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Dupuytren's Contracture in Athletes: Prevalence, Causes, Treatment. A Literature Review and guide for sport professionals

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Abstract

Background: Dupuytren's contracture is a fibrotic condition of the hand, traditionally associated with age, genetics, and metabolic factors. However, recent observations suggest it may also appear in younger individuals with high physical activity levels.

Aim of the study: The aim of this study was to review the current literature on Dupuytren's contracture in athletes and explore possible links between training load, mechanical stress, and early disease onset**.**

Material and methods: The review was conducted using published case reports, observational studies, and athlete-specific data describing Dupuytren's contracture symptoms, diagnosis, and treatment outcomes using a PubMed search and inclusion criteria.

Results: Several studies describe early nodular changes and functional symptoms in athletes from sports such as climbing, judo, hockey, and rowing. Repetitive microtrauma, overuse, and delayed tissue recovery may contribute to earlier fibrotic changes. Functional impairment in athletes often appears earlier and requires tailored treatment to preserve performance.

Conclusions: Dupuytren's contracture in athletes may follow a distinct pathway, triggered or accelerated by mechanical overload. Early recognition and sport-specific management may help prevent long-term complications. Further studies are needed to identify risk factors and develop screening tools for athletic populations.

Keywords: Dupuytren's Contracture, Dupuytren's Disease, Vikings' disease, Sport, Physical Activity, Rehabilitation, Hand, Hand surgery, Z-plasty, fasciectomy, needle fasciotomy, Hand Trauma, Hand health, Hand dexterity.

Contents

Introduction

Dupuytren disease is a proliferative fibroplasia of the subcutaneous palmar tissue occurring in the form of nodules and cords that may result in secondary progressive and irreversible finger joint flexion contractures (1). The disease usually affects the ring and middle finger of the hand by making it impossible to stretch the affected fingers (1). The disease has been divided into stages depending on the intensity of extension deficit (2). It usually affects the metacarphalangeal joint and the proximal interphalangeal, but in up to 5% may affect also the distal interphalangeal joint (3).

It is a major cause of disability, creating problems with daily life such as preparing meals, dressing, gripping, personal care, physical work or affecting physical activity (4, 5). It usually progresses with time, with the fingers becoming more and more stiff and unable to be straightened by pulling the finger away from the palm. The disease usually starts on the ulnar side of the ring finger of the dominant hand and may progress to other fingers as well. In some cases, the disease forms ectopic areas such as in the wrist. Other forms of the disease such as knuckle caps, occur in up to 54% of patients (6). The other lesion locations are less quantified by modern studies (7).

Pathogenesis

The pathogenesis of this disease is mostly unknown, though the processes through which is appears have been discovered (8). At the core of the disease is excessive fibroblast proliferation and collagen type 3 deposition (1). 10% of cells involved in nodule formation are immune cells, including macrophages and lymphocytes. These cells secrete a wide spectrum of pro-inflammatory cytokines, such as tumour necrosis factor (TNF), interleukin-6 (IL-6) and IL-8 (9). Dupuytren's contracture is thought of as a localized inflammatory disorder, but the exact mechanism of immune cell recruitment to form nodules and cords is still not fully understood (10). It has been suggested that it is a T cell–mediated autoimmune disease due to the discovery of dense T-cell infiltrates in the nodules. It progresses with time.

Epidemiology

It affects men up to ten times more commonly than women. Males also tend to be affected at a younger age (11). The average age of onset is 33 to 63 years old for men and 46 to 70 years of age in women (11) while other source point to an age between 40-59 for men and 40-69 for women (12). Aside from age, literature lists other pathogenetic factors such as manual labour, heavy exposure to vibration (such as in power hammer users), heavy alcoholism, cigarette smoking, epilepsy, diabetes mellitus (1, 6, 11, 13). Some individuals are more prone to developing this disease due to genetic factors. An autosomal dominant pattern of heritance has been observed. Patients with higher percentage of Neanderthal DNA have also been found to be at higher risk (14). Hindocha et. al discovered a sibling recurrence-risk ratio of 2.9 (15). Due to it occurring more commonly in those of Nordic, Central and Eastern European descent some call it Viking's disease (1). Those genetically-burdened individuals tend to develop Dupuytren's contracture more frequently and earlier in life, often affecting both hands and multiple joints of the fingers (1). Newer research identified other risk factors for the disease, such as physical trauma, including resulting from sports-realted injury (6). Some types of physical activity, recreational and competitive, lead to more common and more severe cases of this ailment.

