



12-31-2022

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Recommended Citation

Wu, Pao-Sheng; Lu, Chun-Te; and Chiu, Valeria (2022) "Ganglion Cyst of Lumbrical Muscles: A casereport," *Rehabilitation Practice and Science*: Vol. 50: Iss. 1, Article 9.

DOI: [https://doi.org/10.6315/TJPMR.202206_50\(1\).0009](https://doi.org/10.6315/TJPMR.202206_50(1).0009)

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Ganglion Cyst of Lumbrical Muscles: A Case Report

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Ganglion cysts arising from joints or tendons are commonly seen in our daily work as physiatrists, but those originating from muscles have been infrequently reported. In this case report, we present a patient with a ganglion cyst arising from the fascia of the fourth lumbrical muscle in an occupational therapist, which has never been reported before.

The lumbrical muscles of the hand vary greatly from other intrinsic muscles, because of their distinctive structure and function. A ganglion cyst that arises from the lumbrical muscle is supposed to affect the precise movement of the occupational therapist's hand. As a result, the early identification, management, and subsequent rehabilitation of the ganglion cyst originating from the lumbrical muscle are important, especially for a patient whose job involves high-precision activities of the intrinsic muscles, such as an occupational therapist. (*Tw J Phys Med Rehabil* 2022; 50(1): 67 - 75)

Key Words: ganglion cyst, lumbrical muscles, muscle spindle, hand, occupational therapist

INTRODUCTION

Ganglion cysts are common benign fluid-filled masses that are most often seen in the wrist and hand, but they can occur anywhere.^[1] Although ganglion cysts sometimes cause pain or other discomfort, the most common presentation is a painless mass like lesion with cosmetic concerns.^[2] The definite diagnosis of ganglion cyst is pathology report; however, image study such as ultrasonography might be more non-invasive and the accuracy is also high.^[3] Besides the size of the ganglion cyst, the lobulations, content inside, vasculature and connection to the joint capsule can all be assessed by ultrasonography as well.^[4] Treatment of ganglion cysts includes nonsurgical aspiration, but because there are

frequent reports of recurrence after nonsurgical intervention, surgery is recommended.^[5]

Consider ganglion cysts in the hand, 60 to 70% of them are observed on the dorsal side of the wrist, for instance, at the scapholunate joint, whereas fewer than 20% are found on the volar side of the wrist.^[6] Others can arise not only from joints but also from tendons, with approximately 10% of cases reportedly occurring from the flexor tendon sheath in the hand,^[7] resulting in symptoms such as finger snapping, pain, and even carpal tunnel syndrome.^[8] The ganglion cysts from the dorsal and volar wrist, together with those arising from the flexor tendon sheath account for 90% of all ganglion cysts in the hand;^[9] however, ganglion cysts that arise from the muscles, either from the fascia or the muscle itself, have been seldom

Submitted date: 10 August 2021

Revised date: 8 September 2021

Accepted date: 1 November 2021

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doi: 10.6315/TJPMR.202206_50(1).0009

reported.^[10-13] In this report, we review the case of a patient who complained of a ganglion cyst deriving from the lumbrical muscles of the hand, which, to the best of our knowledge, has not been previously reported.

CASE REPORT

The patient was a 36-year-old right-handed woman with no systemic underlying disease who worked as an occupational therapist in a northern regional hospital in Taiwan. She detected a nodule in her left palm 1 week before presentation to the physical medicine and rehabilitation outpatient clinic. She did not recall a specific traumatic injury preceding the nodule but mentioned to have played with the Xbox elite interactive computer game with a wireless console controller one month ago. Physical examination indicated a 0.8-cm, hard, round, skin-color nodule located just slightly medial to the left fourth metacarpophalangeal (MCP) joint of her left palm (Figure 1). Mild tenderness was noted during compression, while the patient complained of some numbness.

Musculoskeletal ultrasound revealed a well-defined, non-lobulated, anechoic, mild compressible, cystic mass ($7.6 \times 3.9 \times 5.7 \text{ cm}^3$ in size), with posterior acoustic en-

hancement, lying superficial and ulnar sided to the left fourth flexor digitorum tendon while not compressing the tendon (Figure 2). A simple ganglion cyst was favored, and the patient received a steroid injection under ultrasound guidance (Figure 3). However, the ganglion cyst persisted in the following few months after the injection, and she was thus referred to the plastic surgeon clinic for excision of the cyst. During the surgery, the ganglion cyst was found to originate from the fascia of fourth lumbrical muscle and lying just next to the fourth ulnar digital nerve (Figure 4). To prevent recurrence, in addition to excision of the ganglion cyst, the fascia of the fourth lumbrical muscle was also partially removed for complete excision. The fourth ulnar digital nerve was left intact after the excision procedure (Figure 5).

