



Prevalence of Septated First Dorsal Compartment Among Iranian Patients with De Quervain Tenosynovitis

Alireza Pahlavansabagh¹, Mohammad Soleimani², Alireza Ghaznavi¹, Mahsa Roshanipour¹, Farbod Yousefi³, Seyed Nima Taheri^{1*}

Received: 17 Mar 2022

Published: 8 Nov 2022

Abstract

Background: A septum in the first extensor compartment and variation of abductor pollicis longus (APL) and extensor pollicis brevis (EPB) tendons affect the development and treatment of the de Quervain disease. This study aimed to determine the prevalence of septum and the number of APL and EPB tendons in Iranian surgical de Quervain patients.

Methods: In this case series, we evaluated 37 consecutive wrists from September 2019 to April 2020 that were evaluated and surgically explored by the same senior surgeon; and the number of tendons and the existence of septum were recorded.

Results: Patients were mainly women (24 [67.6%]), and the mean age was 50.43 ± 16.42 years. Seven (18.9%) patients had one, 23 (62.2%) had two, and 7 (18.9%) patients had three APL tendons. All patients had EPB tendons, 34 (91.9%) had 1 EPB tendon, and 3 (8.1%) had 2 EPB tendons. A septum was observed in 23 (62.2%) patients.

Conclusion: The most functional variation in Iranian patients consists of 2 APL tendons and 1 EPB tendon. Also, most affected wrists had a septum in the first extensor compartment.

Keywords: Anatomic Variation, De Quervain Disease, Tendinopathy

Conflicts of Interest: None declared

Funding: None

***This work has been published under CC BY-NC-SA 1.0 license.**

Copyright© Iran University of Medical Sciences

Cite this article as: Pahlavansabagh A, Soleimani M, Ghaznavi A, Roshanipour M, Yousefi F, Taheri SN. Prevalence of Septated First Dorsal Compartment Among Iranian Patients with De Quervain Tenosynovitis. *Med J Islam Repub Iran.* 2022 (8 Nov);36:130. <https://doi.org/10.47176/mjiri.36.130>

Introduction

The abductor pollicis longus (APL) and extensor pollicis brevis (EPB) tendons are compressed in the first extensor compartment of the wrist in the stenosis tenosynovitis of the wrist, de Quervain disease (1). Generally, this condition occurs after inflammation of the synovial sheaths of the tendons in the compartment (2, 3). Pain over the radial

styloid without trauma is the primary complaint, and crepitation on the radial styloid and a positive Finkelstein test is found in the physical examination (4). The condition is predominant in the middle-aged and in women— it is 6 to 10 times more prevalent in women (5).

The primary treatments are rest, splint, nonsteroidal an-

Corresponding author: Dr Seyed Nima Taheri, Taheri.ni@iums.ac.ir

¹ Bone and Joint Reconstruction Research Center, Department of Orthopedic Surgery, School of Medicine, Iran University of Medical Sciences, Tehran, Iran

² Department of Epidemiology, School of Public Health, Iran University of Medical Sciences, Tehran, Iran

³ Department of Orthopedics and Trauma Surgery, School of Medicine, Tehran University of Medical Sciences, Tehran, Iran

↑What is “already known” in this topic:

The presence of a septum in the first extensor compartment is associated with the failure of nonsurgical treatments and a higher number of extensor pollicis brevis (EPB) and abductor pollicis longus (APL) tendons with the likelihood of development of the de Quervain disease.

→What this article adds:

Although the condition is well described in other populations, to the best of our knowledge, there have been no prior studies on the Iranian population, making this case series the first study to report the condition in the Iranian population. In this study, most patients had 2 APL tendons and 1 EPB tendon, and most affected wrists had a septum in the first extensor compartment.

ti-inflammatory drugs, and steroid injections. Surgery is indicated in patients for whom the conservative management has failed. Several studies have identified subcompartmentalization within the first extensor compartment as a predisposing factor to de Quervain disease and a reason for treatment failure (1, 6-10). The number of APL and EPB tendons is also associated with an increased risk of developing the disease (2). Moreover, these differences affect the success rate of different treatments (11, 12).

Understanding the anatomical variations of this compartment is essential for effective treatment. To the best of our knowledge, no study evaluated the prevalence of a septated first dorsal compartment in the Iranian population. Thus, in this study, we aimed to determine the anatomical prevalence of the APL and EPB tendons and a septated first dorsal compartment in patients with de Quervain disease requiring surgery.

