

Forecasting Fracture-Related Infection: Intraoperative Core Body Temperature Is a Modifiable Predictor

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Purpose: The purpose of this study was to determine whether perioperative core body temperature variations during index fracture repair are predictive of the development of a confirmed fracture-related infection (FRI).

Methods: This was an IRB-approved study. A series of consecutive and operatively treated fracture patients were followed. All patients were reviewed for demographics, injury information, and perioperative body temperatures at time of index hospitalization and fracture repair (pre-, intra-, and postoperative temperatures were queried). Hypothermia was defined as body temperature $<36^{\circ}\text{C}$, 98.6°F , and hyperthermia was defined as body temperature $>38^{\circ}\text{C}$, 100.4°F . Patients were divided into 2 cohorts: those who developed a confirmed FRI as defined by the FRI Consensus Group criteria (FRI) and those who did not (Control). Univariable and multivariable analyses were performed to assess the effect of perioperative body temperature on development of FRI.

Results: Of 6071 patients with comprehensive temperature data, 141 (2.3%) developed a confirmed FRI, and 5930 (97.7%) did not. Patients in the FRI cohort had significantly higher average ($P = 0.029$) and maximum ($P = 0.014$) intraoperative temperatures compared to those without FRI. There were no differences in preoperative ($P = 0.220$), minimum intraoperative ($P = 0.171$), or immediate postoperative ($P = 0.842$) temperatures. The incidence of hyperthermia before, during, and after surgery were comparable between the FRI and Control cohorts ($P = 0.179$, $P = 0.414$, $P = 0.468$, respectively). Similarly, the rates of hypothermia before, during, and after surgery did not significantly differ between the FRI and Control cohorts ($P = 0.379$, $P = 0.222$, $P = 0.535$, respectively). Interestingly, the FRI cohort demonstrated a significantly larger change in body temperature (delta) intraoperatively ($1.86^{\circ} \pm 1.50^{\circ}$ FRI vs $1.20^{\circ} \pm 1.47^{\circ}$ Control, $P < 0.001$). When controlling for confounding factors, multivariable analysis revealed that both a larger intraoperative temperature delta (odds ratio [OR]: 1.185, 95% confidence interval [CI]: 1.070-1.312, $P = 0.001$) and a higher maximum intraoperative temperature (OR: 1.208, 95% CI: 1.085-1.577, $P = 0.005$) are independently associated with an increased risk of FRI.

Conclusion: The study indicates an association between intraoperative temperature fluctuations and the development of FRI. These results suggest that intraoperative temperature variability, rather than a single episode of hyperthermia or hypothermia, may be associated with FRI. Perioperative control of body temperature may be a modifiable risk factor for the development of FRI.