

An extremely rare case of absent extensor digitorum communis of the right index finger

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Summary

The hand is a unique structure in human body performing complex activities of daily life making it prone to injuries. While operating on zone VI extensor tendon injury, a surprising entity was observed. The extensor digitorum to the right index finger was absent. This is an extremely rare entity in the literature. Also, all previous studies on the extensor digitorum are cadaveric. Our findings are first of its kind intraoperative, incidental, and confirmed on MRI. Thus, it becomes a case report of special worth mentioning in literature.

Key words

extensor digitorum communis – extensor tendons – hand surgery – anatomic variations – index finger – absent tendon – congenital hand anomalies

Patil SB, Doshi S, Bhasin M. An extremely rare case of absent extensor digitorum communis of the right index finger. *Acta Chir Plast* 2024; 66(2): 82–85.

Introduction

The extensor digitorum originates from the common extensor origin over the lateral epicondyle of the humerus, intermuscular septum, and antebrachial fascia [1]. In the middle of the forearm, it is present as a rounded belly. Distally, it passes with the tendon of the extensor indicis proprius, through a compart-

ment underneath the extensor retinaculum. This muscle provides extension of the interphalangeal and metacarpophalangeal joints [2,3]. A single slip of the extensor digitorum to the index finger is present radially to the extensor indicis proprius over the metacarpal head region. Substantial evidence of variations in the extensor digitorum anatomy

has been displayed in the literature in the form of absent, accessory, multiple or primitive tendons or as variations in its origin and insertion [4]. In this case report we wish to highlight absent extensor digitorum to the index finger, which is extremely rare in literature [5].

Case report

A 38-year-old male presented to casualty with a glass piece injury to the right hand dorsum. Local examination revealed a 3-cm lacerated wound over the right hand dorsum with absent extension of the right index finger. The patient was diagnosed with zone VI extensor tendon injury. Intraoperatively, the extensor indicis proprius was lacerated and the extensor digitorum to the right index finger could not be found upon exploring its entire normal anatomical location site. Commonly, the extensor digitorum tendons are flat and the extensor indicis is a round tendon, which was seen intraoperatively. When the extensor digitorum belly was pulled, the tendon going towards the index finger



Fig. 1. Right hand dorsum with absent extensor digitorum of index finger. EDM – extensor digiti minimi, EDCL – extensor digitorum communis little finger, EDCR – extensor digitorum communis ring finger, EDCM – extensor digitorum communis middle finger, EIP – extensor indicis proprius

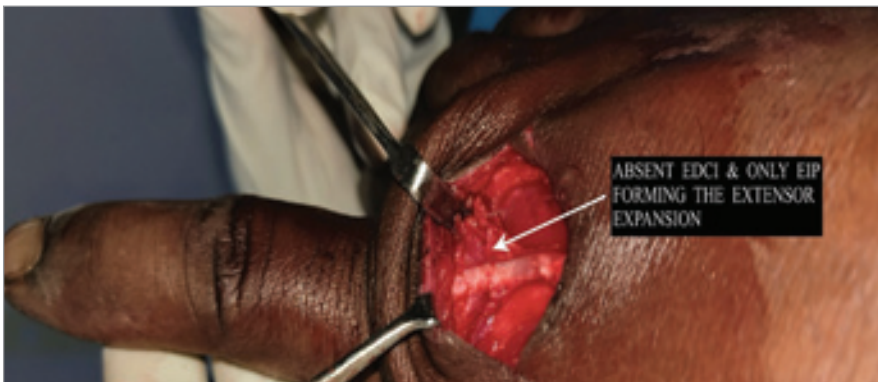


Fig. 2. EDCI – extensor digitorum communis index finger, EIP – extensor indicis proprius.

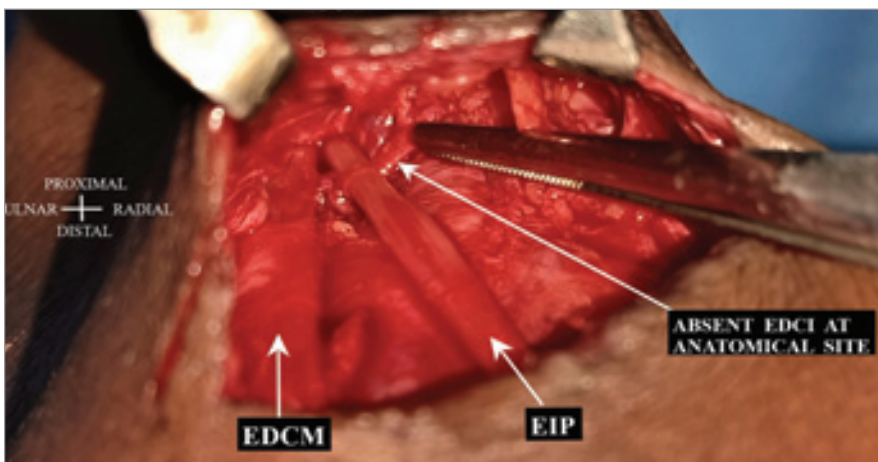


Fig. 3. Showing normal anatomical location of extensor digitorum of index finger which is on radial side of EIP and is absent in our case. EDCM – extensor digitorum communis middle finger (flat), EIP – extensor indicis proprius (round)

