Case Report

Central slip and bilateral lateral band laceration with negative Elson's and modified Elson's tests

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ARTICLE INFO

Keywords:
Elson's test
Modified Elson's test
Central slip
Lateral bands
Extensor mechanism
Extensor laceration

ABSTRACT

Elson's test is the gold standard clinical exam for assessing central slip integrity, but the test and its modifications were historically applied to isolated central slip injuries with intact lateral bands (Elson, 1986; Schreuders et al., 2006). This case report presents an open zone III extensor injury to the right index finger with complete laceration of the central slip and bilateral lateral bands. No prior reports of this injury, specifically one without any associated bony or neurovascular injury, have been explicitly described in the literature. Physical examination in this case demonstrated complete digital extensor lag at the interphalangeal joints, and false negative Elson's and modified Elson's tests. It is important to remain aware that complete laceration of the central slip and bilateral lateral band disruption is a possibility with zone III extensor lacerations. Importantly, Elson's test and its modifications have limited utility for these particular injuries, as the lateral bands cannot transmit extension forces to the terminal tendon.

Introduction

The extensor mechanism at the level of the proximal interphalangeal (PIP) joint is composed of the central slip, paired lateral bands, the triangular ligament, and the transverse retinacular ligament. Midline central slip injuries are classically described in acute closed and open zone III extensor injuries near the PIP joint. Proper diagnosis and management of these injuries is important, as central slip disruption with additional triangular ligament injury or incompetence results in volar displacement of intact lateral bands and, consequently, carries risk for permanent boutonniere deformity due to abnormal flexion and extension moment at the PIP and DIP joints. Isolated central slip injuries may be overlooked at initial examination, as the finger will retain some active extension if the lateral bands are intact. Prior studies largely focus on the central slip component of the extensor mechanism in zone III extensor injuries. Implications of concomitant lateral band lacerations are rarely discussed. This case report presents an open zone III extensor injury to the right index finger with complete laceration of the central slip and bilateral lateral bands.

Case report

A 45-year-old, right-hand-dominant man presented to our hand clinic 11 days after sustaining a right index finger extensor zone III
laceration. The wound extended from radial mid-axial line to ulnar mid-axial line at the PIP joint level, measuring 1.5 cm in length. Complete extensor lag at the PIP and DIP joints was appreciated, while passive interphalangeal extension was full. Elson's and modified Elson's tests were negative. The digit was neurovascularily intact. Radiographs of the finger showed no foreign body, fracture, or articular deformities.

Decision was made to perform right index finger wound exploration. 20 milliliters of 1% lidocaine with epinephrine was injected to affected finger for digital block. A dorsal curvilinear skin incision was made. Complete laceration of the central slip and bilateral lateral bands was identified (Fig. 1). Intraoperative Elson's test under local anesthesia remained negative. Temporary single-suture repair of central slip ends eliminated PIP joint extensor lag. Transarticular PIP joint immobilization was performed with a 0.045 in. Kirschner wire. The proximal and distal ends of the central slip were repaired with 4-0 FiberWire suture in a two-strand modified Kessler fashion. The lateral bands were primarily repaired using 4-0 FiberWire suture in a horizontal mattress fashion. Extensor repairs were reinforced with 5-0 Prolene suture in a Silfverskiöld cross-stitch fashion (Fig. 2). Skin was closed, and sterile dressings and a radial gutter splint were applied. Hand therapy was initiated at two weeks postoperatively, and the immobilizing transarticular K-wire removed at four weeks postoperatively. Long-term functional recovery was excellent, as the patient regained full passive and active range of motion of the affected digit without any residual deficits.

Discussion

Elson's test is the gold standard clinical exam for assessing central slip integrity [1,2]. A negative Elson's test reveals a non-rigid DIP joint upon resisted PIP joint extension with PIP joint flexion to 90°. In a normal digit, the lateral bands and central slip are interdependent. Fixed flexion of the PIP joint fixes the lateral bands in place and prevents transmission of any extension forces to the terminal tendon insertion on the distal phalanx [1–4]. Similarly, a negative modified Elson's test reveals symmetrical, non-rigid, flexed DIP joints upon attempted DIP joint extension while applying force against middle phalanges of corresponding bilateral digits with PIP joint flexion to 90°, and is suggestive of the same normal findings [2].

Traditional teachings lead us to expect positive Elson's and modified Elson's tests with digital extensor lag in patients with acute central slip injuries [1,2,5]. However, these tests were historically applied to isolated central slip injuries, indirectly assessing central slip integrity by means of force transmission from lateral bands to the terminal tendon. Neither test directly assesses active extension or extension strength at the DIP joint. Thus, both tests are limited in their assumptions that lateral bands remain intact with all central slip injuries.

This case sheds light on the idea that a negative Elson's test or modified Elson's test does not always represent “normal.” Rather, a
negative test more accurately demonstrates “failure for extension forces to transmit to the terminal tendon.” While this Elson's finding is normal in the setting of an intact central slip and intact lateral bands, it can certainly be pathologic when paired with extensor lag at both the proximal and distal interphalangeal joints. This case report presents such an example, specifically a zone III extensor laceration with complete disruption of the central slip and bilateral lateral bands, resulting in complete digital extensor lag at the interphalangeal joints with negative Elson's and modified Elson's tests. No prior reports of such an injury have been described in the literature. Pain, edema, and patient non-compliance can all contribute to suboptimal physical examinations during assessment of acute zone III extensor injuries. It is important to remain aware that complete laceration of these three extensor components is a possibility with zone III extensor laceration, and to understand that Elson's test and its modifications have limited utility for these particular injuries, as the lateral bands cannot transmit extension forces to the terminal tendon. Assessment should focus on history of the incident, patient's complaint of pain, range of motion, and wound exploration. Operative exploration is ideal for diagnosis and definitive management in such cases with ambiguous physical exam findings.

**Funding**

The author(s) received no financial support for the research, authorship, and/or publication of this article.

**Informed consent**

Written informed consent was obtained from the patient for their anonymized information to be published in this article.

**Authorship**

EM and PJ performed the operative repair described in this case report. PJ reviewed literature and prepared the manuscript. EM and PJ reviewed and edited the manuscript and approved the final version of the case report.

**Declaration of competing interest**

The authors declare no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

**Fig. 2.** Status-post repair of central slip and bilateral lateral bands, right index finger.
Acknowledgements

None.

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