This review aims to identify risk factors and evaluate the potential link between physical activity, sports-related trauma, and Dupuytren's disease. The following sections will provide an overview of the condition in the context of sports, covering both treatment approaches and physical rehabilitation.

Materials & Methods

A comprehensive literature search was conducted on PubMed to identify relevant studies concerning Dupuytren's Contracture and its association with physical activity and trauma. The search strategy employed a search query: ("Dupuytren Contracture" OR "Dupuytren's disease" OR "Dupuytren" OR "Dupuytrens disease") AND (athlete OR sports OR "physical activity" OR sport).

The initial search yielded a total of 92 results. Following a meticulous screening process, 17 articles met the inclusion criteria and were subsequently incorporated into the review. The inclusion and exclusion criteria are were as follows in Table 1. A full list of included articles is included as Table 2.

Inclusion Criteria:
Articles discussing Dupuytren's Contracture in the context of sports, sports trauma, or general physical activity.
Studies investigating sport-related trauma as a potential etiological factor or exacerbating condition for Dupuytren's Contracture.
Case reports, cohort studies, or systematic reviews containing clinical data or biomechanical analyses relevant to the research question.
Exclusion Criteria:
Articles primarily focused on purely genetic or idiopathic cases of Dupuytren's Contracture without any demonstrable link to trauma.
Papers exclusively addressing the treatment of Dupuytren's Contracture unless the discussion explicitly included its trauma etiology.
Animal studies or in-vitro research unless their findings were directly and demonstrably relevant to the mechanisms of trauma in human Dupuytren's Contracture.

Table 1 *Inclusion and Exclusion criteria*

Among the selected 17 studies, several propose a link between athletic activity and Dupuytren's disease formation. There are many elements that contribute to Dupuytren's contracture in athletes.

Analysis

Vibration Exposure

As early as in 1971 mechanical stress and vibration was proposed as a contracture causing agent. Sinkarenko et. al suggested that these factors could cause contractures (16). This would occur through the impact on connective tissue, collagen proliferation and immune cell activation. Prolonged exposure to hand-arm vibration has links to a greater chance of Dupuytren's contracture and other vascular, nervous and connective tissue issues.

Examples include motorsports, power tools, and certain gym equipment. In a 2023 review, Gerger et al. described 10 studies with over 24,000 individuals. They found a noteworthy connection between hand-arm vibration and fibrotic conditions of the hand (hand-arm vibration syndrome, Dupuytren's contracture, or hypothenar hammer syndrome) with odds ratios ranging between 0.93 and 3.43 (95%) (17). Popiołek reviewed clinical data from patients with Hand-Arm Vibration Syndrome (HAVS). A higher incidence of palmar thickening and early-stage contracture occurred in HAVS affected individuals, compared to a control group (13). Moreover, some studies prove that Dupuytren's contracture caused by HAVS has lower odds of successful surgical treatment than idiopathic Dupuytren's disease (18).

Repetitive Load and Overuse

Sports with repeated, forceful gripping place considerable strain on the palmar fascia. Examples are climbing, judo, hockey, rowing, gymnastics, and racquet sports. Haas-Lützenberger et al. compared hand dexterity, strength and movement between 27 patients with more advanced (Tubiana stage II, III and IV) Dupuytren's disease to 27 matched controls.

The Dupuytren's group showed greater grip force, even during routine tasks (gripping, grasping and lifting) (19). This habit may contribute to progression of this condition.

Rock climbing is a sport which places extreme stress on the musculoskeletal system of the upper extremity. Merritt et al. described hand injuries in rock climbers extensively. These include repetitive pulley strain, joint inflammation, and fascia stress. These may mimic or precede early-stage Dupuytren's disease (20). Logan et al. conducted a questionnaire study among the Climber's Club of Great Britain. 561 prevalently male rock climbers were included in a matched case-control study. It was discovered that 19.5% of the respondents showed signs of Dupuytren's disease including a notably higher rate of nodular changes and palmar thickening. This study not only highlight the higher rate of incidence but also the earlier onset of the disease in individuals with higher frequency and intensity of palmar microtrauma (21). Likewise, in a 2014 rock climbing related study, Beleta and Forés presented a short report letter about a case of identical twins. One twin, a high-level, high-training intensity rock climber, developed three nodules across both hands. The other twin, a marathon runner with no climbing history, had no signs of the disease. Neither had a family history of the disease. This case implies that repetitive micro trauma from climbing might trigger early-onset Dupuytren's contracture, especially where there is genetic susceptibility but even without it (22).

