Factors influencing functional outcome of proximal interphalangeal joint collateral ligament injury when treated with buddy taping and exercise

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Introduction

- **Proximal interphalangeal joint (PIPJ)**
  - The most commonly injured joint in the hand
    - Unprotected location, long lever arm, and low lateral/rotational mobility
  - Lateral dislocation can occur with collateral ligament and volar plate rupture, of which the incidence is estimated to be 11.3 per 100,000 persons per year

- **PIPJ collateral ligament injury**
  - “Jammed finger” or finger sprains
  - PIPJ is prone to stiffness following injury, if it is not properly diagnosed and treated, a permanent impairment may result
  - Little information is currently available analyzing unsatisfactory outcomes after a PIPJ collateral ligament injury

- **Purpose of study**
  - To evaluate the factors that influence the treatment outcome and prognoses for patients with a PIPJ injury who were treated conservatively

Materials & Methods

- **Subjects**
  - Retrospective Cohort study
  - 67 Patients conservatively treated for a PIPJ collateral ligament injury of 2 to 5 fingers
  - Inclusion criteria
    - Stable PIPJ in an active range of motion (ROM) even if a small avulsion fragment existed
  - Exclusion criteria
    - More than one finger injured
    - Prior injuries or abnormalities on the contralateral hand
    - Comorbid chronic pain condition such as severe arthritis
    - Worker’s compensation status

- **Buddy strapping and exercise protocol**
  - A buddy strapping of the injured finger for 3 to 4 weeks of continuous wear
  - 4 exercises: making a fist, making a small fist (flexing the PIP and DIP joints only), flexing the MCP joints while keeping the PIP and DIP joints stretched, spreading the fingers as far as possible with the hand lying flat on a table
  - Exercise diary (noting date, time, and duration of exercise)

- **Measurements of clinical outcomes**
  - Functional assessment at 3 and 6 months after their injury
    - Total active ROM (TAM), Grip strength
    - Quick Disability of the Arm, Shoulder, and Hand score (QuickDASH)
  - Potential independent variables
    - Trauma factors: injury type, injury severity, initial dislocation
    - Treatment factors: time to treatment, duration of buddy taping, length of exercise training
    - Patient related factors: age, gender, hand dominance, affected finger
    - The injury severity: Bower’s classification
  - Grade 1: No instability with active and passive ROM representing mild tearing of the ligament
  - Grade 2: Abnormal laxity with stress and < 20° of deviation with a firm end point on lateral stress
  - Grade 3: Completely torn ligaments and > 20° of joint laxity on lateral stress without solid end point

Results

- **Patients demographic data**
  - Participants 60
  - < 65: 53 (88%), ≥ 65: 7 (12%), Male: 43 (72%), Female: 17 (28%)
  - Dominant Nondominant Sports-related Not related
    - Injuries: 39 (65%) 21 (35%) 45 (75%) 15 (25%) I II I II
    - Injury severity: 13 (22%) 14 (23%) 22 (37%) 12 (20%)
    - Presence of initial dislocation: 17 (28%) 11 (18%)
    - Duration of buddy taping (weeks): 3.1 ± 0.8

- **Grip strength (%)**
  - Total: 58 ± 9%, Male: 60 ± 9%, Female: 55 ± 10%

- **QuickDASH**
  - Total: 21.3 ± 12.1, Male: 21.9 ± 12.3, Female: 22.2 ± 10.1

- **Outcome scores**
  - 3 month: ROM (%) 69 ± 13%, Grip strength (%) 77 ± 9%
  - 6 month: ROM (%) 84 ± 11%, Grip strength (%) 77 ± 9%

- **Independent predictor of grip strength, TAM, and QuickDASH**
  - **Delayed treatment**: ROM and QuickDASH up to 6 months
  - **Age** and **injury severity**: Grip strength up to 6 months

- **Discussion & Conclusions**

  - **Discussions**
    - Disability was influenced by a delayed treatment and female gender at 3 months, however, at 6 months only a delayed treatment remained as an associated factor
    - Overcautious activity restriction has been associated with posttraumatic stiffness and delayed recovery in hand fractures
    - Significant associations between the injury severity and grip strength after a hand injury
    - Decreased active ROM was associated with injury severity in hand fractures

  - **Conclusion**
    - PIP collateral ligament injuries had very good outcomes with buddy strapping
    - However, delayed treatment was significantly associated with poor functional outcomes in terms of the ROM and patient-perceived disability
    - An increased in age and injury severity were associated with lower grip strength up to 6 months while a female gender and radial digit injury were associated with an increased disability up to 3 months