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ULTRASOUND-GUIDED HYDRODISSECTION IN MEDIAN NERVE ENTRAPMENT NEUROPATHIES: DIFFERENCES IN EVIDENCE AND OUTCOMES BETWEEN CARPAL TUNNEL SYNDROME AND PROXIMAL COMPRESSION SITES. A NARRATIVE REVIEW

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ABSTRACT

Introduction: Ultrasound-guided hydrodissection (HD) has emerged as a promising and minimally invasive treatment for peripheral nerve entrapment syndromes, especially carpal tunnel syndrome (CTS). While there is increasing evidence supporting efficacy of HD in treating CTS, its role in more proximal median nerve (MN) entrapment neuropathies, as pronator teres syndrome (PTS), has not been well established.
Purpose: The aim of this narrative review was to summarize the current evidence on the efficacy and safety of ultrasound-guided hydrodissection in median nerve entrapment neuropathies, focusing on its use in CTS and PTS.
Methodology: A narrative review of the literature was conducted using Google Scholar and PubMed, focusing on recent systematic reviews, randomized controlled trials, cohort studies, and case series published up to 2026 that evaluated ultrasound-guided hydrodissection in median nerve entrapments.
Conclusions: Considerable evidence supports the use of HD in CTS, with multiple randomized controlled trials demonstrating improvements in pain, symptom severity, and functional outcomes. In contrast, evidence for proximal median nerve entrapments remains limited and is restricted mostly to the case reports. Further high-quality studies are essential to establish the effectiveness of HD across different anatomical locations of median nerve compression.

KEYWORDS

Ultrasound-Guided Hydrodissection, Carpal Tunnel Syndrome, Pronator Teres Syndrome, Peripheral Nerve Entrapment, Steroid, Platelet-Rich Plasma, and 5% Dextrose

CITATION

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Introduction

Carpal tunnel syndrome

Carpal tunnel syndrome (CTS) is a common condition that significantly limits daily functioning and reduces quality of life. (Damms, McCallum, Sarrigiannis, and Zis, 2020; Gautam et al, 2021; Geoghegan, Carolina, French, Harrison, and Rodrigues, 2024) It most often occurs in individuals between the ages of 40 and 60. (Krieger et al, 2024) Previous studies have established that the prevalence of CTS ranges from 1% to 5%. (Sevy, Sina and Varacallo, 2023) However, a recent meta-analysis suggests that it may affect up to 14% of the global population, with a threefold higher prevalence in women. (Gebrye, Jeans, Yeowell, Mbada, and Fatoye, 2024; Sevy et al, 2023)

Although the precise mechanism that leads to the development of CTS has not been fully explained, it is known that its pathophysiology involves a combination of mechanical injury, increased pressure, and ischemic damage to the median nerve within the carpal tunnel. (Joshi et al, 2022) Repeated elevation of pressure results in compression of the median nerve, inducing focal demyelination at the site of compression, impairing perfusion in the endoneurial capillaries, and leading to endoneurial edema, further exacerbating nerve damage. (Annisa, Rianawati, Rahayu, Raisa, and Kurniawan, 2021; Osiak, Elnazir, Walocha, and Pasternak, 2022; Sevy et al, 2023)

There are multiple conditions that contribute to the development of CTS, including repetitive wrist activity, fractures or malunions of the distal radius, wrist osteoarthritis, inflammatory or infectious arthritis, renal failure, heart failure, obesity, pregnancy, menopause, genetic predisposition, acromegaly, diabetes, hypothyroidism, use of oral contraceptives, and alcoholism. (Joshi et al, 2022; Osiak et al, 2022; Wielemborek et al, 2022) These factors increase the risk of this disorder and contribute to its clinical presentation.

