Original Research Paper

Anatomical terminology regarding anatomical variations needs to be refined: An example systematic review of extensor pollicis et indicis and extensor indicis et medii variations

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Abstract: The anatomical terminology used to identify typical anatomical structures has been condensed over time as evidenced by compendiums of anatomical terminology such as *Terminologia Anatomica*. Yet, most variant anatomical structures which are diverse, common, and inherently clinically important have not been subject to the same sort of scrutiny and standardization. Thus, superfluous anatomical terminology remains commonplace with regard to anatomical variations. This study utilizes a systematic review to demonstrate a thorough means of assessing anatomical nomenclature. Specifically, the study assesses superfluous terms used to describe singular anatomical variations of the extensors of the 1st and 2nd digits including *extensor pollicis et indicis communis*, *extensor pollicis et indicis accessorius*, and *extensor pollicis et indicis* as well as the extensors of the 2nd and 3rd digits including *extensor indicis et medii communis*, *extensor indicis et medius communis*, *extensor indicis et medii proprius*, and *extensor indicis et medii accessorius*. The systematic review informs the use of *extensor pollicis et indicis* and *extensor indicis et medii* as preferable terms due to accuracy in description, brevity, and historical consistency. The reproducible methods and results of this study may serve as a model to henceforth improve anatomical nomenclature in an objective and scientific way. Likewise, the methods and results of this study may be used as lens through which retrospective assessment and interpretation of anatomical variations may be viewed.

Keywords: anatomy; anatomical terminology; anatomical variation; medical terminology; systematic review

Introduction

In late 19th-century, anatomical terminology was so rife with superfluous anatomical terms that remediation was warranted. Accordingly, in 1895, anatomical terminology was markedly refined by *Nomina Anatomica*, and refinement continued with subsequent iterations including the most recent *Terminologia Anatomica* (His, 1895; Eycleshymer et al., 1917; FIPAT, 2019). Over time, *Terminologia Anatomica* removed several inaccurate terms, eponyms, and many superfluous names given to singular anatomical structures (His, 1895; Eycleshymer et al., 1917; FIPAT, 2019). As a result, anatomical language has been largely condensed relative to that which had propagated into the 19th-century.

Despite progress in condensing the terminology used to describe typical human anatomy, there has

been little refinement of the terminology used to describe most anatomical variations. Importantly, anatomical variations listed in *Terminologia Anatomica* amount to less than 2% of listed terms (Kachlik et al., 2020). Thus, eponyms persist (e.g., *Linburg-Comstock variation, Darwin's tubercle*) (Fernandes et al., 2021; Rani et al., 2021; Prasatkaew et al., 2022; Gabrikova et al., 2023; Sowmya et al., 2023), inaccurate or misleading terms persist (e.g., *corona mortis* – the "crown of death") (Matos et al., 2024; Saini et al., 2024), and superfluous names continue to be applied to singular anatomical variations.

Anatomical variations are diverse, commonplace, and important to understand. Indeed, variations are so diverse and common that anatomical texts such as *Bergman's Comprehensive Encyclopedia of Human Anatomic Variation* (comprised of over 1400 pages) are dedicated to elucidating variant anatomy (Tubbs et al., 2016). Further, in addition to diversity and commonality, the clinical importance of anatomical variation cannot be overstated. Even among experienced surgeons, failure to properly identify variant anatomy is a commonly cited technical error with regard to surgical injuries (Regenbogen et al., 2007; Bonrath et al., 2013; Ni et al., 2016; Kowalczyk and Majewski, 2021). Thus, confusion in nomenclature must be eliminated in order to improve communication and the understanding of anatomical variation.

Pointing Fingers at the Variant Extensors of the 1st, 2nd, and 3rd Digits

To underscore the notion that superfluous names are often used to describe one particular variation, one may look to the varied denominations of the extensor variations of the first three fingers. Regarding variant musculature that inserts into both the thumb and index collectively, terms such as *extensor pollicis et indicis communis*, *extensor pollicis et indicis accessorius*, and *extensor pollicis et indicis* have all been used to describe the very same anatomical variation (Yoshida, 1990; Komiyama et al., 1999; Gaulke, 2001; Yalçin et al., 2006; Casanova Martínez et al., 2013 and 2014; Yammine, 2015; Suwannakhan et al., 2016; Souder et al., 2019; Ozturk et al. 2020; Cowher et al., 2024; Okazaki et al., 2024). Likewise, regarding variant musculature that inserts into both the second and third digits collectively, terms such as *extensor indicis et medii communis*, *extensor indicis et medius communis*, *extensor indicis et medii proprius*, and *extensor indicis et medii accessorius* have been used to describe the very same anatomical variation (Yoshida, 1990; von Schroeder and Botte, 1991; Yoshida, 1995; Tan and Smith, 1999; Komiyama et al., 1999; Yalçin et al., 2006; Yammine, 2015; Suwannakhan et al., 2016; Ozturk et al., 2020; Vaida et al., 2021).

