Tourniquet-less Total Knee Arthroplasty Does not Negatively Affect Cement Penetration: A Double-blinded Randomized Controlled Trial

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INTRODUCTION: Tourniquet use during total knee arthroplasty (TKA) has been standard practice to improve surgical visibility, minimize blood loss, and enhance cement penetration. However, concerns about complications have raised questions about its necessity. This study evaluated whether tourniquet-less TKA compromises cement penetration compared to tourniquet-assisted procedures.

METHODS: A double-blinded randomized controlled trial was conducted from December 2022 to August 2023, including 120 patients with end-stage osteoarthritis undergoing unilateral TKA. Patients were randomly assigned to tourniquet (n=60) or tourniquet-less (n=60) groups. All patients received tranexamic acid, spinal anesthesia with controlled hypotension, and an identical surgical protocol except for tourniquet application. Cement penetration was measured on standardized radiographs 60 days post-surgery using the Knee Society Radiographic Evaluation System. The effect of bone mineral density on cement penetration was assessed as a secondary outcome.

RESULTS: Both groups achieved cement penetration ranging from 2-3 mm across all measured zones. No significant differences in average cement penetration were observed between the groups in the tibia and femur. Bone mineral density did not significantly affect cement penetration in either group, as both achieved optimal penetration levels irrespective of osteoporosis status (28.9% of patients had osteoporosis).

DISCUSSION AND CONCLUSION: Performing tourniquet-less TKA does not compromise cement penetration when using standardized modern cementing techniques with tranexamic acid administration and controlled hypotension. Bone mineral density had no significant impact on cement penetration in either group. Tourniquet-less TKA can be considered a safe alternative to conventional tourniquet-assisted techniques, potentially reducing postoperative pain and improving functional recovery without sacrificing implant stability.