The symptoms of carpal tunnel syndrome vary between individuals. (Alanazy, 2017; Dawod et al, 2025) Pain, numbness, and paresthesia affecting the first three fingers and the radial half of the fourth finger are the typical early symptoms. (Annisa et al, 2021) They usually first occur at night while lying down. Over time, they may extend to daytime activities and become persistent in advanced stages. (Sevy et al, 2023) The pain may occur around the wrist, involve the entire hand, and sometimes radiate along the forearm. (Ghasemi-Rad et al, 2014) Progression of the disease may lead to impaired coordination, hand weakness, and atrophy of the thenar muscles. (Sevy et al, 2023)

The diagnosis is primarily based on medical history and physical examination, including several provocative maneuvers. (Kumar et al, 2023; Roghani et al, 2025) Typically, it does not require additional testing in mild cases. (Osiak et al, 2022) Electrodiagnostic tests are performed to confirm diagnosis and assess the severity of nerve damage. (Osiak et al, 2022; Sevy et al, 2023) In mild CTS, patients typically exhibit only sensory abnormalities, whereas in moderate CTS, both sensory and motor abnormalities are observed. (Tüfekçi and Boz, 2022) Ultrasound provides a complementary role, enhancing diagnostic accuracy. (Mathieu, Lemmens, and Stassijns, 2022) However, in recent years, it has emerged as an important tool for identifying and grading clinically suspected CTS, as well as for guiding treatment decisions. (Fontes et al., 2025; Kanagasabai, 2022) The use of ultrasonography allows detailed evaluation of the median nerve at the carpal tunnel, helps rule out secondary causes of compression such as flexor tenosynovitis or joint abnormalities, and identifies predisposing anatomical variations. (Kumar et al, 2023; Sveva et al., 2024)

Treatment options for carpal tunnel syndrome (CTS) depend on the severity of the condition. In most cases, patients should initially undergo conservative management, including ergonomic modifications, wrist immobilization with a splint, manual and pharmacological therapy. (Sevy et al, 2023) Corticosteroid injections can be used as an alternative, providing temporary relief. (Tulipan and Ilyas, 2020) Patients with severe symptoms or those unresponsive to conservative methods may require surgical intervention, including open or endoscopic carpal tunnel release. (Osiak et al, 2022) Studies demonstrate that long-term efficiency of surgical treatment exceeds 70%. (Krieger et al, 2024) However, up to one-third of patients may require repeat surgical intervention within five years. (Sveva et al., 2024) The main reasons are incomplete decompression, perineural adhesions, excessive scar tissue, or hematoma formation within the carpal tunnel. (Sveva et al., 2024) The observed outcomes highlight the importance of developing and implementing more effective conservative treatment strategies before surgical interventions.

Pronator teres syndrome

Pronator teres syndrome is a relatively rare neuropathy provoked by compression of the median nerve at the proximal forearm. (Nishimaki, Kawabata, Yamazaki, and Iwamoto, 2025) PTS occurs more frequently in women at the age of 40-50 years. (Binsaleem, 2024) Due to its low prevalence and often nonspecific presentation, it is frequently underdiagnosed or misdiagnosed. (Shojaie, Botchu, Iyengar, Drakonaki, and Sharma, 2023)

It might develop as a consequence of repetitive pronation movements and gripping. This may cause pronator teres muscle hypertrophy and the entrapment of the median nerve, which passes between the radial and ulnar head of the pronator teres muscle. (Dididze, Tafti, and Sherman, 2023; Siahaan, 2021) Compression of the nerve area also restricts blood flow outside the epineurium. This process leads to the accumulation of toxins and development of neurogenic inflammation and neuropathic pain. (Siahaan, 2021)

Morphological variability of the pronator teres muscle plays a crucial role in the pathogenesis of pronator syndrome. A 2025 review identified three morphological types with distinct entrapment mechanisms. (Podlasińska, Landfald, Adamczyk, Szewczyk, and Olewnik, 2025) Other risk factors are associated with repetitive forearm pronation, playing tennis, prior elbow or forearm trauma. (Rałowska-Gmoch, Hajzyk, Matyskieła, Łabuz-Roszak, and Dziadkowiak, 2025)

Patient presentation may mimic the signs and symptoms of carpal tunnel syndrome. (Binsaleem, 2024) The most common symptoms are focal proximal forearm pain and paresthesia extending to the thumb, index, middle finger, and radial half of the ring finger. (Binsaleem, 2024; Dididze et al, 2023) Other symptoms include tenderness and positive provocative maneuvers over the proximal section of the pronator teres muscle. (Shojaie et al, 2023)

