

Timing of Tourniquet Release in Orthopaedic Upper Extremity Surgery: A Prospective Randomized Trial

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INTRODUCTION: The use of a tourniquet is standard practice in orthopaedic upper extremity surgery. There is thorough clinical research on the benefits and complications of tourniquet use; however, there has been minimal research evaluating whether releasing the tourniquet before or after surgical wound closure affects patient outcomes. The objective of this study is to determine if tourniquet release before wound closure in upper extremity surgeries leads to decreased complications and/or improved clinical outcomes.

METHODS: This study was a prospective, blinded, randomized trial. Surgeries were performed at a level one trauma center as well as surrounding hospitals and surgery centers by five fellowship-trained hand and upper extremity surgeons. Patients were randomized into two study arms at the time of closure. The Prior group had the tourniquet released before closure, while the After group had the tourniquet released after closure. Demographic, intraoperative, and follow-up data were collected. Outcome measures included pain, satisfaction, and Quick DASH scores.

RESULTS: A total of 214 consecutive patients were recruited, with 107 patients having the tourniquet released prior to closure and 107 patients having the tourniquet released after closure. There were 75 elective and 32 trauma cases in each study arm. Both groups had similar demographics. Intraoperative data collection revealed no intraoperative or postoperative complications requiring intervention. Of the patients who had the tourniquet released prior to closure, 16% required cauterization for light bleeding with no arterial injuries noted. No patients in either group had hematoma formation or bleeding requiring further intervention. In patients available for follow up, pain and satisfaction scores were similar and there was no significant difference in Quick DASH scores between groups. Additionally, there were no clinically significant differences between either study arm when stratified into elective and trauma cases. Although the total tourniquet time was shorter in the Prior group and the total surgical time was longer in the Prior group, neither of these differences was statistically significant. Interestingly, when comparing outcomes between trauma and elective cases, trauma patients demonstrated significantly higher QDASH scores than elective patients, regardless of which study arm they were in.

DISCUSSION AND CONCLUSION: There is an absence of literature regarding the effect of tourniquet release timing relative to wound closure on patient outcomes in orthopaedic upper extremity surgery. In our study, there was no difference in pain, postoperative complication rates, patient satisfaction with surgery, or outcome scores at two weeks postoperatively between the Prior and After groups. Orthopaedic upper extremity surgeons should feel confident in their decision to release the tourniquet either prior to or after surgical wound closure, given that either option will yield similar complications and patient satisfaction outcomes.

Table 5: Two Week Follow-up Outcomes

Outcomes	All (N = 214)	Prior Group (n = 107)	After Group (n = 107)	P value
Follow-up	172 (80%)	91 (85%)	81 (76%)	0.085
QDASH Score	48.2 ± 25.3 [44.3–52]	51.2 ± 25 [46–56.4]	44.7 ± 25.3 [39.1–50.4]	0.095
Visual Analogue Pain Score (0-10)	3.3 ± 2.3 [3–3.6]	3.4 ± 2.2 [2.9–3.8]	3.2 ± 2.3 [2.7–3.7]	0.632
Patient Satisfaction Score (1-5) ^a	4.6 ± 0.8 [4.5–4.7]	4.6 ± 0.8 [4.4–4.7]	4.6 ± 0.8 [4.5–4.8]	0.564

^aQDASH score, visual analogue pain score, and patient satisfaction scores are expressed as mean ± SD [95% Confidence Interval]

^bPatient satisfaction scores were recorded using a self-reported questionnaire completed by patients at the 2-week postoperative visit

with 5 being the highest degree of satisfaction.

Table 3: Intraoperative Results

Outcomes	All (N = 214)	Prior Group (n = 107)	After Group (n = 107)	P value
Tourniquet Time (min)	37.7 ± 30.6 [33.5–41.8]	34.5 ± 31.3 [28.5–40.5]	40.8 ± 29.7 [35.1–46.5]	0.131
Total Surgical Time (min)	43.6 ± 34.8 [38.9–48.3]	45.2 ± 38.3 [37.9–52.6]	42 ± 31 [36–48]	0.508
Incision Length (cm)	5.7 ± 5.1 [5–6.4]	6.3 ± 5.9 [5.1–7.4]	5.2 ± 4.1 [4.4–6]	0.1325

^a Tourniquet time, total surgical time, and incision length are expressed as mean ± SD [95% Confidence Interval]