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원 저

Anatomical Study on the Heart Meridian Muscle in Human

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This study was carried out to identify the components of the human heart meridian muscle, the regional muscle group being divided into outer, middle, and inner layers. The inner parts of the body surface were opened widely to demonstrate muscles, nerves, blood vessels and to expose the inner structure of the heart meridian muscle in the order of layers.

We obtained the following results;

- The heart meridian muscle is composed of muscles, nerves and blood vessels.
- In human anatomy, the difference between terms is present (that is, between nerves or blood vessels which control the meridian muscle and those which pass near by).
- The inner composition of the heart meridian muscle in the human arm is as follows:

1) Muscle

H-1: latissimus dorsi muscle tendon, teres major muscle, coracobrachialis muscle
H-2: biceps brachialis muscle, triceps brachialis muscle, brachialis muscle
H-3: pronator teres muscle and brachialis muscle
H-4: palmar carpal ligament and flexor ulnaris tendon
H-5: palmar carpal ligament & flexor retinaculum, tissue between flexor carpi ulnaris tendon and flexor digitorum superficialis tendon, flexor digitorum profundus tendon
H-6: palmar carpal ligament & flexor retinaculum, flexor carpi ulnaris tendon
H-7: palmar carpal ligament & flexor retinaculum, tissue between flexor carpi ulnaris tendon and flexor digitorum superficialis tendon, flexor digitorum profundus tendon
H-8: palmar aponeurosis, 4th lumbrical muscle, dorsal & palmar interrosseous muscle
H-9: dorsal fascia, radiad of extensor digiti minimi tendon & extensor digitorum tendon

2) Blood vessel

H-1: axillary artery, posterior circumflex humeral artery
H-2: basilic vein, brachial artery
H-3: basilic vein, inferior ulnar collateral artery, brachial artery
H-4: ulnar artery
H-5: ulnar artery
H-6: ulnar artery
H-7: ulnar artery
H-8: palmar digital artery
H-9: dorsal digital vein, the dorsal branch of palmar digital artery

3) Nerve

H-1: medial antebrachial cutaneous nerve, median n., ulnar n., radial n., musculocutaneous n., axillary nerve
H-2: median nerve, ulnar n., medial antebrachial cutaneous n., the branch of muscular cutaneous nerve
H-3: median nerve, medial antebrachial cutaneous nerve
H-4: medial antebrachial cutaneous nerve, ulnar nerve
H-5: ulnar nerve
H-6: ulnar nerve
H-7: ulnar nerve
H-8: superficial branch of ulnar nerve
H-9: dorsal digital branch of ulnar nerve

Key Words: meridian muscle, meridian point (H1~9), muscle, blood vessel, nerve.

Introduction

The concept of *Meridian Muscle* shown in Ling Shu (*Miraculous Pivot*) of *HUANDI NEIJING* (A Bible in traditional chinese medicine for about two thousand years) is closely connected with *The Twelve Main Meridian. Main Meridian or Meridian Muscle* is a general term of muscular system distributed in circulation of *The Twelve Main Meridian*, classified into *3Yin (The Negative)-3Yang (The Positive)* of upper & low limb[1] and composed of muscular tissue such as muscle (involving tendon), fascia, ligament[2], which *Chi* (Gie : life energy) in *The Twelve Main Meridian* is collected for or concluded or translated into[3]. *The Twelve Meridian Muscle* is distributed in the body surface of limb, trunk or head part, and in most case it's way is made in the opposite direction to the tip of limb.

The term of *Meridian Muscle* has a deep meaning in myology, arthrology, rehabilitation, and the other clinics. Since anatomical, constituent elements of individual *Meridian Muscle* are misknown to the academic world of oriental medicine, it bring about a mistaken clinical application or a wrong diagnosis.

This study was carried out in order to investigate correct elements of *The Twelve Meridian Muscle* and to support the meridianology or oriental clinics .

At this time we report *The Heart Meridian Muscle* in human following *The Lung Meridian Muscle*[4], *The Large Intestine Meridian Muscle*[5], *The Spleen Meridian Muscle*[6], and *The Small Intestine Meridian Muscle*[7].

