

# Medical Leech Therapy (Hirudotherapy) in Rotator Cuff Syndrome Resistant to Conventional Treatments: A Case Report

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## Abstract:

Rotator cuff syndrome is a common condition that disrupts the biomechanics of the shoulder and leads to severe pain and loss of function. This case report evaluates the efficacy of medical leech therapy (hirudotherapy) in a patient with a traumatic rotator cuff injury that did not respond to conservative treatments. A 52-year-old male patient presented with a five-month history of right shoulder pain resulting from a fall, which had not responded to NSAIDs, corticosteroid injections, or physical therapy. Magnetic Resonance Imaging (MRI) revealed supraspinatus tendinosis and subacromial effusion. Initially, the patient's Visual Analog Scale (VAS) score was 80, and he experienced severe night pain. Three sessions of *Hirudo verbana* application were administered to the peri-acromial region and the supraspinatus muscle, with sessions conducted every two weeks. Following the first session, the VAS score dropped to 30, and the night pain resolved. After the third session, the VAS score decreased to 5. Active shoulder flexion improved from 90° to 100°, and abduction increased from 70° to 80°. No complications were observed. The bioactive peptides in leech saliva likely reduced inflammation and improved microcirculation. Hirudotherapy may be considered as a complementary medical approach for rotator cuff pathologies resistant to conventional treatment.

**Keywords:** Rotator Cuff Syndrome, Leech Therapy, Hirudotherapy, Shoulder Pain, Complementary Medicine

Rotator cuff syndrome is one of the most common causes of shoulder joint dysfunction, encompassing degenerative or traumatic pathologies of the supraspinatus, infraspinatus, subscapularis, and teres minor muscle-tendon complex. Its pathophysiology involves repetitive microtraumas, tissue ischemia, and subacromial impingement. Current conservative treatment algorithms consist of analgesics, non-steroidal anti-inflammatory drugs (NSAIDs), glucocorticoid

injections, and specific physical therapy and rehabilitation programs as the first step. However, the long-term effectiveness of these modalities may be limited, and managing pain may become challenging in chronic cases [1].

Hirudotherapy (medical leech therapy), which is among traditional and complementary medicine practices, is gaining increasing attention, particularly in venous congestion, osteoarthritis, and inflammatory musculoskeletal diseases. The saliva of medicinal

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leeches such as *Hirudo verbana* and *Hirudo medicinalis* contains more than 100 bioactive molecules, including hirudin, hyaluronidase, bdellin, eglin, destabilase, and histamine-like vasodilators. These substances synergistically exhibit local blood flow-enhancing, edema-resolving, anti-inflammatory, and analgesic effects [2-4].

This case presentation aims to discuss the clinical and functional outcomes of medical leech therapy applied in a case of resistant supraspinatus tendinosis that developed after trauma and did not respond to multiple pharmacological agents and the physical therapy and rehabilitation program in light of the literature.

## CASE PRESENTATION

A 52-year-old male patient, who works in a sedentary job and has no known chronic comorbidities, presented to the Orthopedics and Traumatology outpatient clinic on July 27, 2025, complaining of sudden pain and limited movement in his right shoulder after grabbing the banister while falling down the stairs. A non-contrast Magnetic Resonance Imaging (MRI) of the right shoulder performed two weeks after the fall revealed hypertrophic changes in the acromioclavicular joint, a partial tear of the supraspinatus tendon, and fluid accumulation around the biceps tendon.

Between August 2025 and December 2025, various specialists prescribed the patient numerous systemic analgesics and topical agents, including naproxen sodium, dexketoprofen, flurbiprofen, and combinations of tramadol hydrochloride and paracetamol. The patient also received an intra-articular/subacromial corticosteroid injection (betamethasone dipropionate) on August 12, 2025. In addition to medical treatment, a physical therapy program planned by the Physical Medicine and Rehabilitation clinic three months after the fall was completed; this program consisted of cold therapy, transcutaneous electrical nerve stimulation (TENS), range of motion (ROM) exercises, and muscle strengthening exercises.

Despite the comprehensive conservative treatments administered, the patient's symptoms progressed, and an MRI scan was performed five

months after the fall for follow-up. The new imaging revealed tendinosis of the supraspinatus tendon and effusion in the subcoracoid bursa; no acute rupture was detected.

