

Evaluating the Effect of Electrical Muscle Stimulation (EMS) on Post-Operative Musculoskeletal Function and Recovery

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AIM

To determine whether adjunctive postoperative EMS preserves quadriceps muscle volume and improves early knee function after unilateral TKR.

Primary endpoint: MRI-derived quadriceps volume change at 6 weeks.

BACKGROUND

Quadriceps weakness after total knee replacement is driven by early disuse and arthrogenic muscle inhibition: pain, effusion and altered afferent input reduce voluntary motor-unit recruitment. The steepest decline occurs during the first postoperative weeks, when patients may be unable to generate sufficient voluntary loading. Loss of quadriceps volume and strength is associated with slower gait recovery, difficulty with stairs and delayed rehabilitation. Electrical muscle stimulation can evoke contraction without requiring full voluntary activation and may bridge this early neuromuscular deficit.

1 METHODS

Prospective controlled two-group study of 60 adults undergoing elective unilateral TKR. Participants received standard physiotherapy alone or physiotherapy plus Regen EMS; all completed the 6-week assessment.

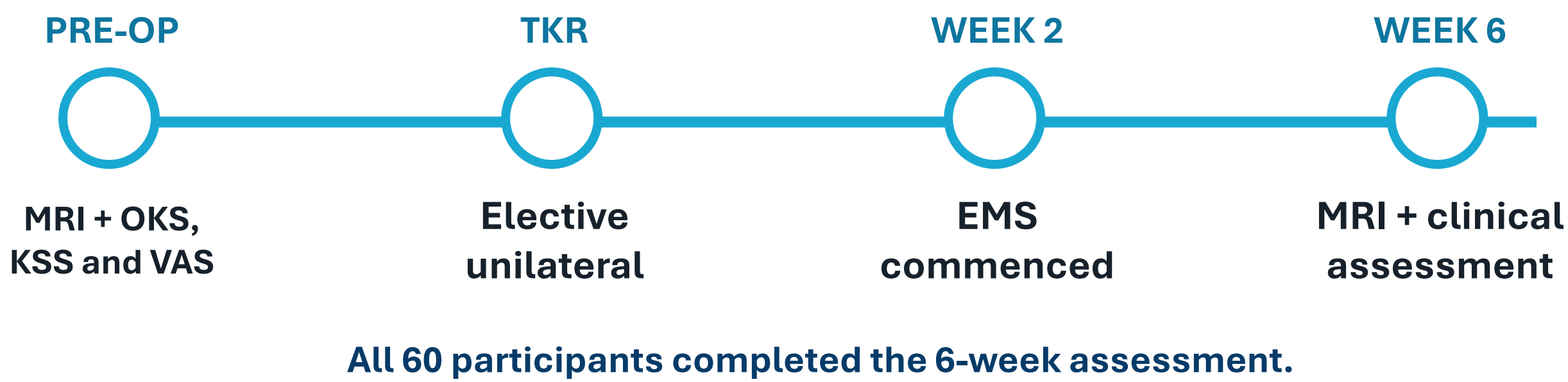
PRIMARY OUTCOME & ANALYSIS

Quadriceps volume was measured on preoperative and 6-week MRI. Between-group comparisons were made at 6 weeks; chart whiskers show SEM calculated from the reported SD and n.

Design, participants & outcomes

DESIGN	Prospective controlled study; 60 adults undergoing elective unilateral TKR.
GROUPS	Standard physiotherapy alone (n=30) or physiotherapy plus Regen EMS (n=30).
INTERVENTION	EMS to the operative anterior thigh, approximately 20 cm above the wound: 10 min, 5 times/day for 6 weeks, beginning 2 weeks postoperatively.
OUTCOMES	MRI quadriceps volume preoperatively and at 6 weeks; Oxford Knee Score (OKS), Knee Society Score (KSS) and VAS.

