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Authors' Affiliation:
Medical University of Warsaw, Żwirki i Wigury 61, 02-091 Warsaw, Poland

***Corresponding author:**
Paweł Krzysztof Woś,
Medical University of Warsaw, Żwirki i Wigury 61, 02-091 Warsaw, Poland,
Email: pawelwos01@gmail.com

ORCID List:
Paweł Woś 0009-0003-2604-6170,
Bartłomiej Kowalski 0009-0003-5856-2663,
Tomasz Kucharski 0009-0007-5647-9021,
Daniel Dylko 0009-0004-2162-2340,
Michał Szustakowski 0009-0001-9043-1845,
Paweł Lewandowski 0009-0009-3486-1945,
Jan Bogdański 0009-0000-8367-2205

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Modern Perspectives on De Quervain's Tenosynovitis: From Degenerative Pathogenesis to Ultrasound-Guided Management: A Narrative Review

Paweł Woś*, Bartłomiej Kowalski, Tomasz Kucharski, Daniel Dylko, Michał Szustakowski, Paweł Lewandowski, Jan Bogdański

ABSTRACT

De Quervain's tenosynovitis (DQT) has evolved from an inflammatory occupational injury into a degenerative tendinosis. Our growing understanding of modern biomechanics, such as the "texting thumb" phenomenon in adolescents and the physical demands on primary caregivers, is driving this shift in clinical perspective. This study intends to describe changes in the etiology, anatomy, imaging, and management of DQT by summarizing the literature from the last 6 years. We detail the histopathological changes in DQT, specifically fibrocartilaginous metaplasia and irreversible bony changes, such as radial styloid sclerosis. A high incidence of an intracompartmental septum (up to 67%) represents a major factor in conservative treatment failure. We contrast the high recurrence rates of "blind" corticosteroid injections with the accuracy of ultrasound-guided (USG) injections, which yield results comparable to arthroscopic release. Furthermore, we show that USG-percutaneous release effectively treats patients experiencing recurrence after arthroscopic procedures. We explore the use of orthobiologics, such as Platelet-Rich Plasma (PRP), for chronic structural tendon damage, as well as the role of acupuncture in early rehabilitation. High-resolution ultrasound is our preferred modality for the modern treatment of DQT, and we advocate for patients to be part of shared decision-making to restore hand function and prevent recurrence.

Keywords: De Quervain's tenosynovitis, radial styloid pain, ultrasound-guided injection, texting thumb, corticosteroid injection.

1. INTRODUCTION

De Quervain's tenosynovitis (DQT) is a type of wrist pain that occurs when a narrow space compresses the tendons that control thumb movement. The tendons affected are called the abductor pollicis longus (APL) and the extensor pollicis brevis (EPB). The tendons pass under a ligament at the base of the thumb that keeps them in place. When tendons narrow, severe pain results. DQT was for many years

considered to be a condition caused by repetitive hand use or activities, such as typing or lifting. While some of these activities are likely to contribute to the condition, more recent studies have shown that DQT is occurring in an increasing number of other populations as well. Mobile device use among teenagers and young adults poses a modern risk (Asad et al., 2024). DQT is also common among caregivers (mother's wrist). Lifting and holding infants strains the tendons, leading to entrapment (Ferraro et al., 2023).

Researchers no longer see inflammation as the only underlying cause of DQT. Research now points to degenerative changes, such as thickening of the tendon sheath and fibrocartilaginous metaplasia (Fakoya et al., 2023). These changes often occur with bone changes at the radial styloid (Akdag et al., 2022). Anatomical differences, especially an intracompartmental septum between the APL and EPB, affect symptom display and clinical outcomes (Allbrook, 2019; Fakoya et al., 2023).

