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Case Report

The Lambda Cord: An Anatomic Configuration of Radial-Sided Dupuytren Disease

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The thumb and first webspace are involved in a relatively low proportion of cases of Dupuytren disease of the hand (3%–28%). Given the rarity, there has been a paucity of literature regarding anatomic cord configurations and the surgical technique for the management of such radial-sided diseases. There are unique anatomic considerations in the thumb that warrant understanding prior to safe surgical exploration. A case of an anatomic variant of Dupuytren disease involving the thumb and first webspace treated with a webspace skin–sparing partial fasciectomy is described. The current literature regarding surgical management of Dupuytren disease affecting the thumb and first webspace is also briefly presented.

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Dupuytren disease (DD) of the thumb and first webspace is a unique entity within the spectrum of DD.[1] Although often seen concomitantly with disease on the ulnar aspect of the hand (ring and little fingers), it presents as unique anatomic challenges that call for alternate surgical interventions compared with the treatment of DD in other parts of the hand. This particular patient presented with a previously undescribed cord configuration that was amenable to management with a novel webspace skin–sparing approach. Written informed consent was obtained from the patient for publication of this case report and accompanying images.

Case Report

A 66-year-old right-handed man, an automobile mechanic, presented with complaints of worsening metatarsophalangeal joint and interphalangeal joint flexion contractures of the right thumb and an adduction contracture of the first webspace, worsening over the past 10 years and causing him increasing debilitation. He also had concomitant worsening proximal interphalangeal joint contractures of the ring and little fingers. On examination, palpable webspace and radial thumb cords were observed. The thumb-to-index finger abduction angles were consistent with stage 2 disease as defined by Tubiana (45°–90° of maximal radial abduction).[2] Additionally, there was an extension lag of 90° at the little finger's proximal interphalangeal joint and 20° at the metacarpophalangeal joint. After an appropriate evaluation and discussion, the patient chose to proceed with surgical management of DD in his right hand.

Prior to incision, hydrodissection was performed using saline. For the thumb, a lateral zig-zag incision was designed at the radial thumb from the most distal aspect of the thumb cord at the level of the distal phalanx joint down to the thenar eminence. Using a laterally based zig-zag incision, violation of the entire volar surface of the thumb and associated scarring was avoided. During this dissection, at the level of the thumb metatarsophalangeal crease, a bifurcation of diseased cord fibers was encountered; the radial-sided longitudinal fibers of the superficial palmar aponeurosis were noted to cross perpendicular to the transverse commissural ligament fibers of the first web, forming what visually appeared as a lambda configuration of thick, abnormal DD cord tissue (Fig. 1). The transverse commissural fibers were followed ulnarly along the webspace. They were approximately 1 cm proximal and parallel to the webspace margin so that the fibers were able to be dissected in a tunneled fashion without extending the skin incision across the first webspace at all. Instead, a vessel loop was placed for retraction, and a separate 1-cm incision was made distally at the radial aspect of the index finger's metatarsophalangeal joint, where the most

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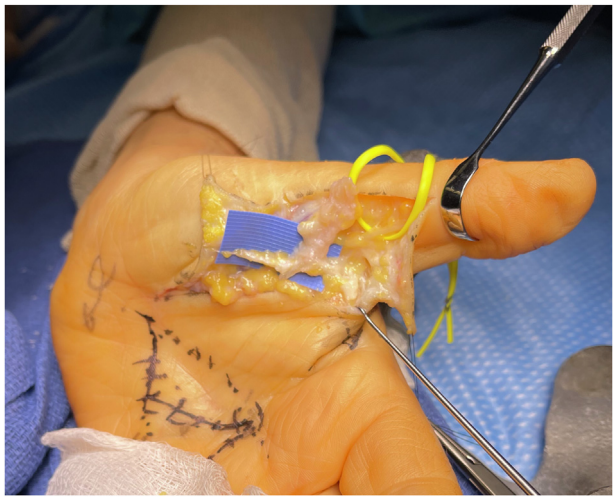

Figure 1. Intraoperative view of bifurcation of diseased cord fibers, forming what visually appeared as a "λ" (lambda) configuration of thick, abnormal cord tissue.

