Grip Lock Injury Resulting in Extensor Tendon Pseudorupture: Case Report

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Grip lock injuries are uncommon, potentially devastating occurrences in male gymnasts performing high bar routines, and typically cause severe wrist sprains or forearm fractures. We retrospectively reviewed medical records of a 24-year-old former collegiate gymnast surgically treated for complete loss of index and long finger extension (pseudorupture) after a grip lock injury. Intraoperative evaluation 3 weeks after injury revealed profound intratendinous attenuation of index and long finger extensors with adhesions in the fourth compartment. We performed tenolysis and imbrication of the affected tendons. At 12-month follow-up, the patient had no pain, full digital range of motion with the wrist in neutral, but residual extensor lag with the wrist in extension. He had returned to gymnastics with some apprehension. This case broadens the known spectrum of grip lock injuries. *(J Hand Surg Am. 2013;38(12):2335–2338. Copyright © 2013 by the American Society for Surgery of the Hand. All rights reserved.)*

Key words Grip lock, gymnastics, musculotendinous injury, tendon attenuation, tendon rupture.

GRIP LOCK INJURIES ARE infrequent but potentially devastating injuries that occur to male gymnasts performing routines on the high bar. Competitive gymnasts typically use leather grips (with or without incorporated dowels) to grasp the bar, thereby minimizing friction on the hand and achieving the grip strength necessary for some of the more difficult exercises. As the gymnast rotates around the high bar, the center of rotation rests normally at the center of the bar (Fig. 1). A poorly fitted or stretched-out leather grip may completely encircle the bar and lock onto itself, abruptly immobilizing the hand relative to the bar. The athlete's substantial momentum carries the rest of the body through the swing, with the center of rotation instantaneously shifting to the wrist or distal forearm. The resulting grip lock injury typically consists of either wrist sprains or forearm fractures.[1] A less common injury pattern consists of musculotendinous injuries of the extensors.[2,3] We present a case of a grip lock injury that resulted in acute intratendinous attenuation (pseudorupture) of multiple extensor tendons and subsequent adhesions requiring operative treatment. We also review the literature with focus on risk factors, injury patterns, treatment, and outcomes.

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Received for publication February 12, 2013; accepted in revised form September 3, 2013.

No benefits in any form have been received or will be received related directly or indirectly to the subject of this article.

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0363-5023/13/38A12-0003$36.00/0
http://dx.doi.org/10.1016/j.jhsa.2013.09.010

CASE REPORT

A 24-year-old former collegiate gymnast, otherwise healthy and with no history of prior wrist-related injury or pathology, was performing a giant swing on the high bar using an overhand grip when his left grip locked (Fig. 2). He noted a sharp, tearing sensation on the dorsum of the wrist and forearm. He required assistance to disengage the left hand from the bar and was unable to continue. After the injury, he developed diffuse swelling and tenderness throughout the dorsal wrist and forearm and was unable to extend the left index and long fingers. The patient was first evaluated at an outside institution, where radiographs of the wrist and forearm revealed a nondisplaced

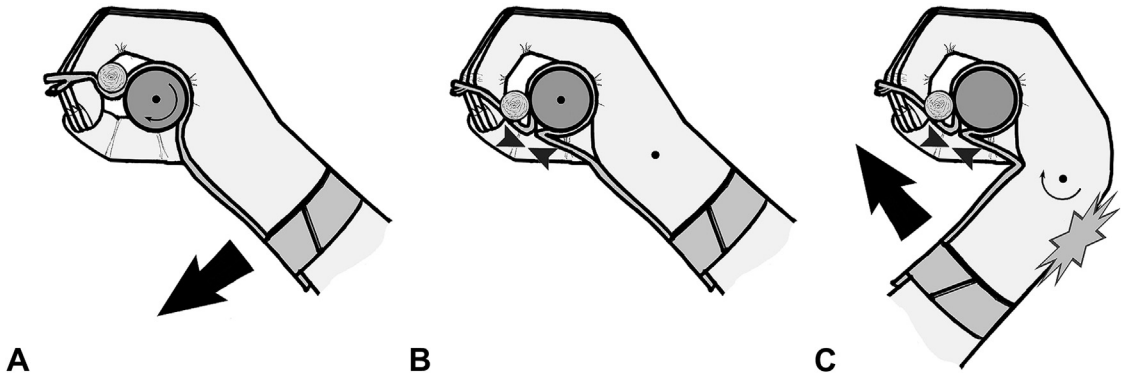

FIGURE 1: Mechanism of grip lock injury. **A** Normal fit of leather grip with dowel (light gray circle). Hand glides freely around high bar (dark gray circle) with center of rotation located in center of bar. **B** Poorly fitting leather grip may completely encircle the bar and lock onto itself (arrowheads), abruptly immobilizing the hand relative to the bar. **C** Momentum carries the rest of the body through the swing. The center of rotation shifts instantaneously, resulting in high tensile forces on dorsal aspect of wrist and forearm.

