Treatment of Flexor Pulley Injury in Rock Climbers

You have injured one or more flexor tendon pulleys during rock climbing (A2 or A4 pulley, probably in combination with the A3 pulley). Because you are still able to bend the injured finger almost completely (clench ones fist) a conservative treatment (without surgery) is possible. The healing time of a ligament takes much more time (compared to bone healing), for what 4 – 6 months have to be considered. If you follow this treatment scheme, in almost all of the cases a normal function of your finger can be expected.

Week 1 – 6 (-8): After the injury the pulley protection splint is applied as early as possible (figure 1), which has to be worn all the time. After the swelling has disappeared (5 – 10 days) start with active flection movements (finger middle joint up to 80°) and passive full flexion of the finger into the clench fist. During the exercises protect the injured pulley with the finger of the other hand (figure 2). Ensure that extension of the finger joints is exercised additionally. Exercises are done twice or three times daily.

Climbing: After 2 – 4 weeks simple rock climbing on a vertical wall or slab with large holdes are allowed, no crimping of the fingers, no dynamos, only top rock climbing.

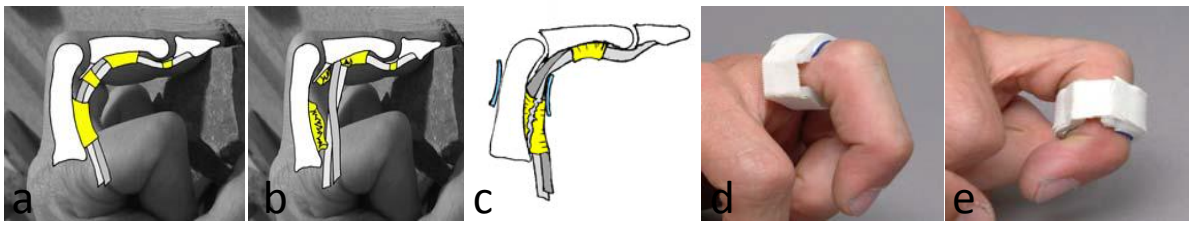

Figure 1: Intact flexor tendon pulley system keeping the flexor tendon near to the bones (a). Torn A2 and A3 pulley (b). Flexor tendon pulley protection ring keeps the tendon close to the bone and allows healing of the flexor tendon pulley in functionally better position (c), for better force transmission the splint is positioned not directly over the pulley, but rather close to the joint. Pulley protection ring for the torn A2 (d) or A4 (e) pulley.

Figure 2: Movement exercises of the finger with permanent protection of the injured pulley. The index finger and the thumb are pressed together and push the flexor tendon against the bone, the injured finger can then be extended (a) and flexed (b). Stretching exercises into complete extension (c).

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Week 8 – 12: After the clinical and sonographical investigation of the two month control, the pulley protection splint is removed and flexor tendon pulley protection tape is applied (figure 3), which is wrapped around the finger in way that flection of the finger middle joint is possible only up to 80°. Movement exercises are continued. Forceful clench of one's fist is still not allowed.

Climbing: Careful increase of climbing difficulty on slightly overhanging walls is allowed, no crimp grips, no dynamos.

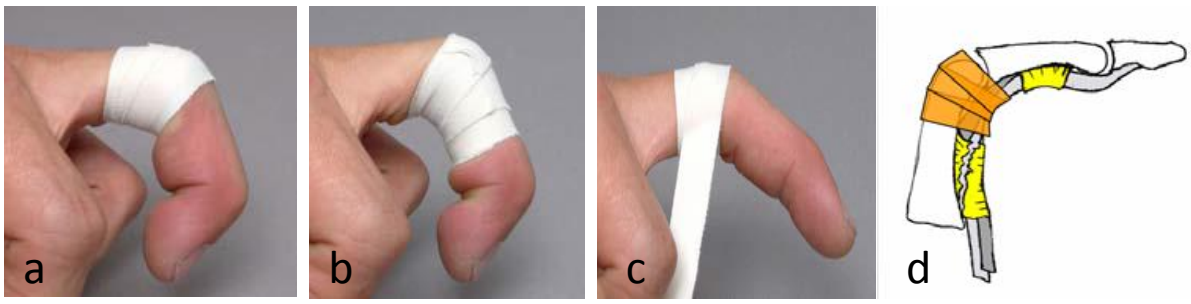

Figure 3: Correct application of a pulley protection tape for the A2 (a) and A4 (b) flexor tendon pulley. A sport tape of 12 mm width and 12 – 15 cm length is wrapped around the finger middle joint while this joint is flexed about 20 – 30° (c). It is important that the tape is wrapped round over the joint itself with fanning out technique. This allows increasing tension of the tape while the finger is flexed.

Week 12 – 16: Weaning from flexor tendon pulley protection tape gradually, the tape is still worn during climbing, full forceful clench of one's fist is now started. Motion exercises over the whole range of motion.
Climbing: Pulley protection tape is worn permanently. Further increase of difficulty and steepness of the wall with a preference of large holes is allowed. Carefully start to apply semi-open finger position (finger middle joint flexed up to 90° without using the thumb). Be careful with rope handling (high forces to flexor tendon pulley system occurs).

