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## Choosing ankle tourniquets in foot and ankle surgery: Beyond postoperative pain considerations

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### Abstract

This editorial critically explores the use of ankle *vs* thigh tourniquets in foot and ankle surgery based on a recent study that found no significant difference in postoperative pain between the two placement techniques. Despite these findings, we argue for the preferential use of ankle tourniquets, highlighting their potential benefits in reducing venous blood stasis and minimizing soft tissue injury. This approach underscores the importance of considering long-term patient outcomes and vascular health beyond immediate postoperative pain. By integrating study findings with broader clinical considerations, we hereby advocate for a nuanced approach to tourniquet use that prioritizes patient safety and long-term recovery in conjunction with immediate postoperative pain.

**Key Words:** Lower extremity; Deep venous thrombosis; Recovery; Postoperative outcomes; Intraoperative decision-making

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**Core Tip:** This editorial advocates for the selection of ankle tourniquets in foot and ankle surgery. While ankle tourniquets do not significantly reduce postoperative pain compared to thigh tourniquets, ankle tourniquets may minimize lower extremity venous stasis and soft tissue compression, especially in high-risk patients, which can enhance long-term vascular health and promote uneventful patient recovery.

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## INTRODUCTION

The recent study titled "Effect of ankle versus thigh tourniquets on post-operative pain in foot and ankle surgery" presents important findings investigating tourniquet use in orthopedic procedures[1]. While the study, conducted on 201 patients undergoing foot and ankle surgery, concludes that there is no significant correlation between the site of tourniquet application (ankle *vs* thigh) and immediate postoperative pain scores, it opens the door to a broader discussion on the choice of tourniquet placement[1]. This editorial aims to delve into why, despite the study's findings, choosing an ankle tourniquet might be preferable in certain surgical scenarios, particularly to mitigate venous blood stasis in the leg and soft tissue injury, especially in procedures of longer duration and at-risk patients.

## TOURNIQUET

The use of tourniquets in surgery is a long-standing practice primarily aimed at providing a bloodless field for optimal surgical visibility and reducing intraoperative blood loss[2]. However, the choice of tourniquet placement has varied, with some surgeons preferring the thigh for its ease of application and perceived patient comfort, while others opt for the ankle to localize pressure effects[3-5]. This study's finding of no significant correlation between tourniquet site and postoperative pain intensity might initially suggest that the choice of tourniquet location is inconsequential concerning pain management. Yet, this view overlooks other crucial factors, such as the potential risk of venous blood stasis, limb ischemia in patients with compromised vascular health, and associated complications[4].

Venous stasis, the stagnation of blood flow in the veins, is a known risk factor for deep vein thrombosis (DVT) and other vascular complications[6]. When a tourniquet is applied to the thigh, it exerts pressure over a larger area and encompasses major blood vessels, potentially increasing the risk of venous blood pooling and stasis in the entire leg. This is especially concerning in patients with pre-existing vascular conditions or those at higher risk for DVT. In contrast, an ankle tourniquet applied over the supramalleolar region localizes the pressure to a smaller area distal to the calf, reducing the risk of venous stasis in the leg.

Moreover, the study's methodology, while robust in its approach, does not specifically address the long-term vascular implications of tourniquet placement. The focus on immediate and short-term postoperative pain, while clinically relevant, does not encompass the broader spectrum of potential complications arising from tourniquet use, especially in patients who are immobilized for long periods of time postoperatively, with a history of DVT or suffer from peripheral vascular disease. Notably, prolonged tourniquet ischemia following thigh tourniquet use in patients with compromised extremity blood supply may lead to post-tourniquet syndrome, tissue edema, and even compartment syndrome[7]. Therefore, when interpreting the study's findings, surgeons should consider these unaddressed aspects and weigh them against the immediate postoperative pain outcomes.

It is also essential to consider the anatomical and physiological aspects of tourniquet application. With its larger circumference, the thigh often requires higher tourniquet pressures to achieve effective blood occlusion[3,4]. This increased pressure can contribute to more extensive tissue compression and potential damage[8,9]. On the other hand, the ankle, with its smaller circumference, may require lower pressures, thereby potentially reducing the overall risk of tissue injury and complications associated with high-pressure tourniquet application. Such phenomena may be better elucidated by the use of emerging computational analytical technologies, such as finite or discrete element analysis that has enabled researchers to better understand the biomechanical implications of extrinsic and intrinsic forces on anatomical structures[10]. However, to our knowledge, there is little to no computational evidence in the literature investigating the effects of tourniquet use, particularly on the ankle and thigh.

Further, the effect of ankle tourniquet placement on the rate of postoperative wound healing, surgical success, and infection rates must be studied. Some experts have recommended against the use of tourniquets for certain surgeries. For example, a study by Konrad *et al*[11] found that using a tourniquet during open reduction and internal fixation of ankle fractures increased postoperative swelling and pain, reporting a trend toward decreased range of motion in the ankle during follow-up. As a result, they do not recommend the use of a tourniquet for osteosynthesis of ankle fractures, citing the potential for increased complications such as wound healing disturbances and infections. Therefore, the evaluation of the impact of ankle tourniquets on both closed and open-foot fractures for different surgical procedures is also a critical area for future research, adding more depth to the conversation regarding the effects of tourniquet use and its placement for foot and ankle surgery.

## CONCLUSION

In conclusion, while the study "Effect of ankle versus thigh tourniquets on post-operative pain in foot and ankle surgery" provides valuable insights into the relationship between tourniquet placement and postoperative pain[1]. The choice of tourniquet placement site must consider other patient-specific variables. The potential benefits of using an ankle tourniquet, particularly in reducing the risk of venous blood stasis and its complications, merit serious consideration. As with all surgical decisions, the choice of tourniquet placement should be tailored to each patient, considering both the immediate and long-term implications for patient health and recovery.

## FOOTNOTES

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