Methods

In this case series study, after obtaining approval from the ethics committee of our institute, we selected patients with de Quervain disease undergoing surgery in Rasoul Akram hospital, Tehran, Iran, from September 2019 to April 2020.

A total of 37 hands in 37 consecutive patients were included in the study; all patients provided written informed consent. The inclusion criteria were having signs and symptoms of de Quervain disease, disturbance by pain, and failure of conservative treatment. The exclusion criteria were any musculoskeletal anomalies, history of hand surgery, and history of severe hand trauma.

The same senior hand surgeon performed all surgeries with the same method. Age, gender, operated hand, dominant hand, the number of the APL and EPB tendons, and the presence of a first extensor compartment wall were extracted from the operative reports.

The Kolmogorov-Smirnov was used to check for normality. Categorical data are presented as frequency and percentage, and quantitative variables as mean and standard deviation. Data were analyzed by SPSS Version 16, and the significance level was set at 0.05.

Results

The mean age of the patients was 50.43±16.42 years. Patients were women and right-handed, predominantly with 24 (67.6%) and 34 (91.9%) patients. The affected hand was the right hand in 27 (73%) cases. Regarding the number of APL tendons, 7 (18.9%) patients had one, 23 (62.2%) had two, and 7 (18.9%) patients had three APL tendons, making a total of 30 (81.1%) with 2 or more APL tendons. All patients had EPB tendons, 34 (91.9%) had one, and 3 (8.1%) had two EPB tendons.

Among the patients, 14 (37.8%) had no septum, while 21 (56.8%) had partial septum, and 2 (5.4%) had complete septum, making a total of 23 (62.2%) patients with septa. (Table 1).

Table 2 demonstrates the findings in each patient.

Discussion

This study examined anatomical variations in the first

Table 1. Demographic characteristics of patients

Variable	Value
Age ¹	50 (16.42)
Female sex ²	24 (67.6)
Right dominant hand ²	34 (91.9)
Right affected hand ²	27 (73)

1: Mean (SD); 2: Number (%).

extensor compartment in Iranian surgical de Quervain patients. Our results suggest that 62.2% of the patients had subcompartment housing in the first dorsal extensor compartment. Also, most patients had 2 APL tendons and 1 EPB tendon (62.2% and 91.9%, respectively). Moreover, most compartments had an incomplete septum. Further, the patients in our study were mostly middle-aged and women.

Since a Swiss physician, de Quervain, described the condition in 1895, the stenosing tenosynovitis of the APL and EPB tendons has been widely studied (7, 9, 13-18). Cadaveric and anatomic studies showed that a septum in the compartment is a common variant; however, the septum and the number of tendons vary in different studies (19-21). Also, the existence of a septum within the compartment causes the condition and determines the success of the treatment (14, 19, 22-24). Several studies have been carried out to determine the prevalence of these variations (3, 25, 26); nonetheless, none evaluated the Iranian population.

In a recent systematic review and meta-analysis by Lee et al (2), the prevalence of a septum in the first extensor compartment of the wrist was reported at 42% in normal cadavers and 59% in de Quervain patients, making a significant difference. Also, 59% of patients with septum had incomplete septa. Moreover, the prevalence of a single APL tendon was 18% in normal cadavers and 27% in de Quervain patients. In our study, the prevalence of a tendon in patients with de Quervain disease was 18.9%. Further, in the systematic review, the prevalence of 1 EPB tendon in patients was 93.8%, close to 91.9% in our results (2).

Kulthanan examined anatomical variations between 82 assumed normal cadavers and 66 de Quervain patients in the Thai population. The APL had more than 1 tendon in 49% of patients, and 94% had 1 EPB tendon (3). Out of their 66 patients, 59 were women, which is in line with our findings. They also found septum in 58% of patients, which is concordant with our results (3).

Ravi dissected 77 cadaveric upper limbs of 40 cadavers of Indian origin and found 1 (1.3%), 73 (94.8%), 2 (2.6%), and 1 (1.3%) upper limbs with 0, 1, 2, and 3 tendons of EPB, respectively (17). They also observed a septum within the first extensor compartment in 58% of cases, almost similar to our findings.

