신경근육재활 및 전기진단

게시일시 및 장소 : 10 월 18 일(금) 08:30-12:20 Room G(3F)

질의응답 일시 및 장소 : 10 월 18 일(금) 10:00-10:45 Room G(3F)

**P 1-41**

## Effect of fascia penetration on sensory nerve conduction in the later femoral cutaneous nerve

Mi-Jeong Yoon[1*], Hye Min Park[1], Sun Jae Won[1†]

Yeouido St. Mary's Hospital, College of Medicine, The Catholic University of Korea, Department of Rehabilitation Medicine[1]

**Objective**

This study is to identify the effect of the fascia penetration and develop a reliable technique for the lateral femoral cutaneous nerve (LFCN) conduction study based on ultrasound-guided tracking of LFCN.

**Methods**

Forty volunteers were randomly assigned to the conventional LFCN conduction group utilizing anterior superior iliac spine (ASIS) as a landmark and the ultrasound-guided LFCN conduction group. The fascia penetration site of LFCN was localized by ultrasound (Figure 1A, 1B) and the LFCN was stimulated at the penetration point or 4 different sites, 2PPP (2cm proximal to penetration point), PP (penetration point), 2DPP (2cm distal to penetration point) and 4DPP (4cm distal to penetration point) (Figure 1C). Sensory nerve action potential (SNAP) amplitudes, latencies, spending time and visual analogue scale scores were obtained.

**Results**

The cross-sectional area of the LFCN at penetration point was 1.50± 0.55 mm2, and the mean distance between the LFCN penetration point and the ASIS was 1.60 ± 1.29 cm. Using the ultrasound-guided penetration point (PP) conduction, SNAP responses were elicited in 38 of 40 legs, whereas 33 of 40 legs using the conventional technique. The mean SNAP amplitude from ultrasound-guided PP conduction was slightly higher than conventional conduction of LFCN, although there was no significant difference between groups at 14 cm recording electrode. At more proximal recording electrodes (10 cm, 12 cm), SNAP amplitudes of LFCN were increased in ultrasound-guided PP conduction. The mean consuming time required to obtain the SNAP response of LFCN using ultrasound-guided PP conduction (the time from the placement of the ultrasound transducer on the skin to marking the course of the LFCN using ultrasound + the time obtaining LFCN SNAP) was 202.7±43.87 sec, which is comparable to conventional technique (269.39±249.44 sec) (Table 1). Representative waveforms of SNAPs of LFCN obtained from 4 different stimulation sites are shown in Figure 1D. Statistical analysis showed significant difference between 2PPP, PP, 2DPP and 4DPP in terms of peak latencies and amplitudes ($P<0.05$

with Tukey's ANOVA) (Table 2). SNAP amplitudes of PP and 2DPP were significantly higher than those of other tested points.

**Conclusion**

This study shows that ultrasound-guided PP conduction in LFCN would be a useful technique with higher response rate and time-saving advantage. We found that the SNAP of the LFCN significantly changes near the fascia penetration point and especially, stimulation at PP and 2DPP provide high amplitude. The results suggest that the fascia penetration point should be taken into consideration in LFCN conduction study.

