

## LUXATION OF EXTENSOR TENDONS IN THE HAND

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EXTENSOR TENDONS in the hand may become dislocated following trauma or disease. The resulting condition, although rare, is characteristic. At first glance it resembles, but should not be confused with trigger finger from other causes. The condition of "trigger finger" or "spring finger" is usually described as being due to impediment of the motion of a flexor tendon by narrowing of the tendon sheath or swelling in the course of the tendon. It should be recognized that the same phenomenon, whereby the finger can be flexed voluntarily, but cannot be extended past an apparent obstruction without assistance, may be caused by the lesion which is herewith described.

Legouest,<sup>1</sup> in 1868, described the first case of luxation of an extensor tendon in the hand. After this Paget,<sup>2</sup> Marsh,<sup>3</sup> and Schürmayer<sup>4</sup> had reported cases before 1900. Recently, Razemon<sup>5</sup> was able to collect a total of 17 cases due to trauma, in eight of which the reports lacked sufficient detail to offer statistical material. Charcot,<sup>6</sup> Krukenberg<sup>7</sup> and Spitzzy<sup>8</sup> have reported pathologic luxation from arthritis deformans. Levy<sup>9</sup> suggested the possibility of a congenital tendency and reported a father and daughter who could voluntarily dislocate an extensor tendon. Other authors have speculated upon the mechanism involved.

After Maydl,<sup>10</sup> the cases can be divided into those due to pathologic softening of structures in the vicinity of the metacarpophalangeal joint, and those due to trauma. The traumatic group may be further divided into those in which the dislocation is caused by a direct blow on the metacarpophalangeal joint which tears the extensor tendon loose from its normal bed, and dislocations from indirect violence caused by contraction of the extensor tendon against resistance; or by external force causing flexion of the finger against muscular resistance. From the recorded cases it appears that the luxation always occurs at the metacarpophalangeal joint. The middle finger was involved in 10 cases; the index finger in three cases. The displacement was toward the ulna in all but one case. Five injuries were caused by direct trauma, of which a fighter's blow to the chin of his opponent may be taken as typical. Five cases, including the present one, were caused by a muscular effort against resistance. One case was apparently due to repeated slight muscular effort. The right and left hands were equally involved.

The patients uniformly give a history of an injury which may be trivial or severe. This is immediately followed by interference with the normal

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function of the finger and swelling on the dorsum of the hand. The swelling and acute pain disappear within a few days, but the extensor function of the finger remains permanently impaired, and there is apt to be pain and weakness on use of the finger.

Examination of the older cases, with the fingers in full extension, reveals an apparently normal hand. As flexion of the fingers is executed, when the proximal phalanx of the finger approaches flexion of  $45^\circ$ , a distinct jerk is observed as the extensor tendon slips off the head of the metacarpal bone. At the same time, the finger jumps into a position of deviation toward the ulnar aspect of the hand. As flexion is continued, the finger can complete full flexion in ulnar deviation. When extension is attempted, the motion

FIG. 1

FIG. 2

FIG. 3

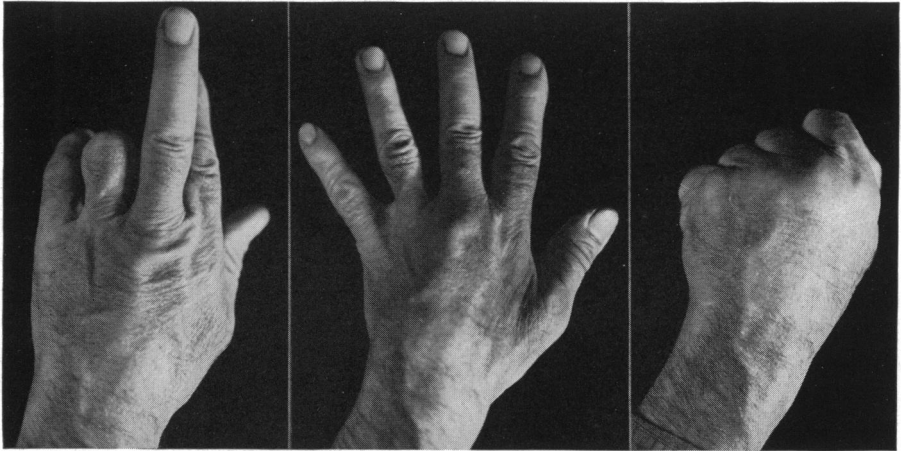


FIG. 1.—Showing the apparent normal relations of the extensor tendon of the middle finger, when in full extension.

FIG. 2.—Showing the extensor tendon of the middle finger beginning to slip to the ulnar side of the third metacarpal, with finger in  $45^\circ$  degree flexion.