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Materials and methods

1. Reagents and injection

1) The preparation of a preservative

Phenol weighing one kilogram was dissolved in one litre methylalcohol (The 1st solution).

The 500㎖ of glycerin was dissolved in 2 ℓ of methylalcohol and thereafter the additional 500㎖ of glycerin was dissolved in this solution (The 2nd solution). The 1st and 2nd solution were well mixed, and made warm (30min, 20℃). The 1 ℓ of methylalcohol was added to this mixed solution, and was stirred for 10minutes. For the last time 1.5 ℓ of formalin was added to this mixed solution.

2) Injection

The sheath of femoral artery & vein was exposed by vertical incision at the medial third of inguinal ligament, and femoral artery is carefully separated from femoral vein.

A preservative was injected into femoral artery at the speed of 150㎖ per minute. After 6 ℓ of preservative was injected, A needle-inserted part was ligated, and subsequently injector needle was inserted downwards for the preservation of the leg.

2. Embalmment of cadaver and experimental procedure

1) Cadaver was pending in the embalmment system for 40 hrs at 40℃.

2) Cadaver was exposed for 1hr at the normal temperature, and after that, was kept in refrigerated storage (3℃, 30% humidity).

3) *The Heart Meridian Muscle* was labelled by latex at the surface of cadaver, subsequently photographed.

4) Pore was made by drill in the vertical direction at each meridian point.

5) Skin and superficial fascia were stripped off in the order and thereafter was labelled by latex at the exposed

deep fascia surface, once more was photographed.

6) Deep fascia was also removed.

7) Subsequently muscle, tendon, nerve, blood vessels are investigated, photographed, and being divided into three layers (outer, middle, and inner layer).

Results

The Heart Meridian Muscle was marked at the surface of cadaver, and investigated. And also constituent elements was divided into three layers (outer, middle, inner layer) and identified as follows

1) A schema of *The Heart Meridian Muscle* (Figure 2, and referred to 5)

2) Muscle, blood vessels, nerve constituting *The Heart Meridian Muscle.*

1. Kūkch'ōn (H1)

As shown in figure 1, muscle group at outer layer is composed of latissimus dorsi muscle tendon, those at middle layer are composed of teres major muscle, and coracobrachialis muscle.

Axillary artery belongs to blood vessel group at middle layer, more correctly speaking, it is situated at anterior & medial side of this meridian point. There is posterior circumflex humeral artery at inner layer.

In case of nerves, there are medial antebrachial cutaneous nerve, median n., ulnar n., radial n. in middle layer, musculocutaneous nerve and axillary n. at inner layer.

2. Ch'ōngnyōng (H2)

Muscle group are composed of biceps brachialis muscle at outer layer (Fig. 1) and triceps brachialis muscle at inner layer, of course, being changed from outer group to inner group according to acupunctured direction, and also middle layer, composed of brachialis muscle (Fig. 1).

Referring to blood vessel basilic vein is situated at outer layer (Fig. 1), and brachial artery, at middle layer.

Nerve group at outer layer are composed of median nerve, ulnar n., medial antebrachial cutaneous n., and the branch of muscular cutaneous nerve (Fig. 2, 1).

3. Sohae (H3)

As gathering from this study, muscle group constituting this meridian muscle are pronator teres muscle at outer layer, brachialis muscle at inner layer,

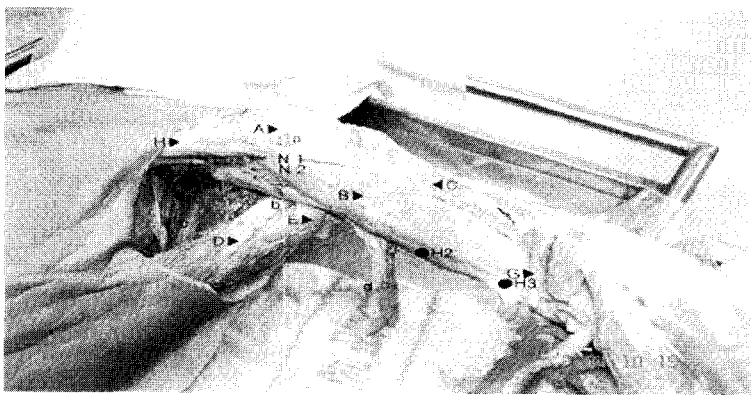

Fig. 1. Photograph shows meridian points (H1~3), muscles (A:deltoid, B:biceps brachii, C:brachialis, D:latissimus dorsi, E:teres major, F:serratus anterior, G:brachioradialis), blood vessel (a:cephalic vein, b:brachial artery and vein, c:lateral thoracic artery, d:basilic vein), nerve (N1:ulnar nerve, N2:median nerve)