The pathology report confirmed the ganglion cyst as anticipated, and the patient was enrolled in post operation rehabilitation programs, consisting of ultrasound and laser modalities and range-of-motion (ROM), stretching, and friction massage exercises. At 1-month follow-up, the patient stated that her pain had significantly subsided after the surgery, and she remained asymptomatic after 1-year follow-up.

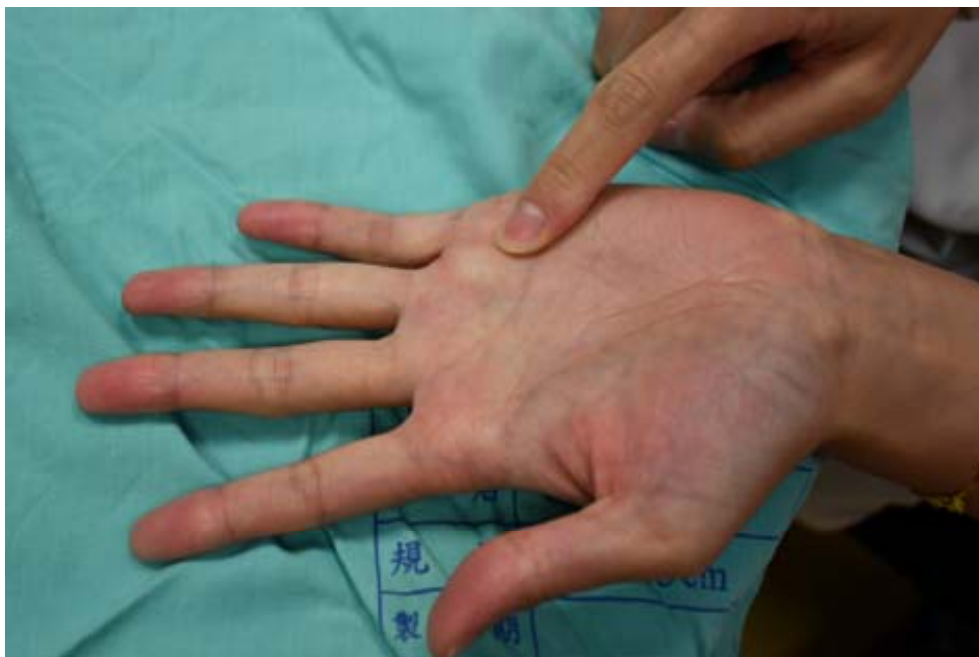


Figure 1. Gross appearance of the patient's left palm. A mass like lesion was detected over the ulnar side of the left fourth distal metacarpophalangeal (MCP) joint.