FIG. 3.—Showing ulnar deviation of the middle finger, upon complete flexion, with the extensor tendon slipped entirely to the ulnar side of the third metacarpal.

proceeds normally until the proximal phalanx again reaches the vicinity of a  $45^\circ$  angle, when the motion is locked or impeded. Frequently, it requires assistance from the examiner or the patient's other hand to carry extension past this point; or it may be that by obvious effort, the patient's own extensor muscle may succeed. In any event, there is a visible and palpable jump as the extensor tendon slips back onto the head of the metacarpal bone. The ulnar deviation of the finger disappears and the extension is normally completed. In recent cases, the displacement of the extensor tendon during this procedure may be masked by swelling. It is easily visible and palpable in older cases. In describing the pathology of the condition, all observers have noted the displacement of the tendon. Becker<sup>11</sup> recorded an associated tear of the junctura tendinum uniting the extensor tendon to its radial neighbor. Ritschl<sup>12</sup> recorded a case in which the extensor tendon became split, so that the head of the metacarpal projected through the longitudinal tear in button-hole fashion.

## LUXATION OF TENDONS OF HAND

**Case Report.**—A male, age 56, applied at the Central Free Dispensary, July 22, 1937, with the history that one week previously, while bearing his weight on the dorsum of his partly closed fingers as he leaned upon a table, he felt a distinct “pop” and experienced immediate pain in the vicinity of the metacarpophalangeal joint of the middle finger. Since then, the middle finger had been stiff, flexion was painful and extension more so. He had noted swelling in the dorsum of the hand.

**Physical Examination:** As flexion was executed, the extensor tendon slipped to the ulnar side of the third metacarpal and pulled the finger into ulnar deviation. Exten-

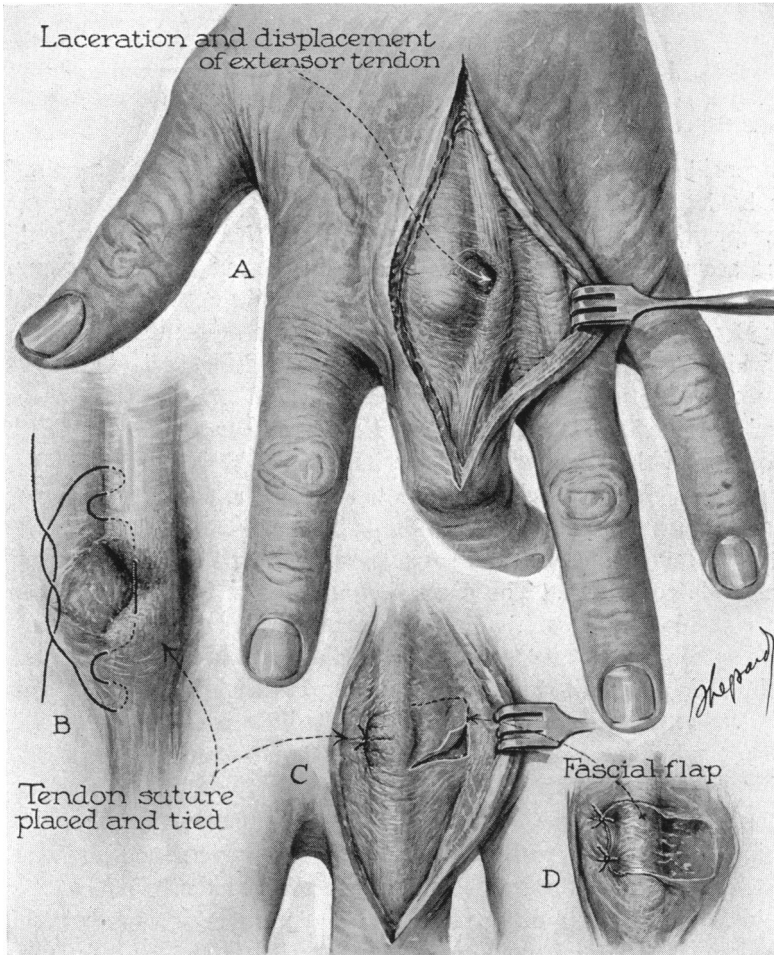


FIG. 4.—Drawing illustrating: (A) The “V” tear in the extensor tendon; an intact vinculum between the extensor tendons of the ring and middle fingers; the absence of vinculum between the extensor tendons of the index and middle fingers. (B) (C) and (D) The operative procedures employed in effecting the repair.

sion occurred to 45°, and then was so impeded that assistance was necessary to spring the extensor tendon back into its normal position, after which extension was completed normally (Figs. 1, 2 and 3). A roentgenogram did not show any bony injury.

**Operation.**—July 2, 1937: Under local anesthesia, a longitudinal incision was made over the metacarpophalangeal joint of the middle finger and the extensor tendon was exposed. At the level of the metacarpophalangeal joint, the medial one-half of the flat

extensor tendon was found to be torn and separated into a "V" (Fig. 4A). This allowed the intact lateral one-half of the tendon to slide toward the ulnar side of the metacarpal head. It is of interest to note that the dissection was carried widely enough laterally to demonstrate an intact vinculum between the extensor tendons of the ring and middle fingers. There was no vinculum between the extensor tendons of the index and middle fingers. No gross tear was reported in the capsule of the joint, although there was some granulation tissue in this region which may have obliterated such a tear.