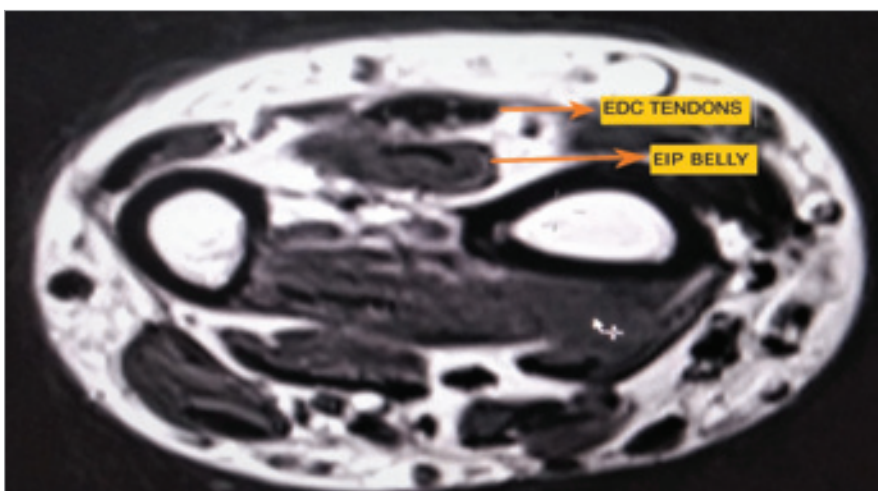


Fig. 4. Transverse section at distal end of radius ulna showing belly of extensor indicis proprius (EIP) near the interosseous membrane (it is the only muscle belly to be present at that location, which is present in this MRI and extensor digitorum communis (EDC) tendons.

did not show any movement. Later after post-operative recovery, when the Horn test was performed with flexion of all fingers, the patient was able to extend the index and the little finger signifying the presence of the extensor indicis and the extensor digiti minimi. All these findings confirmed that the repaired tendon was the extensor indicis and the extensor digitorum to the index finger was absent. Minimal incision was taken proximal to the wrist to identify all the tendons. Intraoperatively post-dissection, the extensor indicis tendon was brought in close proximity to other extensor digitorum tendons for representation and photographic purposes only (for clear visibility in the picture). Moreover, it is still seen volar in location to other extensor digitorum tendons, which is commonly seen in anatomy (Fig. 1–5).

Discussion and review of literature

Embryologically, the primitive extensor muscle bud of the forearm differentiates into three components. The superficial component forms the extensor digitorum, the extensor carpi ulnaris and the extensor digiti minimi [6,7]. Possibly, absence of the extensor digitorum of the index finger reported in the current case report is due to changes in the myotomes involved in the transformation of the somatic layer of lateral mesoderm which develop into superficial portion of the forearm extensor muscle bud [8]. The extensor apparatus of the index finger is composed of a tendon from the extensor digitorum muscle and a tendon from the extensor indicis proprius (EIP) muscle [8,9]. In our case, the extensor digitorum had no contribution to the extensor apparatus of the index finger. The dorsal digital expansion of the index finger was formed by the tendon of extensor indicis proprius only.

The first systematic study of division of the extensor muscles in humans was done by Le Double, which was published in 1897. In 1985, a study published by

Mestdagh et al. on 150 upper limb cadaver specimens revealed that the extensor digitorum tendon to the index finger was not absent in any case [10]. In 1992, Godwin et al. revealed on 50 upper limb cadaver specimens that the extensor digitorum tendon to the index finger was not absent in any case [11]. In 1995, a study published by El Badawi et al. on 181 upper limb cadaver specimens revealed that the extensor digitorum tendon to the index finger was not absent [12]. In 1995, Von Schroeder et al. revealed on 43 upper limb cadaver specimens that the extensor digitorum tendon to the index finger was not absent [13]. In 2001, Hirae et al. revealed on 548 upper limb cadaver specimens that the extensor digitorum tendon to the index finger was present in all cases [14]. In 2004, a study published by Zilber et al. on 50 upper limb cadaver specimens revealed that the extensor digitorum tendon to the index finger was not absent [15]. In 2009, a study by Palatty et al. on 50 bilateral upper limb cadaver specimens including adult and foetal cadavers revealed one right hand of a male foetus where the extensor digitorum tendon to the index finger was absent [16]. In 2011, a study published by Agarwal et al. on 120 upper limb cadaver specimens revealed that the extensor digitorum tendon to the index finger was absent in one case [17]. In 2018, a study by Rajan et al. on 100 upper limb cadaver specimens revealed that the extensor digitorum tendon to the index finger was not absent [18].