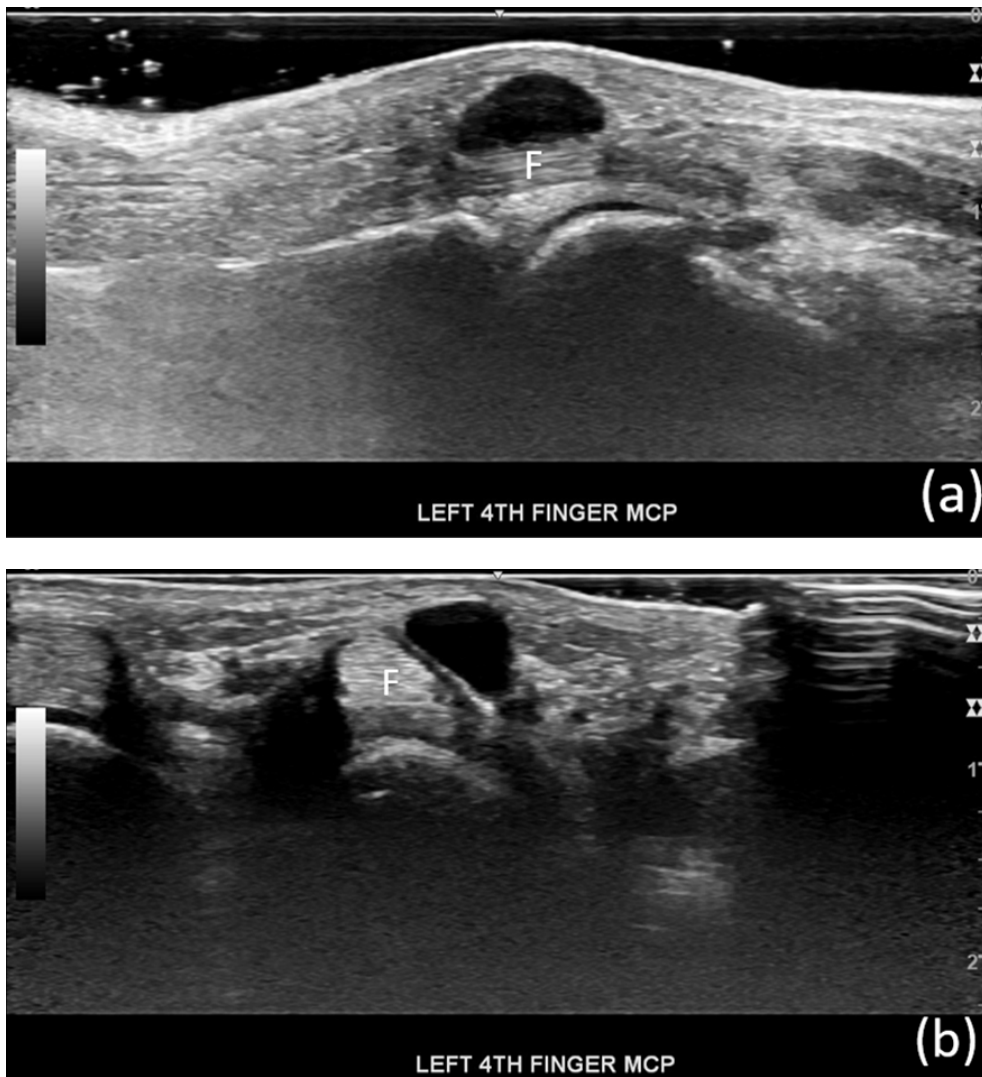


Figure 2. Musculoskeletal ultrasound of the left fourth finger at the MCP joint in (a) the sagittal view and (b) the transverse view. F, flexor digitorum tendons.



Figure 3. Echo-guided steroid injection into the ganglion cyst.