Moreover, the aforementioned extensor muscle variations are of particular clinical importance. They are at increased risk for traumatic insults due to their superficial positioning and poor subcutaneous tissue protection (Georgiev, 2018; Suwannakhan et al., 2016; Ozturk et al., 2020). One prevalence study found hand tendon injuries to comprise 33.9% of all musculoskeletal soft tissue injuries, with an associated incidence of 18 per 100,000 (Clayton, 2008). Variants of the extensor musculature within the antebrachial region have also been shown to intrinsically generate pain and swelling themselves, manifesting as clinical syndromes (Suwannakhan et al., 2016). Indeed, anatomical variations concerning extensor indicis proprius have been particularly associated with inducing a so-called "extensor indicis proprius syndrome" (Ritter and Inglis, 1969; Patel et al., 1996). This condition is marked by severe pain due to tenosynovial proliferation around the additional variant tendon, especially during wrist flexion, resulting in subsequent constriction of the fourth dorsal compartment (Patel et al. 1996; Ritter and Inglis 1969; Georgiev, 2018). Lack of knowledge regarding such anatomical variations, and their pathologic implications, may lead to false diagnosis resulting in inappropriate treatment selection (Suwannakhan et al., 2016) Despite this, the majority of extensor variations are observed to be asymptomatic and often are not identified until surgery (Suwannakhan et al., 2016, Yammine, 2015).

Variant extensor tendons of first three digits can be utilized as grafts for reconstructive surgery (Georgiev, 2018; Sumwannakhan et al., 2016; Yammine, 2015). The tendon of extensor indicis proprius and its associated variants are considered to be ideal donors for a variety of surgical procedures (Yammine, 2015; Ozturk et al., 2020). These

commonly include treatment in the loss of extensor pollicis longus function, ulnar deviation of the fingers, and tendon ruptures especially among those with antecedent rheumatoid arthritis (Yammine, 2015). It is also the preferred graft used in the reconstruction of abductor pollicis longus (Yammine, 2015). Therefore, comprehensive understanding of these anatomical variations is also paramount for clinical decision-making during operative procedures (Casanova-Martinez et al. 2014).

Anatomical variations, like those of the extensors of the first three digits, are clinically important and the language used to describe them should be refined in order to provide clarity in communication (e.g., what terminology one might use to perform an efficient and accurate literature search). Therefore, this report provides a systematic review of the literature regarding extensor muscle variations of the first three digits in order to improve anatomical language and communication.

Materials and Methods

The MEDLINE database was searched via the PubMed search engine. The following search script was used: "(extensor pollicis et[Title/Abstract]) OR (extensor indicis et[Title/Abstract])".

The authors read the titles and abstracts of all studies in tandem from two separate computers. There was no blinding of any details of MEDLINE records (e.g., journal titles, author names, author affiliations, dates, etc.). The search was performed for all articles *ab initio* until 28 June 2024.

Research items were assessed specifically for the terminology used to describe variant musculature that spanned from first to second digit (extensor pollicis et…) and from second to third digit (extensor indicis et…).

Results

A total of 14 results were identified, screened, and included in assessment of terminology. Results regarding "extensor pollicis et" are summarized in Appendix 1, and results regarding "extensor indicis et" are summarized in Appendix 2.

Of the 14 studies included within the review, 11 included "*extensor pollicis et*" in the title or abstract. 5:11 (45.5%) utilized the term *extensor pollicis et indicis communis*. Of these five, two utilized this term to describe a supernumerary extensor variant supplying both the 1st and 2nd digits, arising in the presence of both extensor indicis proprius (EIP) and extensor pollicis longus (EPL) (Okazaki et al., 2024; Casanova-Martinez et al., 2014); two utilized the term to describe a single extensor supplying both the 1st and 2nd digits, but instead noted it to arise in the absence of EIP or EPL (Yoshida, 1990; Yoshida, 1995); and one utilized the term in reference to others' work without morphologic description (Casanova-Martinez et al. 2013).

A total of 4:11 (36.4%) studies utilized the abbreviated term "*extensor pollicis et indicis."* Of these four, two used the term to describe the same supernumerary extensor variant, responsible for supplying both the 1st and 2nd digits, arising in the presence of a concurrent EIP and EPL (Yammine, 2015; Gaulke, 2001). One used the term in reference to the work conducted by Suwannakhan et al., describing a similar variant with a bifurcated tendon supplying the 2nd digit (Ozturk et. al 2020). Uniquely, the report by Suwannakhan et al (2016) utilized the term as a general denomination to describe a variant extensor also responsible for supplying both the 1st and 2nd digits. However, the report by Suwannakhan et al (2016) further subdivided the observed variants into three novel "types" based on the morphologic characteristics of the particular variation, and the presence or absence of other complimentary muscles such as EIP and EPL (Suwannakhan et al. 2016).

