Spontaneous Rupture of the Extensor Pollicis Longus Tendon in Console Video Game Players: A Case Series

Jean G. Louka[1], Georges Zeine[1], Damien Pourre[1]

Learning Point of the Article:

The possibility of diminished pain perception raises concerns regarding hands overuse in video gamers leading to spontaneous rupture of the EPL tendon without underlying chronic inflammation or structural abnormalities.

Abstract

Introduction: Extensor pollicis longus (EPL) tendon spontaneous rupture has been related to numerous risk factors including wrist fractures, rheumatoid arthritis, and steroids administered locally or systemically, as well as repetitive and excessive wrist motion.

Case Report: Four cases of spontaneous rupture of the EPL tendon, diagnosed clinically, in console video game players, were reported by the authors. None of the patients had a predisposing factor. Intraoperatively, the rupture of the EPL tendon was observed at the level of the extensor retinaculum. The ruptured tendon was repaired using a conventional extensor indicis proprius to EPL tendon transplant. At the last follow-up, 2 years following surgery, the patients had satisfactory full extension of the thumb.

Conclusion: This series reported the spontaneous rupture of the EPL tendon without underlying chronic inflammation or bony abnormalities. It is hypothesized that chronic repetitive movements weaken the tendon leading to rupture. The possibility that playing video games can decrease pain sensation evokes concerns regarding overuse.

Keywords: Extensor pollicis longus, tendon rupture, thumb, case series.

Introduction

The Extensor pollicis longus (EPL) is a skeletal muscle with a complex anatomical structure and course, in charge of thumb's distal phalanx extension, adduction of the first metacarpal bone and retropulsion of the thumb [1]. The most common cause of EPL tendon rupture is non-displaced fractures of the distal radius [2, 3]. EPL tendon, on the other hand, may rupture spontaneously given its complex structural and functional characteristics. This is associated with predisposing factors such as chronic inflammation in rheumatoid arthritis or lupus, prior local or systemic steroid use, and chronic repetitive movement of the wrist [4, 5, 6]. Spontaneous rupture of the EPL tendon remains uncommon in the literature. Moreover, it has seldom been associated with professional or recreational activities without predisposing factors and many aspects of this condition remain unclear [7]. This study goal is to report four cases of spontaneous rupture of EPL in console video game players without any risk factor.

Four patients from the authors' practice who had spontaneous rupture of the EPL between 2007 and 2010 were reviewed. The patients sustained the spontaneous rupture without any predisposing factor known to the condition. The only thing that they had in common was their excessive daily console video gaming, which ranged from 6 to 10 hours daily and had been going on for more than 6–12 weeks before presentation. Two of the patients experienced acute ruptures on their dominant side,

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Author's Photo Gallery


Dr. Jean G. Louka


Dr. Georges Zeine


Dr. Damien Pourre

[1]Department of Orthopaedics and Traumatology, Simone Veil Hospital, Eaubonne, France.

Address of Correspondence:
Dr. Jean G. Louka,
Department of Orthopaedics and Traumatology, Simone Veil Hospital, Eaubonne, France.
E-mail : jeanloukas@gmail.com

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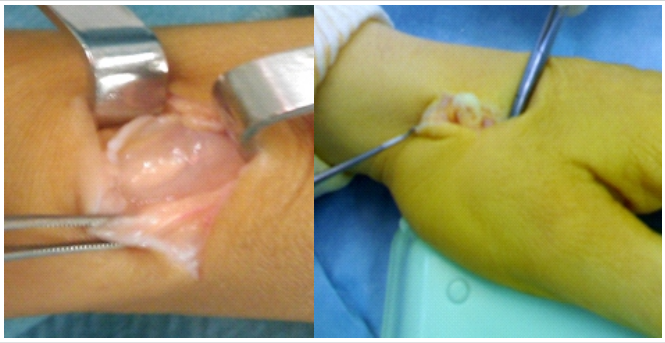

Figure 1: Intraoperative photos of the ruptured EPL tendon. On the left, notice the presence of synovial tissue covering the ruptured tendon seen through.