The first step in the diagnosis of PTS is evaluation through history and physical examination. Electrodiagnostic studies are often inconclusive or normal but can be useful in excluding other neuropathies. (Adler and Wolf, 2020) Imaging modalities such as ultrasound or magnetic resonance imaging may help identify structural causes of nerve compression when other measures are inconclusive. (Shojaie et al, 2023) High-resolution ultrasound (USS) often reveals structural changes of the median nerve proximal to the entrapment site. The findings include adhesion, compression, and narrowing of MN while traversing the muscle. (Shojaie et al, 2023)

Conservative management is typically the preferred first-line approach for PTS. Physical therapy and immobilization play an essential role in the management of PTS. However, nonsteroidal anti-inflammatory medications, oral steroids, and local steroid injections are also used in this condition. (Dididze et al, 2023) When conservative treatment is not sufficient, patients might need surgical median nerve release. (Dididze et al, 2023)

Ultrasound-guided perineural hydrodissection

Ultrasound-guided perineural hydrodissection has gained considerable attention as a therapeutic option used to mechanically release and decompress the entrapped nerves. It allows to separate the nerve from the surrounding tissue. (Buntragulpoontawee et al, 2021; Mathieu et al, 2022) In CTS, the fluid is injected between the median nerve and transverse carpal ligament, whereas in PTS, hydrodissection of MN is performed at the level of the pronator teres. (Mathieu et al, 2022; Nishimaki et al, 2025) This reduces the pressure exerted on the nerve fascicles and nervi nervorum, which decreases nociceptor activation and alleviates pain. (Lam et al, 2020) Additionally, improved function of the vasa nervorum enhances blood flow, supporting toxin removal and nutrient delivery. Collectively, these effects reduce inflammation, edema, and promote the restoration of normal nerve function. (Lam et al, 2020; Sveva et al, 2024) The use of ultrasound guidance is a key advancement, as it helps to avoid damage to surrounding nerves and tendons during the procedure, providing real-time visualization of essential anatomical structures and their variations within the carpal tunnel. (Sveva et al, 2024; Kumar et al, 2023) It provides enhanced accuracy while reducing the risk of iatrogenic injuries. (Kumar et al, 2023) Studies show that in comparison to blind injections, ultrasound-guided injections in CTS are more effective and significantly reduce the risk of treatment failure within one year by 55%. (Mathieu et al, 2022; Kumar et al, 2023) Furthermore, this minimally invasive approach not only improves cosmetic outcomes by avoiding surgical scars but also enables a faster return to daily activities. (Kumar et al, 2023) These advantages support the consideration of ultrasound-guided procedures as a promising treatment approach.

Methodology

This study was conducted as a narrative review based on evidence from systematic reviews, randomized controlled trials, cohort studies, and case series published up to 2026 that evaluated ultrasound-guided hydrodissection in median nerve entrapments. Databases searched included PubMed/MEDLINE and Google Scholar. Search terms included: “ultrasound-guided hydrodissection”, “carpal tunnel syndrome”, “pronator teres syndrome”, “peripheral nerve entrapment”, “steroid”, “platelet-rich plasma”, and “5% dextrose”. Analysis techniques included study selection, data extraction, qualitative synthesis and interpretation of the findings across different studies. Data on clinical outcomes, most commonly used injectates, reported adverse events were extracted and analyzed.

Results

The most frequently administered substances for hydrodissection include corticosteroids, 5% dextrose, and PRP. (Sveva et al, 2024)

