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Anatomic localization of motor branch points of flexor digitorum superficialis

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Objective
The aim of this study was to identify the location of the intramuscular nerve branchs of the flexor digitorum superficialis(FDS), and to provide accurate injection region of the botulinum toxin.

Design
In this study, 12 arms of fresh cadavers were anatomically dissected to find an intramuscular nerve endings to FDS. The entry site of the motor nerve into the muscle belly was recorded as the motor branch points(MBPs). The proximal limit points(PLPs) and the distal limit points(DLPs) of the terminal intramuscular nerve endings were recorded. The three parameters were expressed in longitudinal and transverse coordinates in relation to the reference line. The reference line was established between the most prominent point of the medial epicondyle and the center of line connecting radial and ulnar styloid process, considering the origin and the direction of FDS. The longitudinal coordinate was recorded as a percentage of the distance along the reference line, and the transverse coordinate was measured at right angles from the reference line. The longitudinal coordinates are shown as % ± SD, followed by the transverse coordinate in millimeter ± SD.

Results
The mean length of the reference line was 234.6 ± 11.2 mm. Two MBPs innervating the FDS were identified in all 12 arms. In the first main branch, the MBPs was located at 41.6 ± 2.6% in the longitudinal coordinate of the reference line, PLPs was located at 35.1 ± 4.1%, and DLPs was located at 53.4 ± 4.6%. And in the second main branch, corresponding values were 72.4 ± 4.5%, 67.5 ± 1.5% and 82.0 ± 5.7%, respectively. The transverse coordinate of each parameters is shown in Table 1. The mean values of the transverse coordinate was -0.2 ± 4.5 mm, indicating that each parameters did not deviate significantly from the reference line.

Conclusions
Previous studies used a reference line that did not take into account the direction of the FDS, so each parameters were deviated from the reference line in the transverse coordinate. In this study, we set the reference line considering the direction of FDS and confirmed the location of the second main branch as well as the first main branch. The MBP of the first main branch is about 40% of the reference line and the MBP of the second main branch s about 70%. This result will help to determine an optimal injection site for botulinum toxin to FDS.

Table 1. Location of the MBPs, the PLPs and DLPs of the flexor digitorum superficialis.

	First main branch	
	Longitudinal coordinate	Transverse coordinate
PLP	35.1 ± 4.1% (82.3 ± 9.6 mm)	0.3 ± 3.2 mm
MBP	41.6 ± 2.6% (97.7 ± 7.5 mm)	-1.3 ± 4.0 mm
DLP	53.4 ± 4.6% (125.2 ± 12.2 mm)	-0.5 ± 4.4 mm
	Second main branch	
	Longitudinal coordinate	Transverse coordinate
PLP	67.5 ± 1.5% (160.0 ± 9.4 mm)	0.8 ± 6.7 mm
MBP	72.4 ± 4.5% (170.3 ± 12.0 mm)	0.2 ± 5.7 mm
DLP	82.0 ± 5.7% (191.4 ± 18.5 mm)	-0.7 ± 3.5 mm

PLP, Proximal limit point; MBP, Motor branch point ; DLP, Distal limit point

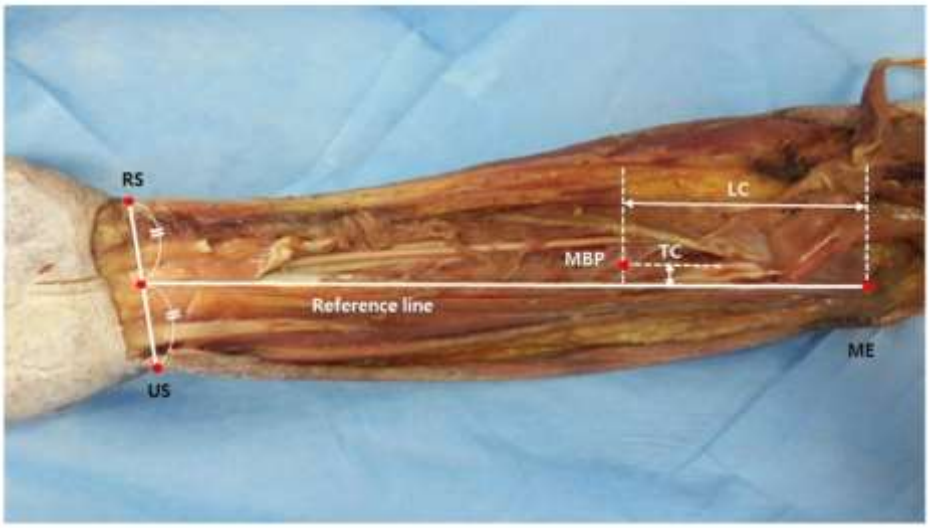

Fig 1. Photograph of an anatomic dissection showing the median nerve branch entering the flexor digitorum superficialis.