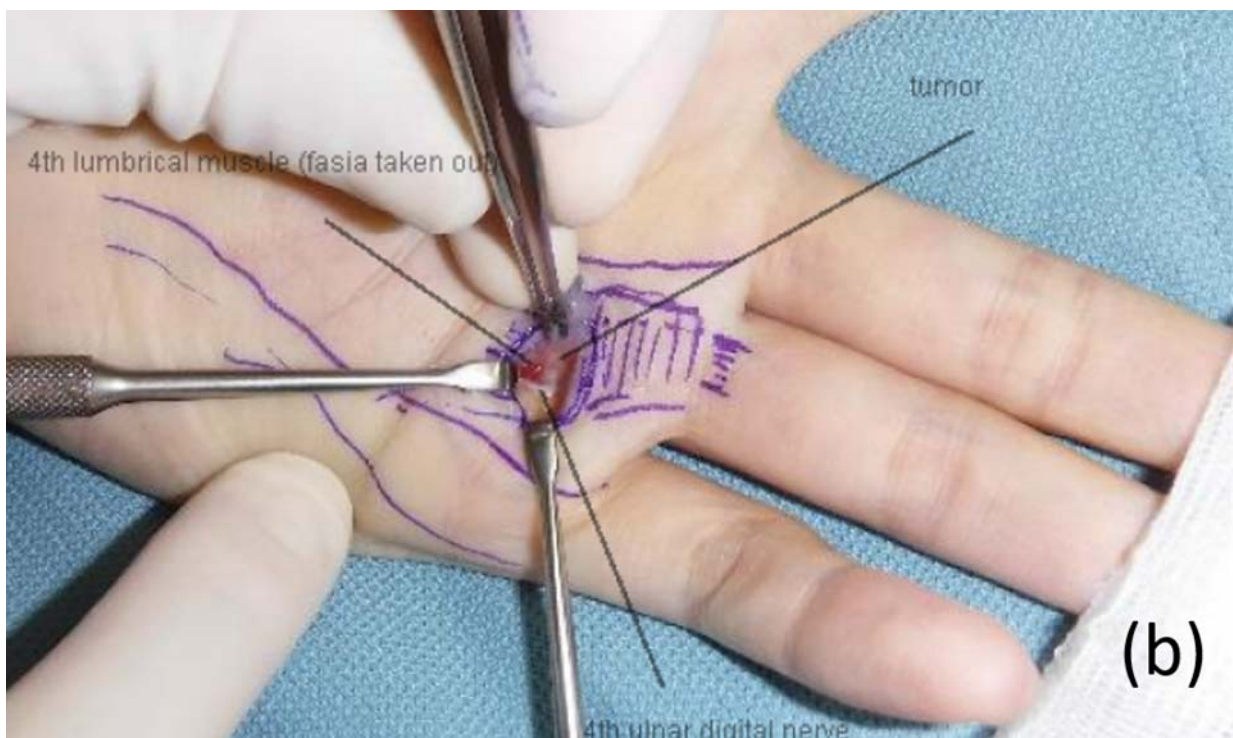
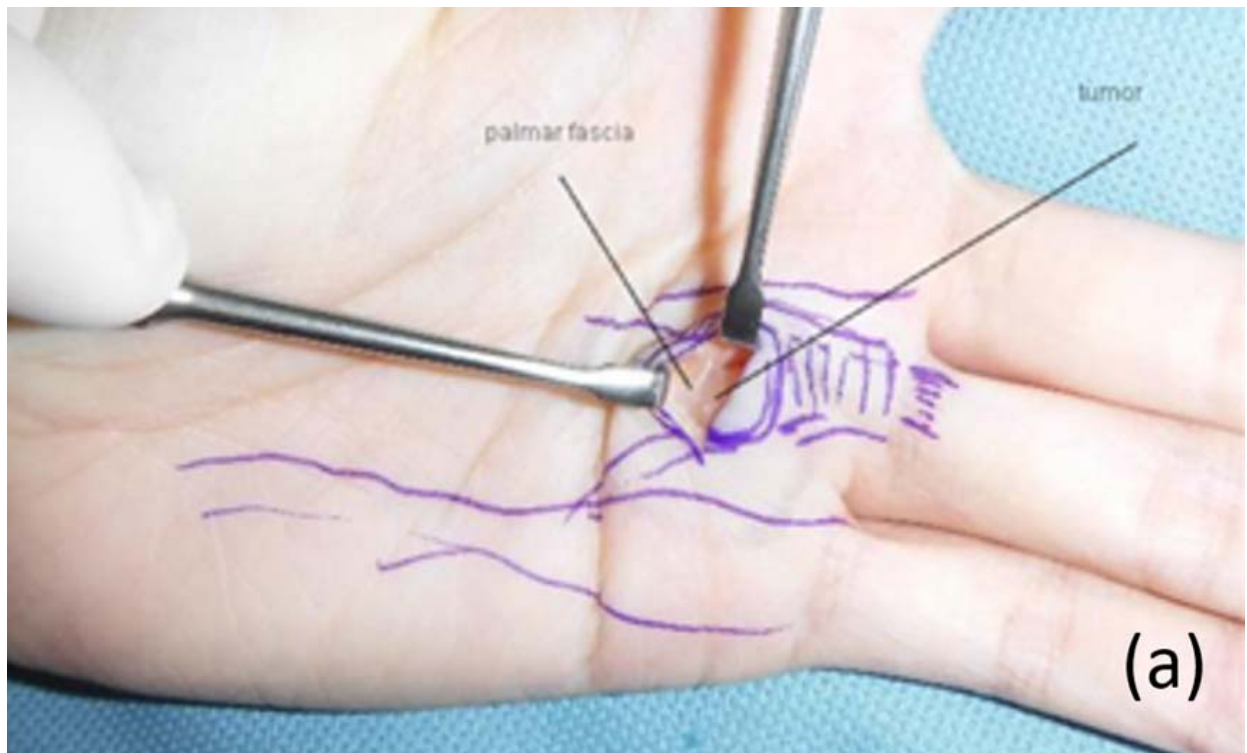


Figure 4. Pictures during the operation.(a) The ganglion cyst was seen after opening the skin and palmar fascia (palmar aponeurosis).(b) The fourth lumbrical muscle was exposed after removing the fascia and its cyst, and the ulnar digital nerve was detected next to the ganglion cyst.

