposed to modulate inflammatory cytokine activity and support peripheral nerve regeneration, although its clinical efficacy remains uncertain. This case report describes the clinical outcomes of ultrasound-guided perineural PRP injections in a patient with intercostal neuralgia refractory to systemic pharmacological treatment, cryoablation, and prolotherapy (Weinberg et al., 2022).

Intercostal neuralgia is a clinically distinct but frequently underrecognized cause of chest wall pain that may arise from irritation, compression, or injury to the intercostal nerves as they course along the inferior margins of the ribs (Fazekas et al., 2026). Patients typically describe the pain as a band-like sensation extending around the chest wall and back along the distribution of the affected thoracic dermatome. The clinical presentation may become more complex when the underlying nerve injury is associated with vertebral or rib fractures (Liu, 2025). Because its symptoms may overlap with cardiac, pulmonary, and musculoskeletal causes of chest pain, diagnosis requires careful clinical assessment and consideration of alternative etiologies (Botchu et al., 2024; Collins et al., 2021).

Neuropathic pain conditions, including intercostal neuralgia, represent a substantial global health burden, with neuropathic features identified in a considerable proportion of patients experiencing chronic pain (Du et al., 2023; Finnerup et al., 2021). The underlying mechanisms are heterogeneous, ranging from ectopic neuronal activity at sites of peripheral nerve injury to central sensitization within the spinal cord and brain. This mechanistic diversity contributes to variations in treatment responses across neuropathic pain syndromes (Finnerup et al., 2021). Consequently, no single therapeutic approach is universally effective, highlighting the importance of individualized, mechanism-based treatment strategies, including the approach explored in the present case report.

Traumatic rib fractures are recognized causes of intercostal nerve injury because displaced fracture fragments, localized hematomas, and reactive fibrosis may compress or entrap adjacent intercostal nerves during healing (Weinberg et al., 2022). Even after satisfactory radiographic fracture healing, some patients continue to experience persistent neuropathic pain along the affected dermatome. Similar symptoms have been documented following other forms of thoracic trauma and peripheral nerve irritation in different clinical populations (Tascón Padrón et al., 2025). This discrepancy between structural bone healing and symptom resolution suggests that persistent nerve dysfunction may contribute to long-term pain following chest wall injuries, even when bony union has been achieved.

Chronic intercostal neuralgia can substantially impair daily functioning by disrupting sleep, restricting physical activity, and reducing quality of life, particularly when symptoms remain refractory to first-line treatment. These challenges have been illustrated in reports describing atypical or diagnostically complex presentations of intercostal neuralgia (Botchu et al., 2024). Diagnostic uncertainty may be further complicated by the absence of specific imaging

abnormalities, requiring clinicians to rely on clinical history, examination of the affected dermatomal distribution, and, when appropriate, responses to diagnostic intercostal nerve blocks (Correa López et al., 2018). These diagnostic and functional challenges highlight the importance of documenting individual clinical experiences, including the therapeutic course described in the present case report.

Initial management of intercostal neuralgia generally involves conservative treatment, including oral analgesics, medications for neuropathic pain such as anticonvulsants and tricyclic antidepressants, and nonpharmacological interventions such as TENS and physical therapy (Correa López et al., 2018). Although these approaches may provide meaningful symptom relief, evidence regarding nonpharmacological interventions for thoracic trauma-related pain suggests that treatment responses can be variable and that some patients continue to experience persistent symptoms despite multimodal management (Weinberg et al., 2022). These limitations have encouraged further investigation of interventional and regenerative therapies for patients with refractory neuropathic pain.

Among the interventional approaches considered for refractory intercostal neuralgia, ultrasound-guided nerve blocks and perineural injections offer the advantage of real-time visualization and targeted delivery of therapeutic agents near the affected nerve. Ultrasound guidance may also help clinicians identify adjacent anatomical structures and reduce procedural risks, although complications cannot be completely eliminated (Sánchez et al., 2017). PRP has emerged as an investigational injectable treatment because it contains platelet-derived growth factors and other bioactive mediators that may contribute to peripheral nerve repair (Wang et al., 2024). These potential properties have generated interest in PRP as a minimally invasive therapeutic option for patients whose symptoms persist despite conventional pharmacological and nonpharmacological treatments. However, its effectiveness specifically for intercostal neuralgia has not been established.