Figure 2: Range of motion 2 years after surgery.

whereas the other two experienced them on their non-dominant side.

Cases Presentation

All patients were previously healthy and did not take any drugs regularly. The patients' age ranged from 22 years to 50 years old (mean 31). All patients reported mild persistent discomfort or pain at the wrist's radial side before suddenly being unable to extend their thumb. Clinical examination revealed that although complete active flexion of the thumb's interphalangeal (IP) joint was still possible, there was a loss of active full extension at the metacarpophalangeal (MCP) and IP joints as well as being unable to lift the thumb off surface when placing their hands flat on a table, with potentially modest residual MCP joint extension still present due to the aid of the extensor pollicis brevis. All patients' wrist and hand radiographic findings were normal. Every patient had their Lister's tubercle examined during surgery in addition to any other significant rheumatological abnormalities. None of the patients had any overt rheumatological abnormalities, mechanical irritants, or bony outgrowth identified at the Lister's tubercle, which was determined to be normal in all cases. Around the frayed tendon ends, there was variable level of synovitis, with a significant amount of invasive synovitis in one case. The pathology results in all patients indicated fibrosis and chronic inflammation. An Extensor indicus proprius (EIP) to EPL tendon transfer was performed on all patients (Table 1).

Table 1: Findings and follow -up evaluation

Patient	Age	Dominant hand	Prodromal syndrome	Abnormal surgical findings	Time before Surgery	Range of motion of thumb's IP Joint at Last Follow -up
Patient 1	22	Yes	Yes	None	2 days	12° Hyperextension
Patient 2	25	No	Yes	None	2 weeks	12° Hyperextension
Patient 3	31	Yes	Yes	None	10 days	10° Hyperextension
Patient 4	50	No	Yes	None	2 weeks	10° Hyperextension

Table 1: Findings and follow-up evaluation

Demonstrative case (Patient 1)

A 22-year-old right-handed undergraduate student, previously healthy, incidentally discovered that he could not extend his thumb or make a precision grip while doing some housework. According to the clinical findings, he was diagnosed with a rupture of the EPL tendon. The patient reported mild pain on the radial side of his right for 1-week history before presentation. He was operated on under general anesthesia, with a well-padded pneumatic tourniquet applied. The surgical limb was prepped and draped in a sterile manner. Our reconstruction was approached first by a dorsal arc-shaped incision approach at the level of the lister's tubercule.

Intraoperatively, the extensor retinaculum was discovered to be intact. The proximal and distal segments of the torn EPL tendon were identified around the carpometacarpal joint covered with obvious inflammatory synovial tissue and confirmed the clinical examination (Fig. 2). No cortical irregularity was found on the dorsal side of the wrist and the carpal bones. The surgical technique included identifying the extensor tendons of the index and then splitting them through a transverse incision distal to the MCP joint. The harvested EIP tendon was transected distally through the dorsal arc-shaped incision and secured to the distal EPL stump using the Pulvertaft weave with the thumb's IP and MCP joints in extension and the wrist in a neutral position. The patient was immobilized in a thumb spica cast for 5 weeks.

After the cast was taken off, physiotherapy consultation was

sought to educate patient how to use the transfer, enhance the thumb's range of motion, and to ultimately make it stronger. Four months following surgery, the patient was extending the IP joint of the thumb without experiencing extension lag.

The active and passive ranges of motion were measured with a goniometer on regular basis for 2 years. A Jamar dynamometer was used to measure grip strength. At the final follow-up, 24-month after surgery, none of the patients had any extension lag at thumb's IP joint. None of the patients reported loss of neither the thumb's power nor limitation in their capacity to carry out activities of daily living (Fig. 2).