A total of 4:11 (36.4%) studies utilized the term "*extensor pollicis et indicis accessorius."* Of these four, three utilized the term to describe the same supernumerary extensor variant responsible for supplying the 1st and 2nd digits, all of which were observed to arise in the presence of EIP and EPL (Komiyama, 1999; Yoshida, 1990; Yoshida, 1995). One study used the term in reference to the work conducted by Komiyama et al (1999) but failed to provide any morphologic description of the variant itself (Yalcin et al. 2006).

Of the 14 studies included in the review, ten included "*extensor indicis et*" in the title of abstract. Nomenclature regarding this particular variant demonstrated remarkably less variability, as 7:10

(70%) utilized the term "*extensor indicis et medii communis*". However, upon further analysis, this common term was used to describe two distinct morphologic variations cited across the reviewed reports. Of the seven studies, two utilized the term in reference to a supernumerary variant extensor with a bifurcated tendon supplying both the 2nd and 3rd digits (Vaida, 2021; Ozturk et al. 2020). In both, it was noted to be observed in the presence of EIP. Similarly, three of the studies used the term to describe a variant extensor responsible for supplying both the 2nd and 3rd digits (Yalcin et al., 2006; Tan and Smith, 1999; Von Schroeder and Botte, 1991). In contrast, however, the variant in these studies was observed to arise in the absence of EIP. Furthermore, Yammine et. al utilized the same term to describe a similar muscular variant originating on the dorsal ulna with a bifurcated tendon that supplied both the 2nd and 3rd digits but made no reference to the concurrent presence of EIP whatsoever (Yammine et al., 2015). Suwannakha et al (2016) attempted to address this discordance by using the term as a general means to reference a variant extensor supplying both the 2nd and 3rd digits, and then further subdivided the observed variants into "types" depending on whether a concurrent EIP was present or not (Suwannakhan et al., 2016).

Only 4:10 (40%) of the studies that referenced "*extensor indicis et*" utilized a term other than "*extensor indicis et medii communis."* Komiyama et al (1999) utilized "*extensor indicis et medii proprius (or accessorius*)" in reference to a variant that has been documented across several prevalence studies. It was given a limited morphologic description, only being noted as inserting into both the 2nd and 3rd digits (Komiyama et al., 1999). Two studies used "*extensor indicis et medii accessorius*" to describe a supernumerary variant extensor that was observed in the presence of a concurrent EIP (Yoshida, 1990; Yoshida, 1995). Its common tendon was noted to bifurcate in order to supply both the 2nd and 3rd digits respectively. Lastly, Vaida et al (2021) used the term "*extensor indicis et medius communis*" within their abstract on a case report regarding an extensor variant whose common tendon was observed to split into 3 separate tendons, two of which supplied the 2nd digit and one of which supplied the 3rd digit. However, within the very same paper, the authors later denoted their finding as "*extensor indicis et medii communis"* during the subsequent discussion (Vaida et al., 2021).

Discussion

Great progress has been made in the refinement of anatomical terminology; however, there remains much to be done regarding the terminology used to describe the plethora of anatomical variations. Herein, the authors utilized a systematic review of the literature regarding variant extensors of the first and second digits to demonstrate a thorough means of assessing nomenclature. The methods and results of this study may serve as a model that may be useful in efforts of improving the future use of anatomical nomenclature. Likewise, the methods and results of this study may be used as lens through which retrospective assessment and interpretation of anatomical variations may be viewed.

The results of this study reaffirmed the authors premise for assessment— there, indeed, is discordance in the terminology used to describe variations in the extensor musculature of the 1st and 2nd digits. The principal discordance was regarding the use of the terms "*accessorius*" and "*communis*."

When inspecting the terminology used to describe the variant musculature spanning between the 1st and 2nd digits, the use of "*accessorius*" and "*communis*" had been explicitly addressed by Yoshida (1990, 1995), who noted that the use of the term *extensor pollicis et indicis communis* should be reserved for a muscle that is found in non-human animals which exists in the absence of extensor hallucis longus and extensor indicis proprius muscles. Thus, Yoshida (1990, 1995) explicitly noted that extensor pollicis et indicis should be used with regard for human variation. Yet, despite the recommendation, many have continued to use the term *extensor pollicis et indicis communis* and, accordingly, have perpetuated the confusion.

It would appear simple to suggest that *extensor pollicis et indicis accessorius* should be the preferred term with regard to the musculature of the 1st and 2nd digits; however, this study identified that the similar muscle which bridges the 2nd and 3rd digits has been referred to as *extensor indicis et medii communis* with few exceptions. Thus, using the term *accessorius* with regard to the 1st and 2nd digit for the sake of accuracy is confounded by the fact that

communis is the commonplace term used to describe a similar variation between the 2nd and 3rd digit.