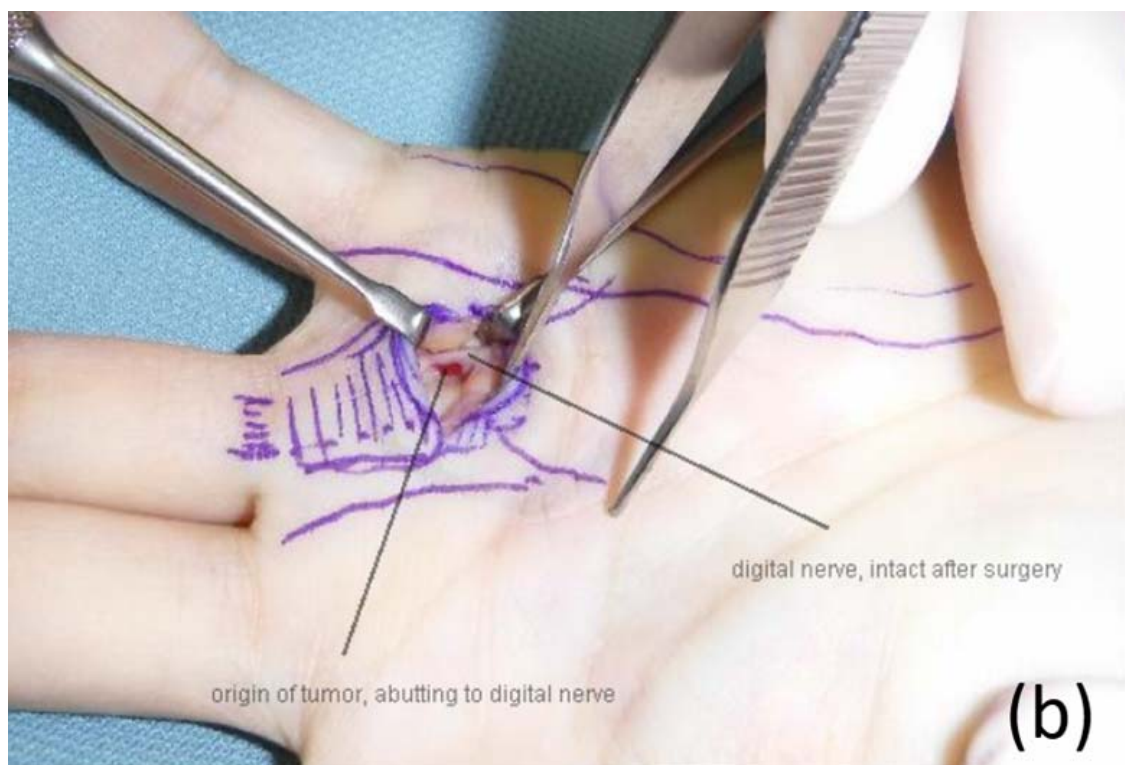
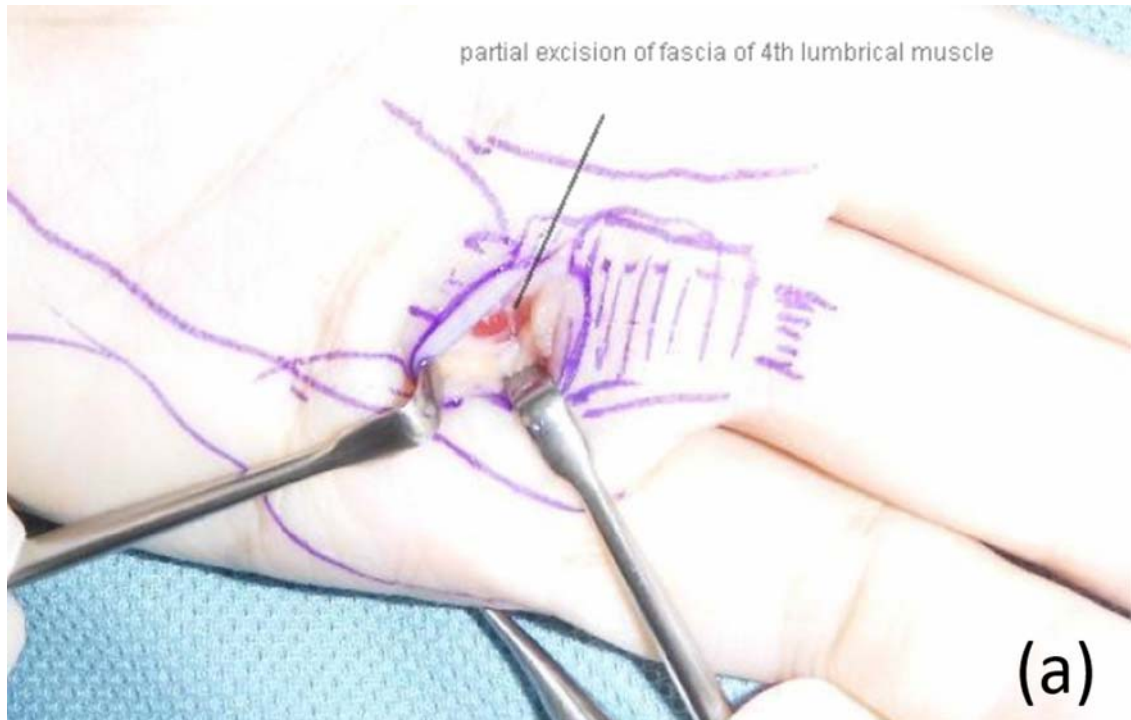


