Paper 24: Cryocompression Results in a Significant Decrease in Opioid Consumption following Shoulder Surgery – A Multi Center Randomized Controlled Trial

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Objectives: Elective shoulder surgical procedures, some of the most commonly performed orthopaedic surgeries, are increasing rapidly.[1] The management of pain following shoulder surgery typically includes the use of cryotherapy and the prescription of pain medication, typically in the form of opioid analgesics. Much focus has been put lately on the opioid epidemic, which in part is fueled by excessive prescription of opioid medications.[2,3] Recent studies have indicated that orthopaedic surgeons are some of the highest opioid prescribers, often prescribing above recommended amounts.[4,5] This is especially critical considering that opioid-naïve patients undergoing shoulder surgery are at an increased risk of long-term dependence.[6] With the increased number of shoulder surgeries performed, identifying ways to reduce opioid consumption post-operatively is imperative for orthopaedic surgeons to reduce opioid prescriptions.

Cryotherapy is commonly utilized following shoulder surgery to decrease swelling and inflammation, as well as to help alleviate postoperative pain. The application of cold can come in many forms, from ice packs to more complex cryotherapy devices. Previous studies have found a combination of cryotherapy and compression effective at reducing analgesic consumption and increasing recovery in patients undergoing knee and spine surgery, however, efficacy in patients undergoing shoulder surgery has not been evaluated.[7-9] The aim of this study was to evaluate the effectiveness of a cryocompression device on postoperative shoulder pain, narcotic use, and quality of life when compared to standard care.

Methods: A prospective, unblinded, multicentered, randomized controlled trial of 200 patients was performed in 5 hospitals in Ontario, Canada. Patients over the age of 18 scheduled for primary or revision unilateral shoulder surgery were approached by board-certified orthopaedic surgeons for participation between December 2019 and February 2023.

Patients were randomized to either the cryocompression group, or standard care. The intervention group received a cryopneumatic device, which consisted of a Game Ready® GRPro® 2.1 system with a Game Ready® ATX® shoulder wrap. The device provides continuous cold and intermittent pneumatic compression therapy to the shoulder joint and surrounding soft tissues. The standard care group received the treating surgeon's preferred method of cryotherapy. There were no limitations to the type of cryotherapy that could be used in the standard care group, with the exception of a Game Ready device. The standard of care intervention was used as per the treating surgeon's standard recommendations to patients. In both groups, patients received a standard shoulder immobilizer, postoperative medications and physical therapy as per their treating surgeon and physiotherapist's standard practices.

Narcotic usage post-surgery was evaluated by the number of opioid morphine oral morphine milligram equivalent (OMMEs) consumed during the postoperative period, as well as the time to cessation of narcotic use. Narcotic usage was collected using a patient drug diary which was completed by the patient during the postoperative period. Patient-reported outcome measures (PROMs) consisted of a numeric pain

rating scale (NPRS) on a scale ranging from 0 (no pain) to 10 (worst possible pain), quality of life using the 36 item Short Form Survey (SF-36) and its subscales reported on 0-100 scales with higher values representing better outcomes, patient experience assessed using the Net Promoter Score, and adverse events. Narcotic usage was collected after the patient completed their use of their narcotic medication, while PROMs and adverse events were collected at 2, 6 and 12 weeks postoperative.

Normality of data was tested using the Shapiro-Wilk test and visualization of residual Q-Q plots. For continuous outcome measures normally distributed data was analyzed using a one-way ANOVA for OMMEs consumed and time to cessation of narcotics, and a two-way repeated measures ANOVA for PROMs. Non-normally distributed data was analyzed using a Mann-Whitney U test for OMMEs consumed and time to cessation of narcotics, and a generalized linear model (GLM) for PROMs. Adverse events were analyzed using a Pearson's chi-square test.

Results: Patients in the cryocompression group showed a significant decrease in post-operative opioid consumption when compared to standard care (median 56.1 OMME [IQR 66.1] vs. median 112 OMME [IQR 99.4]; p=0.02468) (Figure 1). A significant increase in self-reported function (SF-36 Physical Function subscale) was seen in the cryocompression group at 2 weeks when compared to standard care (mean 61.2 ± 21.2 vs. mean 54.2 ± 22.9; p=0.0412). Time to cessation of opioids was lower in the cryocompression group compared to the standard care group, although this measure did not reach statistical significance (median 4 days [IQR 5] vs. median 6 days [IQR 4.5]; p=0.1543). No significant differences were seen in VAS pain or other SF-36 measures at any timepoints despite significant decrease in opioid consumption in the cryocompression group. No significant difference was seen in adverse events between groups (4 standard care, 2 cryocompression, p=0.4379).

Conclusions: In patients undergoing unilateral shoulder surgery, the use of a cryocompression device, when compared to standard of care, resulted in a significant decreased opioid consumption post-operatively, as well as increased function at 2 weeks postoperative.

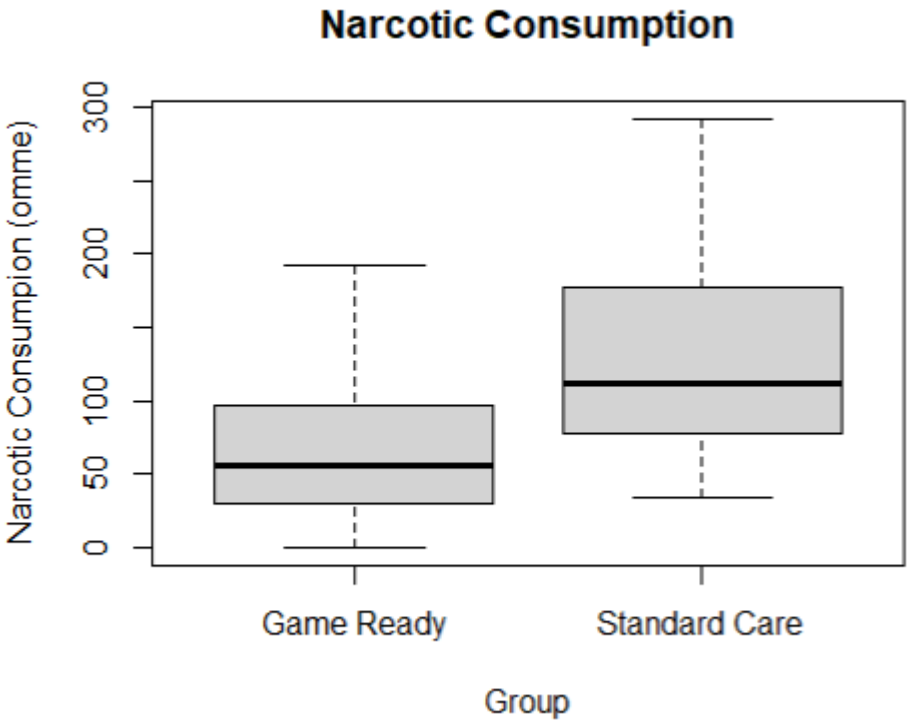

Figure 1

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