To resolve the problem regarding the use of *accessorius* and *communis*, the authors suggest not using either of the terms. Let the variations simply be known as *extensor pollicis et indicis* and *extensor indicis et medii*. In doing so, consistency may be maintained between the variations in the extensor tendons. Moreover, a literature search for "extensor pollicis et indicis" or "extensor indicis et medii" will identify studies which include both *accessorius* and *communis* (all of the studies identified in this report). Likewise, the terms remain descriptively accurate despite having more brevity than options including *accessorius* and *communis*. Indeed, rather than coining a new term, which may be detrimental to the anatomical nomenclature (Neumann, 2023), this represents a minor modification. Thus, the authors find it logical to espouse terminology with the greatest degree of brevity that still remains descriptively accurate while, likewise, causing minimal disturbance to the terminology that has been used historically. Regarding historical use, change in anatomical terminology that has been established throughout historical literature may have detrimental and unforeseen consequences and should be approached cautiously (Kachlik et al., 2008; Neumann et al., 2020; Kachlik, 2021; Zdilla, 2021; Neumann, 2021; Zdilla, 2022; Zdilla, 2024a and 2024b; Pretterklieber, 2024; Agur and Dalley, 2024).

This study provides an example of a critical appraisal of anatomical terminology using reproducible methods accompanied by an interpretation of results with an emphasis on accuracy, brevity, and consistency with respect to historical use. Similar studies should continue to refine the anatomical lexicon, especially the terminology used to describe anatomical variations.

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Literature Cited

Agur AMR, Dalley AF (2024) Terminologica Anatomica2: are we working toward achieving a unified consensus based anatomical terminology? Anat Sci Int doi:10.1007/s12565-024-00767-5

Bonrath EM, Dedy NJ, Zevin B, Grantcharov TP (2013) Defining technical errors in laparoscopic surgery: a systematic review. Surg Endosc 27(8):2678-2691

Casanova-Martínez, D., Valdivia Gandur, I., Golanó, P (2013) Extensor pollicis et indicis communis or extensor indicis radialis muscle. Anat Sci Int 88:153-155.

Casanova-Martínez D, Valdivia-Gandur I, Golanó P (2014) Extensor pollicis et indicis communis with triple slips in a bilateral case of accessory muscles of the hand. Anat Sci Int 89(4):250-254

Cowher AE, Sowinski H, Balta JY, Troy AE, Zdilla MJ (2024) The Prevalence of the Extensor Pollicis et Indicis Communis Muscle. Anat Rec 307(S1) doi:10.1002/ar.25522

Sowmya MV, Mehrotra D, Mohammad S, Singh RK, Tiwari AK, Katrolia R, Sharma Yogesh S (2023) 3D assessment of ear morphology. J Oral Biol Craniofac Res 13(5):622-629

Eycleshymer AC, Schoemaker DM, Moodie RL (1917) Anatomical Names: Especially the Basle Nomina Anatomica ("BNA"). W. Wood, United States

Fernandes CH, Lopes EJ, Meirelles LM, Dos Santos JBG, Faloppa F, Albertoni WM (2021) Outcome of carpal tunnel release surgery in patients with and without Linburg-Comstock anomaly. Hand Surg Rehabil 40(6):777-781

FIPAT - Federative International Programme for Anatomical Terminiology (2019) Terminologia Anatomica 2nd Ed. Updated August 16, 2021 (Version 2.07). Accessed June 28, 2023. <FIPAT.library.dal.ca>

Gabríková K, Kachlík D, Belbl M, Kunc V (2023) An accessory muscle belly or an accessory muscle head? An unusual arrangement of muscles in the anterior compartment of the forearm. Surg Radiol Anat 45(3):271-275

Gaulke R (2001) [The Extensor Pollicis et Indicis: An Accessory or Rudimentary Deep Extensor Tendon to the Thumb? Variants - Frequency - Clinical Relevance]. Handchir Mikrochir Plast Chir 33:310–320

His W (1895). Die anatomische Nomenclatur. Nomina anatomica, Verzeichniss der von der anatomischen Gesellschaft auf ihrer IX. Versammlung in Basel angenommenen Namen. Veit, Leipzig

Hugh TB (2008) Critical evaluation: patterns of surgical technical error. ANZ J Surg 78:715-717

Kachlik D, Baca V, Bozdechova I, Cech P, Musil V (2008) Anatomical terminology and nomenclature: past, present and

highlights. Surg Radiol Anat 30(6):459-466

Kachlik D (2021) Changes of anatomical nomenclature must be deliberate: The female external genitalia. Clin Anat 34(2):320-323

Kachlík D, Varga I, Báča V, Musil V (2020) Variant Anatomy and Its Terminology. Medicina (Kaunas) 56(12):713

Komiyama M, Nwe TM, Toyota N, Shimada Y (1999) Variations of the Extensor Indicis Muscle and Tendon. J Hand Surg Eur Vol 24:575-578

Kowalczyk KA, Majewski A (2021) Analysis of surgical erros associated with anatomical variations clinically relevans in general surgery. Review of the literature. Trans Res Anat 23:100107.