Figure 5. Pictures after excision of the ganglion cyst.(a) The fascia of the fourth lumbrical muscle was partially removed along with the ganglion cyst for complete excision. (b) The fourth ulnar digital nerve was left intact.

DISCUSSION

Ganglion cysts accounts for 50 to 70% of all soft tissue tumors of the hand.^[11] According to their location and origin, 60 to 70% of all the ganglions of the hand were located in the dorsal wrist, 18-20% in the volar wrists, and 10% over the flexor tendon sheath arc; together they represent 90% of all the ganglions in the hand.^[9] After searching the Cochrane library, PubMed, and Google Scholar using the keywords “ganglion cyst” or “cyst,” along with “lumbricals,” “lumbricalis,” or “lumbrical muscles,” this is, to the best of our knowledge, the first case report of a ganglion cyst arising from the fascia of the lumbrical muscles in the hand.

Lumbrical muscles of the hand are relatively special as they originate from the flexor digitorum profundus tendons and insert onto the lateral band of the extensor tendons, whereas the other muscles both originate and insert onto bones.^[14] The action of the lumbrical muscles involves the proximal interphalangeal (PIP) and distal interphalangeal (DIP) joint extension and MCP joint flexion.^[15] Although the interosseous muscle seems to be much more important for extending the PIP and DIP joints, with only one study mentioning that the lumbrical muscles contribute to only 2% of MCP joint flexion and suggesting that motor function might not be the main function of the lumbrical muscles,^[16] the sensory function of the lumbrical muscles in the proprioceptive feedback of the MCP, PIP, and DIP joints has been proposed.^[17,18]

The lumbrical muscles have been reported to act as a constant tension-monitoring structure that facilitates the collaboration between the digital flexors and extensors within a closed loop,^[19] which is attributed to its unique high muscle spindle density and the relatively long muscle fiber length-to-muscle ratio. These are crucial for precise fine selectively movements, meticulous manipulation of small objects, and variably forceful digital motor control, especially for an individual such as an occupational therapist to perform their everyday work.

Although the actual etiology remains unclear, a history of trauma is present in at least 10% of patients.^[20] Computer games input devices such as the console controller used to move either the avatars, weapons or cars, can be operated in different ways according to the

users.^[21] Computer gaming related injuries have been reported which were related to the way the games were controlled through the console controllers.^[22] It has been hypothesized that either injury or overuse of the joint or tendon allows leakage of synovial fluid, which irritates surrounding tissue, resulting in degeneration of the adjacent soft tissue, followed by subsequent fluid accumulation and then eventually the formation of ganglion cyst.^[2,23] Nevertheless, the pathogenesis of ganglion cysts derived from muscles is not commonly mentioned in the literature, with only one study proposing that they may develop after a muscle tear.^[10]

