



Neuromuscular electrical stimulation for quadriceps muscle strengthening after bilateral total knee arthroplasty: a case series

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STUDY DESIGN:

A case series. OBJECTIVES: The purpose of this case series was to assess the effect of high-intensity neuromuscular electrical stimulation (NMES) on quadriceps strength and voluntary activation following total knee arthroplasty (TKA).

BACKGROUND:

Following TKA, patients exhibit long-term weakness of the quadriceps and diminished functional capacity compared to age-matched healthy controls. The pain and swelling that results from surgery may contribute to quadriceps weakness. The use of high-intensity NMES has previously been shown to be effective in quickly restoring quadriceps strength in patients with weakness after surgery.

METHODS AND MEASURES:

All patients were treated for 6 weeks, 2 to 3 visits per week, in outpatient rehabilitation. Five patients (NMES group) participated in a voluntary exercise program for both knees and NMES for the weaker knee. Three patients (exercise group) participated in a voluntary exercise program for both knees without NMES. For each treatment session, 10 isometric electrically elicited muscle contractions were administered at maximally tolerated doses to the initially weaker leg of the NMES group. Quadriceps strength and muscle activation were repeatedly assessed up to 6 months after surgery using burst superimposition techniques.

RESULTS:

At 6 months, the weak NMES-treated legs of 4 of 5 patients in the NMES group had surpassed the strength of the contralateral leg. In contrast, none of the weak legs in the exercise group were stronger than the contralateral leg at 6 months. Changes in quadriceps muscle activation mirrored the changes exhibited in strength.

CONCLUSION:

When NMES was added to a voluntary exercise program, deficits in quadriceps muscle strength and activation resolved quickly after TKA.

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