Discussion

EPL muscle is responsible of the thumb's retropulsion, distal phalanx extension, and adduction of the first metacarpal [8]. With its complex anatomical course in the humans' hands, the EPL origin located on the middle third of the dorsal surface of the ulna and the interosseous membrane, traversing the forearm obliquely in the direction of the wrist's radial side [9]. Covered by the extensor retinaculum like all extensor tendons, the EPL passes through the third extensor compartment, ulnar to Lister's tubercle [8]. The anterior interosseous artery vascularizes the proximal segment of the EPL tendon up to the synovial sheath, after which the radial artery supplies the tendon. The tendon exhibits inadequate vascularity or is avascular in the third compartment close to Lister's tubercle [10, 11].

EPL tendon rupture is typically associated with distal radius fractures at Lister's tubercle, most commonly Colles fractures, and occurs six to eight weeks following the fracture, with a reported prevalence of 0.2–5% [12]. Notably, non-displaced distal radius fractures are often coupled with EPL tendon ruptures, suggesting an ischemic pathogenesis in contrast to an osseous spike causing attritional rupture [4, 12, 13]. Spontaneous ruptures of the EPL tendon are also possible, especially in the presence of risk factors. Among these are long-term inflammatory diseases such as lupus or rheumatoid arthritis, prior local injection or systemic steroid usage, the development of bony spur after distal radius, and long-term repetitive movements of the wrist [4, 6]. Most EPL tendon ruptures occur at the Lister's tubercle, located beneath the extensor retinaculum, and serving as a pulley for the EPL tendon, causing irritation of the tendon, especially if there are irregularities of the dorsal cortex [4].

Although rare, reports of a few cases of spontaneous EPL tendon rupture can be found in the medical literature. Athletes are prone to EPL injuries due to their strenuous hand movements leading to potential rupture, which was reported in skiers, martial artists, and tennis players [14, 15]. Hu et al. published an eight cases series of which they came to the conclusion that the existence of an obvious and visible fracture is not obligatory for a spontaneous rupture of EPL [4]. According to Diep et al., there may be prodromal pain preceding the rupture in the case of EPL tendonitis, and a result, they concluded that the EPL rupture could be a preventable event [16]. In our article, we reported persistent, radiating pain in the wrist region that lasted from period from two to 10 days before presentation. Meads et al. concluded that the transfer of the EIP tendon is a safe, reliable, and a key factor procedure to the success of EPL tendon repair [17].

Injuries and medical complaints such as neck, shoulders, back, and hands pain related to video games have been reported in the literature. These injuries have been linked to the fast activation of muscles that were of minimal usage [18, 19, 20]. Furthermore, several components attributed to video games including immersive ambience and in-game rewards make them extremely enjoyable and addictive [21]. Playing video games along with the associated excitement and pleasure caused physiological arousal and suppression of pain perception in children and burn patients [22, 23]. In the case reported by Gilman et al., they concluded that playing video games excessively caused visual distraction and arousal in their patient, providing a potential justification why he did not experience any pain while excessively playing, leading to attritional rupture of the tendon [24].

Conclusion

This series reported the spontaneous rupture of the EPL tendon that occurred without any underlying inflammatory or bony abnormalities. It is hypothesized that chronic repetitive movements weaken the tendon leading to mechanical attrition and subsequently rupture.

The possibility that playing video games can decrease pain sensation evokes concerns regarding overuse. More studies are needed to determine whether some people who excessively play video games causes damage related to them as a result of pain reduction.

Clinical Message

This series described spontaneous EPL tendon rupture in video gamers without underlying chronic inflammation or bony abnormalities. The possibility of diminished pain perception raises concerns regarding hands overuse leading to spontaneous rupture of the EPL tendon.

Declaration of patient consent: The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given the consent for his/ her images and other clinical information to be reported in the journal. The patient understands that his/ her names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Conflict of interest: Nil **Source of support:** None

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