Based on the provided evidence, ultrasound-guided hydrodissection with 5% dextrose water (D5W) appears to be an effective and safe treatment for carpal tunnel syndrome. It leads to significant improvements in pain, symptoms, and hand function. (Güleç, Özmen, and Kokar, 2026; Lin et al, 2020) Research shows that D5W injections provide clinically meaningful relief for patients with mild, moderate, and severe CTS. (Güleç et al, 2026) It has been found to be effective even in cases where conservative management has failed. (Pokharel, Silwal, Shrestha, and Neupane, 2024) Retrospective studies indicate high long-term success rates. One study found that 88.6% of patients reported effective outcomes (defined as ≥50% symptom relief), with a follow-up of one to three years. (Li et al, 2021) For patients who experience persistent or recurrent symptoms after CTS surgery, 5% dextrose water hydrodissection achieved an effective outcome in 61% of cases, with a mean follow-up of 33 months. (Chao, Reeves, Lam, Li, and Wu, 2022) It is particularly sufficient for recurrent CTS. (Chao, Reeves, Lam, Li, and Wu, 2022) The volume of D5W used in HD appears to influence the degree of symptom relief. Higher volumes are thought to better reduce adhesions between the median nerve and surrounding tissues. (Eyvaz et al, 2025) Greater injectate volumes resulted in better pain reduction and functional improvement at 4 and 12 weeks post-injection. However, by the 24th week, there were no significant differences between different volume groups. (Lin et al, 2020) Adding D5W hydrodissection four weeks after a corticosteroid injection appeared to be more beneficial than corticosteroid monotherapy, showing superior improvements in symptoms and function at 8- and 12-week follow-ups. (He et al, 2022) Combining HD with the use of a wrist orthosis also significantly improved a patient's ability to perform daily activities, compared to using an orthosis alone. (Eyvaz et al, 2025; Türkyolu, Bugdayci, Akgun, and Kalaoglu, 2026) Some research suggests that D5W may be preferred over corticosteroids, especially when the diagnosis is uncertain, because it does not damage nerves and offers similar efficacy in improving quality of life. (Güleç, and Aktaş, 2023) The number of injections required often depends on the severity of the CTS; for example, mild cases averaged 1.7 injections, while severe cases averaged 2.6 to reach an effective outcome. (Li et al, 2021)

Pronator teres syndrome is an uncommon neuropathy, and there is limited evidence on the use of hydrodissection in this condition. However, the most frequently used injectate was 5% dextrose. In one case study, a patient with PTS was treated with two sessions of ultrasound-guided hydrodissection with a combination of 5% dextrose, 2% lidocaine, and triamcinolone. (Shojaie et al, 2023) Initially, the patient reported a 50% reduction in pain two weeks post-procedure. Four weeks later, a second hydrodissection was performed. (Shojaie et al, 2023) Follow-up ultrasound imaging revealed a normal size of the median nerve, both proximal and at the pronator teres level, with a negative provocative manouvers. The patient exhibited significant improvement in pain and symptoms severity seven months after the procedure. (Shojaie et al, 2023) In another case series, two sessions of ultrasound-guided perineural D5W injection in 2-week intervals resulted in immediate relief and recovery. (Siahaan, 2023) After 1 month, a considerable reduction of pain and functional limitations was observed. Even greater improvements were observed further on. Follow-up at 12 months showed that none of patients experienced relapse, and all of the subjects experienced satisfactory recovery on evaluation after treatment. In long-term evaluation, subjects exhibited good clinical and functional outcomes. (Siahaan, 2023) Evidence shows that injections with D5W were associated with significant pain resolution and a perceived reduction in paresthesia. (Siahaan, 2021) After five sessions (with 2-week intervals), the patient described more than 50% of strength improvement in his right thumb flexion. (Chang, Wu, Hsu, Yang, and Özçakar, 2022)

In patients with mild and moderate carpal tunnel syndrome, research consistently demonstrates that PRP injections are superior to traditional conservative treatments and provide more sustained relief than corticosteroids. In a randomized controlled trial of patients with mild-to-moderate CTS, both PRP and steroids significantly improved clinical symptoms and electrodiagnostic parameters at one month. (Senna, Shaat, and Ali, 2019) However, by the third month, PRP showed clear superiority in improving clinical manifestations, motor conduction velocity, and sensory latency. (Senna, Shaat, and Ali, 2019) Another study comparing PRP, steroids, and splinting found that while both injections outperformed splinting alone, PRP demonstrated more sustained benefits at the six-month follow-up, particularly regarding grip strength. (Cansever, Koldaş Doğan, Erdem Toslak, Bilgilisoy Filiz, and Toraman, 2026) PRP was proven to be significantly more effective than normal saline injections. (Senna et al, 2019) In moderate-to-severe cases, a single dose of PRP provided improved symptom severity scores that lasted for up to one year post-injection. (Chen et al, 2021) One case study highlighted that performing active tendon and nerve gliding exercises immediately following PRP hydrodissection resulted in improvements in pain and nerve function comparable to surgical release. (Savage and Albano, 2020) Additional use of PRP as an adjuvant to wrist splinting provided superior results in reducing night pain and numbness compared to using a splint alone. (Cansever et al, 2026) Beyond symptom relief, PRP contributes to measurable physiological improvements, including morphological changes and enhanced sensory and motor conduction velocities. (Cansever et al, 2026; Chen et al, 2021; Senna et al, 2019) These benefits are often sustained for 6 to 12 months, suggesting that PRP may offer a more durable non-surgical solution than other injectables. (Cansever et al, 2026; Chen et al, 2021)