Matos CD, Hincapie D, Hoyos C, Gracia E, Rivera E, Gabr M, Miranda-Arboleda AF, Sauer WH, Romero JE (2024) Corona Mortis: A Potential Etiology for Complications During Femoral Vein Access. JACC Clin Electrophysiol 10(5):1000-1003

Neumann PE, Gest TR, Tubbs RS (2020) The principles of anatomical nomenclature revision: They're more like guidelines anyway. Clin Ana 33(3):327-331

Neumann PE (2021) Rules of nomenclature versus principles of revision: An impudent debate. Clin Anat 34(2):312-314

Neumann PE (2023) Substantive changes in the Latin anatomical nomenclature: Sometimes less is more. Clin Anat 36(3):372-376

Ni M, Mackenzie H, Widdison A, Jenkins JT, Mansfield S, Dixon T, Slade D, Coleman MG, Hanna GB (2016) What errors make a laparoscopic cancer surgery unsafe? An ad hoc analysis of competency assessment in the National Training Programme for laparoscopic colorectal surgery in England. Surg Endosc 30(3):1020-1027

Okazaki K, Hamasaki S, Koyama Y, Mukuda T, Nakane H, Taniguchi R, Furuichi R, Kameie T, Kaidoh T (2024) An unusual configuration of two anomalies in the extensor digitorum profundus complex in a human. Anat Sci Int 99:326–330

Ozturk K, Kastamoni Y, Dursun A, Albay S (2020) Prevalence of the extensor digitorum, extensor digiti minimi and extensor indicis tendons and their variations. Hand Surg Rehabil 39:320–327

Patel MR, Moradia VJ, Bassini L, Lei B (1996) Extensor indicis proprius syndrome: a case report. J Hand Surg Am 21:914-915

Prasatkaew W, Kruepunga N, Yurasakpong L, Korkong R, Ardsawang S, Ronglakorn S, Sananpanich K, Suksri S, Suwannakhan A (2022) A reverse form of Linburg-Comstock variation with comments on its etiology and demonstration of interactive 3D portable document format. Surg Radiol Anat 44(2):227-232

Pretterklieber ML (2024) Nomina anatomica-unde venient et quo vaditis? Anat Sci Int doi:10.1007/s12565-024-00762-w

Rani D, Krishan K, Sahani R, Baryah N, Kanchan T (2021) Variability in human external ear anthropometry-Anthropological and forensic applications. Clin Ter 172(6):531-541

Regenbogen SE, Greenberg CC, Studdert DM, Lipsitz SR, Zinner MJ, Gawande AA (2007) Patterns of technical error among surgical malpractice claims: an analysis of strategies to prevent injury to surgical patients. Ann Surg 246:705–711

Ritter MA, Inglis AE (1969) The extensor indicis proprius syndrome. J Bone Joint Surg Am 51:1645–1648

Saini V, Alla S, Verma H, Chhabra U (2024) Encountering the corona mortis vessel during laparoscopic totally extraperitoneal mesh hernioplasty and its significance. BMJ Case Rep 17(4):e259775

Souder KS, Petrone AB, Lambert HW, Zdilla MJ (2019) The Extensor Pollicis et Indicis Communis Muscle: A Rare Muscular Variation. FASEB Journal 33 (1 suppl):616.33

Suwannakhan A, Tawonsawatruk T, Meemon K (2016) Extensor tendons and variations of the medial four digits of hand: a cadaveric study. Surg Radiol Anat 38:1083-1093

Tan ST, Smith PJ (1999) Anomalous extensor muscles of the hand: A review. J Hand Surg 24:449-455

Tubbs RS, Shoja MM Loukas M (2016) *Bergman's Comprehensive Encyclopedia of Human Anatomic Variation*. Wiley, Germany

Vaida MA, Gug C, Jianu AM, Damen NS, Muntean IL, Grigoriță L (2021) Bilateral anatomical variations in the extensor compartment of forearm and hand. Surg Radiol Anat 43:697-702

von Schroeder HP, Botte MJ (1991) The extensor medii proprius and anomalous extensor tendons to the long finger. J Hand Surg 16:1141–1145

Yalçin B, Kutoglu T, Ozan H, Gürbüz H (2006) The extensor indicis et medii communis. Clin Anat 19:112–114

Yammine K (2015) The prevalence of the extensor indicis tendon and its variants: a systematic review and meta-analysis. Surg Radiol Anat 37:247–254

Yoshida Y (1995) Anatomical studies on the extensor pollicis et indicis accessorius muscle and the extensor indicis radialis muscle in Japanese. Okajimas Folia Anat Jpn 71:355–363

Yoshida Y (1990) Anatomical study on the extensor digitorum profundus muscle in the Japanese. Okajimas Folia Anat Jpn 66:339–353

Zdilla MJ (2021) The pudendum and the perversion of anatomical terminology. Clin Anat 34(5):721-725

Zdilla MJ (2022) What is a vulva? Anat Sci Int 97(4):323-346

Zdilla MJ (2024a) Hundreds of body parts are named after hair: is anatomical terminology supercilious or simply super silly?

