Title: "Association of Atopic Disease with Implant-Related Complications and Postoperative Infection After Major Orthopedic Surgery"

Background:
Atopic diseases, including atopic dermatitis, allergic rhinitis, and asthma, are characterized by immune dysregulation, epithelial barrier dysfunction, and increased susceptibility to microbial colonization. Atopic dermatitis in particular is associated with impaired skin barrier integrity, which may adversely affect wound healing and host response to implanted orthopedic hardware. Despite these biologic considerations, the relationship between atopy and postoperative orthopedic outcomes remains incompletely defined.

Methods:
A retrospective cohort study was conducted using the TriNetX database. Adults undergoing major orthopedic procedures, including total hip arthroplasty, total knee arthroplasty, and operative fixation of femoral or tibial fractures, were identified. The exposure cohort required a diagnosis of atopic disease ≥1 year prior to surgery. Patients with non-atopic immunocompromising conditions were excluded. 1:1 propensity score matching generated balanced cohorts of 138,994 patients. Primary outcomes within 1 year included revision surgery, implant/mechanical complications, hardware removal, osteomyelitis, postoperative infection, and wound dehiscence.

Results:
Postoperative infection occurred in 1.8% of atopic patients versus 1.2% of controls, while wound dehiscence occurred in 1.6% versus 1.1%, respectively ($p < 0.001$). Mechanical failure occurred in 6.7% of atopic patients compared to 5.2% in controls (RR 1.31, $p < 0.001$). Postoperative infection rates were also elevated (1.8% vs 1.2%; RR 1.48, $p < 0.001$). Osteomyelitis was slightly increased in the atopic cohort (0.7% vs 0.6%, $p < 0.001$). There was no statistically significant difference in rates of hardware removal between cohorts (0.7% vs 0.8%; $p = 0.239$).

Conclusions:
These findings suggest that the impact of atopic disease may not be limited to impaired wound healing and increased susceptibility to infection, but may also involve altered interactions with orthopedic implants. Dysregulated inflammatory signaling in atopic disease may interfere with implant integration and affect long-term stability.

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