In this region, the extensor digitorum and the extensor indicis can present as double slips or a single slip. There can also be a variation in the location of these two tendons with respect to each other (Tab. 1). Moreover, aberrant tendons can also be found as variations in this region.

In our case, one slip of the extensor digitorum was present to the middle finger, the ring finger and the little finger and tendinous interconnections were present between them. Complete

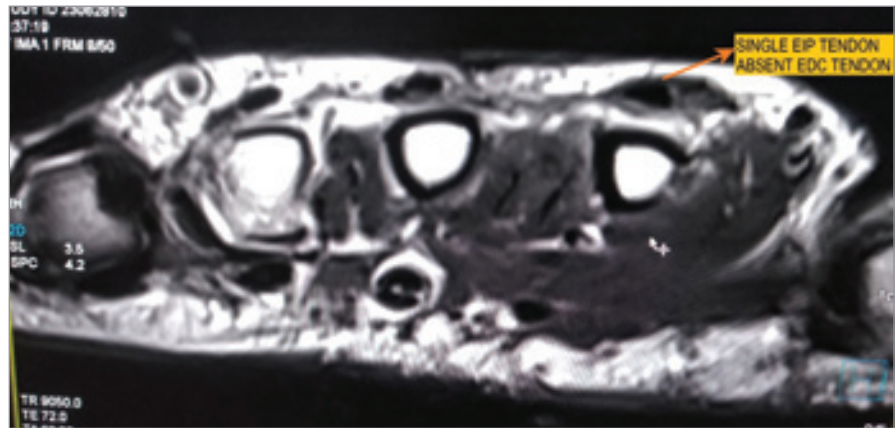


Fig. 5. Transverse section at body of metacarpals showing single extensor indicis proprius (EIP) tendon and absent, extensor digitorum communis (EDC) tendon to index finger in our case.

Tab. 1. Previously published data about absent EDC to Index finger.

Name of the study	Year	Upper extremity sample size (N)	Absent number of EDC tendons to index finger
Mestdagh et al.	1985	150	0
Godwin and Ellis	1992	50	0
El Badawi et al.	1995	181	0
Von Schroeder et al.	1995	43	0
Hirae et al.	2001	548	0
Zilber and Oberlin	2004	50	0
Palatty et al.	2009	50	1
Agarwal and Tirthani	2011	120	1
Rajan T et al.	2018	100	0
	total	1,292	2
	%	0.15	

EDC – extensor digitorum communis

absence of the extensor digitorum was noted to the index finger. Hence, being the most sensitive and specific investigation than USG, MRI was done to prove the diagnosis and to confirm the origin of the extensor indicis at a distal forearm level. The tendinous absence reported herein is an extremely rare entity in the literature thus it becomes a point of interest to clinicians, reconstructive surgeons, and anatomists for academic and clinical purposes.

Conclusion

Absence of the extensor digitorum to the index finger is an extremely rare entity leading to the presence of a single tendon to the index finger in the form of the extensor indicis proprius for its functioning which may cause excessive use of the tendon and may produce tenosynovitis or rupture of the tendon. Knowledge of anomalous/absent tendons is of crucial importance in planning any surgical procedure on the extensor tendons and

these variations have always to be kept at the back of the mind. The tendinous absence reported herein is an extremely rare entity in the literature. Moreover, all previous studies were cadaveric and our findings are intraoperative and confirmed on MRI. Thus, it becomes a point of special interest, worth mentioning for academic and clinical purposes.

Roles of the authors

All authors have been actively involved in the planning, preparation, analysis and interpretation of the findings, enactment and processing of the article with the same contribution.

Acknowledgements: None.

Conflict of interest: The author(s) declare no potential conflicts of interest with respect to the research, authorship, and/or publication of this case report.

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

Informed consent: Written informed consent was obtained from the patient for their anonymized information to be published in this article. All procedures performed in this study involving human participants were in accordance with ethical standards of the institutional and/or national research committee and with the Helsinki declaration and its later amendments or comparable ethical standards.

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Submitted: 18. 9. 2023

Accepted: 17. 6. 2024