The proposed neuroregenerative effects of PRP involve several biological mechanisms, including the stimulation of Schwann cell proliferation and migration, modulation of local inflammatory responses, and promotion of angiogenesis that may support axonal regeneration (Wang et al., 2022). Recent reviews have further examined the roles of platelet-derived growth factors and other bioactive components in peripheral nerve repair while emphasizing that treatment outcomes may vary according to platelet concentration, leukocyte content, and PRP preparation methods (Shang et al., 2025). Because PRP formulations and preparation protocols remain heterogeneous, transparent reporting of treatment procedures is essential for interpreting clinical observations and supporting future standardization efforts (Collins et al., 2021; Gagnier et al., 2013). Accordingly, the present case report describes the clinical course of a patient with refractory posttraumatic intercostal neuralgia who underwent ultrasound-guided perineural PRP injections after failing to achieve adequate pain relief from systemic pharmacological treatment, cryoablation, and prolotherapy.

METHOD

This case report described the clinical course and treatment outcomes of a patient with posttraumatic intercostal neuralgia refractory to conservative treatment who underwent ultrasound-guided perineural platelet-rich plasma (PRP) injections at a tertiary pain clinic in Jakarta, Indonesia. The report was prepared in accordance with the CARE (CAse REport)

guidelines (Gagnier et al., 2013). Written informed consent was obtained from the patient for the publication of her clinical data, imaging, and photographs, and patient confidentiality was maintained throughout the study.

Clinical data, including trauma history, previous treatments, pain characteristics, and Numeric Rating Scale (NRS) scores, were obtained from the patient's medical records and supplemented by interviews during clinic visits. The diagnosis of intercostal neuralgia was established clinically based on the distribution of pain along the left tenth intercostal nerve (T10). Point-of-care ultrasonography was performed to assess the surrounding chest wall structures and identify the target anatomical region before injection.

Autologous PRP was prepared from the patient's peripheral venous blood using a closed, double-spin centrifugation technique designed to concentrate platelets while minimizing red blood cell and leukocyte contamination. The PRP was administered under real-time ultrasound guidance using an in-plane needle approach, with the injectate delivered into the perineural plane surrounding the left tenth intercostal nerve at the midaxillary line. A second injection was administered two weeks later based on the patient's clinical response to the initial treatment.

Treatment outcomes were assessed using NRS pain scores recorded at baseline and during follow-up visits after each injection. Additional outcomes included patient-reported improvements in sleep quality and the ability to perform daily activities.

RESULTS AND DISCUSSION

Fifty-two years old female presented to pain clinic with chronic pain on left thoracal region. The pain was felt on left midaxillary line, extending towards anterior side, on level of thoracal 10 region. Patient had history of simple fracture on 10th of left costae 10 months before, and had undergone conservative treatment. Patient initially complained of sharp pain on fracture region, and eventually turned into constant dull pain with time, radiating to the anterior region. Patient had baseline NRS of 3-4 with breakthrough pain of NRS 6 three to five times per day. In the last one month, there was an increase in pain intensity accompanied with sleep disturbance and difficulty in performing daily activities. Cryoablation and prolotherapy had been attempted to treat the pain; however, the effect was not significant. Afterwards, patient was scheduled for PRP injection on left tenth thoracal intercostal nerve on midaxillary line. First injection of PRP managed to produce 50% pain relief, and complete pain relief was achieved after second injection two weeks thereafter.