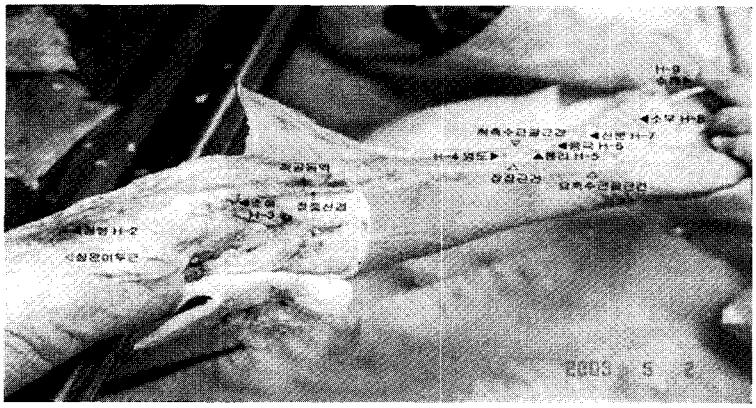

Fig. 2. Photograph in superficial fascia level shows meridian points (▲:H2~9), muscles (△:biceps brachialis, palmaris longus flexor carpi ulnaris), ulnar artery and ulnar nerve, median nerve (→ arrow: opened).

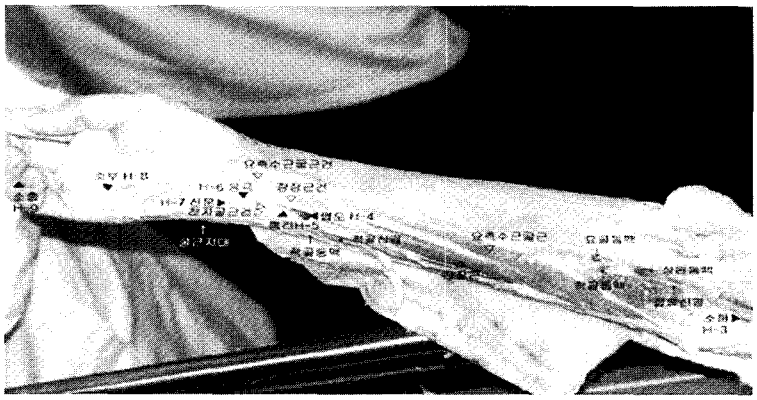

Fig. 3. Photograph in deep fascia level shows meridian points (▲:H3~9), muscles (△:flexor carpi ulnaris, flexor carpi radialis, palmaris longus, flexor digitorum superficialis, flexor retinaculum), ulnar artery and ulnar nerve (→ arrow).

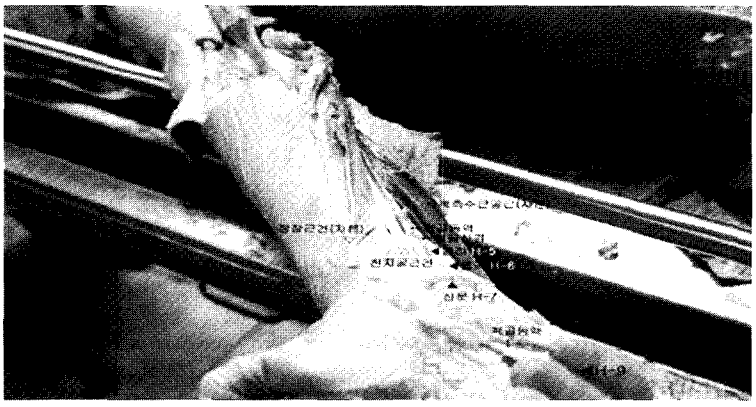

Fig. 4. Photograph in deep fascia & muscular level shows meridian points (▲:H5~9), muscles (△:flexor carpi ulnaris, palmaris longus, flexor digitorum superficialis, flexor retinaculum), ulnar artery and ulnar nerve (→ arrow).

as for blood vessel basilic vein, inferior ulnar collateral artery, brachial artery at outer layer.