The patient, who continued to experience persistent nociceptive pain, presented to the GETAT (Traditional and Complementary Medicine) Center at Bursa Yuksek Ihtisas Training and Research Hospital six months after the fall. On physical examination, the patient's range of motion measurements showed right shoulder abduction at 70 degrees, active flexion at 90 degrees, and limited internal and external rotation to the midpoint of the range. The patient's visual analog scale (VAS) score for right shoulder pain was determined to be 80. The patient complained of nighttime pain that significantly impaired sleep quality.

After the patient was informed about the medical leech procedure, the Hirudotherapy. Informed Consent Form was signed. To ensure biological safety and clinical standardization, *Hirudo verbana* leeches sourced from production facilities licensed and certified by the Ministry of Agriculture and Forestry of the Republic of Turkey were used. The leeches used in the treatment were single-use.

The treatment was administered in a total of three sessions, spaced two weeks apart. During the first session on January 6, 2026, a total of three leeches were placed on the anterior and posterior surfaces of the right shoulder acromion and on the body of the



**FIGURE 1.** 1st application.

supraspinatus muscle (Figure 1). By the second week of treatment, the patient's VAS score had decreased to 30, and active flexion had increased to 95 degrees. The patient was not using any NSAIDs or narcotic analgesics and had no other active medical treatment. The night pain described by the patient had resolved. The same session was repeated with 4 leeches (Figure 2). In the evaluation conducted prior to the third session, it was noted that the patient's night pain had completely resolved, the VAS score had dropped to 10, and abduction had reached 80 degrees. The patient was not using any NSAIDs or narcotic analgesics and was not undergoing any other active medical treatment. Four leeches were reapplied to the same anatomical regions (Figure 3). At the final examination two weeks after the completion of treatment, no recurrence of rest or night pain was observed in the patient. The VAS score was found to have decreased to 5. The patient was not using any NSAIDs or narcotic analgesics and was not receiving any other active medical treatment. In joint range of motion measurements, abduction was recorded at 80 degrees and active flexion at 100 degrees. A home exercise program was prescribed for the patient to improve joint range of motion. Throughout the entire process, no significant complications were observed other than the expected temporary local erythema and slight oozing-type bleeding at the application sites.

At the follow-up examination 4 months after leech

therapy, the patient reported no pain and was not using any NSAIDs or narcotic analgesics. In the physical examination performed before the leech therapy, joint range of motion measurements showed that right shoulder abduction was 70 degrees, active flexion was 90 degrees, and both internal and external rotation were limited to the midpoint of their respective ranges. Joint range of motion measurements taken four months after leech therapy recorded abduction at 110 degrees and active flexion at 160 degrees. The patient's severe limitations in internal and external rotation had resolved, and the patient was able to bring their hand to their waist and neck.

The study was conducted in accordance with the principles of the Helsinki Declaration, and an informed consent form was obtained from the patient authorizing the use of their data for academic purposes in connection with the hirudotherapy to be administered.

## DISCUSSION

The primary treatment goals for rotator cuff lesions are to halt the inflammatory cascade, resolve tissue ischemia, and restore the shoulder's normal biomechanics. In the presented case, despite continuous pharmacotherapy (NSAIDs, weak opioids) combined with an exercise program including local



**FIGURE 2.** 2nd application.



**FIGURE 3.** 3rd application.

corticosteroid injections and electrotherapy over a five-month period, no clinically significant improvement in pain scores was achieved. However, following local hirudotherapy, a dramatic decrease in the VAS score from 80 to 5 was achieved, and the night pain that disrupted sleep completely disappeared.

It is believed that the complex enzymatic composition of leech saliva underlies this striking analgesic effect. Hyaluronidase (a spreading factor), a matrix metalloproteinase found in the saliva, breaks down hyaluronic acid in connective tissue, thereby increasing tissue permeability. This facilitates the penetration of potent anti-inflammatory and protease inhibitor peptides such as eglin, bdellin, and antistatin into the subacromial and subcoracoid regions. It is believed that the supraspinatus tendinosis and subcoracoid effusion identified in our case's MRI findings have resolved, and the pain cycle has been broken through the suppression of local inflammation by these bioactive agents.

Additionally, local hypoxia which plays a critical role in the pathophysiology of chronic tendinopathies is reversed through the vasodilation provided by hirudotherapy. Histamine-like substances and hirudin in leech saliva optimize oxygenation and nutrition of degenerative tendon tissue by regulating microcirculation. In our case, the increase in active shoulder flexion from 90 degrees to 100 degrees can be explained not only by the inhibition of nociceptive pathways but also by the reduction in subacromial pressure associated with inflammatory joint effusion and the restoration of tissue elasticity [5].