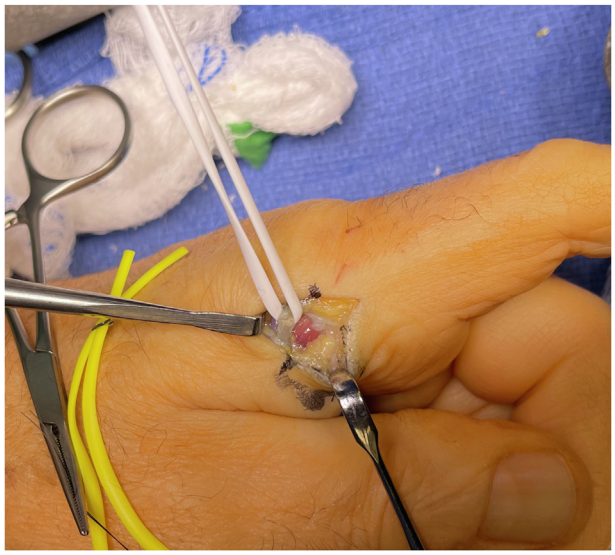

Figure 2. Intraoperative view of separate distal incision at the base of the index finger and identification of the distal end of the distal 1st webspace cord, allowing sparing of a trans-webspace incision.

distal aspect of the cord was identified and vessel loop was retracted and noted to disappear into the radial aspect of the index finger's metacarpophalangeal joint (Fig. 2). In order to visualize the intervening space, a thin and tapered *Chiu*-lighted retractor modeled after Aufricht was used to assist in performing the dissection of the cord, freeing it safely from the surrounding structures and allowing visualization of the webspace cord in its entirety (Fig. 3). Once fully mobilized, the cord was divided at its distal insertion into the index finger's metacarpophalangeal joint and delivered into the radial thumb incision. The proximal limb of the lambda-shaped cord was noted to follow the radial margin of the abductor pollicis brevis and coalesce into the superficial palmar fascia at the base of the thenar eminence. This course was noted to at times intimately involve both the radial and ulnar digital nerves of the thumb.

After this, the patient underwent partial fasciectomy and excision of the little finger for DD via extension of the thumb incision. This was all performed without damage to surrounding neurovascular structures, and the wounds were able to be closed primarily.

Figure 3. Intraoperative view of the *Chiu*-lighted retractor (tapered version of the Aufricht) in place within the webspace which allowed webspace skin sparing visualization of the diseased cords in their entirety.

Discussion

From an anatomic standpoint, various anatomic patterns of the palmar and digital cords of the thumb and first webspace have been described.[3] Unlike the other four digits, extension of the central pretendinous cord is not typically present in thumb DD. In addition, stout ulnar-sided longitudinal cords of the thumb are not seen. Instead, thumb cords are generally made up of up to four different elements (Fig. 4): (1) radially located longitudinally oriented fibers of the palmar aponeurosis; (2) a thick fibrous skeleton of the thenar eminence, primarily along its radial border; (3) a distal transverse commissural ligament or cord of the first web; and (4) a proximal transverse commissural cord of the first web. Accordingly, contractures of the thumb take on contracture patterns that are correlated with the dominant fibrotic component. The radial longitudinal cord of the palmar aponeurosis and thick fibrous skeleton of the radial aspect of the thenar eminence lead to metatarsophalangeal joint and interphalangeal joint flexion contractures of the thumb, and the transverse commissural cords of the first web (one distal and one proximal) result in contracture of the webspace, leading to adduction deformity of the thumb. A staging system described by Tubiana and based on the angle between the radial side of the thumb at the interphalangeal joint and the index finger at the palmar digital crease enables clinical assessment of severity and outcome evaluation.[2] In this case, both the longitudinal and transverse cord components were prominent, leading to both a flexion deformity and narrowing of the webspace.

The lambda cord configuration of the thumb and first webspace has not been described in the past. Although both longitudinal and transverse fibers at this level have been documented, such a

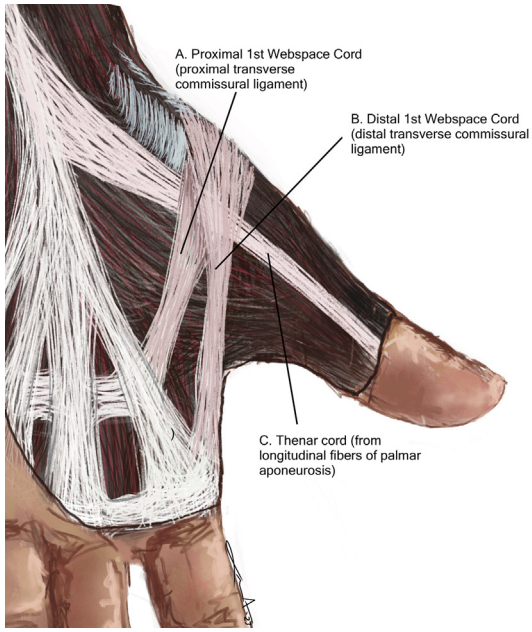

Figure 4. The pathologic Lambda (λ)-shaped cord may be composed of a maximum of three elements: **A** The pathologic proximal 1st webspace cord originating from the normal proximal transverse commissural ligament; **B** the pathologic distal 1st webspace cord originating from the normal distal transverse commissural ligament (Grapow's ligament); **C** the pathologic thenar cord originating from the normal thenar longitudinal fibers of the palmar aponeurosis.

