

# Effects of ultrasound-guided percutaneous neuromodulation on the activation of hip abductors in a professional tennis player: a single case study

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## Abstract

**Background** Ultrasound-guided percutaneous neuromodulation (US-guided PNM) is defined as electric stimulation of a peripheral nerve at some point of its trajectory via a needle, with analgesic objectives and for the improvement of muscle function. Hip abductor muscles play an important role in the performance of tennis players, participating primarily in the transfer of forces in situations such as stopping and starting, changes in direction and even hitting the ball.

**Aims** The aims of this study were to confirm the effects of US-guided PNM on the superior gluteal nerve on strength and muscle activity in hip abductors and the reduction of the Q angle of the knee during a single-legged squat in a high performance athlete.

**Material and Methods** The subject was a high performance athlete aged 17, without traumatic injuries to the lower limb. The study was conducted in the installations of AY360° Salud y Deporte. The following variables were measured before and after the intervention: force (MVIC), muscle activity (RMS) using surface electromyography and the knee Q angle during a single-legged squat using Kinovea video analysis. A treatment protocol was performed under ultrasound guidance using a PES current with 6 Hz pulses and a pulse duration of 250  $\mu$ s. In total, 5 applications of 15 seconds' duration were applied with the help of a pointer.

**Results** Improvements were obtained for strength measurements, from a MVIC of 0.13 mV (50.72%) to 0.26 mV (100%), for muscle activity RMS improved from 13.26% to 23.96%, and degrees changed from 23.6° to 21°.

**Conclusions** The US-guided PNM technique, according to the parameters studied, appears to be a useful tool for the improvement of the cited variables.

## Keywords

- ▶ physiotherapy
- ▶ sports
- ▶ tennis
- ▶ neuromodulation
- ▶ ultrasound
- ▶ gluteus medius