While evidence in the literature demonstrating the efficacy of leech therapy for musculoskeletal disorders such as osteoarthritis and lateral epicondylitis is growing, data regarding its use in refractory rotator cuff injuries remains limited. This case demonstrates that when hirudotherapy is applied with the correct indication and localization, it can serve as a potent analgesic and functional restorative agent in situations where conventional treatments fall short [6].

In a histological study by Yamaguchi *et al.* [7], the natural course of asymptomatic tears was examined, and no reduction in lesion size was observed in any of the 58 cases. Therefore, the article states that neither patients nor surgeons should expect spontaneous healing of the rotator cuff. In conclusion, it highlights the potential role of alternative methods (such as leech

therapy in this specific case) that could contribute to clinical improvement by altering the biological environment in situations where standard approaches fall short.

A review of the patient's medical history revealed that approximately 21 weeks had elapsed between the intra-articular betamethasone dipropionate injection administered on August 12, 2025, and the date of admission to the GETAT center on January 6, 2026. One of the most comprehensive meta-analyses examining the efficacy of corticosteroid injections for shoulder pain, the Cochrane review, reports that steroids provide a significant clinical advantage over placebo in the short term (typically the first 4–6 weeks) for rotator cuff disorders, but that this effect diminishes starting at the 12th week and eventually reaches levels comparable to placebo or physical therapy. In light of these data, the persistent severe pain (VAS: 80) disrupting the patient's sleep quality five months after the injection is consistent with the waning of the steroid's pharmacological effect. The dramatic improvement observed following leech therapy initiated on January 6 is thought to stem from the direct inhibitory effect of biological agents in leech saliva on local inflammation, rather than a delayed effect of the previously administered steroid [8].

The dramatic clinical improvement observed in our case can be attributed to the specific therapeutic properties of proteins identified in medical leech saliva, such as protease inhibitors and vasodilators. It is thought that these proteins work synergistically to reduce local edema and facilitate tissue repair by altering the local biological environment. [4, 5]

The clinical improvement observed in our case can be attributed to the specific therapeutic properties of proteins such as protease inhibitors and vasodilators identified in medical leech saliva. It is thought that these proteins work synergistically to alter the local biological environment, thereby reducing local edema and facilitating tissue repair [4, 5].

This case report has some limitations that should be considered. First, although a dramatic reduction in pain (VAS) was achieved, the improvement in ROM remained relatively limited. This suggests that while hirudotherapy effectively addresses the inflammatory component of the pathology, achieving full functional recovery may require a longer-term rehabilitation regimen due to the mechanical limitations or chronic

nature of the rotator cuff lesion. In this patient, dramatic improvement in joint range of motion was observed during follow-up after leech therapy, in conjunction with a home exercise program. Second, clinical assessment relies primarily on VAS scores and physical examination findings; the absence of shoulder-specific, validated functional scoring systems such as the DASH (Disability of the Arm, Shoulder, and Hand) or Constant-Murley score limits the objective measurement of the patient's functional recovery. Larger-scale studies utilizing these standard tools are necessary to more comprehensively evaluate the functional outcomes of medical leech therapy in rotator cuff syndrome.

## CONCLUSION

In conclusion, medical leech therapy using *Hirudo verbana* may help control symptoms and contribute to moderate functional improvement in certain cases of rotator cuff syndrome that do not respond to multifaceted conservative treatments. While the observed reduction in pain is significant, the limited improvement in range of motion suggests that leech therapy should be considered a complementary component rather than a standalone solution in chronic cases. To clarify the underlying molecular mechanisms and determine the precise role of this application within routine treatment algorithms, larger-scale, randomized controlled clinical trials using validated functional scoring systems are essential.

### *Ethics Approval and Consent to Participate*

As this study is a single case report, formal ethics committee approval was not required. However, the study design and data collection were conducted in strict accordance with the principles of the Declaration of Helsinki. Written informed consent was obtained from the patient for the publication of this case report and any accompanying clinical details and images.

### *Data Availability*

All data generated or analyzed during this study are included in this published article. The data that support the findings of this study are available on request from the corresponding author, upon reasonable request.

### *Authors' Contribution*

Study Conception: RE; Study Design: RE; Supervision: RE; Funding: RE; Materials: ABB; Data Collection and/or Processing: RE; Statistical Analysis and/or Data Interpretation: RE; Literature Review: RE; Manuscript Preparation: RE; and Critical Review: RE.

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### *Editor's Note*

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