Median nerve and medial antebrachial cutaneous nerve lies at outer layer(Fig. 1, 2, 3).

4. Yōngdo (H4)

Constituent elements of this meridian muscle are palmar carpal ligament and flexor ulnaris tendon, medial antebrachial cutaneous nerve at outer layer, ulnar artery & nerve at middle layer(Fig. 2, 3).

5. T'ōngni (H5)

Muscular elements of this meridian muscle are palmar carpal ligament, tissue between flexor carpi ulnaris tendon and flexor digitorum superficialis tendon at outer layer, flexor digitorum profundus tendon at inner layer.

Medial antebrachial cutaneous nerve exist at outer layer. And also at middle layer ulnar artery & nerve exist(Fig. 2, 3, 4).

6. Ūmgūk (H6)

Palmar carpal ligament & flexor retinaculum, flexor carpi ulnaris tendon constitute muscle group at outer layer.

Middle layer are composed of ulnar artery & nerve(Fig. 2, 3, 4)

7. Shinmun (H7)

Outer layer are composed of palmar carpal ligament & flexor retinaculum, tissue between flexor carpi ulnaris tendon and flexor digitorum superficialis tendon, and middle layer, composed of ulnar artery & nerve. There is flexor digitorum profundus tendon at inner layer(Fig. 2, 3, 4).

8. Sobu (H8)

At outer layer palmar aponeurosis, 4th lumbrical muscle, palmar digital artery, the superficial branch of ulnar nerve exist. there is dorsal & palmar interrosseous muscle at inner layer(Fig. 2, 3).

9. Soch'ung (H9)

Constituent elements of outer layer are composed of dorsal fascia, radiad of extensor digiti minimi tendon & extensor digitorum tendon, dorsal digital vein, the dorsal branch of palmar digital artery, the dorsal digital branch of ulnar nerve(Fig. 3, 4).

Discussion

The Heart Meridian Muscle originates from heart, covers the lateral part of *The Conception Vessel Meridian*, goes down piercing diaphragm, subsequently

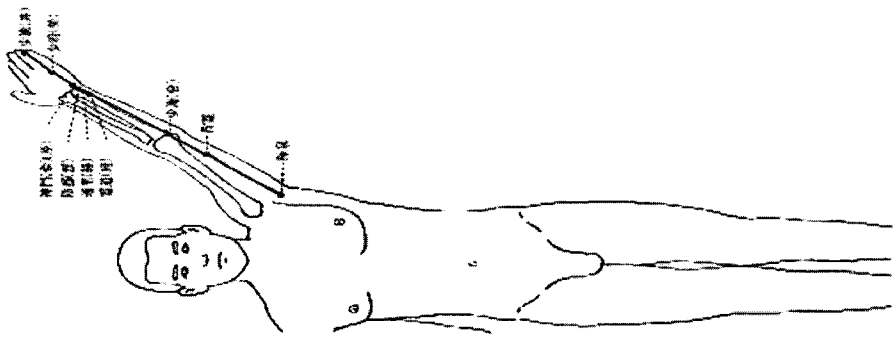

Fig. 5. The scheme of The Heart Meridian in human.

goes round small intestine. Main branch reaches axillary region via lung, especially *Kŭkch'ŏn* meridian point. That passes by anterior & medial side of brachium and behind *The Lung Meridian Muscle* via *Ch'ŏngnyŏng*, and subsequently arrives at *Sohae* situated at anterior epicondyle of humerus, passes by medial & posterior of antebrachium, shortly it goes through lateral side of wrist joint, after that medial crus of palm, finally reaches *Soch'ung* at the tip of little finger[1]. (Fig. 5)

Meridian Muscle in oriental medicine means a concept comprising soft tissue such as muscle, fascia ligament, and nerve on the out skirts of them[8]. But we mean to comprice blood vessel additionally in this concept.

