Tourniquet Use in Total Knee Arthroplasty
Clinical Publications and Results

Pain


In this prospective, randomized study of 80 patients, Abdel-Salem and Eyres reported significantly lower pain scores in the non-tourniquet group than in the tourniquet group using a linear analogue scale (mean pain score at 4 hours = 4 and 8, respectively, p<0.05). In addition, the authors identified more cases of wound infection and deep-vein thrombosis in the tourniquet group.


Using a linear analogue scale in a prospective, randomized double-blind study of 88 patients, Barwell et al. reported significantly lower pain scores in the early tourniquet release group compared to the post-closure release group (median pain score at 4 hours = 1 and 4, respectively, p=0.001). The authors also identified significantly more minor complications (ooze, erythema, cellulitis, p=0.04) and cases of excessive swelling (p=0.02) in the release post-closure group.


In this prospective, double-blind, randomized clinical trial, post-operative pain was assessed on 28 simultaneous bilateral total knee arthroplasty patients. Tourniquet pressure of 350mmHg was used on one thigh and 100mmHg plus systolic blood pressure was used on the other. Worland et al. reported significantly more thigh pain on high pressure on the first (p=0.01), second (p=0.01), and third (p=0.001) postoperative days.

Range of Motion


In this randomized radiosteriometric analysis (RSA) study of 50 patients, Ledin et al. found pain measurements using a visual analogue scale were lower in the non-tourniquet group (p=0.01) and range of motion was 11 degrees greater in the non-tourniquet group (p=0.001 at 2 years). In addition, RSA showed no significant differences in loosening at 6 months, 1 year, and 2 years.
In this meta-analysis, Rama et al. systematically analyzed eleven randomized, controlled studies involving 872 patients and 893 primary knee arthroplasties. Tourniquet release after closure significantly increased the risk of regional complications, including wound complications, symptomatic deep vein thrombosis, and knee stiffness requiring manipulation (p=0.006). Rate of reoperation due to post-operative complication was 3.1% (9/290) in the late release group in contrast with 0.3% (1/290) in the early release group (p=0.04). Complications included wound dehiscence, hematomas, and infections that required drainage and/or debridement and knee stiffness that required manipulation with the patient under anesthesia.

In this meta-analysis, Smith and Hing reported a trend toward increased wound haematoma, peroneal nerve palsy, superficial wound healing disorders, blisters, DVT, and PE in tourniquet versus non-tourniquet patients.

In this meta-analysis of 11 published total knee arthroplasty (TKA) studies comparing 634 knees with and without a tourniquet, Tai et al. reported that the current evidence suggests that using a tourniquet in TKA may save time, but may not reduce blood loss. Due to the higher risks of thromboembolic complications, tourniquets should be used with caution in TKA procedures.

Dobner and Nitz investigated electromyographic (EMG) and functional deficits associated with using a pneumatic tourniquet in knee surgery in this controlled, randomized, prospective study of 48 patients. Six weeks following surgery, functional and EMG examination found (1) 17 of 24 (71%) of the tourniquet group had EMG evidence of denervation and a functional capacity of 39% of the normal leg, (2) 7 of 24 (29%) of the tourniquet group had no evidence of denervation and a 71% functional capacity, and (3) the control group had no evidence of denervation and a functional capacity of 79%.


Patellofemoral Tracking

The impact of tourniquet application in flexion or extension on patellofemoral tracking was examined in this prospective, randomized study of 100 patients. The authors reported no difference in the number of lateral releases between the groups. Of the 16 patellas found to be maltracking, however, tourniquet deflation led to better patella tracking in all cases (11 major maltrackings were subsequently deemed minor; 5 minor maltrackings were corrected).

The authors prospectively evaluated 171 knees in 133 patients to determine the need for a lateral retinacular release before and after tourniquet deflation. A total of 77 knees appeared to need a lateral release before tourniquet deflation. Evaluating these knees following tourniquet deflation, 27 knees required lateral release, representing a 65% reduction in lateral releases.

Methicillin-Resistant Staphylococcus Aureus (MRSA)

Ahmed et al. sampled 20 tourniquets used in orthopaedic procedures. Coagulase-negative Staphylococcus spp. were found on every tourniquet sampled. Methicillin-resistant Staphylococcus aureus (MRSA) were found on two tourniquets, Pseudomonas spp. were found on one, and Staphylococcus aureus were found on one.

Total Blood Loss

Total measured blood loss was not found to be significantly different in tourniquet and non-tourniquet groups by Tetro and Rudan in this prospective, randomized study (blood loss = 654 and 742 mL, respectively, p>0.25). A trend toward more complications such as increased postoperative pain and slower recovery was reported in the tourniquet group (p=0.06).

Cement Interdigitation

In this prospective, randomized trial of 40 patients, Vertullo used Digital Sectional Analysis to objectively quantify cement penetration in tourniquet and tourniquetless arms. Mean cement penetration and standard deviation (SD) were nearly identical in each group (2.98 mm with SD of 0.82 in the tourniquet group versus 3.10 with SD of 0.84 in the tourniquetless group). Vertullo concluded that cement penetration was not altered by tourniquet inflation.