Study pathway



Intervention and placement

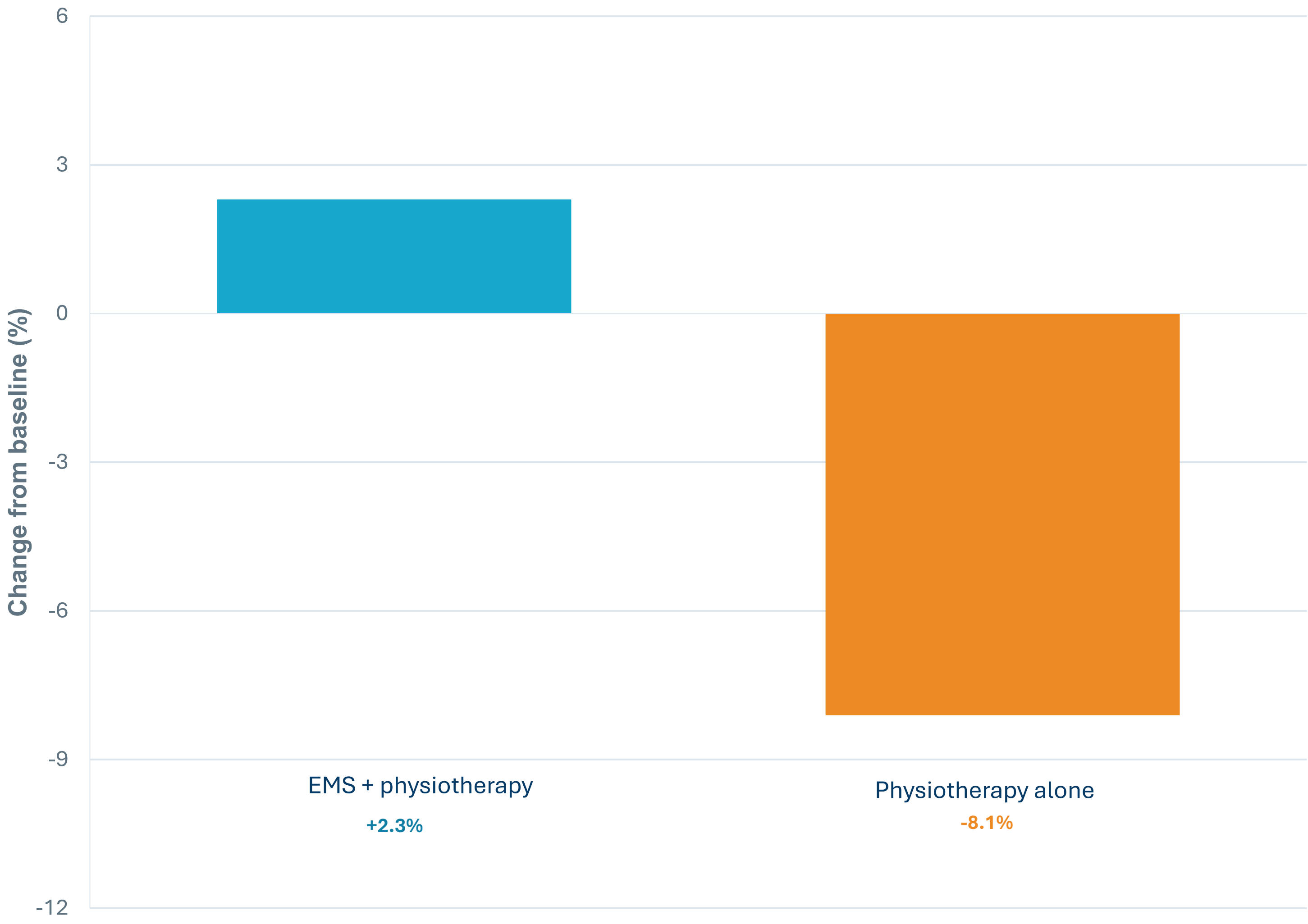


Correct placement: anterior operative thigh, approximately 20 cm above the wound.

EMS prescription: 10 minutes x 5 sessions/day x 6 weeks; source device shown in inset.