Unfortunately none of the studies evaluated the use of platelet-rich plasma (PRP) during hydrodissection in pronator teres syndrome.

The most commonly used corticosteroid for perineural injection is typically combined with a local anesthetic, usually 2 ml of triamcinolone acetonide or methylprednisolone mixed with 2 ml of 1% lidocaine. (Kumar et al, 2023) Given its low injection volume, the perineural steroid acts mainly through pharmacological mechanisms rather than by mechanically separating the nerve from the transverse carpal ligament. (Kumar et al, 2023) Most studies conclude that both hydrodissection (using saline and/or lidocaine) and corticosteroid injections significantly improve symptom severity, functional status, and electrodiagnostic results in patients with mild to moderate CTS. Improved sensory nerve conduction velocity and decreased distal latency were common across all effective interventions. (Elawamy et al, 2021; Ghorbanpour et al, 2025; Hsu, Yang, Hsu, and Huang, 2022) Interestingly, none of the interventions (hydrodissection or steroid only) showed a significant improvement in muscle strength within the study periods (Elawamy et al, 2021; Ghorbanpour et al, 2025; Hsu et al, 2022) Several trials found no significant difference in long-term outcomes (typically at 3 to 6 months) between hydrodissection and standard corticosteroid injections. (Schrier, Brault, and Amadio, 2020) One study specifically noted that hydrodissection did not provide an additional benefit over corticosteroid perineural injection alone. (Wang, Hsu, Wang, and Chang, 2021) Another pilot study suggested that symptom scores improved slightly less in the hydrodissection group at the 4-week mark, though this difference disappeared by 6 months. (Schrier et al, 2020) However, intraepineurial injections (administered inside the nerve's outer sheath) during ultrasound-guided hydrodissection resulted in greater patient satisfaction, better symptom relief, and a more meaningful reduction in median nerve edema compared to extraepineurial injections. (Hsu, Yang, Hsu, and Huang, 2018) In patients with CTS due to systemic sclerosis, injections of methylprednisolone showed worse results than ozone/oxygen. Ozone provided superior long-term results (at 6 months) in terms of pain alleviation, hand function, and median nerve conduction. (Elawamy et al, 2021) A prospective, randomized trial involving elderly patients indicates that hydrodissection with lidocaine and normal saline is as effective as hydrodissection combined with either low-dose (40 mg) or high-dose (80 mg) triamcinolone. (Roghani et al, 2018) These results suggest that the mechanical effects of hydrodissection, rather than the steroid dose, may be a primary therapeutic driver in this specific demographic. (Roghani et al, 2018)

In one study, patients with PTS who underwent ultrasound-guided perineural hydrodissection with steroid achieved excellent results. Treatment achieved symptom relief (≥75% improvement) in 70% of nerves at 3-month follow-up. There was no significant change in symptoms between 3 and 6 months. (Delzell and Patel, 2020) Another patient received ultrasound-guided hydrodissection containing triamcinolone acetonide, 1% mepivacaine, and normal saline. (Nishimaki et al, 2025) Additionally, targeted manual therapy and a home-based exercise program was included in the treatment protocol. The effect of therapy was significant symptomatic relief following the first treatment session. After four sessions over a two-month period, the patient successfully maintained symptom control. (Nishimaki et al, 2025)