Diagnosis is mainly clinical and often depends on Finkelstein's test. High-resolution ultrasonography has greatly boosted accuracy. This scan detects tendon changes within the tendon sheath and anatomical variations (Tamura et al., 2020). Most conditions of the wrist tendon sheath are treated initially with corticosteroid injections and a period of immobilization. Over the years, though, we have moved on to using other, more effective treatment modalities, such as Platelet Rich Plasma injections, ultrasound-guided tendon release, and acupuncture needling of tendons (Bhat et al., 2023; Alam et al., 2024; Qin et al., 2024).

Based on 19 clinical studies and meta-analyses, this review offers a synthesis that updates our knowledge of the etiology, diagnostic criteria, and treatment options for DQT. It reviews both traditional and novel therapeutic options, serving as a useful guide to the management of DQT.

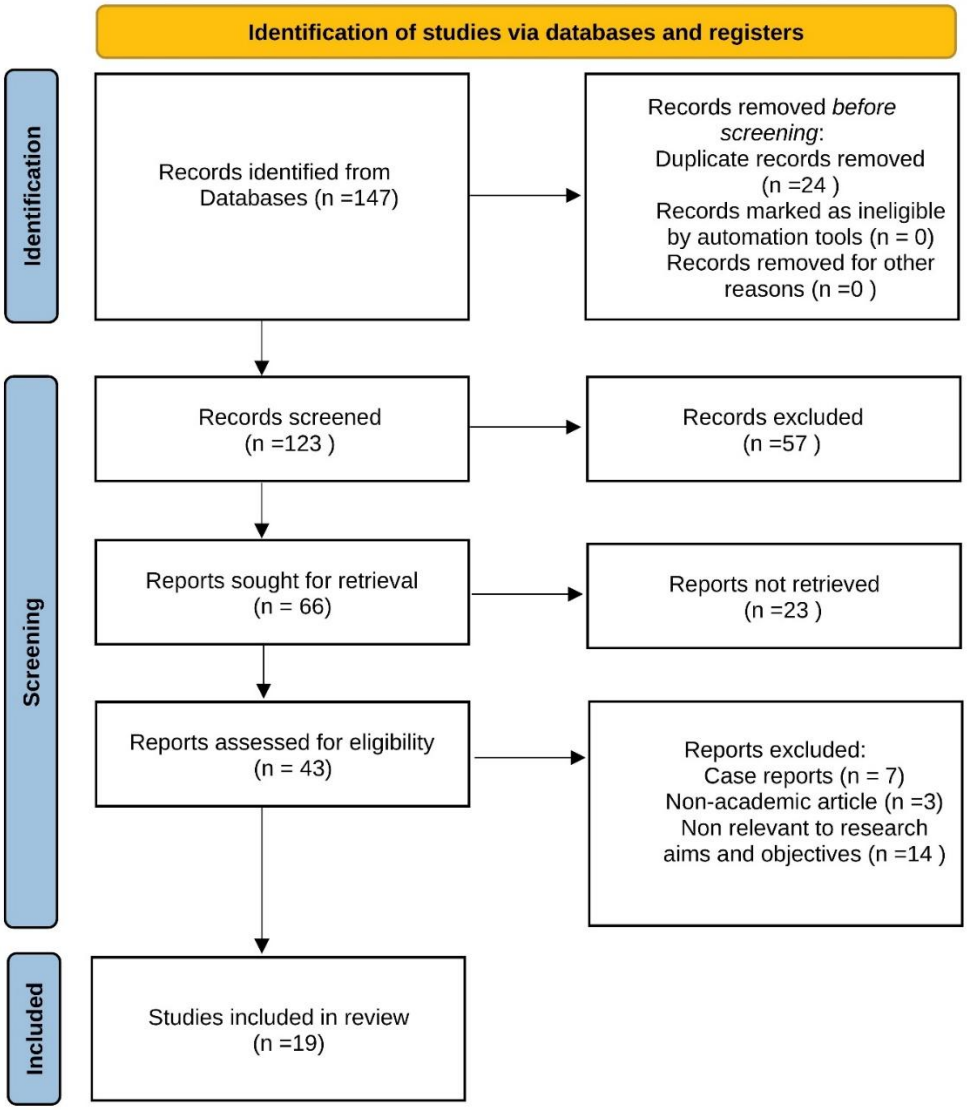

Figure 1. PRISMA 2020 flow diagram detailing the database searches and record screening process.

