Imoto AM, Peccin S, et al. Effectiveness of electrical stimulation on rehabilitation after ligament and meniscal injuries: a systematic review. Sao Paulo Med J 2011;129:414-23

Design: systematic review of clinical trials

Purpose of study: to assess the effectiveness of electrical stimulation (ES() for improving the strength of muscles following soft tissue injuries of the knee, treated surgically or conservatively

PICOS:

- Patient population: patients 14 or older with acute or chronic injuries of the cruciate ligaments, collateral ligaments, or menisci
- Intervention: rehabilitation protocols which use ES as a component of treatment of soft tissue injuries of the knee
- Comparison: placebo treatment, no treatment, other physical intervention, or conventional rehabilitation
- Outcomes: muscle strength, walking speed, use of crutches, and functional scales such as activities of daily living (ADL) or Lysholm scores
- Study types: randomized or quasi-randomized clinical trials

Study selection:

- Databases included MEDLINE, EMBASE, the Cochrane Central Register, CINAHL, and the PEDro database through December 2010
- Two authors independently rated articles for selection and assessed trial quality using the Delphi list (randomization done, allocation concealed, groups similar at baseline, inclusion and exclusion criteria specified, blinding of outcome assessor, blinding of patient, blinding of care provider, point estimates and variability of outcome measures provided, and intention to treat analysis)

Results:

- 19 studies were included for the analysis, most involving ACL reconstruction but 2 involving meniscectomy
- There were methodological flaws in the available studies; none described concealment of allocation and only one mentioned intention-to-treat analysis; blinded outcome assessment was described in only four studies
- Only for one outcome, isometric quadriceps peak torque six weeks postoperatively, were data from different studies pooled in a meta-analysis, where ES was compared to isometric exercise without ES
    - Three studies, with a total of 76 patients, had a weighted mean difference in favor of ES of 32.97 newton-meters (24.3 foot-pounds)

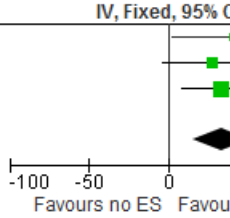
- For all other outcomes, the results of single studies were presented in narrative form, with a mixture of studies showing results in favor of ES and results showing no difference between ES and control
    - One study of 93 patients with a validated and standardized functional outcome score (Lysholm score and Tegner score at 12 weeks) showed no difference between the groups on either the Lysholm or the Tegner scores
- For meniscectomy patients, there was no significant difference between groups in isometric quadriceps peak torque at three or at six weeks

Reasons not to cite as evidence:

- The authors had insufficient high-quality information on which to base conclusions regarding the effectiveness of ES versus control interventions
- The single pooled analysis of isometric peak torque measures a surrogate outcome for functional gains following knee replacement
    - Figure 1, with the data on peak torque, has an error in the standard deviation for the second study in the forest plot, giving the standard deviation as 9 for each group
        - This SD is much smaller than the other two studies; the result is that this study has more than 91% of the weight in the meta-analysis even though it has a smaller sample size than the third study in the forest plot
        - The value of 9 is actually not a standard deviation but a standard error, and the SD is the SE multiplied by the square root of the sample size
        - Correcting this error reduces the weight of the second study from 91.38% to 48.4%, but does not influence appreciably the effect size:

	ES			Control				Mean Difference	Mean Difference
Study or Subgroup	Mean	SD	Total	Mean	SD	Total	Weight	IV, Fixed, 95% CI	IV, Fixed, 95% C
Delitto 1988	154.58	55.6	10	113.9	27.12	10	20.5%	40.68 [2.34, 79.02]	
Paternostro 1999	108.8	55.3	16	81.4	32.2	17	31.1%	27.40 [-3.72, 58.52]	
Wigerstad 1988	90	32.45	13	57	28.46	10	48.4%	33.00 [8.05, 57.95]	
Total (95% CI)			**39**			**37**	**100.0%**	**32.83 [15.48, 50.19]**	

Heterogeneity: Chi² = 0.28, df = 2 (P = 0.87); I² = 0%
Test for overall effect: Z = 3.71 (P = 0.0002)



- The result of these limitations is that there is insufficient evidence to recommend the routine use of ES after knee replacement surgery
- The authors are correct in concluding that randomized trials of better methodological quality are needed, and that 12 months of followup are necessary to ascertain the effectiveness of ES following knee surgery

Assessment: Inadequate for evidence regarding the effectiveness of postoperative electrostimulation for improving the functional outcomes of knee arthroplasty, ligament surgery, and meniscectomy