One retrospective review compared different injectates for CTS. PRP and D5W were found to be the most effective for functional improvement. (Wu et al, 2022) In another study, it was proved that both corticosteroids and platelet-rich plasma, used in ultrasound-guided hydrodissection, significantly improve clinical and electrophysiological outcomes. (Hashem, Shamandy, Elmulla, and Mansour, 2025) However, corticosteroid injections were found to be more efficacious in enhancing short-term functional outcomes and reducing pain compared to PRP. (Hashem et al, 2025) A different retrospective analysis evaluated a dual hydrodissection approach consisting of an initial hydrodissection with methylprednisolone, followed by a second session using 5% dextrose in water (D5W) one month later. (Panwar, Roy, Srivastava, Surange, and Gupta, 2024) This protocol yielded significant clinical and electrophysiological improvements in both mild-to-moderate and severe CTS cases. (Panwar et al, 2024) A key finding was that 71% of patients with severe CTS showed recordable sensory nerve action potentials after treatment, despite having non-recordable potentials at baseline. (Panwar et al, 2024)

Hydrodissection is generally considered safe. However, some side effects may occur after the procedure. The most common is a mild and transient pain at the injection site. (Güleç et al, 2026; Hsu et al, 2022; Lin et al, 2020) There are no reported severe complications in most of the studies. (Ashworth et al, 2023; Güleç et al, 2026; He et al, 2022; Lin et al, 2020) In a retrospective review, there were no reported instances of neurovascular injury, hematoma, seroma, skin hypopigmentation or fat atrophy. No cases of cellulitis or skin abscesses were observed within 30 days post-procedure. (Guo, McCool, Wang, Guo, and Guo, 2021) Only one study reported a 7.1% incidence of transient median nerve injury following ultrasound-guided hydrodissection. (Hsu et al, 2022)

Discussion

The median nerve is formed by the union of the lateral and medial cords of the brachial plexus. (Murphy, Ryan, and Fakoya, 2025) During its course, it runs through various narrow passages where it could be compressed. The most common site of entrapment is at the carpal tunnel and it leads to CTS. At the elbow the median nerve is most frequently compressed at the level of superficial and deep heads of the pronator teres muscle, leading to the onset of PTS. (Murphy et al, 2025) Studies show that even from 57 to 66% of patients with CTS needed surgical intervention after initial conservative treatment. (Burton, Chesterton, Chen, and van der Windt, 2016) This narrative review summarizes the recent evidence on the use of ultrasound-guided hydrodissection treatment in median nerve entrapment neuropathies, with particular emphasis on CTS and PTS.

Based on the gathered results it appears that ultrasound-guided hydrodissection (USG-HD) is safe and effective therapeutic intervention for compressive neuropathies, including carpal tunnel syndrome and pronator teres syndrome. It allows the release of adhesions and liberate the median nerve from surrounding tissues with minimizing the risk of damaging the nerve or vascular structures. The effect of hydrodissection is achieved through mechanical decompression of MN and the different pharmacological effects of the used injectates.

Five percent dextrose in water (D5W) is an isotonic solution of dextrose in the form of D-glucose. (Sveva et al, 2024) Further studies are needed to clarify its mechanism of action. However, it is suspected to involve both pharmacological and mechanical effects. (Lam et al, 2020) One of the assumed pathway involves attenuation of neurogenic inflammation through downregulation of TRPV-1 (transient receptor potential vanilloid receptor 1) which is typically upregulated in chronic neuropathic pain states. (Malek, Pajak, Kolosowska, Kucharczyk, and Starowicz, 2015) D5W might also act through correcting glycopenia around the corresponding nerve. (Lam et al, 2020) Mechanically, higher injection volumes facilitate hydrodissection, separating the median nerve from surrounding structures. (Mathieu et al, 2022)

Platelet-rich plasma (PRP) is an autologous plasma fraction with high concentration of platelets and multiple growth factors, including TGF-β (transforming growth factor-β), PDGF (platelet-derived growth factor), VEGF (vascular endothelial growth factor), NGF (nerve growth factor), BDNF (brain-derived neurotrophic factor), and IGF-1 (insulin-like growth factor-1), which play important roles in tissue repair, angiogenesis, and neural regeneration. (Sveva et al, 2024; Wielemborek et al, 2022) Upon activation, PRP releases bioactive mediators that modulate inflammation, enhance Schwann cell proliferation and axonal regrowth, and facilitate the natural healing process. (Buntragulpoontawee et al, 2021; Sveva et al, 2024; Wielemborek et al, 2022)