2. REVIEW METHODS

Search Strategy

We searched PubMed, Scopus, Google Scholar, Cochrane Library, and ScienceDirect databases for literature published over the last 5 years (2021-2026). The used keywords were "De Quervain's tenosynovitis"; "stenosing tenosynovitis"; "first dorsal compartment"; "Finkelstein's test"; "corticosteroid injection" and "ultrasound-guided release". Figure 1 shows the methods for reviewing clinical studies.

Inclusion and Exclusion Criteria

We filtered and reviewed 19 sources after evaluating their quality. Criteria used for selecting sources: - RCTs / Systematic Reviews / Meta-analyses - Modern risk factors including the use of devices or activities related to caregiving - Studies comparing Imaging and Clinical examinations - We selected only English language sources for this literature review. Criteria excluded from analysis: - Low value case reports - non-peer reviewed studies - Studies related to generalized arthritis, without proper details regarding the wrist tunnel.

Data Synthesis

We extracted and synthesized relevant data about current treatment strategies. In addition, we evaluated the outcomes of conservative and surgical treatments of DQT, with particular regard to the impact of intra-articular anatomical variability.

3. RESULTS & DISCUSSION

3.1. Epidemiological Shifts

De Quervain's tenosynovitis was once regarded as a condition mainly affecting middle-aged manual laborers. Recently, it has become evident that it is affecting a wider variety of people. Changes in lifestyle and parenting appear to be the major elements causing this variation in the epidemiology of this condition.

New research is alerting this field by showing really strong links between overdose on mobile usage and wrist pain in Saudi adolescents (Asad et al., 2024). They reported a cross-sectional study of DQT in adolescents in Saudi Arabia. The researchers found that excessive cell phone use is associated with wrist pain. The tendons are generally underneath the extensor retinaculum, and are therefore switching constantly between being contracted and lengthened. These movements cause mechanical fatigue. Teenagers who used their devices for gaming or texting for 4–6 hours a day or more had significantly higher Finkelstein's test scores. The study showed more signs of soft-tissue damage, suggesting that it occurs before adulthood and before individuals assume adult or occupational duties.

A detailed review of the "mother's wrist" is long overdue. Despite being a common term, the reasons for increased DQT in the postpartum period were unknown. Relaxin causes ligamentous laxity (Pflibsen et al., 2023). An increased level of the hormone causes DQT in postpartum women already at high risk. Our findings indicate that this is now a biomechanical factor rather than just one of many postpartum changes driven by fluid retention or hormonal imbalance. A survey of 121 primary caregivers found that caring for babies places significant physical strain (Ferraro et al., 2023). Interestingly, the study included men and women to rule out purely hormonal causes of the condition. The 20 caregivers who had wrist and hand pain and a positive Finkelstein test had higher QuickDASH disability scores than those with non-specific wrist pain. The authors of the study found a strong statistical correlation ($p = 0.007$) between symptom severity and the child's age and weight. The average age of an infant who did not cause any difficulties for the caregiver was 272.8 ± 196.5 days. In contrast, the average age of an infant who caused DQT symptoms in the caregiver was 481.9 ± 488.9 days.

3.2. Anatomical Complexity: The Intracompartmental Septum and Gliding Resistance

The considerable impact of anatomical variances on the progression of DQT is a recurrent theme in the research. Although it varies from person to person, the thumb tendons lie in the first dorsal compartment. An intracompartmental septum frequently separates the APL and EPB tendons (Allbrook, 2019; Fakoya et al., 2023). Between 40% and 67% of people have this trait.

