

# A Way to Avoid Muscular Fibrosis in the First Dorsal Interosseous Muscle after Acupuncture Injection Therapy

Yiu Ming Wong\*

Health Science Unit (PEC), Hong Kong Physically Handicapped & Able Bodied Association, Kowloon, Hong Kong

## Key Words

acupuncture, fibrosis, hand, injection

## Abstract

Fibrosis of skeletal muscle following acupuncture is an iatrogenic disorder. The present case illustrates a patient with a unilateral fibrotic formation on a thumb muscle after acupuncture injection therapy with red sage. The patient in the present case was a counter-terrorism police officer with right-handedness; he noted a palpable nodule three months after injection therapy at his left first dorsal interosseous in which the acupuncture point LI4 (He Gu) is located. He also found a reduction in the strength of his left pinch grip that noticeably affected his left handgun marksmanship. However, being ambidextrous in single-hand pistol shooting is an essential requirement for counter-terrorism police officers. Based on the patient's medical history and claims, no underlying disease or trauma was found to be associated with his current complaint. During physical examination, a fibrotic formation in his left first dorsal interosseous muscle was visualized by using diagnostic ultrasound; also, as confirmed with dynamometry, the strength of his left pinch grip was significantly lower than that of the right counterpart. Because acupuncture injection therapy has three components, antiseptic practices, the mechanical action of syringe insertion, and the pharmacological effect of the sterile herb extract, any one of the components may have contributed to the present

adverse event. The first dorsal interosseous muscle is small in dimension and rather vascular; thus, it is not an ideal site for intramuscular injection. When a clinician needs to treat a patient by performing acupuncture at the LI4 acupoint and injecting a herbal extract simultaneously, the clinician should only mechanically stimulate the LI4 acupoint while injecting the herbal medicine into the LI14 (Bi Noe) acupoint on the same meridian, the LI14 acupoint being located in the distal portion of the deltoid muscle and being fairly close to the universally agreed upon site on the upper arm for safe administration of an injection.

## 1. Introduction

Invasive procedures such as intramuscular injections have been associated with fibrotic tissues developing in skeletal muscles; the muscular weakness due to fibrotic formation usually takes months to manifest itself before it presents clinically [1]. For acupuncture therapy, the literature [2, 3] shows that fibrotic formation can occur with the first dorsal interosseous (FDI) muscle in which a commonly chosen acupuncture point, LI4, is located. A medicine injected into the FDI, which is a small-volume hand muscle, can increase intramuscular pressure and reduce local vascular flow. A post-injection edema will further increase the local pressure which, together with or without any septic event, can potentially lead to local infarction and necrosis and result in fibrotic tissue [4].

Received: May 09, 2017 Reviewed: Aug 10, 2017 Accepted: Aug 16, 2017

© This is an Open-Access article distributed under the terms of the Creative Commons Attribution Non-Commercial License (<http://creativecommons.org/licenses/by-nc/4.0/>) which permits unrestricted noncommercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

© This paper meets the requirements of KS X ISO 9706, ISO 9706-1994 and ANSI/NISO Z39.48-1992 (Permanence of Paper).

