

# **Computer Assisted Cryotherapy Reduce Opioids Use after Total Knee Arthroplasty: A Safe Postoperative Pain Management**

Raffaella Alonzo, Veronica Giuliani, Ilaria Nicolosi<sup>1</sup>, Stefano Pecchia, Riccardo Di Niccolo, Stefania De Sanctis, Giorgio Bruni, Silvia Frontini, Carmelo D'Arrigo

<sup>1</sup>La Sapienza

## **INTRODUCTION:**

Despite advances in anesthetic techniques and pain management, total knee arthroplasty (TKA) is associated with pain and discomfort for most patients due to tissue damage, inflammatory response, local swelling, edema and stiffness. The aim of this study was to evaluate the effectiveness and safeness of computer assisted cryotherapy (CAC) in pain control and analgesics use after primary TKA.

## **METHODS:**

Patients undergoing TKA between July 2020 and January 2023 were prospectively enrolled and randomly assigned in two Groups. Randomization was performed using web-based generated randomized numbers. Inclusion criteria were primary TKA replacement due to painful osteoarthritis and the ability to follow instructions and return to follow up. Exclusion criteria were revision TKA, knee infection, extension deficit more than 15°, and/or flexion less than 110°.

Patients out of Group I received a standardized multimodal pain control protocol using NSAID and Opioids including morphine as a rescue analgesic for severe pain. In Group II, patients received the same pain control protocol and, moreover, underwent CAC with a standardized protocol. This protocol consisted of two application daily of 3 hours at a temperature of 10-12° and an intermittent compression up to 50 mmHg. In both groups daily low molecular heparin injections were used as a thrombosis prophylaxis and patients underwent the same rehabilitation program consisting of full weight-bearing and active range of motion exercises starting the day of surgery.

The main outcomes were the Visual Analogue Scale (VAS) Pain registered at 1, 3, 5 days postoperatively and opioids consumption noted during the first 5 postoperative days. Secondary outcomes were Range Of Motion (ROM), swelling, blood transfusions, infections, thrombotic events, and length of hospital stay. Moreover in Group II local adverse events to CAC were strictly evaluated. Particularly local skin reaction, superficial infections, and wound healing problems were assessed. Statistical analysis was performed by an independent analyst using student's t tests and chi-square tests for categorial variables. P value was considered statistically significant at  $p < 0.01$ .

## **RESULTS:**

A total of 213 consecutive patients were eligible for enrollment. Fourteen patients were excluded because they were not meeting inclusion/exclusion criteria leaving 200 patients (Group I: 100 patients; Group II: 100 patients). The two groups were homogeneous for demographic characteristics (age, sex, BMI). In both groups a significant ( $p < 0.01$ ) reduction in VAS Pain was registered between day 1 and day 5 postoperatively. However, when comparing both Groups, a significant difference ( $p < 0.01$ ) was found at 1, 3, and 5 days postoperatively with better pain control in the CAC group.

When considering analgesics consumption, a significant difference ( $p < 0.01$ ) was found between the two groups with a lower administration of opioids, including morphine, in the CAC group. Particularly, a mean consumption of 232,65 mg and 26,53 mg of Tramadol was registered respectively in Group I and Group II. Moreover, a mean administration of 19,3 mg of morphine was registered in Group I compared to a mean consumption of 0,61 mg in Group II.

Despite better results in Group II particularly in terms of NSAID use, better ROM and lower local swelling, no statistically significant differences between the two groups were registered. Non differences were observed in blood transfusion and length of hospital stay. No infections, thrombotic events, or local adverse effects were registered.

## **DISCUSSION AND CONCLUSION:**

The most important finding of this study is that postoperative computer assisted cryotherapy (CAC) is effective in terms of pain control after primary TKA as it was associated with reduced pain and less administration of opioids during the early postoperative period. Moreover CAC seems to be a safe procedure with no adverse effect registered in our series. In conclusion, CAC is a safe and effective procedure following primary TKA resulting in less experienced pain and opioids use in the first postoperative days. The procedure with CAC is well tolerated improving patients satisfaction with fewer episodes of acute pain in the early postoperative period. We can speculate that this protocol can have potential favorable effect in the rehabilitation period and final outcomes.