2 RESULTS & INTERPRETATION

Mean quadriceps volume change at 6 weeks (p < 0.001)

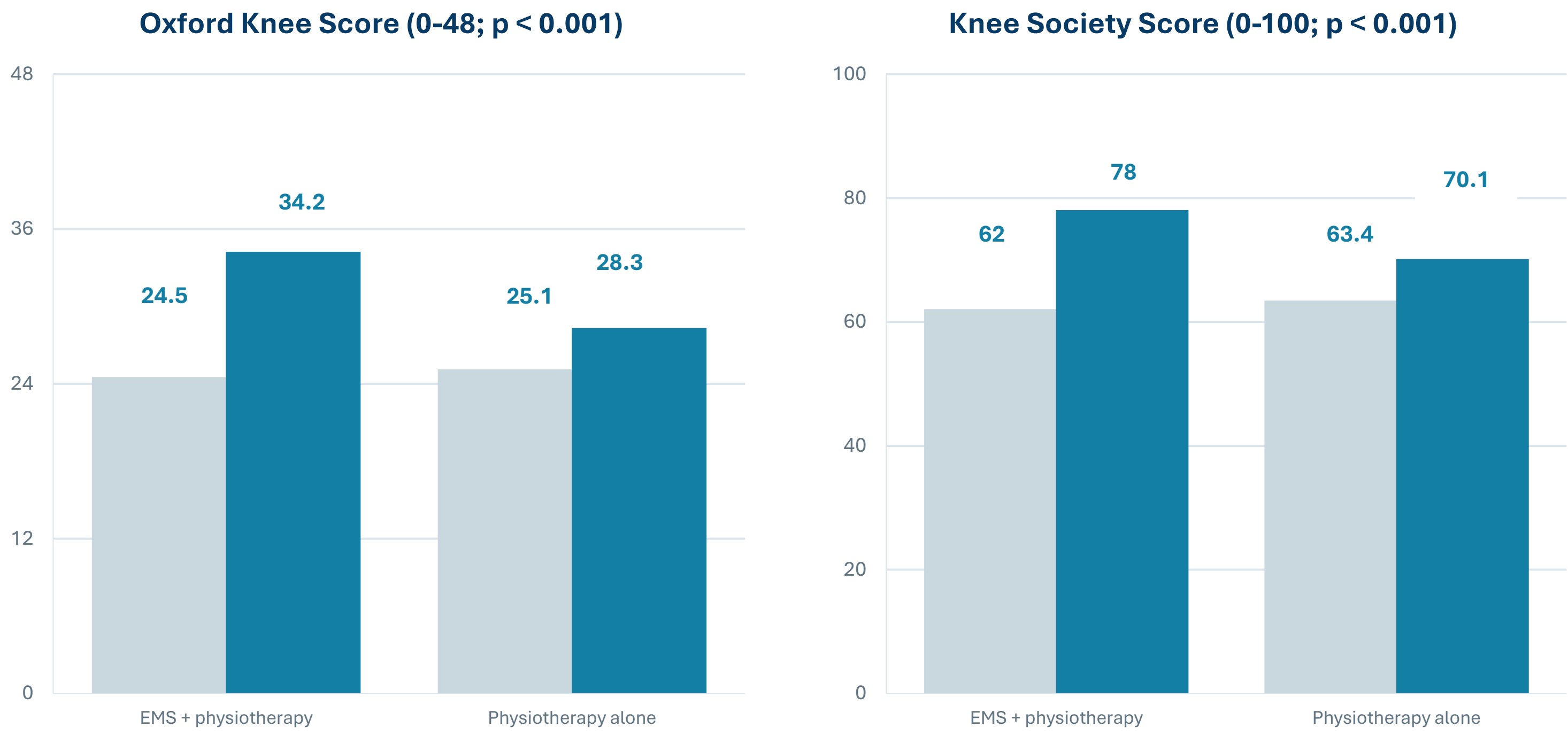


77%

of controls lost more than 5% of quadriceps muscle volume

EMS mean change +2.3% versus -8.1% in controls; between-group difference 10.4 percentage points.

Clinical recovery at 6 weeks



Grey = pre-operative; teal = 6 weeks. EMS change: OKS +9.7 vs +3.2; KSS +16.0 vs +6.7; p < 0.001 for both.

Conclusion

Adjunctive EMS after TKR was associated with better preservation of quadriceps muscle volume and larger early improvements in OKS and KSS than physiotherapy alone.

EMS may be a practical, non-invasive adjunct when voluntary quadriceps activation is limited.

Limitations & next step

Larger randomised studies should include longer follow-up, strength testing and functional outcomes.

EMS shifted the early post-TKR trajectory from quadriceps loss towards preservation.



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<https://iamregen.com/>