The main anatomical reason for failure of conservative (non-surgical) management is such compartmentalization, which isolates the DQT pathology within the smaller, more tightly packed EPB sub-compartment. High-resolution ultrasonography provides clear diagnostic evidence in clinical case studies (Tamura et al., 2020). When primary care physicians give "blind" corticosteroid injections

based on anatomical landmarks only, without imaging guidance, they are at the mercy of the anatomy. The injectate almost invariably enters the larger APL sub-compartment. The impermeable nature of the septum prevents the anti-inflammatory medication from bathing the inflamed EPB tendon. This results in high clinical recurrence rates, often quoted between 30-40% in non-guided settings, and prolonged patient suffering.

Altered joint biomechanics may also be responsible for secondary degenerative trauma to the thumb (DQT). De Quervain's tenosynovitis represents a frequent and serious complication following trapeziometacarpal arthroplasty for degenerative thumb conditions (Ledoux, 2024). A complete trapeziectomy or a joint replacement totally changes the trapezoidal body shape. Such a procedure also changes the thumb's longitudinal axis and length of the thumb column. This change in geometry alters the approach angle of the APL and EPB tendons as they enter the first dorsal compartment. It increases their gliding resistance dramatically. Increased friction at the extensor retinaculum starts a secondary, iatrogenic stenosing tenosynovitis. Surgeons must thoroughly evaluate compartmental tightness during and after thumb base reconstruction.

3.3. Histopathology and Osseous Alterations

The term tenosynovitis derives from the supposed acute prostaglandin-mediated inflammatory process. The latest studies, however, suggest that DQT is degenerative tendinosis with fibrocartilaginous metaplasia.

Intraoperative biopsies of the extensor retinaculum in patients with chronic DQT show no evidence of typical inflammatory cells, such as neutrophils or macrophages (Fakoya et al., 2023). Instead, researchers found heavily damaged tissue. Chronic tensile and compressive friction stimulates the fibroblasts in the tissue to alter the expression of proteins. There was upregulation of Type III collagen, a heterogeneous, inferior, and fibrotic type of collagen, expressed abundantly in scar tissue rather than the more ordered and organized Type I collagen. In addition, there was an accumulation of mucopolysaccharides in the extracellular matrix, leading to myxoid degeneration and a significant increase in the cross-sectional area of the tendon sheath. That imposes a critical spatial constraint within the fibro-osseous tunnel. The authors postulate that such mechanical strangulation is aetiological for the pathologic neovascularisation and neurogenesis, as there was an increase in the density of substance P-releasing nociceptive nerve fibers, which correlated with the intensity of pain as exhibited by the patients during the Finkelstein or Eichhoff test.

Radiographic evidence shows that osseous alterations at the radial styloid strongly influence DQT pathology (Akdag et al., 2022). The first major change is that they demonstrated that DQT isn't simply a soft-tissue condition but also includes considerable bone remodeling. The researchers analyzed posteroanterior wrist radiographs from 24 surgically treated DQT patients and compared them with the same number of age- and sex-matched healthy controls and conservatively treated DQT patients. The study found that surgically treated DQT patients showed greater bony growth and cortical thickening at the radial styloid than conservatively treated patients and controls. Chronic soft-tissue DQT tendon sheath friction apparently elicits a reactive periosteal response with bone formation, thereby worsening the narrowing of the space. Radiographic evidence of bone sclerosis at the radial styloid confirms that this area is indeed a marker of chronicity. In these cases, patients with radial styloid sclerosis are unlikely to gain any long-term benefit from conservative therapy and should be referred for surgery promptly.

