

# Tourniquetless Total Knee Arthroplasty with Modern Perioperative Protocols Decreases Pain and Opioid Consumption in Females

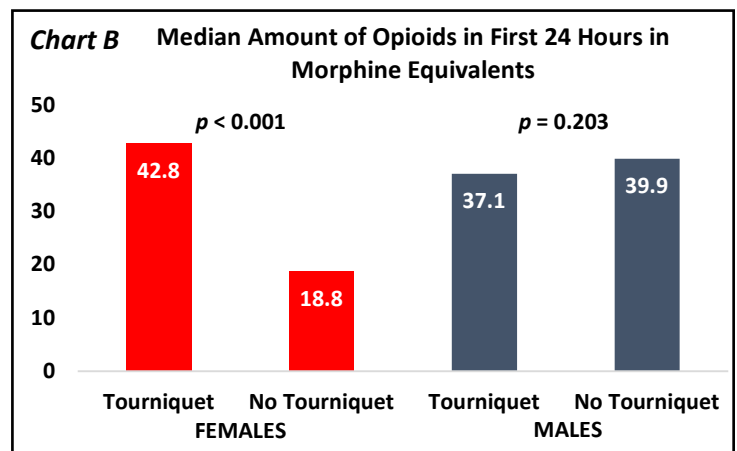
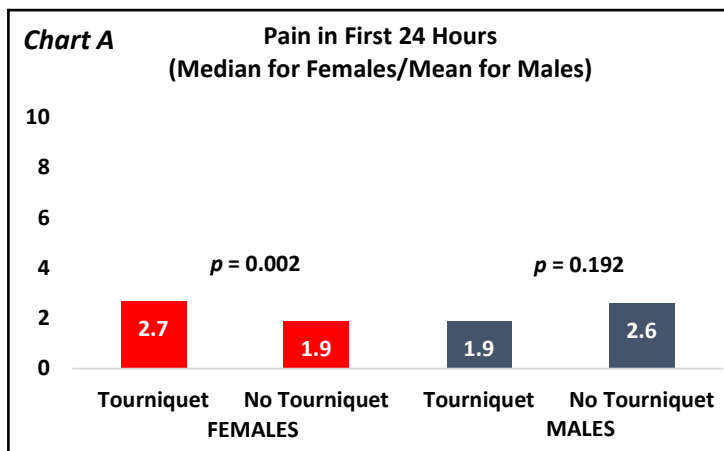
Michael M. Kheir MD, Mary Ziembra-Davis BA, Julian E. Dilley BS, Mark Hood Jr. MD, R. Michael Meneghini MD  
Indiana University School of Medicine, Indianapolis, IN, USA

**Background:** Studies have observed that tourniquet use results in greater pain in the immediate postoperative period. Two of three studies noted a related increase in analgesia consumption. We examined the relationship between tourniquet use and pain and opioid consumption in the early postoperative period following TKA performed with modern perioperative pain protocols.

**Methods:** Retrospective study of 203 consecutive primary unilateral cemented TKAs performed by a single surgeon at a single academic institution between Jan 2016 and Mar 2017. *Inclusion Criteria:* secondary to primary, traumatic, or inflammatory osteoarthritis. *Exclusion Criteria:* antiplatelet medications except aspirin, clotting disorder, unplanned tourniquet disruption, or preexisting periarticular hardware. The same surgical approach, computer-aided navigation, implants, and modern perioperative pain, clinical, and rehabilitation protocols implemented in all cases. *Tourniquet Group* (n = 93): Inflated at 250 mm Hg from incision to sterile dressing. *No Tourniquet Group* (n = 91): Tourniquet not inflated during cementation. Cement mantle optimized with CO2 gas compression. Patient-reported pain scores on a 10 point scale (none to severe) recorded every four hours by nursing staff were averaged to derive an overall pain score during the first 24 hours following surgery. Narcotics consumed during the first 24 hours were recorded and standardized to morphine milligram equivalents.