One of the limitations of this study is that only patients who needed surgery were evaluated in this study, and patients treated with conservative measures and corticosteroid injections were not examined. In this study, only the data of de Quervain patients were examined. We suggest the examination of the normal population in addition to anatomical variations in de Quervain patients in future studies. Also, this study was designed and executed in 1

Table 2. Characteristics of each patient

Patient	Age	Sex	Side	APL tendon(s)	EPB tendon(s)	Compartment(s)	Septum
1	24	Male	Left	2	1	2	Partial
2	63	Female	Right	2	1	2	Partial
3	53	Female	Right	1	1	1	No
4	38	Male	Right	1	1	2	Complete
5	70	Female	Left	3	1	1	No
6	45	Male	Right	2	1	2	Partial
7	66	Female	Left	2	1	1	No
8	62	Male	Right	2	1	2	Partial
9	70	Female	Right	2	2	1	No
10	31	Male	Right	1	1	2	Partial
11	24	Female	Right	2	1	2	Partial
12	23	Male	Right	3	1	1	No
13	62	Female	Left	2	1	2	Partial
14	55	Female	Right	2	1	1	No
15	44	Female	Right	2	1	2	Partial
16	28	Male	Right	3	1	1	No
17	32	Female	Left	1	1	1	No
18	75	Female	Right	2	1	1	No
19	81	Female	Right	2	1	2	Partial
20	49	Female	Right	3	1	1	No
21	41	Male	Left	3	1	2	Partial
22	36	Male	Left	2	1	1	No
23	57	Female	Right	1	2	2	Partial
24	62	Female	Right	2	1	2	Partial
25	66	Female	Right	2	1	2	Partial
26	53	Male	Right	3	1	2	Partial
27	28	Male	Right	2	2	2	Complete
28	47	Female	Left	2	1	1	No
29	33	Female	Right	2	1	2	Partial
30	41	Female	Right	2	1	2	Partial
31	60	Female	Right	2	1	2	Partial
32	67	Female	Right	2	1	1	No
33	54	Female	Right	1	1	1	No
34	32	Female	Left	2	1	2	Partial
35	67	Female	Right	1	1	2	Partial
36	55	Male	Right	3	1	2	Partial
37	72	Female	Left	2	1	2	Partial

APL, abductor pollicis longus; EPB, extensor pollicis brevis.

center and had a small sample size, and multicenter studies are suggested for a larger sample size.

Of note, comparing de Quervain patients with cadavers may be inaccurate, and ultrasonography or magnetic resonance imaging are not always diagnostic. Surgical exploration by the same surgeon seems the most accurate way to make an accurate comparison between de Quervain patients and healthy people.

Conclusion

In this study, the anatomical variations of the components of the first extensor compartment were investigated in Iranian surgical patients with de Quervain disease. This study showed that the most functional variation consists of 2 APL tendons and 1 EPB tendon. Also, the most common variation is the existence of a septum in the first extensor compartment.

Conflict of Interests

The authors declare that they have no competing interests.

References

- Choi SJ, Ahn JH, Lee YJ, Ryu DS, Lee JH, Jung SM, et al. de Quervain disease: US identification of anatomic variations in the first

extensor compartment with an emphasis on subcompartmentalization. *Radiology*. 2011;260(2):480-6.

- Lee ZH, Stranix J, Anzai L, Sharma S. Surgical anatomy of the first extensor compartment: a systematic review and comparison of normal cadavers vs. De Quervain syndrome patients. *J Plast Reconstr Aesthet Surg*. 2017;70(1):127-31.
- Kulthanan T, Chareonwat B. Variations in abductor pollicis longus and extensor pollicis brevis tendons in the Quervain syndrome: a surgical and anatomical study. *Scand J Plast Reconstr Surg Hand Surg*. 2007;41(1):36-8.
- Peters-Veluthamaningal C, Winters JC, Groenier KH, Meyboom-de Jong B. Randomised controlled trial of local corticosteroid injections for carpal tunnel syndrome in general practice. *BMC Fam Pract*. 2010;11(1):1-11.
- Azar FM, Canale ST, Beaty JH. *Campbell's Operative Orthopaedics*, E-Book: Elsevier Health Sciences; 2020.
- Matzon JL, Graham JG, Lutsky KF, Takei TR, Gallant GG, Beredjikian PK. A Prospective Evaluation of the Anatomy of the First Dorsal Compartment in Patients Requiring Surgery for De Quervain's Tenosynovitis. *J Wrist Surg*. 2019;8(5):380-3.
- Bahm J, Szabo Z, Foucher G. The anatomy of de Quervain's disease. A study of operative findings. *Int Orthop*. 1995;19(4):209-11.
- Alemohammad AM, Yazaki N, Morris RP, Buford WL, Viegas SF. Thumb interphalangeal joint extension by the extensor pollicis brevis: association with a subcompartment and de Quervain's disease. *J Hand Surg Am*. 2009;34(4):719-23.
- Gousheh J, Yavari M, Arasteh E. Division of the first dorsal compartment of the hand into two separated canals: rule or exception? *Arch Iran Med*. 2009 Jan;12(1):52-4.
- Harvey FJ, Harvey PM, Horsley MW. De Quervain's disease: surgical or nonsurgical treatment. *J Hand Surg Am*. 1990;15(1):83-7.