Anat Sci Int doi: 10.1007/s12565-024-00765-7

Zdilla MJ (2024b) The coronation of the clitoris: formally introducing the corona of the glans clitoris. Anat Sci Int 99(4):492-499

Appendix 1: Summary of studies referencing "*extensor pollicis et*"

Author	Year	Journal	Type	Terminology Used	Abbreviation	Description of Structure	Summary
Okazaki et al.	2024	Anat Sci Int	Case report	Extensor pollicis et indicis communis	EPIC	An extra tendon ran between the extensor pollicis longus (EPL) and extensor indicis (EI), before bifurcating near the base of the 2nd metacarpal. The medial slip inserted into the extensor aponeurosis of the index finger, while the lateral slip inserted into the tendon of EPL. The lateral tendon ran through its own compartment, whereas the medial tendon existed within the same compartment as extensor indicis and extensor digitorum communis.	Described an unusual arrangement involving two extensor anomalies in the left upper extremity of a 66-year-old Japanese male. Anatomic study revealed the presence of an accessory slip of extensor pollicis longus in addition to an extensor pollicis et indicis communis (EPIC), comprising a novel distribution not previously reported in man.
Ozturk et al.	2020	Hand Surg Rehabil	Cadaveric study	Extensor pollicis et indicis	None used	Utilized the term in reference to the report by Sumwannakhan et al. (2016), detailing an extensor variant sending tendons to the 2nd digit.	Cadaveric dissection was performed on 83 upper extremities of fetal cadavers in order to investigate variations of extensor digitorum, extensor digiti minimi, and extensor indicis proprius. 7% of hands possessed variant muscles, with 4.7%, 1.2%, and 1.2% displaying extensor indicis et medii communis, extensor medii proprius, and extensor digitorum brevis manus respectively.
Suwannakhan et al.	2016	Surg Radiol Anat	Cadaveric study	Extensor pollicis et indicis	None used	Divided into three subtypes: A, B, and C. Type A describes a muscular variant analogous to extensor indicis proprius (EIP), but with an intertendinous connection to the thumb. Type B indicates a supernumerary bifurcated tendon, originating from the EIP belly, inserting into both the 1st and 2nd digits. Type C represents an instance in which the	100 cadaveric limbs dissected. Four anatomic extensor variations observed and documented: extensor medii proprius, extensor digitorum brevis manus, extensor indicis et medii communis, and extensor pollicis et indicis

						extensor pollicis et indicis was present concurrently with an extensor indicis et medii communis. Type B and C were observed in the presence of a proper EPL and EIP.	
Yammine	2015	Surg Radiol Anat	Meta-analysis	Extensor pollicis et indicis	EPI	A supernumerary muscle that originates on the dorsal aspect of the ulna and interosseous ligament. Its common tendon bifurcates, with its radial slip inserting into the 1st digit and its ulnar slip inserting into the 2nd digit. All instances of the EPI were observed in the presence of extensor pollicis longus (EPL) and extensor indicis proprius (EIP).	Analyzed data regarding 29 anatomic studies on the extensor musculature of the hand, with a total of 3858 extremities. Results included prevalence estimates of both common and variant musculature alike. EMIC had an estimated prevalence of 1.6% while EPI had an estimated prevalence of 0.75%.
Casanova-Martínez et al.	2014	Anat Sci Int	Case report	Extensor pollicis et indicis communis	EPIC	A supernumerary muscle belly that originates from the radial portion of extensor indicis proprius (EIP). Its common tendon divided into 3 slips, with the ulnar and middle slips supplying the 2nd digit and the radial slip joining the tendon of extensor pollicis longus (EPL). Both a proper EPL and EIP were noted.	Described a rare disposition of extensor tendons in both wrists of a 90-year-old female cadaver. The right extremity displayed an extensor pollicis et indicis communis (EPIC) with three tendinous slips, while the left extremity displayed an accessory extensor indicis radialis (EIR) arising from the radial portion of EIP and inserting into the 2nd digit.
Casanova Martínez et al.	2013	Anat Sci Int	Case report	Extensor pollicis et indicis communis	EPIC	No morphologic description included – in reference to work by Yoshida (1995) and Godwin and Ellis (1992)	Described an accessory tendon between the extensor digitorum communis (EDC) and extensor pollicis longus (EPL), seemingly supplying the 2nd digit similarly to an extensor indicis radialis (EIR). However, an intertendinous connection between its radial portion and EPL was noted, meaning it would functionally act as an EPIC.
Yalçin et al.	2006	Clin Anat	Cadaveric study	Extensor pollicis et	EPI	No morphologic description included – in	The upper extremities of 31 randomly selected adult cadavers were dissected for