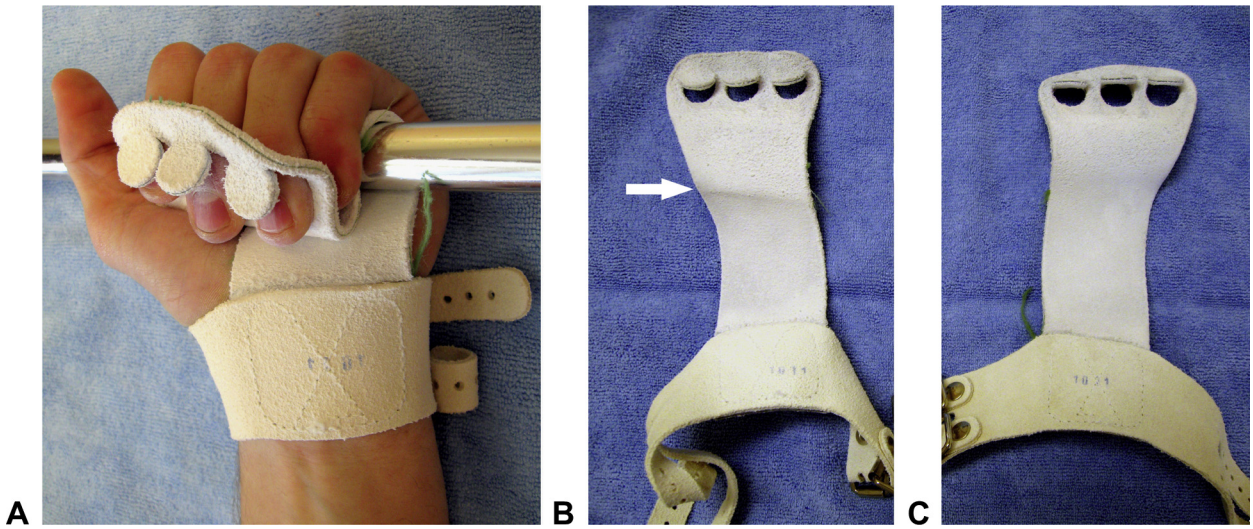

FIGURE 2: **A** Overhand grip position with use of leather grip without dowel. **B** Left grip showing kinking (arrow) and elongation of leather in the palm as a result of grip lock. **C** Right grip without kinking.

ulnar styloid fracture. A magnetic resonance imaging study was nondiagnostic, demonstrating extensive, poorly defined fluid signal throughout the forearm, wrist, and hand (Fig. 3). Rupture at the musculotendinous junction of the extensor digitorum communis (EDC) could not be ruled out. He was placed in a splint that held the wrist and fingers in extension and was referred to our clinic.

On our initial evaluation at 2 weeks after the injury, the swelling had resolved. He had mild tenderness over the ulnar styloid with a negative fovea sign. Elbow and wrist flexion-extension and forearm rotation were full and painless. The distal radioulnar joint was stable. He was unable to extend the left index and long fingers at the metacarpophalangeal (MCP) joints. He could extend the ring finger to neutral. Extensor strength was graded as M1, M2, M4, and M5 in the index, long, ring, and little fingers, respectively (British Medical Research Council scale). Tenodesis effect was absent in the index and long fingers.

Because of absent extension in the index and long fingers, 3 weeks after the injury, we made a 10-cm incision on the dorsal aspect of the mid-forearm. The musculotendinous junction of the EDC was noted to be in continuity. The muscle in this area focally demonstrated a grayish appearance and had minimal response to stimulation with electrocautery. No biopsies were obtained. Traction of the tendons distal to the musculotendinous junction resulted in limited extension at the MCP joint level of the long and ring finger. There was no MCP joint extension in the index finger, which indicated additional pathology distally. We extended the incision over the second metacarpal. The extensor indicis proprius (EIP) and