

# Increased Surgical Time Does Not Increase Deep Infection Rates in Closed Bicondylar Tibial Plateaus Treated with Dual Plating

Adam Boissonneault<sup>1</sup>, Robert V O'Toole, Greg E Gaski, Eben A Carroll<sup>2</sup>, Joshua Layne Gary<sup>3</sup>, Anthony R Carlini<sup>4</sup>, Paul Tornetta, Renan C Castillo<sup>5</sup>, John C Weinlein, Hassan Riaz Mir<sup>6</sup>, David B Weiss<sup>7</sup>, Conor P Kleweno<sup>8</sup>, Heather A Vallier<sup>9</sup>, Nathan N O'Hara<sup>10</sup>

<sup>1</sup>University of Maryland Baltimore, Shock Trauma Cen, <sup>2</sup>Wake Forest Univ School Of Medicine, <sup>3</sup>Keck School of Medicine of USC Department of Ortho, <sup>4</sup>Johns Hopkins Bloomberg School of Public Health, <sup>5</sup>Johns Hopkins Bloomberg School of Public Health, <sup>6</sup>University of South Florida, <sup>7</sup>Univ of Virginia Dept of Ortho Surg, <sup>8</sup>University of Washington Orthopaedics, <sup>9</sup>Metrohealth Med Ctr, <sup>10</sup>University of Maryland

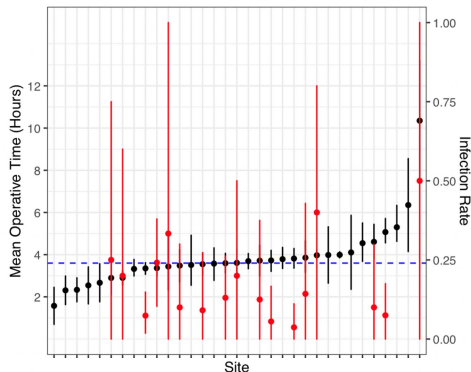
**INTRODUCTION:** Controversy exists regarding the relationship between surgical site infection and operative time in fracture surgery. While studies in other disciplines clearly show association between operative time and deep infections, it is unclear if this association is merely due to selection bias or truly an effect of increased time on infection. We hypothesized that increased operative time would be associated with higher deep infection rates in bicondylar tibial plateau fractures.

**METHODS:** This is a secondary study of the VANCO and OXYGEN randomized controlled trials and includes only patients that underwent surgical fixation of a closed bicondylar tibial plateau with dual plate fixation. The primary outcome was deep surgical site infection (SSI) within 6 months. Association between an increase in operating time and deep SSI were determined using logistic regression. All models used a Bayesian framework, adjusted for tourniquet use, smoking status, diabetic status, and alcohol abuse as presumed confounders in attempt to measure the effect of time on infection.

**RESULTS:** We report on 326 patients from 40 institutions. The overall deep infection rate was 14.3% (95% confidence interval (CI) 7.2% to 24.4%). The mean operative time was 3.6 hours (standard deviation (SD) 1.5 hours). The mean operative time and infection rate by site are illustrated in Figure 1. Each additional hour of operative time was not associated with an increased risk of infection (relative risk (RR) 1.03, 95%CI 0.82 to 1.29) after controlling for confounders. We performed a sensitivity analysis restricted to operative times within 2 standard deviations of the sample mean (0.6 hours – 6.6 hours, n=314), and there remained no increased risk of infection for each additional hour of operative time (RR 1.06, 95% CI 0.79 to 1.42).

**DISCUSSION AND CONCLUSION:** These data suggest that for patients with closed bicondylar tibial plateaus treated in a staged fashion with dual plates, increased operative time is not associated with an increased risk of deep surgical site infection. These multicenter prospective data challenge existing dogma and argue that operative time may not be an important factor driving infection after complex tibial plateau fracture fixation once confounders are accounted for.

Figure 1. Operative time and infection rates by site



The infection rate for each site with more than 1 reported infections is superimposed on Figure 1. The infection rate 95% confidence intervals were generated with 1000 bootstrapped samples. The sample average of 3.6 hours of operative time is indicated by the blue dashed line.