It is possible to know the mode of action of *Meridian Muscle* if we analyze the distribution of *Meridian Muscle* in connection with human anatomy[9,10,11]. In the view of clinical application, *Meridian Muscle* plays an important role in the flexion & extention of muscle or joint or limb, since the abnormality of *Meridian Muscle* is expressed as the abnormalities of *Meridian Muscle*-piercing part, such as stretching, convulsion, relax, rigidity, displacement[12,13,14,15]. Referring to the disability of *Meridian Muscle*, the chapter *Meridian Muscle of Ling Shu* (Miraculous Pivot) explains the following meaning "If *Yang* is over, the muscle extended and so long as Yin is over, then the muscle flexed. Cold brings about the muscle contraction, and hot, muscle slackness." [16] This means the symptom of disease induced by abnormal meridian muscle subsquent to *Yang* or *Yin* over.

As mentioned above, the anatomical knowledge of muscle is essentially required for the clinical application of *Meridian Muscle*. And also at the same time such a knowledge must be exact. Such a knowledge guarantees the exact and effective application of *Meridian Muscle* to clinics.

This study shows some differences from already established study[1,17] on *meridian muscle* ; that is, constituent elements of *Meridian Muscle* such as muscle, nerve, blood vessels, ligament, fascia, and assay method. Above all the structure of each meridian point investigated in this study was divided into three layers according to depth from body surface but on the other hand we came across that it may be wide differences in opinion according to the disparity of real meridian point or the angle of acupunctuation[18].

Reference

1. A joint work of the allied department of acupuncture & moxibustion. college of oriental medicine. Acupuncture & Moxibustion(the 1st volume). 3Eds.. Seoul:Gypmundang. 1991:399-418.
2. Song CH. Study on *The 12 Meridian Muscle* and *The 12 Skin*. The Journal of Korean Acupuncture & Moxibustion Society. 1989;6(1):179-86.
3. 南京中醫學院. 鍼灸學. 上海:科學技術出版社. 1984 :7-8.
4. Lee JM, Park KS. Anatomy of *The Lung Meridian Muscle* in Human. J. Kor. AM-Meridian & Pointology Soc. 2001;18(2):19-25.
5. Lee JM, Sim Y, Park KS. Anatomy of *The Large Intestine Meridian Muscle* in Human. J. Kor. AM-Meridian & Pointology Soc. 2002;19(1):15-23.
6. Park KS. Anatomy of *The Spleen Meridian Muscle* in Human. J. Kor. AM-Meridian & Pointology Soc. 2003;20(4):65-76.
7. Park KS. Anatomical Study on *The Small Intestine Meridian Muscle* in Human. J. of Kor. Inst. of Herbal Acupuncture. 2004;7(2):57-64.
8. 上海中醫學院. 傷科學. Hongkong:商務印書館. 1977:6-14.
9. P. O. Abrahams, R. T. Hutchings, and S. C. Marks Jr, Mc. Minn's Color Atlas of Human Anatomy. Wolfe Publishing. 1977:109-119.
10. H. Ferner and J. Stubesand, Sobotta's Atlas of Human Anatomy(Anatomy 1), 10th Eds.. 1983:318-363.
11. Frank H. Netter. CIBA. Atlas of Human Anatomy.

1987:Plate 401-452.
12. P. Butler, Springer-Verlag. Imaging of the Nervous System. 1990:231-240.
13. R. S. Snell. Neuroanatomy. 3rd Ed. Little & Brown. 1992:417-559.
14. C. Liebenson etc(18). Rehabilitation of the Spine. Williams & Wilkins Inc. 1996:61-71.
15. J. H. Juhl. Roentgen Interpretation. 5th Ed. Harper & Row. 1981.
16. Jang MH. HUANDI NEIJING(A Korean version). Seoul:Sungbosa. 1975:145-54.
17. Ahan YK. Acupuncture & Moxibustion. Seoul : Sungbosa 1991:259-279.
18. Choi HS. A Search on New Direction of Meridian Study. J. Kor. AM-Meridian & Pointology Soc. 2004:21(3).