distinct, thick, coalesced and intact structure of this configuration is unusual in this position and is the first in the author's (D.T.W.C.) 35 years of practice. In this case, it was likely made up of a combination of longitudinally oriented fibers of the palmar aponeurosis at the radial thumb and distal transverse commissural ligament of the first web (Fig. 5). Inferred are the multiple possible variations in thumb and first webspace cord anatomy in radial-sided DD. The longitudinal radial thumb fibers and transverse fibers of the webspace can combine to form any number of configurations. Knowledge of this is important given the proximity to both radial and ulnar digital nerves and digital arteries of the thumb during dissection, which can be easily subject to injury.[4–8] In this particular case, the digital nerves were located exactly at the confluence of fibrous tissue at the center of the lambda cord (at the inverted "V" of the lambda), leading to significant distortion of underlying neurovascular structures. Highlighted, therefore, is the importance of deliberate, precise identification and protection of neurovascular structures during dissection using vessel loops; this must be the first step and cannot be overstated.

Finally, the use of the Chiu's lighted retractor to minimize incisional morbidity in patients with DD has not been described previously in the literature. It was found that this method enabled accurate assessment of the location of the cord within the webspace; facilitated dissection within the tunnel between the radial-sided longitudinal thumb cord and the transverse commissural cord, all the way to the base of the index finger; and helped to ensure protection of the neurovascular bundles to both the thumb and index finger. Given the relative ease of this approach with the distal transverse ligament that was present in this case, the use of an appropriately sized lighted retractor could easily be extended to cases involving a proximal transverse ligament as well. We believe that this particular maneuver significantly decreased the wound morbidity of the operation, resulting in a lower likelihood of skin healing complications (Fig. 6).

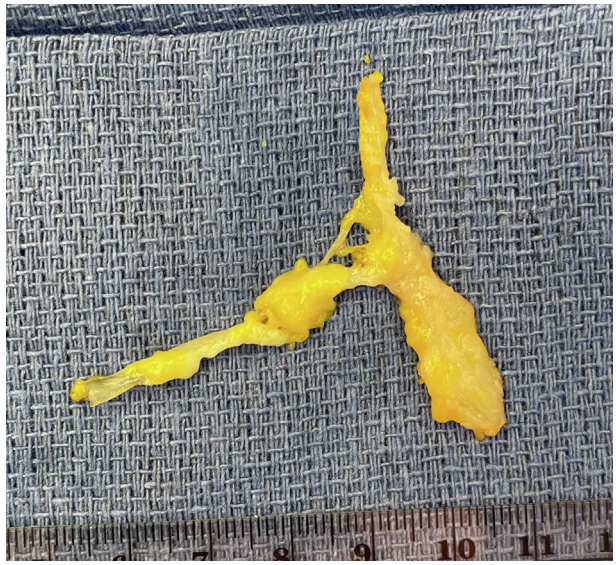

Figure 5. Intraoperative excised specimen ("λ" lambda cord). A stout proximal 1st webspace cord component was not encountered.

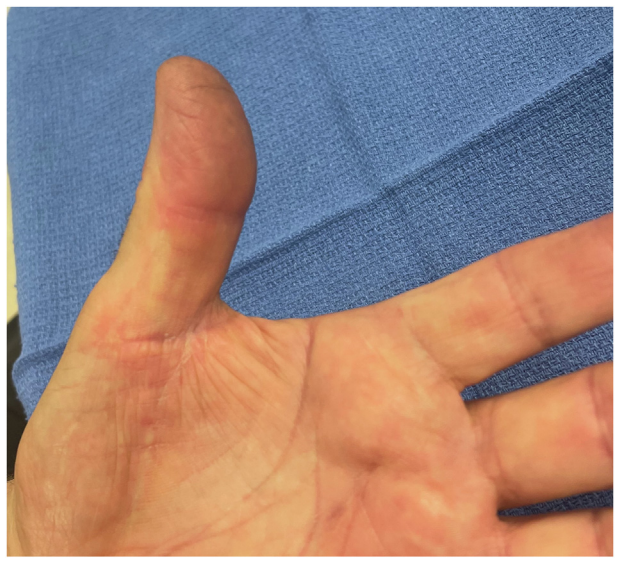

Figure 6. Post-operative appearance of the thumb at 10 weeks.

Conclusion

This case report explores the anatomic basis and surgical management of radial-sided DD via the unusual presence of a distinct "lambda" cord of the thumb. In addition, the first use of a low-profile lighted retractor to reduce wound morbidity across the first webspace was reported. To the best of the authors' knowledge, neither of these has been reported previously in the literature.

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