				indicis accessorius		reference to work by Komiyama et al. (1999)	evaluation of the presence of extensor indicis et medii communis (EIMC). The muscle was observed in 3 of 62 hands.
Gaulke	2001	Handchir Mikrochir Plast Chir	Case report	Extensor pollicis et indicis	EPI	In German – Summary made note that a complete rudimentary EPI with an absent EPL and EI has not yet been found in man.	Two findings of extensor pollicis et indicis (EPI) were classified, according to the literature on comparative anatomy, in order to determine its origin. EPL and EIP were determined to have developed from EPI, with a rudimentary EPI muscle belly sharing a common origin with EPL and EIP in a subset of the population.
Komiyama et al.	1999	J Hand Surg Br	Cadaveric study	Extensor pollicis et indicis accessorius	EPI	Variant muscle was classified as type 2, as it displayed a radially positioned supernumerary tendon in addition to EI. In this case, this radial tendon was seen to bifurcate. Its ulnar distribution inserted into the radial dorsum of the 2nd digit, while its radial distribution inserted into the tendon of EPL.	164 hands of Japanese adults were examined for variations of the extensor indicis muscle. Variations were classified into four types based on morphologic characteristics. Extensor medii proprius was determined to be the most common variation.
Yoshida	1995	Okajimas Folia Anat Jpn	Cadaveric study	Extensor pollicis et indicis accessorius	None used	Supernumerary muscle originating on the lateral part of the dorsal aspect of the ulna. Its single tendon bifurcates into two segments: the radial and ulnar. The radial division inserts into the medial side of the 1st digit or fuses with the tendon of EPL. The ulnar division inserts into the lateral aspect of the second digit or rarely into the tendon of EIP. This muscle was only observed in the presence of EIP and EPL in all cases.	Cadaveric dissection of 952 Japanese adult upper limbs was performed in order to assess for the presence of extensor pollicis et indicis accessorius and extensor indicis radialis. The former was found in 1.4% of limbs while the latter was found in 3.6%.
				Extensor pollicis et indicis communis	None used	Variant muscle originating from the dorsal ulnar shaft seen in some mammals (rabbits, dogs, ect.). Its single tendon bifurcates distally to supply both the 1st and 2nd digits. In this instance, neither EIP or	

						EPLP are present in the extremity.	
Yoshida	1990	Okajimas Folia Anat Jpn	Cadaveric study	Extensor pollicis et indicis accessorius	None used	A supernumerary muscle originating from the dorsal ulna and positioned between EPL and EIP. Its single tendon bifurcates to supply both the 1st and 2nd digits. The lateral portion was usually noted to insert into the distal tendon of EPL, while its medial portion inserts into the lateral dorsum of the 2nd digit.	Cadaveric dissection of 832 upper limbs was performed to assess for variation among the musculature derived from the primitive extensor digitorum profundus mass. Both common and variant configurations were noted. Coexistence of EPL and EIP was the most frequent orientation, observed in 79.8% of limbs.
				Extensor pollicis et indicis communis	None used	A muscle seen to arise in lower mammalian forms when the radial aspect of extensor digitorum profundus does not undergo cleavage into a distinct EPI and EPL. Emphasis was placed on only utilizing this term when the extensor of interest is observed in the absence of EPI and EPL.	

Appendix 2: Summary of studies referencing "*extensor indicis et*"

Author	Year	Journal	Type	Terminology Used	Abbreviation	Description of Structure	Summary
Vaida et al.	2021	Surg Radiol Anat	Case report	Extensor indicis et medius communis	EIMC	Supernumerary muscle originating on the dorsal ulna with a trifurcated tendon supplying the 2nd and 3rd digits. Adjacent aberrant extensor indicis proprius also reported.	65-year-old female presented with multiple extensor variations. Left arm revealed an extensor medii propriius m. while the right revealed an extensor indicis et medii communis and an aberrant extensor indicis.
				Extensor indicis et medii communis			
Ozturk et al.	2020	Hand Surg Rehabil	Cadaveric study	Extensor indicis et medii communis	EIMC	A variant extensor muscle that inserts into both the 2nd and 3rd digits. In this report, an exceptional EIMC with four tendons was documented, three of which were inserted on the 2nd digit and one on the 3rd digit. A concurrent EIP was present in photographs.	Cadaveric dissection was performed on 83 upper extremities of fetal cadavers in order to investigate variations of extensor digitorum, extensor digiti minimi, and extensor indicis proprius. 7% of hands possessed variant muscles, with 4.7%, 1.2%, and 1.2% displaying extensor indicis et medii communis, extensor medii proprius, and extensor digitorum brevis manus respectively.

