

Intraoperative Ketorolac Use Reduces Opioid Demand and Nonunion Risk Open Reduction and Internal Fixation of Distal Radius Fractures

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INTRODUCTION: Intraoperative ketorolac, a nonsteroidal anti-inflammatory drug (NSAID), is commonly used for pain management, but its impact on postoperative outcomes following distal radius open reduction and internal fixation (ORIF) remains unclear. This study examines the association between intraoperative ketorolac and short- and long-term complications, including its potential to reduce postoperative pain.

METHODS:

A retrospective cohort study using electronic medical records compared patients who received intraoperative ketorolac to those who did not. Propensity score matching (1:1) adjusted for demographic and comorbidity differences. Primary outcomes included 90-day complications (e.g., infection, DVT, sepsis, wound disruption, and complex regional pain syndrome [CRPS]). Secondary outcomes assessed two-year complications (e.g., mechanical fixation failure, nonunion, malunion, and tendon rupture). Opioid prescribing patterns within three months were also analyzed. Risk ratios (RR) and 95% confidence intervals (CI) compared outcomes.

RESULTS:

After matching, 5,607 patients remained in each group. The ketorolac cohort had lower opioid prescription rates (40.81% vs. 45.23%, RR=0.902, p=0.0042) and fewer opioid prescriptions per patient (3.09 ± 4.86 vs. 3.99 ± 5.81, p=0.0005). No significant differences were observed in infection, DVT, wound disruption, or CRPS rates. Ketorolac use was associated with lower rates of mechanical fixation failure (0.7% vs. 1.2%, p=0.038) and nonunion (0.4% vs. 1.1%, p=0.001).

DISCUSSION AND CONCLUSION: Intraoperative ketorolac is associated with reduced opioid use, lower mechanical fixation failure, and fewer nonunions. These findings suggest that intraoperative intravenous ketorolac may enhance pain management without increasing postoperative complications and may even offer benefits to bone healing in adult patients undergoing ORIF of the distal radius.

Figure 1: Flow Chart Illustrating Cohort Selection

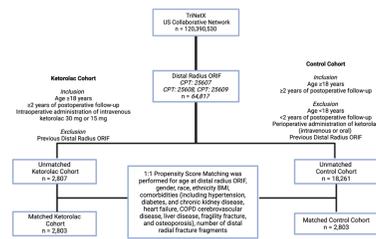


Table 1: Comparison of Post-Propensity Matched Cohorts for 90-Day Medical Complications in Adult Distal Radius Fractures Treated with ORIF: Ketorolac vs. Control Groups

| Outcome | Ketorolac | Control | Risk Ratio | 95% CI (Risk Ratio) | p |
|----------------------|------------|------------|------------|---------------------|-------|
| Skin Infection | 30 (1.1%) | 43 (1.5%) | 0.698 | (0.44, 1.11) | 0.128 |
| DVT | 10 (0.4%)* | 19 (0.7%)* | 0.528 | (0.25, 1.13) | 0.094 |
| Sepsis | 10 (0.4%)* | 10 (0.4%)* | 1 | (0.42, 2.34) | 1 |
| Wound Disruption | 11 (0.4%)* | 21 (0.7%)* | 0.524 | (0.25, 1.08) | 0.076 |
| CRPS | 10 (0.4%)* | 12 (0.4%)* | 0.832 | (0.36, 1.92) | 0.667 |
| Nerve Injury | 10 (0.4%)* | 10 (0.4%)* | 1 | (0.42, 2.40) | 1 |
| Acute Kidney Disease | 10 (0.4%)* | 10 (0.4%)* | 0.999 | (0.42, 2.40) | 0.997 |
| Nerve Compression | 10 (0.4%)* | 10 (0.4%)* | 0.999 | (0.42, 2.40) | 0.997 |
| Stroke | 10 (0.4%)* | 10 (0.4%)* | 1.001 | (0.42, 2.40) | 0.997 |

*Indicates values of 10 or less have been rounded to 10 for de-identification purposes

Table 2: 2-year outcomes in 1:1 Propensity Matched Analysis in Ketorolac vs Control patients

| Outcome | Ketorolac | Control | Risk Ratio | 95% CI (Risk Ratio) | p |
|---|------------|-----------|------------|---------------------|--------------|
| CRPS | 20 (0.7%) | 17 (1.0%) | 0.739 | (0.42, 1.32) | 0.302 |
| Mechanical Complication of Internal Fixation Device | 19 (0.7%) | 34 (1.2%) | 0.558 | (0.32, 0.98) | 0.038 |
| Nonunion ICD | 10 (0.4%)* | 31 (1.1%) | 0.322 | (0.16, 0.66) | 0.001 |
| Repair of Malunion/Nonunion CPT | 14 (0.5%) | 33 (0.8%) | 0.609 | (0.31, 1.18) | 0.138 |
| Malunion | 10 (0.4%)* | 0 (0.4%)* | 0.996 | (0.42, 2.39) | 0.993 |
| Acute Kidney Disease | 48 (1.8%) | 48 (1.8%) | 1.00 | (0.67, 1.49) | 0.991 |
| Death | 10 (0.4%) | 10 (0.4%) | 1 | (0.42, 2.34) | 1 |
| Flexor Tendon Rupture | 0 (0.0%) | 0 (0.4%)* | -- | (--, --) | 0.002 |
| Extensor Tendon Rupture* | 10 (0.4%)* | 0 (0.4%)* | 1 | (0.42, 2.40) | 1 |

*Indicates values of 10 or less have been rounded to 10 for de-identification purposes