**Results:** Analysis was performed separately for females and males because the tourniquet group had significantly more females than the no tourniquet group ( $p = 0.019$ ). Demographics and covariates are presented in Table 1. *Chart A:* Females with a tourniquet reported more post-operative pain in the first 24 hours after surgery than females without a tourniquet (2.7 vs. 1.9,  $p = 0.002$ ). Pain scores did not differ in either group based on the presence of depression ( $p \geq 0.245$ ). *Chart B:* Females with a tourniquet consumed significantly more opioids in the first 24 hours following surgery than females without a tourniquet (42.8 vs. 18.8 morphine equivalents,  $p < 0.001$ ). There were no differences in pain (Chart A) or amount of opioids consumed (Chart B) among males with and without a tourniquet.

| Table 1                             | FEMALES    |               |              | MALES      |               |              |
|-------------------------------------|------------|---------------|--------------|------------|---------------|--------------|
|                                     | Tourniquet | No Tourniquet | <i>p</i>     | Tourniquet | No Tourniquet | <i>p</i>     |
| N                                   | 76         | 60            |              | 17         | 31            |              |
| Mean Age in years                   | 66.9       | 67.2          | 0.844        | 71.3       | 66.7          | <b>0.046</b> |
| Mean BMI kg/m <sup>2</sup>          | 33.5       | 33.8          | 0.788        | 33.5       | 34.4          | 0.664        |
| Median Procedure Time in Minutes    | 74.0       | 74.5          | 0.833        | 77.3       | 85.2          | <b>0.023</b> |
| Mean Limb Ischemia Time in Minutes  | 70.1       | 0.0           |              | 72.9       | 0.0           | –            |
| % with Lumbar Spine Disease         | 18.4       | 15.0          | 0.651        | 41.2       | 22.6          | 0.201        |
| % with Fibromyalgia or SLE          | 7.9        | 6.7           | 1.000        | 0.0        | 0.0           |              |
| % with Depression                   | 27.6       | 45.0          | <b>0.047</b> | 0.0        | 16.1          | 0.146        |
| % without Preoperative Narcotic Use | 65.8       | 71.7          | 0.724        | 64.7       | 67.7          | 0.968        |



**Conclusion:** Tourniquet use has been associated with increased postoperative pain but the effect on opioid consumption and modulating factors such as patient sex is not well known. We observed that female patients with tourniquets compared to those without tourniquets reported significantly higher pain and opioid consumption in the first 24 hours after surgery. Pain and opioid consumption did not vary based on tourniquet use in male patients. Avoiding tourniquet use for females may be a relatively risk-free adjunct to minimize opioid consumption during hospitalization. Further study is warranted to elucidate the factors accounting for different outcomes in females and males.

## Tourniquetless Total Knee Arthroplasty With Modern Perioperative Protocols Decreases Pain and Opioid Consumption in Women.

Kheir MM, Ziemba-Davis M, Dilley JE, Hood MJ Jr, Meneghini RM.

Indiana University School of Medicine, Indianapolis, IN, USA

### Abstract

#### BACKGROUND:

This study examined whether a modern total knee arthroplasty (TKA) protocol without a tourniquet results in less patient-reported pain and in-hospital opioid consumption compared to TKA with a tourniquet.

#### METHODS:

A retrospective study of 203 primary unilateral cemented TKAs consecutively performed with or without tourniquet was performed. Identical perioperative pain and blood loss protocols were used in all cases. In tourniquetless TKAs, the tourniquet was not inflated at any time, and sterile CO<sub>2</sub> gas compression maximized cement interdigitation.

#### RESULTS:

After exclusions for scientific confounds, 184 TKAs (93 with tourniquet; 91 tourniquetless) were analyzed. Controlling for multiple covariates, females with a tourniquet reported significantly more pain ( $P = .002$ ) and opioid consumption ( $P < .001$ ) the first 24 hours after surgery compared to females without a tourniquet. There were no differences in pain ( $P = .192$ ) or amount of opioids consumed ( $P = .203$ ) among males with and without a tourniquet. Tourniquet use resulted in a significant reduction in blood loss for both females ( $P \leq .040$ ) and males ( $P \leq .020$ ), although the total blood savings of approximately 200 mL is of unknown clinical significance.

#### CONCLUSION:

Avoiding tourniquet use during TKA for females may be a relatively risk-free adjunct to minimize opioid consumption during hospitalization. Further study is warranted to elucidate the factors accounting for different outcomes in females and males.

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