

Summary

Rock climbing with its several sub-disciplines is currently gaining in popularity and was recently selected to be part of the next Olympic summer games in Tokyo. The rapid increase in people being enthusiastic about this sport and the rising number of high-level athletes has recently slightly shifted the incidence of climbing specific injuries and we nowadays see more injuries of the wrist. A technique commonly used to treat or prevent injuries of the wrist is the circular wrist tape. As athletes regularly apply this tape inaccurately, we now aimed to clarify how to correctly use this technique by reviewing literature.

Keywords

Climbing – Bouldering – Hamate fractures – Wrist pain – Taping – Carpus

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Circular wrist tape – Korrekte Anwendung im Kletter- und Bouldersport

Zusammenfassung

Die Trendsportart *Klettern* mit ihren Unterdisziplinen *Bouldern*, *Lead*, und *Speedklettern* erfährt momentan weltweit einen enormen „Boom“. Nicht zuletzt deshalb wurde sie nun erstmals in das olympische Programm der nächsten olympischen Sommerspiele aufgenommen. Die explosionsartige Zunahme der begeisterten Sportler führte unlängst zu einer Verschiebung der sportartspezifischen Verletzungsmuster; da immer mehr Athleten den Sport am oberen Schwierigkeitslimit betreiben, häufen sich unlängst Verletzungen im Bereich des Handgelenkes. Eine hierfür häufig verwendete Therapieform ist das *Circular Wrist Tape*. Da diese Tape-Technik in den meisten Fällen aber unzulänglich verwendet wird, soll in der nun vorliegenden Arbeit Klarheit anhand einer Literaturrecherche zum Circular wrist tape geschaffen werden.

Schlüsselwörter

Sportklettern – Bouldern – Hamatumfraktur-Handgelenksschmerz – Tape – Karpalknochen

REVIEW

Circular wrist tape – How to correctly use this technique in climbing and bouldering

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Background

Climbing related injuries of the wrist and the forearm are nowadays seen more frequently than in the past with the rising number of people being enthusiastic about this sport. As more and more athletes perform the sport on a level which was reached by only a few top athletes in the past, injuries like hamate fractures or other pathologies of the wrist become more common. Besides that, modern training- and competition setups include more gymnastic elements and movements for which a variety of different grip techniques is required [8,15,13]. The circular wrist tape is a technique which is commonly used by athletes in different sports to both strengthen and stabilize the wrist for high compression load (e.g. weightlifting [6,16], gymnastics [7,22]) or stabilize the wrist for tensile stress like in climbing where the athlete is pulling on his/her hand [8,4]. However, as different sports have special demands on how to apply supporting devices or tapes, we now aimed to clarify a method of sufficient taping of the wrist for climbing and bouldering.

Wrist taping and strength

Taping of the fingers and the wrist is often used by athletes (e.g. football players) to “increase grip strength” and to give a subjective feeling of stabilization within the wrist [12]. However, in their study published in 1997, Rettig et al. could prove that circular wrist tape, with or without additional taping of the fingers, does not increase wrist strength [12]. Contrary to the perceptions of the athletes, Takahashi et al. even showed that tight circular wrist tape can even slightly decrease grip strength when encircled too tight [18]. However, no climbing specific data known to us has been published so far on grip strength variations under wrist tape.

Instability of the wrist in climbing

Patients suffering from instability feeling in the wrist or unspecific wrist pain are often diagnosed with injuries of the ligaments and capsules or even with bone marrow edema of the carpal bones or carpal fractures [8,4]. The pain and discomfort mainly arises in radial/ulnar abducted positions of

the hand or while performing an *undercling* (position of the hand in maximum supination) [8,4].

During climbing or bouldering, the majority of thenar and hypothenar muscular strength is transferred to carpal bones and the distal part of the radius by the transverse carpal ligament (TCL) causing frequently occurring reactions of the lunate and the distal radius [5]. Biomechanical analysis postulate, that carpal bones (especially the lunate) are in a more unstable position if maximum strength is applied in a slightly ulnar abducted and dorsal flexed-position of the hand [5]. This goes along with the findings of one of our recent studies, showing that the lunate is frequently affected by bone marrow edema in rock climbers causing wrist pain [9]. Despite that, we previously

published a study in which we reported that high stress of flexor tendons can even cause fractures of hamate bone, especially of the hamate hook [8]. It is comprehensible that radioulnar joint instability or anatomic predispositions such as incongruent wrists (pos./neg. ulnar variance) can encourage the development of problems in this region – especially in powerful pronation (so called “gaston” position of the hand) or supination (so called “undercling” position of the hand) or while pushing with the hand instead of pulling [13].

