

**Research Report** (3026 characters with spaces; 3125 allowed) (Body only)

TITLE: Multimodal Swelling Management After Total Knee Arthroplasty: A Pilot Study  
with Cohort Comparison

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Target Submission: Geriatrics Platform, Mike Sponsor (APTA number 377727)

Billing – Bill to MEMP Grant

COMIRB protocol 17-1571 'Multimodal Edema Management After Total Knee  
Arthroplasty: A Pilot Study'

ABSTRACT BODY:

Purpose/Hypothesis: Swelling after total knee arthroplasty (TKA) is a major patient complaint and **is associated with decreased muscle activation, strength, range of motion, and functional performance as well as increased pain and post-surgical complications such as deep venous thrombosis.** However, to date, traditional physical therapy interventions such as cryotherapy have demonstrated minimal effectiveness in reducing swelling and its associated sequelae. The purpose of this pilot study was to determine the feasibility and initial efficacy of a multimodal swelling management (MSM) program for swelling after TKA.

Number of Subjects: 11

**Materials/Methods:** This was a prospective pilot study with historical cohort comparison. Eleven participants awaiting TKA for end-stage osteoarthritis (age  $67 \pm 6.4$  years (mean  $\pm$ SD); 7 female) were consecutively enrolled and participated in MSM for 3 weeks after TKA. Patients were excluded if: 1) body mass index  $> 40 \text{ kg/m}^2$  or 2) had a history of heart failure, lymphatic insufficiency, or any other condition associated with chronic lower extremity swelling. The MSM program consisted of use of a medical grade compression garment (Circaid® Juxtafit® Essentials) for 12 hours daily, self-administered manual lymph drainage massage once daily, and lower extremity active range of motion exercises performed 5 times daily to encourage venous and lymphatic return. Primary outcomes were patient satisfaction, adherence, and bioelectrical impedance, a valid and reliable measurement of swelling. All primary outcomes were assessed preoperatively and at 1, 2, 3, and 6 weeks postoperatively. Secondary outcomes included quadriceps strength and activation at 6 weeks. Data were compared to an historical control group ( $n = 56$ ) with identical inclusion and exclusion criteria (CONTROL). Preliminary effect sizes were obtained by calculating Cohen's  $d$  statistic.

**Results:** 100% of MSM participants were satisfied with the intervention. Adherence for the compression garment, manual lymph drainage massage and exercises was 82%, 100%, and 100% respectively. MSM showed a large reduction in swelling compared to CONTROL at 1, 2, and 6 weeks with effect sizes of -1.41, -1.30 and -0.83 respectively. Using published CONTROL swelling estimates (50<sup>th</sup> percentile), MSM demonstrated 59.5% less swelling than CONTROL at 3 weeks. At 6 weeks MSM attenuated

postoperative quadriceps strength loss to a greater degree compared to CONTROL (effect size of 0.49). MSM also led to an increase in quadriceps activation compared to CONTROL (effect size 0.46).

Conclusions: Use of the MSM program was feasible for treating swelling after TKA and led to large improvements in postoperative swelling and moderate improvements in quadriceps strength and activation. Larger randomized controlled trials are needed to determine efficacy of the MSM program.

Clinical Relevance: The MSM program is the first conservative intervention to demonstrate initial success in controlling postoperative swelling after TKA.