3.4. Efficacy and Clinical Parameters: Corticosteroid Injections (CSI) versus Surgical Intervention.

A meta-analysis confirms that corticosteroid injections are superior to splinting alone for the management of DQT (Cevik et al., 2024; Cuenca-Zaldívar et al., 2025). The use of a thumb spica splint is merely a palliative measure by reducing the mechanical load on the tendons. Still, it does not provide a long-term solution to thickening of the extensor retinaculum. A prospective study involving 75 patients (72% female) showed that over 70% remained completely asymptomatic after a single corticosteroid injection (Afridi et al., 2024). The authors highlight that the high success rate in this study depended on exact drug deposition.

Ultrasound-guided steroid injections demonstrate comparable efficacy to surgical compartment release in the management of DQT (Bhat et al., 2023). Data of clinical outcomes, assessed using the Disabilities of the Arm, Shoulder and Hand (DASH) scale, the Patient-Rated Wrist Evaluation (PRWE) and the Visual Analog Scale (VAS), in patients undergoing ultrasound-guided steroid injections and those who underwent a surgical compartment release have dramatically improved, from basal values for the first indicating the degree of disability (DASH score of 81.7 ± 10.8, on average) to final values of DASH scores for all patients showing no symptoms or complaints at all (in the range of 0 to 30, and without any statistically significant difference in between). Therefore, this study has a major impact on the myth and unproven dogma that recurrence after surgery is impossible; it shows that meticulous placement of steroids at exact locations within the anatomical APL and EPB subcompartments can mimic the effectiveness of scalpel surgery.