It has been observed that people when holding an instrument in their hands, have more difficulty in following the rules of muscle balance as when the hands are free.^[24] Instruments are better controlled if they are being hold with their hand and wrist in the resting functional posture, allowing their hand’s sarcomere to work in their best controlled range of contraction.^[24] In this case report, the patient was an occupational therapist who worked in a hospital that required daily and sustained hand activities to care for physically, emotionally, or mentally disabled individuals. We postulate that the formation of the ganglion cyst might somehow have been related to her job, or could be also related to the improper console controller usage. Massive hand activities can result in both increased joint stress and repetitive micro-trauma to the muscle and tendon. As previously mentioned, delicate hand movements warrant the participation of lumbrical muscles, which are, in this case, vulnerable to the injury, and in turn prone to the formation of ganglion cyst. Similarly, the relationship between a ganglion cyst in the hand and the patient’s occupation has also been reported before, including in jobs such as cashier.^[25,26]

An occupational therapist requires fine proprioception feedback to perform precise hand movements and good coordination, and a ganglion cyst arising from the lumbrical muscles might more or less affect his or her daily clinical practice, not to mention the pain and numbness could bring much more suffering to the individual’s quality of life. As a result, early identification and prompt intervention of the ganglion cyst from the lumbrical muscles in occupational therapist or in other individuals with similar jobs that require extensive hand activities is imperative.

Ultrasonography has been shown to be very accurate for specifically diagnosing ganglion cysts of the hand and wrist.^[3] The information gained from the ultrasonography not only can help physiatrists in the diagnosis, but also identify ganglions' origin, and to determine further treatment options.^[4] In this case, the ganglion cyst was lying superficial and ulnar sided to the left fourth flexor digitorum tendon at the MCP joint, which initially it was supposed to be arising from the flexor tendon sheath ganglion arc. Ganglion cyst arising from the lumbrical muscles have never been reported, for which unfortunately, initial ultrasound diagnosis of its origin has been missed.

The mainstay of nonsurgical treatment for ganglion cyst is aspiration either with or without other adjuvant therapy, such as steroid injection; however, the recurrence rate is high after aspiration.^[2,5] Surgical excision has shown a lower chance of recurrence^[5] and thus remains the gold standard for treatment of ganglion cyst. Rehabilitation after surgery is also important, as conditions such as tendon adhesion, scar formation, and edema could be encountered. In addition, the partial excision of the fascia of fourth lumbrical muscle may also interfere to a certain degree with the fine motor of the hand. As a result, modalities, stretching, massage, tendon gliding, and ROM exercises may be required to restore the pre-morbid function of the hand before the patient returns to her job as an occupational therapist.

CONCLUSION

A ganglion cyst arising from the lumbrical muscles is a condition rarely seen in our daily practice. In cases in which conservative treatment has failed, management of ganglion cyst necessitates surgical excision to lower recurrence. We report the potential impact of a ganglion cyst arising from the lumbrical muscle that might hinder the fine motor and sensory function of the fingers; thus prompt recognition of the lesion, accurate management, and concurrent rehabilitation are crucial.

ACKNOWLEDGMENT

We would like to thank the patient for describing the details of her situation and providing information, and we

would also like to acknowledge the medical and rehabilitation team at Tzu Chi Hospital for their assistance in caring for the patient and preparing this manuscript.

REFERENCES

1. Angelides AC, Wallace PF. The dorsal ganglion of the wrist: its pathogenesis, gross and microscopic anatomy, and surgical treatment. *J Hand Surg Am* 1976;1: 228-35.
2. Meena S, Gupta A. Dorsal wrist ganglion: Current review of literature. *J Clin Orthop Trauma* 2014;5: 59-64.
3. Teefey SA, Middleton WD, Patel V, et al. The accuracy of high-resolution ultrasound for evaluating focal lesions of the hand and wrist. *J Hand Surg Am* 2004;29:393-9.
4. Teefey SA, Dahiya N, Middleton WD, et al. Ganglia of the hand and wrist: a sonographic analysis. *AJR Am J Roentgenol* 2008;191:716-20.
5. Head L, Gencarelli JR, Allen M, et al. Wrist ganglion treatment: systematic review and meta-analysis. *J Hand Surg Am* 2015;40:546-53.
6. Clay NR, Clement DA. The treatment of dorsal wrist ganglia by radical excision. *J Hand Surg Br* 1988;13: 187-91.
7. Greendyke SD, Wilson M, Shepler TR. Anterior wrist ganglia from the scaphotrapezial joint. *J Hand Surg Am* 1992;17:487-90.
8. Asai M, Wong AC, Matsunaga T, et al. Carpal tunnel syndrome caused by aberrant lumbrical muscles associated with cystic degeneration of the tenosynovium: a case report. *J Hand Surg Am* 1986;11:218-21.
9. Høglund M, Tordai P, Muren C. Diagnosis of ganglions in the hand and wrist by sonography. *Acta Radiol* 1994;35:35-9.
10. Chang MC, Boudier-Reveret M, Hsiao MY. Intramuscular Ganglion Cyst of the Flexor Hallucis Brevis Secondary to Muscle Tear: A Case Report. *Diagnostics (Basel)* 2020;10:484.
11. Purohit S, Prabhakar A, Raj A, et al. A rare case of posterior interosseous nerve palsy due to ganglion cyst arising from supinator muscle. *J Clin Orthop Trauma* 2020;11:665-7.
12. Kim YJ, Chae SU, Choi BS, et al. Intramuscular