Figure 1. Patient Positioning



Figure 2. Ultrasound Probe Position During Scanning of 10th Intercostal Region

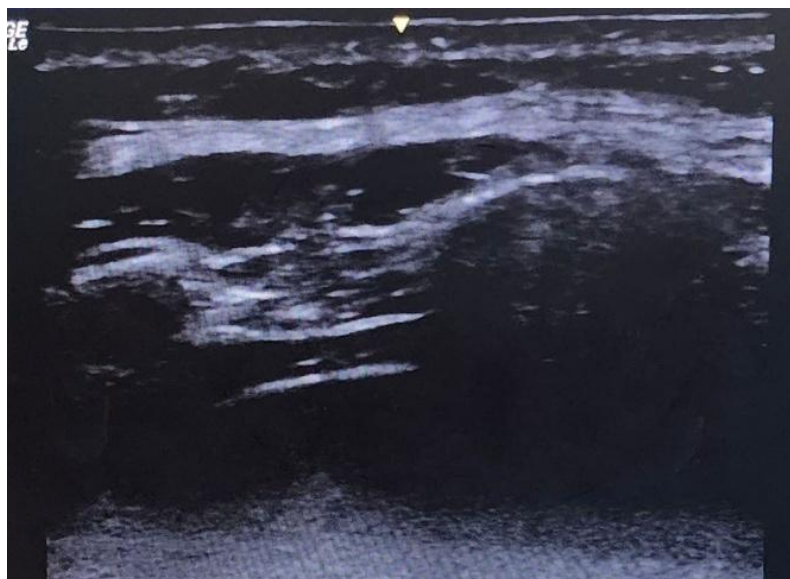


Figure 3. Ultrasound Imaging of 10th Intercostal Region

In trauma patients (fracture, thoracotomy, thoracostomy, WSD placement etc), the source of intercostal neuralgia is either direct damage to the nerve or the structure surrounding it with resulting inflammation and/or nerve entrapment (secondary to scarring or inflammation).

In case of thoracic surgery, it is important to determine a preemptive and multifaceted plan for pain control, including neuraxial or peripheral blockade in combination with multimodal analgesic agent. Intercostal nerve blockade may be a superior alternative to thoracic epidural if combined with a multimodal pain control regimen. Also, opioids, NSAIDs, anticonvulsants, topical medication and TENS are mainstays of adjunctive therapy. In chronic setting of neuropathic pain, TCA, SSRI and SNRI also an option.

For pain control in chronic phase of intercostal neuralgia in general, regardless of cause, medications including NSAIDs, anticonvulsants, antidepressant and opioid may be helpful. Topical medication such as capsaicin, transdermal lidocaine may be helpful. Interventional techniques like intercostal nerve blocks can also be helpful in the diagnosis and treatment of intercostal neuralgia. Neurolysis may be considered in case of block achieve good result.

It is important to remember that the pain of intercostal neuralgia can lead to deconditioning because of avoiding physical activity. Physical therapy, psychotherapy, and acupuncture can be effective and synergistic additions to pharmacological and/or interventional treatments.

Neuropathic pain is believed to be derived from hyperexcitability of injured neuron due to incomplete healing process (Kuffler, 2013). PRP may retrigger inflammatory process and promote tissue repair. Recovering membrane biophysical properties through complete tissue repair will result in pain relief. PRP has advantage over systemic drugs and other techniques because it was originated from autologous blood, easily obtainable at low cost, with no known significant side effect (Dou & An, 2025; Gracia-Fabre et al., 2024; Kuffler, 2024; Morris et al., 2025).

The main mechanism underlying pain in posttraumatic nerve injury, including phantom stump pain after amputation, is likely to be ectopic impulses generated at the site of nerve injury or DRG. This is supported by temporary effect of surgical removals of neuromas, which are

neural sprouts developing at the proximal end of a transected nerve, and of peripheral nerve blocks on going and evoked pain in peripheral nerve injury pain including phantom pain. In human painful neuromas, an upregulation of Nav1.3, 1.7 and 1.8 as well as an upregulation of activated p38 and elongation factors associated with translation (EFT1/2) mitogen-activated protein (MAP) kinases have been found. These may be a molecular driver of pain, as abnormal accumulation of such sodium channels can cause hyperexcitability and ectopic impulse generation.

A low-grade inflammation and pro-inflammatory cytokines may be additional factors associated with pain after peripheral nerve injury as discussed further below. Central sensitization involving the spinal cord and brain stem is likely to be involved particularly in referred sensations and spread of allodynia and hyperalgesia to neighboring dermatomes. Supraspinal neuroplastic changes and cortical reorganization are also seen after amputation, but the association between chronic pain and reorganization after amputation is uncertain (Wang et al., 2022).