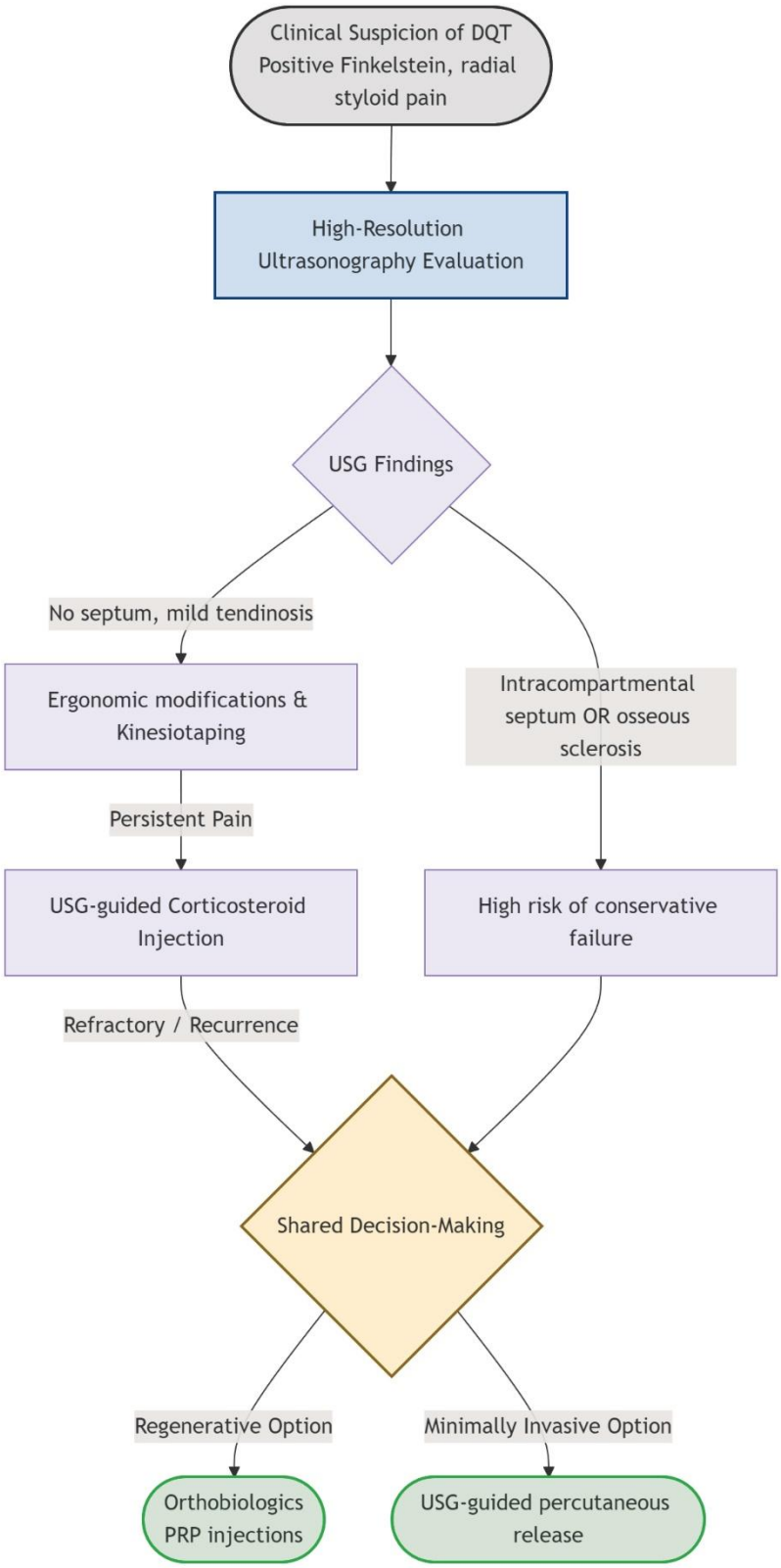

Figure 2. Algorithm of modern therapeutic methods for De Quervain's tenosynovitis.

3.5. The Paradigm Shift: Minimally Invasive Ultrasound-Guided Release

Tendon pathologies that are resistant to steroid injection or in patients with contraindication to steroid usage are traditionally treated using a classic open surgical release. This procedure results in a scar, a potential keloid, and a significant risk of injury to the superficial

branch of the radial nerve. Percutaneous, antegrade, ultrasound-guided tendon release represents a novel and effective method for DQT management (Ferreira Villanova et al., 2025). A retrospective study of 34 patients found that a cutting needle could be used instead of an open-scalpel needle when using ultrasonography-guided needle sectioning of the retinaculum. "The use of the cutting needle and the ultrasound fully decompresses the tendons, without the need for skin excision," the authors explained. "Full tendon movement can be achieved at once, decreasing the risk of nerve damage, and scar tissue is reduced". The new method, termed "sonographic surgery" by the authors, is an efficient "staging post" between conservative management and radical surgery.

3.6. Regenerative and Conservative Alternatives: Platelet-Rich Plasma (PRP) and Acupuncture Neuromodulation

The main pathological feature of DQT is a degenerative tendinosis rather than acute inflammatory changes. Steroids that result in catabolic breakdown and tissue atrophy might not be the best option for the entire patient population in this group of diseases. While steroids mainly reduce pain and inhibit tissue repair, PRP injections activate tendon fibroblasts to remove the degenerated matrix and generate high-quality type I collagen fibers (Alam et al., 2024). They also promote angiogenesis and improve tendon microarchitecture, thereby making PRP a highly effective treatment modality for patients with extensive chronic structural tendon damage.

A meta-analysis indicates that acupuncture is a statistically effective intervention for DQT management (Leung et al., 2022; Qin et al., 2024). The study shows that the acupuncture led to a statistically significant reduction in VAS as compared with the waitlist control. Researchers link endorphin secretion in the central nervous system with local nitric oxide (NO) stimulation for pain relief. While kinesiotaping and physical modalities—such as ultrasound and iontophoresis—do not induce permanent anatomical changes, they provide temporary unloading that increases grip strength and facilitates earlier access to kinesiotherapy (Drapeza et al., 2022; Ferrara et al., 2020).

3.7. The Patient Perspective: Shared Decision-Making

Treatment of DQT should take into account the individual patient's needs and worries. The data gathered suggest that patient's priorities in DQT management often differ from those clinicians expect. Most people would rather get back to work quickly and reduce pain than avoid DQT recurrence at any cost (Parikh et al., 2024).