11. Xu H, Wu JX, Wang Q, Gao ZY. Anatomical variations in the first extensor compartment: a cadaver study. *ANZ J Surg*. 2018;88(9):913-6.
12. Nayak SR, Hussein M, Krishnamurthy A, Mansur DI, Prabhu LV, D'Souza P, et al. Variation and clinical significance of extensor pollicis brevis: a study in South Indian cadavers. *Chang Gung Med J*. 2009;32(6):600-4.
13. Bernstein DT, Gonzalez MA, Hendrick RG, Petersen NJ, Nolla JM, Netscher DT. Impact of Septated First Dorsal Compartments on Symptomatic de Quervain Disease. *Plast Reconstr Surg*. 2019;144(2):389-93.
14. Minamikawa Y, Peimer CA, Cox WL, Sherwin FS. De Quervain's syndrome: surgical and anatomical studies of the fibroosseous canal. *Orthopedics*. 1991;14(5):545-9.
15. Richie III CA, Briner WW. Corticosteroid injection for treatment of de Quervain's tenosynovitis: a pooled quantitative literature evaluation. *J Am Board Fam Med*. 2003;16(2):102-6.
16. Lane L, Boretz R, Stuchin S. Treatment of de Quervain's disease: role of conservative management. *J Hand Surg Eur Vol*. 2001;26(3):258-60.
17. Weiss APC, Akelman E, Tabatabai M. Treatment of de Quervain's disease. *J Hand Surg Am*. 1994;19(4):595-8.
18. Leslie BM, Ericson WB, Jr., Morehead JR. Incidence of a septum within the first dorsal compartment of the wrist. *J Hand Surg Am*. 1990;15(1):88-91.
19. Beutel BG, Doscher ME, Melone CP, Jr. Prevalence of a Septated First Dorsal Compartment Among Patients With and Without De Quervain Tenosynovitis: An In Vivo Anatomical Study. *Hand (N Y)*. 2020;15(3):348-52.
20. Jackson WT, Viegas SF, Coon TM, Stimpson KD, Frogameni AD, Simpson JM. Anatomical variations in the first extensor compartment of the wrist. A clinical and anatomical study. *J Bone Joint Surg Am*. 1986;68(6):923-6.
21. Roy AJ, Roy AN, De C, Banerji D, Das S, Chatterjee B, et al. A cadaveric study of the first dorsal compartment of the wrist and its content tendons: anatomical variations in the Indian population. *J Hand Microsurg*. 2012;4(2):55-9.
22. Gao ZY, Tao H, Xu H, Xue JQ, Ou-Yang Y, Wu JX. A novel classification of the anatomical variations of the first extensor compartment. *Medicine (Baltimore)*. 2017;96(35):e7875.
23. Hadianfard M, Ashraf A, Fakheri M, Nasiri A. Efficacy of acupuncture versus local methylprednisolone acetate injection in De Quervain's tenosynovitis: a randomized controlled trial. *J Acupunct Meridian Stud*. 2014;7(3):115-21.
24. Knobloch K, Gohritz A, Spies M, Vogt PM. Neovascularisation in de Quervain's disease of the wrist: novel combined therapy using sclerosing therapy with polidocanol and eccentric training of the forearms and wrists—a pilot report. *Knee Surg Sports Traumatol Arthrosc*. 2008;16(8):803-5.
25. Ravi PK, Tewari J, Mishra PR, Tripathy SK, Nanda SN, Gantaguru A. Variations of extensor pollicis brevis tendon in Indian population: A cadaveric study and review of literature. *J Clin Orthop Trauma*. 2019;10(2):278-81.
26. Gurses IA, Turkay R, Inci E, Ors S, Onal Y, Ozel S, et al. Sex differences in the radial grooves in the first extensor compartment. *Skeletal Radiol*. 2016;45(7):955-8.