A 2018 study by Broekstra et al. examined 169 male field hockey players, each over the age of 60, and compared them to a group of non-hockey playing of 156 males. Most players had no family history of Dupuytren's contracture. Prior to the analyses, the groups were balanced in risk factors using propensity score matching. The results showed that 51.7% of hockey players had signs of Dupuytren's disease, whereas only 13.8% of controls exhibited signs (OR=9.42, 95% CI 3.01 to 29.53). The study pointed to repetitive and forceful hand use, specifically strongly gripping hockey sticks, as a potential factor for disease development (23).

Trauma

Isolated injuries can also lead to Dupuytren's contracture. Loffredo et al. documented a case of Dupuytren's contracture in a 59-year old athlete who fell awkwardly on his hand. Within days of the accident, he noticed new nodules and a firm cord extending from the base of his ring finger to the base of the palm and was subsequently diagnosed with traumatic Dupuytren's disease (24). Similarly, Eastwood reported this condition in a patient five days after sustaining a dorsal dislocation of the proximal interphalangeal joint. Due to the Dupuytren's disease in its early stage, the dislocation became irreducible, causing progression and further disability (25). In another trauma case, Connelly documented a 41 year old man who suffered both traumatic Dupuytren's disease and traumatic Peyronie's disease, a similar disorder of fascia affecting the penis. Contractures developed after a snowboarding accident and during intensive hammering at a windsurfing outing. This study highlights the similarities in pathogenesis and symptoms of these two conditions (26).

Heim et al. described a case of an athlete who developed bilateral plantar Dupuytren's disease (Ledderhose disease) in the form of painful, fibrotic masses in both feet. The sportsman reported that the disease's symptoms began two years after he lacerated his feet by running barefoot over broken glass (27). This case demonstrates that trauma can initiate the disease process also outside of the hand.

Management of Dupuytren's Contracture in Athletes

Treatment typically involves surgical removal of the affected fascia, with the goal of maintaining proper joint function in the hands. The most common surgery, which is known as fasciectomy, is usually successful, though it leaves permanent scarring and may cause infection, iatrogenic injury to blood vessels, nerves and tendons (28, 29). Alternative treatment options include needle fasciotomy, offering a less invasive approach. (29). It can be done in an outpatient setting.

Non-invasive treatments include reducing stress on an athlete's palms using specialized equipment such as padded gloves, pull up hooks and pads. Increasing the diameter of the grip handle reduces shearing forces applied to the palm of the hand. Thus, through the use of specialized, wider than average grip handles, athletes and recreational sports hobbyists can enjoy physical activity such as golf, tennis, table tennis, weight-lifting (30). Other treatments involve external radiotherapy, collagenase injections and rehabilitation. Aside from the treatments mentioned above, the only possible form of stopping the progression of the disease is by limiting exposure to risk factors.

In a mayor review, Huisstede et al. concluded that early-stage disease may be managed with non-surgical methods. Examples are splinting, therapy, and massage (31). More advanced contractures often require physical interventions, such as collagenase injections or surgery. Collagenase injections present a less invasive approach yet they carry their own set of risks. One rock climber who received a successful collagenase injection ruptured a pulley muscle and had to undergo reconstructive surgery (32). This highlights potential treatment risks, notably in athletes who rely on hand strength.

Rehabilitation Considerations for Athletes:

Early research suggested conservative therapies (16). Examples are splinting and gentle movement. However, modern athletes often need a more aggressive approach, especially those requiring more rapid recovery in order to continue their career. Boe et al. compared outcomes of athletic and non-athletic patients post Dupuytren's disease treatment. Athletes in active rehabilitation programs had faster grip strength recovery (33). Rehabilitation programs for athletes should contain functional grip strengthening exercises, mobility training and sport-specific drills.

Recommendations for Sports Professionals

Coaches, trainers, and therapists should:

- Watch for early signs of Dupuytren's disease. Examples include palmar nodules, difficulty with finger extension, and asymmetrical grip strength.
- Use strategies to lessen hand load. Examples include activity modification and padded grips.
- Enable early referral to a physician for diagnosis and management.
- Encourage collaborative care among relevant professionals to improve athlete outcomes.