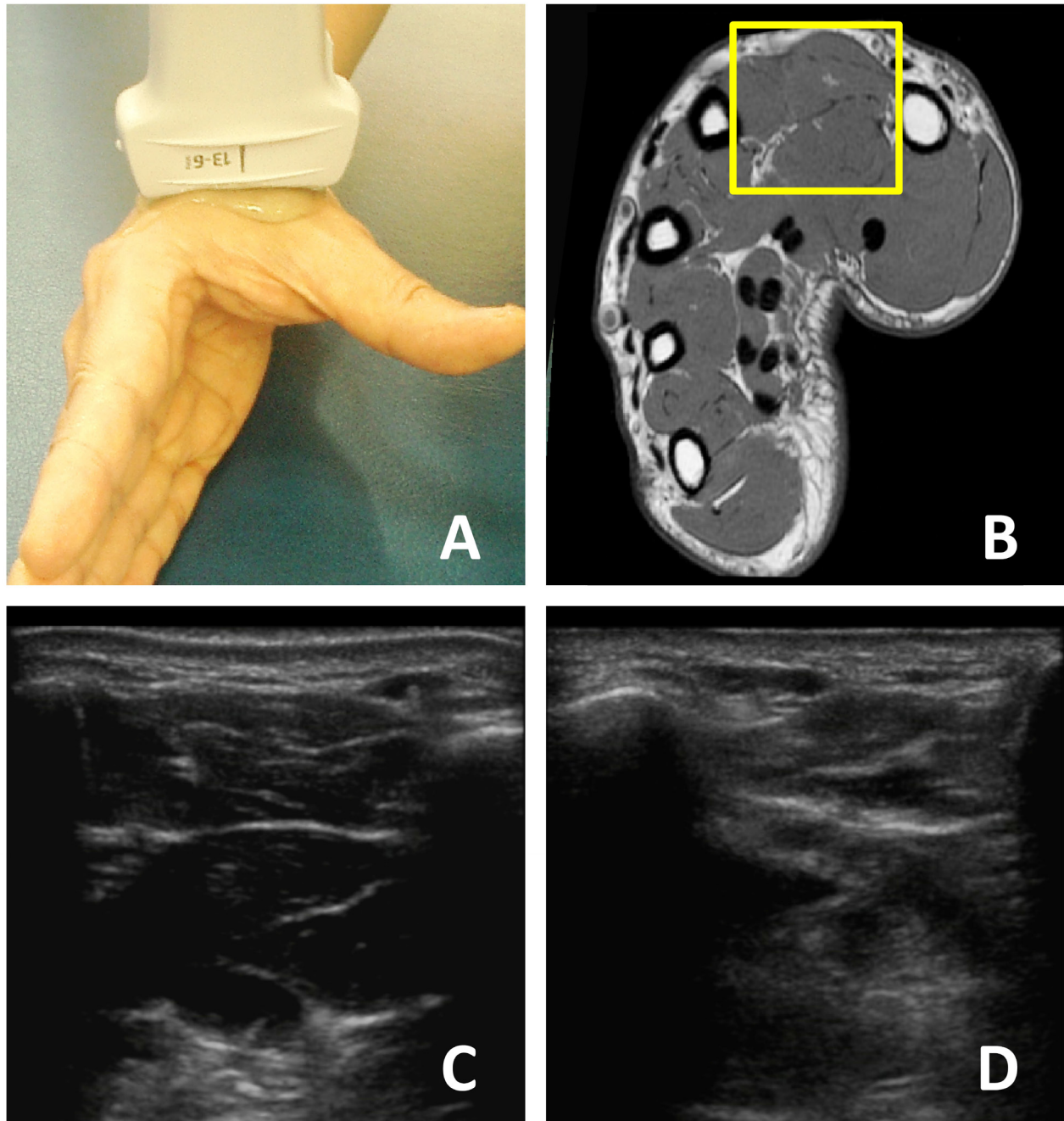
\*Corresponding Author

Yiu Ming Wong, Health Science Unit (PEC), Hong Kong Physically Handicapped & Able Bodied Association, S102, G/F, Lai Lo House, Lai Kok Estate, Shamshuipo, Kowloon, Hong Kong.  
Tel: +852-2351-7762 Fax: +852-2958-1280  
E-mail: [pt@hkphab.org.hk](mailto:pt@hkphab.org.hk)

## 2. Case report

A 35-year-old male counter-terrorism police officer had been trained to be ambidextrous in pistol shooting; his dominant hand, however, was the right hand. His main complaint was weakness and stiffness in his left thumb muscle during the past two months that had affected the accuracy of his left-hand shooting. He recalled that three

months earlier, he had received in his left dorsal thumb acupuncture injection therapy (AIT) with red sage for the treatment of headaches. While his headaches diminished without reoccurrence, he noted a swelling and bruising over the left dorsal first web space after the therapy, which took two weeks to subside. Based on the patient's medical history and claims, no underlying disease or trauma was found to be associated with his current complaint.



**Figure 1** (A) Setting for ultrasonic imaging of the right hand transversely. (B) The yellow square outlines the ultrasound scanning coverage in a corresponding MRI image. (C) Ultrasonic image of the patient's right hand. (D) Ultrasonic image of the patient's left hand with fibrotic tissues.

Under physical examination, we found that a subcutaneous fibrotic tissue was palpable over his left FDI muscle without tenderness; the hand sensation was intact and the fingers' range of motion was normal. B-mode ultrasonic imaging showed that compared to the right hand, the FDI muscle was hyper-echoic (ultrasound waves strongly reflected back to the ultrasonic transducer), corresponding with the palpable fibrosis (Fig. 1). The results of pinch grip dynamometry showed that the pinch grip strength of his left side was 24% lowered than that of his right side whereas a study [5] has shown that among healthy subjects, the dominant hand should only be approximately 3% - 8% stronger than the non-dominant hand.