- ganglion of the quadriceps femoris. *Knee Surg Relat Res* 2013;25:40-2.
13. Nicholson LT, Freedman HL. Intramuscular dissection of a large ganglion cyst into the gastrocnemius muscle. *Orthopedics* 2012;35:e1122-4.
 14. Jacobson MD, Raab R, Fazeli BM, et al. Architectural design of the human intrinsic hand muscles. *J Hand Surg Am* 1992;17:804-9.
 15. Wang K, McGlenn EP, Chung KC. A biomechanical and evolutionary perspective on the function of the lumbrical muscle. *J Hand Surg Am* 2014;39:149-55.
 16. Buford WL, Jr., Koh S, Andersen CR, et al. Analysis of intrinsic-extrinsic muscle function through interactive 3-dimensional kinematic simulation and cadaver studies. *J Hand Surg Am* 2005;30:1267-75.
 17. Leijnse JN, Kalker JJ. A two-dimensional kinematic model of the lumbrical in the human finger. *J Biomech* 1995;28:237-49.
 18. Marzke MW. Precision grips, hand morphology, and tools. *Am J Phys Anthropol* 1997;102:91-110.
 19. Crowley JS, Meunier M, Lieber RL, et al. The Lumbricals Are Not the Workhorse of Digital Extension and Do Not Relax Their Own Antagonist. *The Journal of hand surgery* 2021;46:232-5.
 20. Lowden CM, Attiah M, Garvin G, et al. The prevalence of wrist ganglia in an asymptomatic population: magnetic resonance evaluation. *J Hand Surg Br* 2005;30:302-6.
 21. Nagorsky E, Wiemeyer J. The structure of performance and training in esports. *PLoS One* 2020;15:e0237584.
 22. Jalink MB, Heineman E, Pierie JP, et al. Nintendo related injuries and other problems: review. *BMJ* 2014;349:g7267.
 23. Thornburg LE. Ganglions of the hand and wrist. *J Am Acad Orthop Surg* 1999;7:231-8.
 24. Brand PW. Biomechanics of balance in the hand. *J Hand Ther* 1993;6:247-51.
 25. Pietrzak A, Wojnowska D, Chodorowska G, et al. Multiple myxoid cysts of both hands in a cashier--a case report. *Ann Univ Mariae Curie Sklodowska Med* 2003;58:478-81.
 26. Connolly M, de Berker DA. Multiple myxoid cysts secondary to occupation. *Clin Exp Dermatol* 2006;31:404-6.

蚓狀肌腱鞘囊腫：病例報告

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源自關節或是肌腱的腱鞘囊腫對於復健科醫師來說算是熟悉，但是源自於肌肉的腱鞘囊腫則很少被報導。在本篇病例報告中，我們將提出從未被報導過的病例：源自於一位職能治療師第四手指蚓狀肌筋膜的腱鞘囊腫。

蚓狀肌有其特殊的構造以及功能，跟一般的手部肌肉十分不一樣，根據這樣的理由，我們推測從蚓狀肌長出來的腱鞘囊腫某種程度上可能會影響這條肌肉的功能，進一步干擾職能治療師手部的精細動作。因此我們認為，及早的診斷、治療，加上後續的復健十分重要，尤其是那些需要大量手部動作的職業，例如職能治療師。（台灣復健醫誌 2022；50(1)：67 - 75）

關鍵詞：腱鞘囊腫(ganglion cyst)，蚓狀肌(lumbrical muscles)，肌梭(muscle spindle)，手部(hand)，職能治療師(occupational therapist)