PRP may stimulate nerve regeneration process by Schwann cells proliferation, migration and stabilization, vascular regeneration, and promotion of axonal regeneration. Proliferation and migration of Schwann cells facilitate Büngner band formation and promote axonal growth.⁵ Schwann cells also contribute to axon membrane stabilization by differentiation into myelin sheath. PRP contains VEGF that promotes angiogenesis, resulting in increased vascularization, promoting axonal growth and thus the survival of the neuron (Wang et al., 2022).

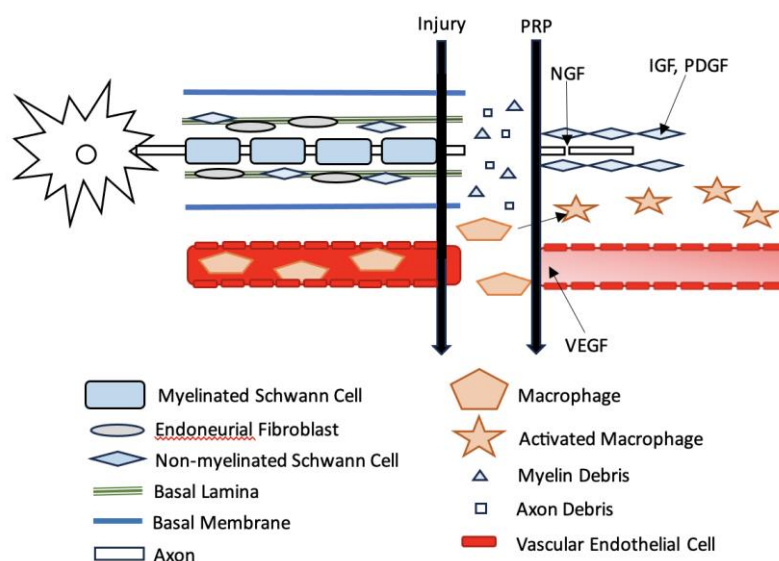


Figure 4. Nerve Injury and Effect of PRP in Nerve Regeneration

PRP may be a promising modality to relieve neuropathic pain by facilitating Schwann cells migration and regeneration, revascularization and promoting axon growth. Limitations of studies using PRP in neuropathic pain include various methods of PRP production process, PRP dose, and the use of activating agent. Further study is needed to determine specific characteristic for PRP used. Standardization of PRP quality and production process have to be established in order to discover its potential in various condition (Ali et al., 2025, 2026; El Haj et al., 2025; Kennedy et al., 2026) .

CONCLUSION

Based on the findings of this case report, ultrasound-guided perineural platelet-rich plasma (PRP) injection may represent a promising therapeutic option for posttraumatic intercostal neuralgia refractory to conventional treatment. A 52-year-old woman with a history of a left tenth rib fracture experienced persistent neuropathic pain for 10 months without meaningful improvement following cryoablation and prolotherapy. Ultrasound-guided perineural PRP injections targeting the left tenth intercostal nerve were associated with approximately 50% pain relief after the first injection and complete pain relief after the second injection, administered two weeks later. These findings suggest that perineural PRP injection may provide clinically meaningful pain relief in selected patients with refractory posttraumatic intercostal neuralgia. However, the observations from this single case cannot establish treatment efficacy or a causal relationship between PRP administration and symptom resolution.

The observed clinical improvement may be associated with the proposed regenerative and anti-inflammatory properties of PRP, including stimulation of Schwann cell proliferation and migration, support for the formation of bands of Büngner and axonal regeneration, promotion of angiogenesis through vascular endothelial growth factor (VEGF), and modulation of local inflammatory responses. Nevertheless, these biological mechanisms were not directly investigated in the present case. As an autologous blood-derived preparation, PRP may offer practical advantages, although its cost-effectiveness and safety profile for perineural treatment of intercostal neuralgia remain insufficiently established. Furthermore, variations in PRP preparation methods, platelet concentrations, injection doses, and the use of activating agents highlight the need for standardized treatment protocols. Further controlled clinical studies with larger patient populations and longer follow-up periods are necessary to evaluate the efficacy, safety, and durability of perineural PRP injections for intercostal neuralgia and other peripheral neuropathic pain conditions.

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