Retrospective Analysis of the Non-Union Rate Associated with the Peri-operative use of Toradol in Osseous Foot and Ankle Surgery

Lawrence A. DiDomenico DPM, FACFAS\(^1\), Danielle N Butto DPM, AACFAS\(^2\), Zachary Flynn DPM, AACFAS\(^3\)

\(^1\)Director, Reconstructive Foot and Ankle Fellowship, Ankle and Foot Care Centers, Youngstown, OH; Attending St Francis Hospital and Medical Center, Hartford, CT
\(^2\)Fellow, Ankle and Foot Care Centers, Youngstown, OH

Purpose
To evaluate the risk for non-union in patients who received Toradol in the perioperative period following osseous foot & ankle surgery.

Methodology/Hypothesis
We propose there is NO significant difference in non-union rate between patients who received Toradol in the perioperative period following osseous surgeries, compared to those the literature reports of using NSAIDs in the post operative period.

Procedures
Level of Evidence: III
Study Design: Random, Retrospective Chart Review of a single surgeon
• 527 patients-186 meeting inclusion criteria
• 172 complete charts available for review

Procedure:
Osseous foot and ankle surgery including osteotomies, fusions, and fracture repair (1° MPJ fusions, Lapidus, Ankle, TTC)

Inclusion Criteria:
1. Undergo osseous surgery including osteotomies, fusions, or fracture repair
2. Received Toradol in the perioperative period
3. Complete chart with radiographs

Outcomes:
Radiographic and chart analysis for non-union between the initial post-operative visit and the final visit

Literature Review
Perioperative use of NSAIDs, mainly Ketorolac, have been utilized among orthopedic and podiatric surgeons for many years. Due to its pain patien relief effects, and reduced side effect profile compared to narcotics, it is used and generally safe in the perioperative and non-operative setting (2.3). Increased awareness of renal adverse and infection from not only the CDC, but educational patients, the use of NSAIDs is being questioned and re-evaluated (4). Although in line with fracture surgery is still being challenged, doctors are facing increasing pressure to reduce post-operative pain, and beneficial modalities to do so are limited (1,2,5).

Non steroidal anti-inflammatory drugs function by inhibiting cycloxygenase (cyclooxygenase) enzymes and prostaglandins in the inflammatory pathway. Through the inhibition of prostaglandin synthase, the inflammatory pathway is halted (6). Inhibition of the inflammatory proteins membranes cell differentiation to osteoblasts and angiogenesis, the result is a decreased bone healing (6). Because prostaglandins play a vital role in other processes throughout the body, exclusion can result in an unwanted systemic effect such as GI irritation, anemia, and platelet function (7). Selective COX-2 medications have reduced the side effect profile, since they target only inflammatory prostaglandins, but still have the potential to impact bone (8).

The majority of the data and research available in human subjects pertains to spinal fusion and prostaglandins. Most animal data follows similar guidelines, and despite similar protocols, controversy remains present. Few studies were identified pertaining to the upper and lower extremities, primarily focused on the lumbar and lumbosacral, which also displayed no correlation (9-10). In this writer’s knowledge, no retrospective study of Ketorolac usage in foot and ankle surgery has been performed.

Results
A total of 186 patients were identified in having undergone a boney procedure and having received Toradol in the post-operative period. Out of the 186 patients, 172 charts were available for review. 165 of the 172 patients underwent unremarkable post operative healing. Seven patients (4.3%) were identified to have a clinical, radiographic or advanced imaging confirmed non-union. This was found to be not statistically significant with a p-value of < 0.005.

Discussion
NSAIDs have been first line therapy for acute pain and inflammation in foot and ankle injuries for many years. Due to their low side effect profile, low cost, and high efficacy, patients are amenable and compliant with their use in the outpatient setting. In the perioperative period, large studies have shown the reduction of opioid need, as well as, means and timing with Ketorolac use (19). Despite these clinical benefits, use of NSAIDs in the perioperative window is still limited for foot and ankle surgery. Even though the literature available is contradictory, the stigma of potentially harming the fracture healing process exists (13).

Since the mainstream data available has been unable to draw a clear conclusion regarding NSAIDs use in bone surgery cases, our study aimed to present a large patient group that had no differences from their usage post-operatively in osseous foot & ankle surgery. As the data demonstrated, there was no systemic evidence that post-operative use of placebo increased the risk of non-union in the patient group.

The most influential limiting factor of this study was the exclusion criteria of patient selection. The patients age, co-morbidities (DM, Rheum, CKD), medications, or smoking status were not considered. These factors could have falsely elevated the non-union group, as they all greatly impact bone healing on a systemic level.

Additionally, it should be noted that the patients in this study were not given placebo NSAID therapy. Therapy was only performed immediately post-operatively, as therapy courses longer than 2 weeks can correlate with bone healing complications (11).

References

\(^{1}\)N. M. Gajraj, "The effect of postoperative nonsteroidal anti-inflammatory drug administration on spinal fusion," Anesthesia 2010; 114(2):424-433
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