

# Research Spotlight: The Association Between Common NSAID Use and Early Dental Implant Failure: A Large-Scale Retrospective Cohort Study

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DOI: 10.63580/ITI.FI.45779

## Series overview

Staying current with developments in implant dentistry is essential for providing reliable, evidence-based care, but the sheer volume of new research can be overwhelming. This Forum Implantologicum article series is designed to cut through that complexity by offering focused, accessible summaries of key studies, with a strong emphasis on clinical relevance. Each installment distills the core messages from recent high-impact publications and translates them into practical insights, enabling clinicians to confidently integrate the latest evidence into everyday practice.

## The study

### The Association Between Common NSAID Use and Early Dental Implant Failure: A Large-Scale Retrospective Cohort Study

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<https://doi.org/10.1016/j.jormas.2025.102680>

## Main messages for the clinician

- Clinicians should carefully assess the use of NSAIDs in pain management, especially for patients with complex medical histories such as diabetes or osteoporosis. The use of Ibuprofen and Naproxen is statistically associated with an increased risk of early implant failure, particularly within the first six months after implant placement.
- A personalized, risk-based approach to choosing analgesics is advised. Alternative pain management options, such as acetaminophen or selective COX-2 inhibitors, could be safer choices for patients with pre-existing conditions that affect bone healing.

## Study background and aims

The impact of NSAIDs on osseointegration has long been debated. The present study aimed to

clarify this issue by analyzing an extensive, real-world patient registry derived from de-identified electronic health records from multiple clinics. A total of 12,943 patients who received 49,997 dental implants between 2011 and 2022 were included. Patients were categorized into an NSAID group ( $n = 3,133$ ) and a non-NSAID control group ( $n = 9,810$ ). NSAID exposure was further stratified by active molecules, including Ibuprofen, Naproxen, and Aspirin. The primary outcome was defined as implant removal within six months of placement.

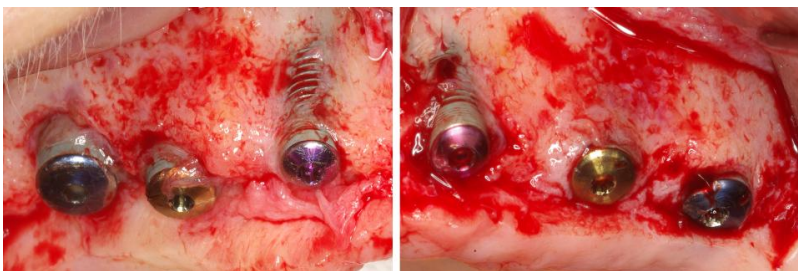
## Current clinical practice and the problem addressed by the study

NSAIDs are frequently prescribed for post-operative pain control following dental implant surgery because of their anti-inflammatory and analgesic properties. However, by inhibiting cyclooxygenase (COX) enzymes, NSAIDs may disrupt prostaglandin production, a process essential for bone healing and osseointegration. Although animal studies have repeatedly raised concerns, results from human clinical trials have been inconsistent, leaving clinicians uncertain about the true clinical impact of NSAID use on implant success.

## New findings and relevance of this study

After adjusting for confounding factors, including age, sex, diabetes, and osteoporosis, the study showed a persistent statistical association between Ibuprofen and Naproxen use and early dental implant failure. Ibuprofen use was associated with approximately a two- to threefold increase in the odds of early implant failure both at the implant level (OR 2.29; 95% CI 1.48–3.55;  $p < 0.0001$ ) and at the patient level (OR 2.87; 95% CI 1.83–4.51;  $p < 0.0001$ ). Naproxen use was associated with an increased risk at the implant level (OR 2.65; 95% CI 1.22–5.75;  $p = 0.014$ ), but this association did not reach statistical significance at the patient level ( $p = 0.0689$ ). Implant-level and patient-level analyses address different clinical questions and should be interpreted accordingly.

These findings indicate that NSAID use may be biologically associated with impaired osseointegration, especially in patients with systemic conditions that hinder bone healing. The results challenge the routine use of non-selective NSAIDs in post-operative implant care and highlight the need for personalized pain management strategies.



*Fig. 1: Inadequate osseointegration of implants in the maxilla, six months after first-stage implant surgery in a patient with extensive celecoxib use for osteoarthritis, suggesting a possible association between NSAID use and impaired implant osseointegration. Photograph courtesy of the Implant Prosthodontic Unit, Faculty of Dentistry, University of Toronto*

## Critical analysis of the data and potential implementation in clinical practice

The large sample size supports the study's statistical power, and the involvement of multiple clinics and clinicians increases the study's external validity. Using multivariable logistic regression to control key confounders strengthens the robustness of the results. However, the retrospective design limits causal inference. The risk of bias assessment using the Newcastle–Ottawa Scale shows overall good methodological quality, although there are still limitations, especially concerning exposure assessment and cohort comparability. In particular, the absence of detailed data on NSAID timing relative to surgery, dosage, duration, and patient adherence can lead to misclassification of exposure. Residual confounding related to surgical technique, implant design, and bone quality cannot be ruled out.

From a clinical perspective, the findings encourage rethinking post-operative pain management strategies in implant dentistry. Given the observed statistical links with Ibuprofen and Naproxen, clinicians might consider suggesting alternative pain relievers, such as acetaminophen. If an NSAID is required, a COX-2–selective NSAID may be considered where clinically appropriate, especially for patients with diabetes or osteoporosis. Adopting a personalized, risk-based approach to pain control could improve implant success and overall patient outcomes.