Clearly, the patients who are informed of the full anatomical nature of their condition (e.g., the presence of the intracompartmental septum, which precludes the so-called "blind" approach to injection or surgery) prefer the more rapid option of USG-guided surgical procedure rather than an extended period of conservative management that may not be highly successful. In some cases, an extended period of splint wear is necessary to assess the requirement for surgery. Still, in the context of a patient who can undergo effective surgery within a relatively short period of time, it does not seem reasonable to ask the patient to accept an uncertain period of splint wear in the expectation that it will prevent the need for surgical intervention. This issue shows the principle of Shared Decision-Making. The clinician must move away from a cookbook approach (e.g., always considering steroid injections before surgery) and develop a treatment strategy customized to the individual patient's biomechanical condition. Figure 2 illustrates the comprehensive diagnostic and therapeutic pathway, while Table 1 summarizes key findings.

Table 1. Summary of paradigm-shifting key findings in modern DQT management.

Domain	Traditional Paradigm	Modern Paradigm (Key Findings)	Clinical Implication
Etiology	Occupational hazard (heavy manual labour) or strictly hormonal postpartum condition.	Driven by modern biomechanics: adolescent smartphone use ("texting thumb") and specific infant cradle holds.	There is a need for early ergonomic education and lifestyle modification before skeletal maturity.
Pathology & Anatomy	Simple acute inflammation; anatomy assumed uniform.	Degenerative tendinosis with a high prevalence (up to 67%) of an intracompartmental septum & irreversible osseous sclerosis.	Routine X-ray/USG is vital for identifying structural damage that precludes conservative management.
First-line Therapy	Blind corticosteroid injections based on anatomical landmarks.	Ultrasound-guided (USG) injections into isolated sub-compartments match the efficacy of open surgery.	"Blind" injections should be abandoned to minimize high recurrence rates.
Surgical	Traditional open surgical	Antegrade percutaneous release	Provides complete

Intervention	release of the extensor retinaculum.	under real-time USG visualization.	decompression with minimal scarring and no iatrogenic nerve injury.
Regenerative Options	Prolonged NSAIDs or repeated steroids (causing tissue atrophy).	Orthobiologics, primarily Platelet-Rich Plasma (PRP).	Promotes type I collagen synthesis and tissue healing for chronic, structural tendon damage.

5. CONCLUSION

Modern studies continue to deepen our knowledge of the genesis, pathophysiology, and treatment of De Quervain's tenosynovitis. This literature review shows that DQT involves fibrocartilaginous metaplasia and myxoid degeneration. It is not an acute inflammatory illness. Modern risk factors, such as "texting thumb" among teenagers and biomechanical strain on primary caregivers, require increasing awareness and early detection standards. An intracompartmental septum is seen in 67% of wrists, so we recommend high-resolution ultrasound as part of standard evaluation. PRP offers a physiological approach to treating chronic tendinosis. Ultrasound-guided percutaneous release is now an important minimally invasive option. Physicians should use shared decision-making and precise imaging for each patient's anatomy. To reduce relapse rates and restore optimal hand function, it is highly advised to consider working conditions and usability needs.

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Authors' Contributions

Paweł Woś - Conceptualization, writing- rough preparation, methodology, investigation, supervision
Bartłomiej Kowalski - Conceptualization, methodology
Tomasz Kucharski - Formal analysis, Writing - Review and editing
Daniel Dylko - Visualization, data curation
Michał Szustakowski - Conceptualization, writing- rough preparation
Paweł Lewandowski - Methodology, data curation
Jan Bogdański - Visualization, data curation

Informed consent

Not applicable.

Ethical approval

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Conflict of interest

The authors declare that they have no conflicts of interest, competing financial interests or personal relationships that could have influenced the work reported in this paper.

Data and materials availability

All data associated with this study will be available based on the reasonable request to corresponding author.

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