The "V" shaped defect in the tendon was repaired by silk suture. (Fig. 4B). A rectangular flap of connective tissue was turned up from the ulnar side of the tendon (Fig. 4C) and sutured over the tendon to the soft tissue on the radial side of the tendon (Fig. 4D). The skin was closed over this with interrupted silk sutures and a palmar splint applied. Eleven days later, the wound was healed. Flexion and extension of the middle finger were normal and there was no luxation of the tendon in any position. One year later the condition was unchanged.

In considering the mechanism of the injury, we must consider the factors which hold the extensor tendon constantly in its normal position over the narrow projection of the metacarpal head. Becker<sup>11</sup> believed that this was in part accomplished by the *junctura tendinum* and that laceration of the *junctura tendinum* was a causative factor in dislocation. Silfverskiöld<sup>13</sup> quotes Braus<sup>14</sup> that the *juncturae* are phylogenetic remnants in man of structures which in the apes are broad membranes limiting individual finger motion in the extensor tendons; and which in man are too variable and too obliquely situated to perform any useful stabilizing function. Poirier<sup>15</sup> states that fixation of the extensor tendon in its proper site is maintained by transverse bands of fascia which unite the tendon to the posterior capsule of the joint and which in turn unite with the palmar aponeurosis. Mason<sup>16</sup> quotes both the preceding theories, and suggests shortening a lax *junctura tendinum* as a possible correction. The discussion among the foregoing authors as to whether the laceration of the *junctura tendinum* or of the posterior aspect of the capsule is the etiologic factor, would obviously apply only to those cases in which the injury is due to direct violence. The mechanical situation is such that indirect violence will apply little or no force to either the *junctura tendinum* or dorsal capsule if the tendon remains intact.

Through the courtesy of Dr. Edwin Miller, I investigated this condition on a number of hands of cadavers. The extensor tendon of the middle finger fuses indistinguishably with the capsule of the metacarpophalangeal joint. This union is so firm that no lateral play is allowed the tendon as it crosses the joint. Proximal to the joint, there is considerable lateral mobility of the tendon. The lateral mobility here is not affected by the presence of the *juncturae tendinum*, which quite obviously, from their oblique situation, play little rôle in stabilizing the lateral position of the tendon. With the scalpel, an incision was made through the radial one-half of the extensor tendon, simulating the lesion found in the case reported. The proximal portion of the tendon was fixed in traction, and the tendon made taut by flexing the middle finger. This caused an obvious tendency on the part of the tendon to slip over the head of the metacarpal bone toward the groove between the

third and fourth metacarpals. However, this luxation was restrained by the attachment of the tendon to the dorsal ligament of the joint. The tension on the dorsal ligament of the joint could be increased by flexing the middle finger in ulnar deviation.

An incision was made on the radial side of an extensor tendon and parallel to it for a distance of three-quarters of an inch at the level of the metacarpophalangeal joint. The preceding procedure was repeated, whereupon the tendon slipped into a position of luxation between the third and fourth metacarpal bones. It is apparent that there must be rupture or division of the dorsal capsule of the joint before lateral displacement of the tendon is possible. This quite conceivably might occur through disease processes. It probably cannot occur through force supplied by muscular contraction against resistance. However, if the radial one-half of the tendon is ruptured, which may happen through an obvious mechanism (the application of power to the extensor tendon while the finger is fixed in flexion with some ulnar deviation), then the continuing force will be applied to the dorsal capsule of the joint. This in turn gives way, and the tendon slips into the groove to the ulnar side of the metacarpal head. Repeated experiments upon a number of tendons, both with and without vincula, appeared to show that this mechanism was correctly interpreted. Division of the vinculum toward the ulnar side of the extensor tendon and tightening of the vinculum toward the radial side when it was present did not prevent the occurrence of the dislocation.

Various authors (Curchod,<sup>17</sup> Silfverskiöld,<sup>13</sup> and Mason<sup>16</sup>) have recommended that recent cases be treated conservatively by immobilization in extension for three weeks, by which time the torn tissue may repair itself, inasmuch as the tendon occupies its normal position during extension. In the two cases where this has been done (Curchod and Silfverskiöld), the repair has been sufficient to allow use of the finger, but in both cases there was persistence of partial luxation when the finger was flexed. It would appear that although this method of therapy may be used, it cannot be depended upon for complete restoration, but the functional result may be adequate.

The first operative repair was reported by Haberern,<sup>18</sup> who turned a flap of fibrous tissue over the tendon just proximal to the head of the metacarpal joint to form a retentive sheath in a manner similar to that herewith described. Becker's<sup>11</sup> effort to retain the tendon in position by suture of the vinculum resulted in success as far as the luxation of the tendon was concerned, but resulted in limitation of motion.

It would appear that operative repair, in which a retention sling is fashioned from the fibrous tissue just proximal to the metacarpal head, gives good functional and anatomic results. This should be combined with suture of the associated lacerations of tendon and capsule as disclosed by operation.

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