Discussion

Seeing signs of Dupuytren's contracture in athletes suggests that physical stress might play a bigger part in the condition than we used to think. While age and family history are well-known causes, cases in young, active people show that repeated strain, small injuries, and not enough time for recovery could also lead to early tissue changes. For athletes, this can be a real problem - even a mild contracture can affect how well they grip or move their hands, which may hurt performance. That's why catching it early is so important. Treatment should be chosen carefully, especially for athletes who need to stay active. The goal is to manage symptoms without stopping training or competing for too long.

Limitations and Future Directions

One clear limit of this review is the small number of studies that focus on athletes with Dupuytren's contracture. Most of the research so far comes from case reports or general observations, which don't give the full picture. More solid data is needed. Future studies should look at how training, rest, and past injuries affect the risk of developing the condition. It would also help to study athletes from different sports, age groups, and skill levels. Tools that help spot the problem early in athletes could lead to better care and prevent long-term issues.

Conclusion

Dupuytren's contracture is a relatively common disease of the hand which has been found to also affect athletes. By increasing awareness of this condition it is now possible to reduce its impact or avoid it completely. The main factors contributing to its development are risk factors, such as exposure to vibration, repetitive strain, and trauma. Early detection and proper management are key. They can protect athletes' careers, training, and quality of life.

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Supplementary Material

Study Title	Author	Source	Year	DOI/Link
Sport-Related Traumatic Dupuytren's Contracture	Loffredo AJ	Curr Sports Med Rep	2022	10.1249/JSR.0000000000000986
Effectiveness of Conservative, Surgical, and Postsurgical Interventions for Trigger Finger, Dupuytren Disease, and De Quervain Disease: A Systematic Review	Huisstede BM	Arch Phys Med Rehabil	2018	10.1016/j.apmr.2017.07.014
Hand injuries in rock climbing	Merritt AL	J Hand Surg Am	2011	10.1016/j.jhsa.2011.08.020
Dupuytren's disease in a rock climber with an unaffected identical twin	Beleta H	J Hand Surg Eur Vol	2014	10.1177/1753193412457149
Sporting implications of podal Dupuytrens disease	Heim M	Br J Sports Med	1987	10.1136/bjsm.21.2.37
[Dupuytren's contracture and rehabilitation]	Sinkarenko IN	Beitr Orthop Traumatol	1971	PMID: 5111342
Dupuytren Contractures: An Update of Recent Literature	Boe C	J Hand Surg Am	2021	10.1016/j.jhsa.2021.07.005
Dupuytren's contracture: a cause of an irreducible traumatic dislocation of the proximal interphalangeal joint	Eastwood GL	J Hand Surg Eur Vol	2007	10.1016/J.JHSB.2006.12.005
Exposure to hand-arm vibrations in the workplace (...) a systematic review and meta-analysis	Gerger H	J Occup Environ Hyg	2023	10.1080/15459624.2023.2197634
Patients With Dupuytren Disease Use Excessive Grip Force When Lifting and Holding Small Objects, Independent of the Degree of Contracture	Haas-Lützenberger EM	Arch Phys Med Rehabil	2023	10.1016/j.apmr.2023.02.010
[Musculoskeletal problems in rock climbing--a review]	Straub G	Wien Med Wochenschr	2000	PMID: 10960961
Hand Arm Vibration Syndrome [HAVS]: What Do We Know So Far? - Journal Review	Popiołek A	Ortop Traumatol Rehabil	2024	10.5604/01.3001.0054.7351
Can rock climbing lead to Dupuytren's disease?	Logan AJ	Br J Sports Med	2005	10.1136/bjsm.2004.015792

Isolated Small Finger Distal Interphalangeal Joint Dupuytren's Contracture	Mehdi SK	Case Rep Orthop	2019	10.1155/2019/7183739
Dupuytren disease is highly prevalent in male field hockey players aged over 60â€…years	Broekstra DC	Br J Sports Med	2018	10.1136/bjsports-2016-096236
Pulley Rupture in Rock Climber after Collagenase Treatment for Dupuytren Contracture	Degreef I	J Hand Surg Asian Pac Vol	2022	10.1142/S2424835522720018
Development of Peyronie's and Dupuytren's diseases in an individual after single episodes of trauma: a case report and review of the literature	Connelly TJ	J Am Acad Dermatol	1999	10.1016/s0190-9622(99)70415-9

Table 2 Main studies included in the review

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