Month 4 – 6: Completely weaning from taping in daily activities, during climbing still apply the tape if the pulley is painful, otherwise start without tape using slope holds. Transition to maximal load, start with dynamic moves. Full crimp with thumb is started apart from the 5th to the 6th month when pain has completely disappeared.

Warm Up and Prophylaxis of Pulley Injuries

Climbing itself is the best way for climbing. Usually three routes with 40 – 50 climbing moves each with increasing difficulty are sufficient. But not only the warm up of muscles, but also warming up the tendons (ligaments and joint capsules) is very important. Particularly the flexor tendon pulleys are prone for injuries, when warming up has not been performed properly. In an investigation about warming up ligaments we have observed that 100 – 120 climbing moves are necessary for a proper warm up and is only achieved when the difficulty is increased during these 120 moves. The pulleys are stretched out and are getting longer to almost 1,5 mm, this increases also the lever arm in the finger middle joint (less force necessary to hold a grip).

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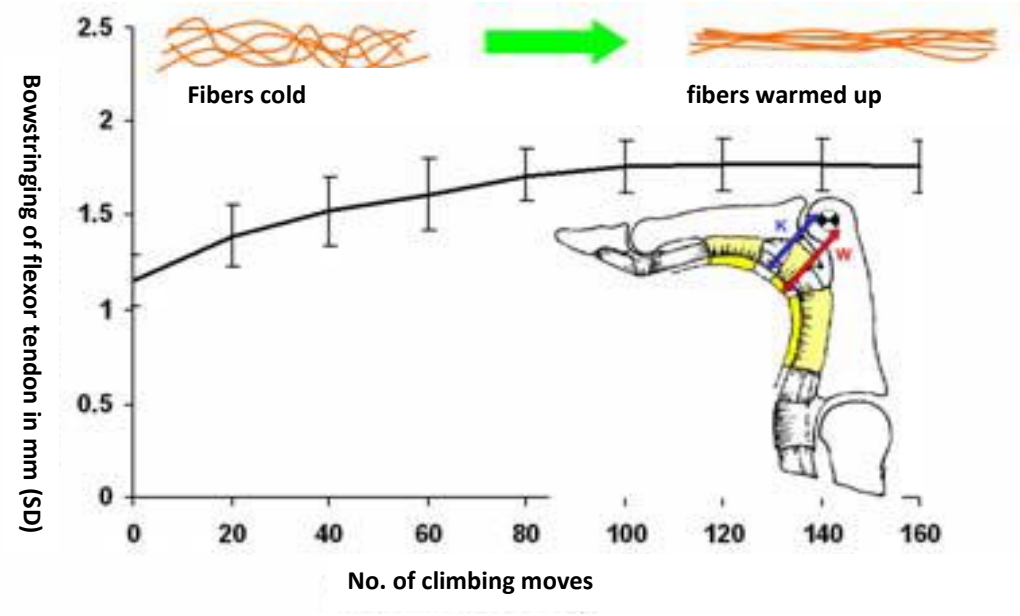
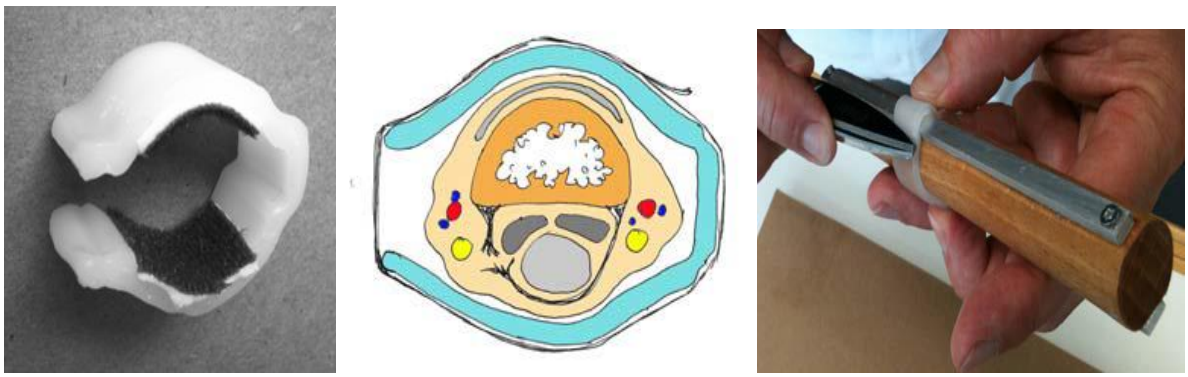


Tips for the Production of a Pulley Protection Splint (for ergotherapist)

The pulley protection ring exists of a one sided opened plastic ring (figure 4). The ends of the ring are flattened and bent out. At the joint of the ring there is some space left so that when wearing the splint compression of the neurovascular structures is prevented. The tape is applied after compression over the injured pulley and fixed with a sport tape. The ring itself is produced of polyethylene or a similar material.

Figure 4: The shape of the pulley protection splint (a) prevents compression of the neurovascular structures (b). The ring is shaped on the base of model in different sizes according the diameter of the finger (b).



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