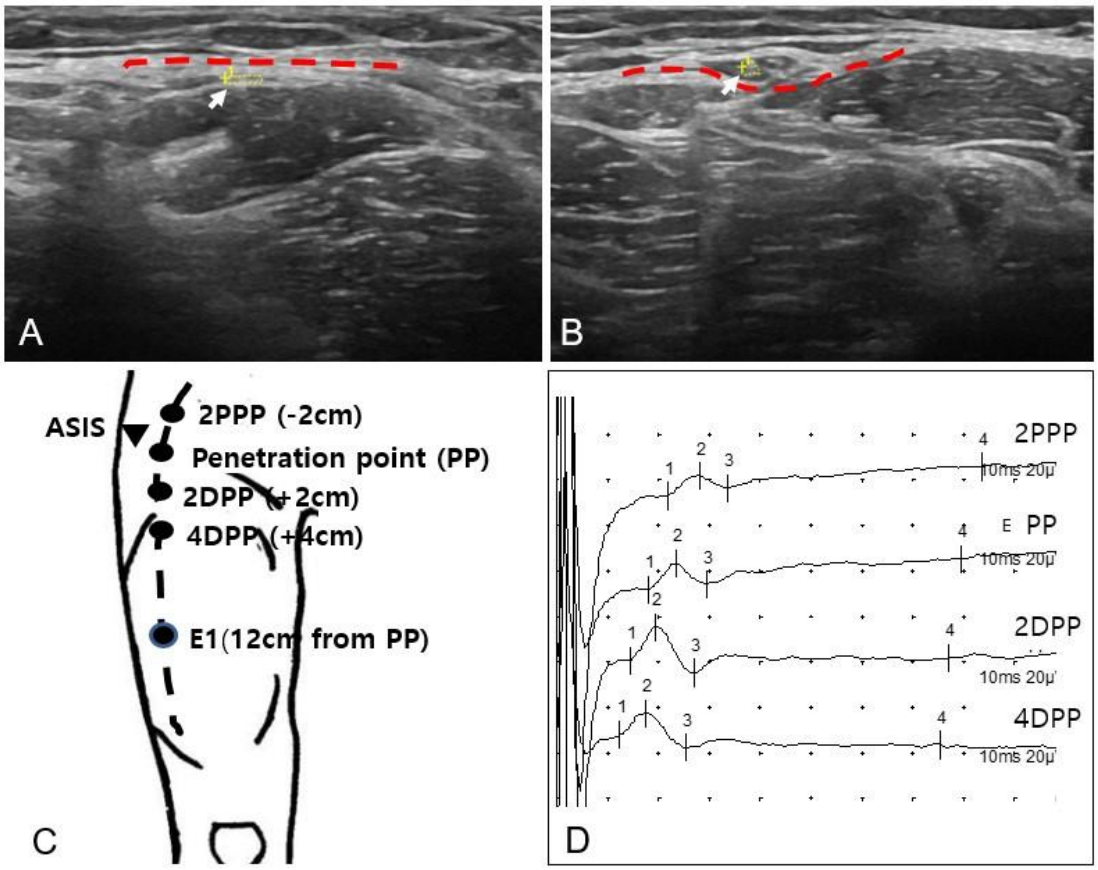


Figure 1. Sonography and sensory nerve conduction study of the lateral femoral cutaneous nerve (A) Lateral femoral cutaneous nerve (dotted circle with arrow) beneath the fascia of the sartorius muscle. (B) Lateral femoral cutaneous nerve (dotted circle with arrow) just after penetrating the fascia. (C) Stimulation point based on the penetration point (PP) in the lateral femoral cutaneous nerve conduction study. 2PPP, 2cm proximal to penetration point; PP, penetration point; 2DPP, 2cm distal to penetration point; 4DPP, 4cm distal to penetration point (D) Sensory nerve action potentials at different stimulation points.

Table 1. Mean SNAP amplitudes, latencies, no response, spending time and VAS score: comparison of the two techniques

**Table 1. Mean SNAP amplitudes, latencies, no response, spending time and VAS score : comparison of the two techniques**

| | Conventional | Ultrasound- guided PP stimulation | | | P-value * |
|---|---|---|---|---|---|
| **Recording electrode** | 14cm | 14cm | 12cm | 10cm | |
| **Latency (ms)** | 2.62±0.18 | 2.75±0.21 | 2.42±0.18 | 2.09±0.17 | 0.0068 |
| **Amplitude (μV)** | 6.97±2.16 | 7.68±2.00 | 8.74±2.35 | 8.98±2.85 | 0.1649 |
| **No response** | 7/40 | 2/40 | | | |
| **Spending time (sec)** | 269.39±249.44 | 202.7±43.87 | | | 0.1126 |
| **VAS score** | 4.52±1.74 | 3.90±1.61 | | | 0.2444 |

*P-value, analysis of data obtained from two techniques at 14cm recording electrode

VAS: visual analogue scale; PP: penetration point

Table 2. Sensory nerve conduction study of the lateral femora cutaneous nerve based on penetration point

| Stimulation point | 2PPP | PP | 2DPP | 4DPP | P-value |
|---|---|---|---|---|---|
| **Latency (ms)** | 2.75±0.20 | 2.47±0.22 | 2.15±0.15 | 1.86±0.16 | <0.0001 |
| **Amplitude (μV)** | 6.66±1.99$^{\dagger}$ | 8.60±2.63$^{\ddagger}$ | 8.92±2.95$^{\ddagger}$ | 6.59±2.91$^{\dagger}$ | <0.0001 |

All values are presented as mean ± standard deviation.

Mean value of $^{\dagger}$ were statistically different from those of $^{\ddagger}$ by one-way ANOVA and Tukey test

2PPP, 2cm proximal to penetration point; PP, penetration point; 2DPP, 2cm distal to penetration point; 4DPP, 4cm distal to penetration point