Anatomy and biomechanics

Lately there has been confusion about proper terminology of two structures covering the nerval

structures, muscles and tendons within the wrist: “flexor retinaculum of the wrist” and “transverse carpal ligament”. Besides these two terms, authors used other titles such as “flexor retinaculum carpi” or “carpal palmar ligament”. In their anatomical study from 2010, Stecco et al. therefore tried to identify differences and “define appropriate terminology” [17]. As the authors could highlight clear differences among the two structures regarding thickness/tightness, soft tissue composition and nerve innervation, they suggested to abandon the term “flexor retinaculum of the wrist”, as it does not appoint one unique structure. The authors recommended to use the term “transverse carpal ligament” (TCL) for the fibrous and thick lamina between hamate/pisiform and

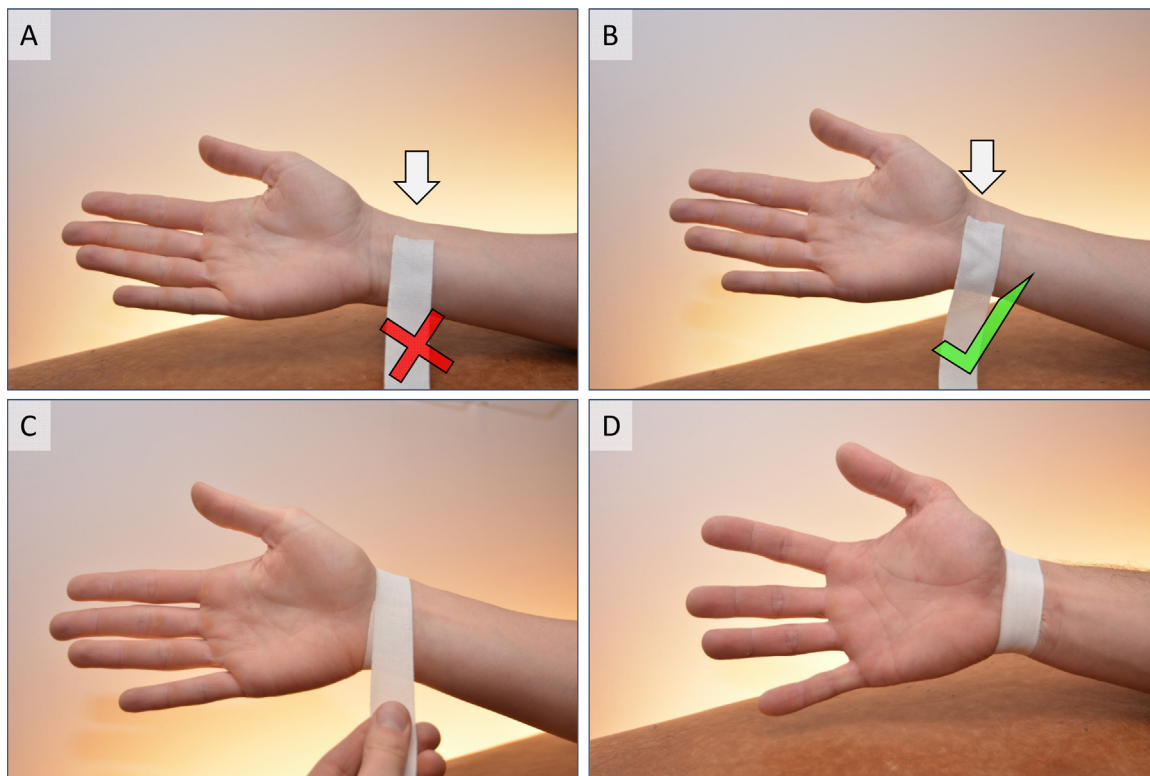


Figure 1

Circular wrist tape technique. (A) Commonly encircled but incorrect position (encircling the distal radio-ulnar joint (DRUJ)) for circular wrist tape in climbing and bouldering (see arrowhead). (B) Correct starting position (skin fold of the wrist) distal of the DRUJ (see arrowhead). (C) Application of the tape by encircling 2–3 layers around the wrist. (D) Initial tight circular wrist tape after application (tape will loosen during first minutes of climbing); blood circulation remains unrestricted.

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