Efficacy of Intra-Articular Tranexamic Acid in Addition to Intravenous Tranexamic Acid in Enhancing Pain Relief and Function After Arthroscopic Anterior Cruciate Ligament Reconstruction: A Randomized Clinical Trial

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INTRODUCTION:
Tranexamic acid (TXA), known primarily for its antifibrinolytic properties, also exert anti-inflammatory effects that could enhance postoperative recovery and pain reduction. However, no study has evaluated its impact on pain and functional recovery when added to intravenous TXA and a multimodal analgesic regimen in anterior cruciate ligament (ACL) reconstruction. Our aim is to investigate whether an intra-articular injection of TXA, administered alongside a standard multimodal analgesic cocktail, improves postoperative pain control and functional recovery.
METHODS: This was a randomized, triple-blind, placebo-controlled clinical trial conducted from April 2022 to October 2023 at a tertiary care center. One hundred patients with isolated, unilateral, chronic ACL tears were randomized 1:1 to receive either an intra-articular injection containing TXA (1 g), morphine sulfate, ketorolac, lidocaine, and normal saline (intervention group) or an identical injection without TXA (control group). All surgeries were performed using hamstring autografts and standardized surgical and postoperative protocols. All patients received 15 mg/kg intravenous TXA in addition to intraarticular TXA. The primary outcomes were pain scores (Visual Analog Scale, VAS) at predefined time points up to 3 months. The secondary outcomes were Knee Injury and Osteoarthritis Outcome Score (KOOS), Lysholm scores, range of motion, swelling, and morphine consumption.
RESULTS:
Early postoperative pain scores (up to 12 hours) were numerically lower in the TXA group but did not differ significantly between groups at any time point ($p > 0.05$). Both groups demonstrated significant within-group improvements over time in KOOS subscores ($p < 0.001$) and Lysholm scores ($p < 0.001$). Postoperative morphine consumption was similar in both groups ($p > 0.05$). The TXA group had better Lysholm scores at 1 month (85.8±9.1 vs 79.6±13.9; $p < 0.01$). The TXA group had significantly better KOOS subscores and Lysholm scores at 3 months with moderate effect size ($p < 0.01$). No serious complications were observed in either group.
DISCUSSION AND CONCLUSION: Intra-articular TXA did not significantly reduce early postoperative pain or opioid use when added to a multimodal analgesic regimen and intravenous TXA in arthroscopic ACL reconstruction. However, it was associated with slightly better functional outcomes at 1 and 3 months postoperatively, as measured by KOOS and Lysholm scores. Although its clinical effect is questionable.