

**CLOSED DISRUPTION OF A SINGLE FDS TENDON SLIP:
CHALLENGING DIFFERENTIAL DIAGNOSIS FOR A PAINFUL POPPING INCIDENT IN THE FINGER.**

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During loading of the flexor tendon particularly in rock climbing a painful popping incident is most commonly associated with a closed flexor tendon pulley injury ^{1,2}. However, when assessing patients with a painful popping sensation in the finger some differential diagnosis should be considered. To date, differential diagnoses of this injury are rarely described in literature.

The present report describes three cases (age 31y, 36y and 45y) where a painful pop in the finger was experienced (two middle fingers, one index) during sport activities (two patients during sport climbing, one patient during judo). In all cases, physical examination revealed a painful flexor tendon sheath in Zone 2 but no functional impairment particular for a FDS tendon injury. MRI and ultrasonography indicated a complete disruption of only the radial FDS tendon slip with its retraction between the A2 and A3 pulley whereas all flexor tendon pulleys remained intact. Conservative treatment restored unrestricted normal function in all patients and allowed them to return to preinjury performance level.

Partial FDS tendon disruption accounts for a differential diagnosis worth considering in patients with a painful pop in the finger usually associated with a closed flexor tendon pulley injury.

Key words: closed FDS tendon slip disruption, radial FDS slip disruption, closed partial superficial flexor tendon disruption

LÉSION FERMÉE DE LA PARTIE RADIALE DU TENDON FLÉCHISSEUR SUPERFICIEL: DIAGNOSTIC RARE POUR UNE DOULEUR SUITE À UN CLAQUEMENT DANS LE DOIGT

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Résumé:

Lors du chargement du tendon fléchisseur, en particulier en pratiquant l'escalade, une douleur suite à un claquement est le plus souvent associé à une lésion fermée des poulies des tendons fléchisseurs^{1,2}. Cependant, lors de l'examen de ces patients, un autre diagnostic doit également être considéré. Jusqu'à présent, les diagnostics associés à une douleur suite à un claquement dans le doigt sont rarement décrits dans la littérature, mis à part la lésion fermée des poulies des tendons fléchisseurs.

Le présent rapport décrit trois cas (31 ans, 36 ans et 45 ans) où une douleur suite à un claquement dans le doigt a été ressentie (deux majeurs, un index) lors d'activités sportives (deux patients pendant l'escalade sportive, un patient pendant le judo). Dans tous les cas, l'examen physique a révélé un tendon fléchisseur douloureux dans la zone 2, mais aucune déficience fonctionnelle particulière pour une blessure au tendon fléchisseur superficiel. L'IRM et l'échographie ont indiqué une rupture complète de la partie radiale du tendon fléchisseur superficiel avec sa rétraction entre les poulies A2 et A3, alors que toutes les poulies sont restées intactes. Le traitement conservateur a rétabli la fonction normale sans restriction chez tous les patients et leur a permis de retrouver leur niveau de performance d'avant la blessure.

La rupture partielle du tendon fléchisseur superficiel représente un diagnostic rare qu'il faut néanmoins envisager chez les patients présentant une douleur suite à un claquement dans le doigt habituellement associé à une blessure à la poulie du tendon fléchisseur.

Mots clés: lésion fermée du tendon fléchisseur superficiel; lésion fermée de la partie radiale du tendon fléchisseur superficiel

Introduction

During high loading of the flexor tendon particularly in rock climbing a painful popping incident can occur and is most commonly caused by a closed flexor tendon pulley injury ^{1,2}. Pulley ruptures were first described in literature by Bollen and Tropet et al. in the 1990ies even though they were known among climbers long before ^{2,3}. Pulley rupture results in reduced strength and range of motion of the affected finger and is typically characterized by the so-called bowstringing ^{4,5}. Suspected pulley rupture can be confirmed radiologically by means of MRI or ultrasound ⁵. Conservative treatment including primary immobilization followed by gradual increase in load whilst wearing a pulley protection has become the most effective primary treatment in closed flexor tendon pulley ruptures ¹. However, when assessing patients with a painful popping sensation in the finger some differential diagnosis should be considered. To date, differential diagnoses of this injury are rarely described in literature.