Corticosteroids act as potent anti-inflammatory agents through multiple mechanisms. They inhibit cytokines and reduce levels of key inflammatory mediators, including prostaglandins, leukotrienes, and platelet-activating factors. (Coutinho and Chapman, 2011) By these actions, corticosteroids also suppress the recruitment and activation of various inflammatory cells—such as lymphocytes, eosinophils, basophils, and macrophages. (Caramori, Mumby, Girbino, Chung, and Adcock, 2019) This combined reduction of cellular activity and mediator release decreases capillary permeability and local blood flow, leading to diminished edema. Consequently, these anti-inflammatory effects contribute significantly to pain relief. (Sveva et al, 2024)

The available data suggest that the ultrasound-guided hydrodissection is a safe procedure, but the short- and long-term effectiveness of reviewed injectates differs. D5W is the most frequently used solution in hydrodissection for CTS and PTS. Research indicates that 5% dextrose water and Platelet-Rich Plasma offer superior long-term outcomes compared to corticosteroids. (Cansever et al, 2026; Senna et al, 2019) Higher volumes of injectates appear to provide better short-term functional outcomes and pain reduction, likely due to more complete hydrodissection. (Eyvaz et al, 2025) Corticosteroids in PTS show some promising results in reduction of pain, paresthesia, and functional limitations, with long-term improvements maintained up to 12 months after treatment. (Delzell and Patel, 2020; Nishimaki et al, 2025). However, in CTS they demonstrate rapid short-term relief with worse sustained benefits than other regenerative agents like PRP. None of the studies have evaluated PRP hydrodissection in PTS, representing a notable gap in the literature. The findings suggest that HD as a part of a multimodal minimally invasive approach can provide rapid and sustained functional recovery for chronic PTS and potentially offer a practical alternative for patients unresponsive to standard conservative care. (Nishimaki et al, 2025) Combining hydrodissection with other therapies as post-injection rehabilitation and orthoses in CTS and PTS has shown enhanced effectiveness in some cases. (Cansever et al, 2026; Eyvaz et al, 2025; Nishimaki et al, 2025; Savage and Albano, 2020; Türkyolu et al, 2026) A multi-stage, dual-agent approach including initial corticosteroid injection followed by D5W, has shown promising results, even in severe CTS. (He et al, 2022; Panwar et al, 2024) Across the studies, ultrasound-guided hydrodissection consistently demonstrated the ability to reduce pain, improve hand function and symptom severity, enhance nerve physiology, including improvements in nerve conduction velocity, distal motor latency, and modify nerve morphology, showing promising results for peripheral nerve entrapment syndromes. (Chang et al, 2022; Hashem et al, 2025; Panwar et al, 2024; Roghani et al, 2018; Shojaie et al, 2023; Siahaan, 2021 and 2023) Importantly, ultrasound-guided hydrodissection seems to have a favorable safety profile, with minimal risk of nerve injury or other severe complications.

However, there are several limitations. The evidence on the use of HD in PTS is limited mostly to the case reports and case series. No studies have evaluated the use of PRP for hydrodissection in pronator teres syndrome. Moreover, there is a significant variability across studies regarding optimal injectate volume, frequency of sessions and follow-up period. This underscores the necessity of establishing standardized protocols for HD.

The promising results motivate further need for researches on the topic of hydrodissection in median nerve entrapments. There is arising need for large, randomized, controlled trials with longer follow-up periods to evaluate long-term results, as well as to clarify whether hydrodissection alone or as an adjunct to other conservative therapies provides superior clinical outcomes.

Conclusions

In summary, there is growing evidence that hydrodissection appears to be a promising method in treating entrapment neuropathies, particularly when conservative measures fail. This narrative review shows that various injectates used in HD demonstrate clinical effectiveness in reducing pain, symptom severity, and improving functional outcomes. However, evidence for proximal median nerve entrapments remains limited and is restricted mostly to case reports. Further high-quality studies are essential to establish standardized protocols and the effectiveness of HD across different anatomical locations of median nerve compression.

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