### 3. Discussion

This is a case report concerning AIT-induced fibrosis of the FDI muscle, which is a key stabilizer in single-hand pistol shooting [6]. The muscle is maximally recruited when the thumb is pressed against the mid-phalanx of the index finger as in the setting of pinch grip dynamometry. An analysis of the patient's medical history and the findings of ultrasound and dynamometry indicated that AIT likely provoked a localized inflammation, after which fibrosis developed. However, before arriving at a conclusion, the fact that AIT has three components, antiseptic practices, the mechanical action of syringe insertion, and the pharmacological effect of sterile herb extract, any one of which could have contributed to the present adverse event, must be taken into account.

AIT can be complicated by infections caused by microorganisms on the patient's skin or in the adjacent environment [7]. The syringe used in this case was an insulin syringe (30 gauge, 1/2 inch, 0.5 mL) that was not likely to cause a significant trauma to the muscle. However, if a blood vessel is pierced during injection, the needle may go through the vessel and exit on the other side. Such an injury can cause extravasations of blood and a hematoma, and the bleeding can lead to substantial fibrin deposition in the FDI; consequently, fibrosis or contracture may develop [8]. Furthermore, the extract of red sage (*Salvia miltiorrhiza*) has been shown to produce anti-oxidation and microcirculatory enhancement effect [9, 10]. In this case, 0.25 mL of red sage was used. Because none of the injected material was left behind, we were unable to request chromatographic and microbiological analyses of the herbal extract; however one should note that contamination of an injectable herbal extract has been previously reported [11].

The middle portion of the FDI is the most commonly used acupuncture point for pain management, but the muscle is small in dimension and rather vascular; it is also a critical muscle for essential hand movements. In light of the balance between the benefits and the risks of the injectable medication use for individual patients, the muscle is clearly not an optimal site for AIT. As a strategy for preventing the above adverse results of AIT, clinicians, when they need to treat patients by performing LI4 acupuncture and injecting a herbal extract simultaneously, should only mechanically stimulate the LI4 (He Gu) acupoint and should inject the medicine into the LI14 (Bi Noe) acupoint on the

same meridian, which is the distal portion of the deltoid muscle and comparatively near to the universally agreed upon site on the upper arm for safe injection of a material.

### Conflict of interest

The authors declare that they have no conflicts of interest.

### ORCID

Yiu Ming Wong. <http://orcid.org/0000-0003-2931-5068>.

### References

1. Scully WF, White KK, Song KM, Mosca VS. Injection-induced gluteus muscle contractures: diagnosis with the "reverse Ober test" and surgical management. *J Pediatr Orthop*. 2015;35(2):192-8.
2. Zhang J, Shang H, Gao X, Ernst E. Acupuncture-related adverse events: a systematic review of the Chinese literature. *Bull World Health Organ*. 2010;88(12):915-21C.
3. Adams D, Cheng F, Jou H, Aung S, Yasui Y, Vohra S. The safety of pediatric acupuncture: a systematic review. *Pediatrics*. 2011;128(6):e1575-87.
4. Chen HC, Huang TF, Chou PH, Chen TH. Deltoid contracture: a case with multiple muscle contractures. *Arch Orthop Trauma Surg*. 2008;128(11):1239-43.
5. Incel NA, Ceceli E, Durukan PB, Erdem HR, Yorgancioglu ZR. Grip strength: effect of hand dominance. *Singapore Med J*. 2002;43(5):234-7.
6. Copay AG, Charles MT. The influence of grip strength on handgun marksmanship in basic law enforcement training. *POLICING*. 2001;24(1):32-9.
7. Woo PC, Leung KW, Wong SS, Chong KT, Cheung EY, Yuen KY. Relatively alcohol-resistant mycobacteria are emerging pathogens in patients receiving acupuncture treatment. *J Clin Microbiol*. 2002;40(4):1219-24.
8. Ialongo C, Bernardini S. Phlebotomy, a bridge between laboratory and patient. *Biochem Med*. 2016;26(1):17-33.
9. Soung DY, Rhee SH, Kim JS, Lee JY, Yang HS, Choi JS, et al. Peroxynitrite scavenging activity of lithospermate B from *Salvia miltiorrhiza*. *J Pharm Pharmacol*. 2003;55(10):1427-32.
10. Kim JY, Kim HS, Kang HS, Choi JS, Yokozawa T, Chung HY. Antioxidant potential of dimethyl lithospermate isolated from *Salvia miltiorrhiza* (red sage) against peroxynitrite. *J Med Food*. 2008;11(1):21-8.
11. Du W, Guo JJ, Jing Y, Li X, Kelton CM. Drug safety surveillance in China and other countries: a review and comparison. *Value Health*. 2008;11(S1):130-6.