Suwannakhan et al.	2016	Surg Radiol Anat	Cadaveric study	Extensor indicis et medii communis	EIMC	Divided into two subtypes: A and B. Type A describes an aberrant muscle originating from the dorsal ulna, in the absence of EIP, to supply the 2nd and occasionally 3rd digits. Type B represents a supernumerary muscle, distal and separate to an existing EIP belly, that acts to supply the 2nd and 3rd digits.	100 cadaveric limbs were dissected. Four anatomic extensor variations were observed and documented: extensor medii proprius, extensor digitorum brevis manus, extensor indicis et medii coommunis, and extensor pollcisi et indicis
Yammine	2015	Surg Radiol Anat	Meta-analysis	Extensor indicis et medii communis	EIMC	A variant muscle originating on the dorsal aspect of the ulna below extensor pollicis longus (EPL) with two distinct tendons emerging at the myotendinous junction to supply the 2nd and 3rd digits respectively. Ultimately inserts into the intertendinous fascia proximal to the MCP joint. No reference to the concurrent presence of EIP is made.	Analyzed data regarding 29 anatomic studies on the extensor musculature of the hand, with a total of 3858 extremities. Results included prevalence estimates of both common and variant musculature alike. EMIC had an estimated prevalence of 1.6% while EPI had an estimated prevalence of 0.75%.
Yalçin et al.	2006	Clin Anat	Cadaveric study	Extensor indics et medii communis	EIMC	A variant muscle originating from the distal medial surface of the ulna with two separate tendons to supply the 2nd and 3rd digits respectively. It was seen to insert into the dorsal aponeurosis at the MCP joint of the 2nd digit, and into the joint capsule of the 3rd digit. Extensor indicis proprius (EIP) was not observed in those displaying the variant.	The upper extremities of 31 randomly selected adult cadavers were dissected for evaluation of the presence of extensor indicis et medii communis (EIMC). The muscle was observed in three of 62 hands.
Komiyama et al.	1999	J Hand Surg Br	Cadaveric study	Extensor indicis et medii proprius (or accessorius)	None used	Utilized the term in reference to others' work regarding a variant extensor that inserts into both the 2nd and 3rd digits.	164 hands of Japanese adults were examined for variations of the extensor indicis muscle. Variations were classified into four types. Extensor medii proprius was determined to be the most common variation.

Tan and Smith	1999	J Hand Surg Am	Literature review	Extensor indicis et medii communis	EIMC	A variant analog to extensor indicis proprius (EIP) that is observed to share the same origin at the distal ulna. Its common tendon splits to insert into both the 2nd and 3rd digits. The EIMC tendon supplying the 3rd digit inserts into the deep fascia near the MCP joint rather than the dorsal expansion. The EIP is absent.	Sources describing anatomic anomalies, including anomalous extensor indicis proprius, extensor digitorum brevis manus, extensor medii proprius, and extensor indicis et medii communis were reviewed and discussed.
Yoshida	1995	Okajimas Folia Anat Jpn	Cadaveric study	Extensor indicis et medii accessorius	None used	A supernumerary muscle originating on the dorsal ulna, medial to EIP. Its tendon "fanned out" between the medial 2nd digit and and lateral 3rd digit, acting to supply both. EIP was present in the illustrated schematic.	Cadaveric dissection of 952 Japanese adult upper limbs was performed in order to assess for the presence of extensor pollicis et indicis accessorius and extensor indicis radialis. The former was found in 1.4% of limbs while the latter was found in 3.6%.
von Schroeder and Botte	1991	J Hand Surg Am	Cadaveric study	Extensor indicis et medii communis	EIMC	A variant muscle, analogous to the EIP, with a single common muscle belly giving rise to two distinct tendons that are seen to split near the myotendinous junction. One tendon inserts into the 3rd digit while the other inserts into the 2nd digit. EIP is absent.	58 upper extremities from adult cadavers were dissected in order to investigate the incidence of both extensor medii proprius and extensor indicis et medii communis. Extensor medii proprius and extensor indicis et medii communis had an incidence of 10.3% and 3.4% respectively.
Yoshida	1990	Okajimas Folia Anat Jpn	Cadaveric study	Extensor indicis et medii accessorius	None used	Supernumerary muscle originating from the dorsal aspect of the ulna medial to EIP. Its single tendon is observed to bifurcate to supply the medial aspect of the 2nd digit and lateral side of the 3rd digit, with a membranous connection frequently observed between the branches.	Cadaveric dissection of 832 upper limbs was performed to assess for variation among the musculature derived from the primitive extensor digitorum profundus mass. Both common and variant configurations were noted. Coexistence of EPL and EIP was the most frequent orientation, observed in 79.8% of limbs.