



## The use of neuromuscular electrical stimulation to improve activation deficits in a patient with chronic quadriceps strength impairments following total knee arthroplasty

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*J Orthop Sports Phys Ther.* 2006 Sep;36(9):678-85

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### STUDY DESIGN:

Case report. BACKGROUND: Long-term deficits in quadriceps femoris muscle strength and impaired muscle activation are common among individuals with total knee arthroplasty (TKA). Failure to address strength-related impairments results in poor surgical and functional outcomes, which may accelerate the progression of osteoarthritis in other lower extremity joints. The purpose of the current case report was to implement a neuromuscular electrical stimulation (NMES) treatment protocol in conjunction with an intense weight-training program, with the aim of reversing persistent quadriceps muscle impairments after TKA. CASE

### DESCRIPTION:

The patient was a 62-year-old male cyclist 12 months following simultaneous, bilateral TKA with impairments in left quadriceps strength and volitional muscle activation. His left quadriceps strength was 26% weaker than his right and central activation ratio (CAR) of his left quadriceps was 13% lower than his right quadriceps CAR. NMES to the left quadriceps was implemented for 6 weeks, in addition to an intense volitional weight-training program with emphasis on unilateral lower extremity exercises.

### OUTCOMES:

The patient demonstrated a 25% improvement in left quadriceps femoris maximal volitional force output following 16 treatments of combined NMES and volitional strength training over a 6-week period. The patient's volitional muscle activation improved from a CAR of 0.83 before treatment to 0.97 after treatment. At discharge from physical therapy and at his 18-month postoperative follow-up, the patient's left quadriceps strength was only 4% lower than his right quadriceps strength. At the 24-month follow-up, the patient's left quadriceps strength was 6% stronger than his right quadriceps strength.

### DISCUSSION:

The patient was able to achieve symmetrical quadriceps strength and complete muscle activation following 6 weeks of NMES and volitional strength training. An intense strengthening program may have the potential to reverse persistent strength-related impairments following TKA.

PMID: 17017273 [PubMed - indexed for MEDLINE]