The scope of the present report was to highlight a challenging differential diagnosis in patients with a painful popping injury in the finger by means of three cases:

Case 1

A 31-year-old male rock climber was holding on to a small pocket in the rock when he noted a popping sound in his left middle finger. Subsequently he experienced pain and soft-tissue swelling at the palmar aspect of the middle phalanx developed. On examination, there was a painful swelling without a functional deficit and no triggering. The MRI revealed a ruptured and retracted radial FDS tendon slip. Functional treatment with restricted load bearing was prescribed for the following 10 weeks. Thereafter normal function could be regained and the patient returned to preinjury performance level.

Case 2

A 45-year-old female recreational climber experienced a popping sensation during a difficult dynamic move and an acute onset of pain in her right index. The pain was accompanied by a palpable mass on the volar side of the proximal interphalangeal joint. During clinical examination, there was no indication for a functional impairment. The MRI depicted an avulsion of the radial slip of the FDS tendon. The proximal part was retracted to an area outside the field of view of the MRI. The conservative treatment included a splint for the first two weeks due to pain and a functional therapy with gradual increase of load for another 10 weeks. At four-month follow-up the functional result was good and the patient was satisfied with the outcome since no symptoms or complaints remained. She was able to return to sport climbing on the same level as before the injury.

Case 3

A 36-year-old judoka suffered acute pain in his right middle finger accompanied by a popping sound while dragging his opponent's kimono.

He was first examined in our outpatient clinic two days after the episode. The right middle finger showed a mild painful swelling at the A3 and A2 pulley on the radial side without functional deficit or triggering. Ultrasound confirmed all flexor pulleys to be intact but instead the radial slip of the FDS tendon was disrupted and the proximal portion was retracted between the A3 and A2 pulley. The patient consented to our proposed functional

treatment with avoidance of maximal load bearing for 10 weeks. Thereafter the patient was able to return to preinjury performance level.

Discussion

A popping sensation is a common incident particularly during rock climbing and is most frequently caused by a flexor tendon pulley injury. However, some differential diagnoses of this injury should be considered. This report describes three cases with a popping incident after forced flexion against resistance without showing the clinical sign of bowstringing nor functional loss of FDS/FDP tendon function. Further diagnostics by means of MRI or ultrasound confirmed no structural impairment of the flexor tendon pulleys but indicated a disruption and retraction of the radial slip of the FDS tendon. Disruption of an isolated FDS slip after closed injury is very infrequent as described earlier ⁶. Exceptionally high static-eccentric forces to the flexor tendons as applied during rock climbing or judo fights may contribute to the pathomechanism of this injury ^{7,8}. In all our reported cases, the radial slip of the FDS tendon was affected, possibly due to a structurally weaker formation than the ulnar slip or unequal distribution of load between the two slips. Bhardwaj et al. however described a case of closed partial FDS tendon disruption where the ulnar sided slip was affected and a trigger phenomenon at the PIP joint occurred due to reeling of the proximal stump to the A1 pulley ⁹. This case required surgical resection. None of our reported patients showed a trigger phenomenon and therefore all of them were subjected to a conservative functional treatment. Limited maximal loading of the injured finger during the first three months posttraumatic was prescribed in order to evite the exceptionally high stress levels on flexor tendons during rock climbing or judo ⁷. In all three cases, unrestricted normal function was regained and patients were able to return to sports.

Several studies have previously reported different forms of FDS tendon injuries.

Isolated closed FDS tendon disruption is a rare injury and clinically less striking than closed FDP tendon disruption therefore medical investigation of these injuries is often missed ^{10,11}. Boyes et al. reported a total number of 80 cases of subcutaneous disruptions of finger flexor tendons ¹⁰. Thereof only five patients suffered selective distal FDS tendon disruption and all of them achieved good results after conservative treatment. Because of an extension deficit of the PIP joint in one case a secondary excision of the FDS stump was needed. Partial laceration of the FDS tendon after open injury was described before and is typically associated with a trigger phenomenon ^{12,13}.

This report highlights closed partial FDS tendon disruption as a diagnostic challenge in patients suffering a painful popping incident. Conservative functional treatment may restore unrestricted normal function and achieve good patients' satisfaction.

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