The Effectiveness of Continuous Passive Motion in Post-Operative Total Knee Replacement Patients

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Introduction

Through this presentation, the effectiveness of the use of continuous passive motion (CPM) in post-operative total knee replacement patients was explored. CPM devices are used to increase joint flexibility and motion in post-operative patients. It is indicated for a variety of uses including total knee arthroplasty, knee manipulation, and orthopedic trauma surgery. The concept was created in 1970 to increase joint range of motion and promote rapid post-operative recovery, and the device was created and first implemented in 1978. CPM is ordered by a physician for use ranging from 12-14 hours per day at 2-3 hour intervals. After removal of the CPM, patients must allow the limb to rest in terminal extension. Recently there have been studies produced with conflicting results on the efficacy of CPM as a treatment for post-operative total knee arthroplasty patients.

Methods

Research articles were used to answer the PICOT question: In post-operative total knee replacement patients, does the use of CPM therapy, in addition to physical therapy, improve patient outcomes of length of stay, pain, edema/drainage, functional ability, and range of motion in comparison with patients receiving physical therapy alone post-operatively? A literature review of evidence-based research articles was conducted to explore the outcomes of the sole use of CPM in post-operative TKA patients, compared with the outcomes of using CPM and physical therapy simultaneously.

Review of Literature

"Use of Inpatient Continuous Passive Motion Versus No CPM in Computer-Assisted Total Knee Arthroplasty" – Alkire & Swank, 2010

Objective: To determine if the use of CPM three times daily, 6 hours a day, for 3 days post-op, resulted in differences in the categories of range of motion, edema/drainage, functional ability, length of stay, and pain when compared with patients who only received physical therapy two times daily while in the hospital.

Major findings: Pain and function measured using the Knee Society Function Score (KSS) and Western Ontario McMaster Osteoarthritis Index (WOMAC) revealed no statistical difference in function after three months. Edema, measured on post-op days one and two, was the same in both groups. The no-CPM group had slightly less drainage from hemovacs. Range of motion, complications, and average length of stay were the same in all groups. This study showed no difference in short or long term flexion of the knee joint.

"To Use or Not Use Continuous Passive Motion Post Total Knee Arthroplasty" – Maniar, Baviskar, Singh, Rathi (2012)

Objective: To determine if CPM use has long term benefit in TKA patients by using the TUG test, knee ROM, pain, swelling, wound complications, WOMAC and SF-12 scores.

Major findings: On POD 5, pain scales showed the 1-day CPM group had less pain, however, no significant difference was seen long term. ROM returned to patients’ pre-op values by day 42 in all groups and by day 90, ROM averaged 117 degrees. No significant differences found in the 3 groups ROM and pain from TUG test, WOMAC and SF-12 scores.

"Effectiveness of the Prolonged Use of the Continuous Passive Motion (CPM), as an Adjunct to Physiotherapy after Total Knee Arthroplasty" - Lenssen et al, 2007

Objective: To determine the efficacy of prolonged CPM use at home versus standardized physical therapy on range of motion and functional recovery at discharge, 17 days, and 3 months out from surgery.

Major findings: Although the results indicated that prolonged CPM use has short-term effect on ROM, there was no long-term effects on increased ROM or transfer to better functional performance.

"Continuous passive motion following total knee arthroplasty in people with arthritis." – Harvery, Brosseau, & Herbert 2010

Objective: To evaluate the effectiveness of continuous passive motion and standard post-operative care following total knee arthroplasty. The primary outcomes were active knee flexion ROM, passive knee flexion ROM, active knee extension range of motion, passive knee extension range of motion, length of hospital stay, and function and incidence of manipulation under anesthesia. The secondary outcomes included pain, swelling, and quadriceps strength.

Major findings: End results of the study provided high quality evidence to indicate that CPM has small short-term effects on active knee flexion ROM and passive knee flexion ROM. Participants who did not have CPM were able to actively move their knee an average of 75 degrees, whereas participants who did have CPM were able to actively move their knee 3 degrees more. In terms of passive ROM, the participants who did not have CPM were able to move their knee an average of 82 degrees and people who did have CPM were able to move their knee 2 degrees more. The medium and long-term effects of CPM on all ROM measures are unclear. Lastly, data suggested there is low quality evidence that CPM has no effect on length of hospital stay, but reduces the need for manipulation under anesthesia.

Conclusions

After review of the literature, we concluded that the use of CPM, while showing some short-term benefits post-operatively, does not show benefits long-term when compared with patients only receiving physical therapy. In our own unit, we do not see CPM therapy used commonly. Studies that include patients receiving surgery under multiple surgeons might offer a better picture of the benefits of CPM nationwide.

References


