

FPIN's Clinical Inquiries

Preoperative A1C Threshold in Patients with Diabetes

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Clinical Question

In patients with diabetes mellitus who are preparing for total joint replacement, what is the preoperative A1C goal to reduce postoperative periprosthetic joint infections?

Evidence-Based Answer

The risk of infection in patients with diabetes increases as the perioperative A1C level increases, although a cutoff of 7% for A1C is not achievable for all patients with diabetes. There is no definitive evidence-based A1C goal that will reduce periprosthetic joint infections for patients with diabetes who are preparing for total joint replacement. The evidence suggests that a perioperative A1C level of less than 7.5% may reduce the risk of such infections. (Strength of Recommendation: C, based on two retrospective cohort studies.)

Evidence Summary

A 2018 systematic review and meta-analysis assessed the relationship between perioperative glycemic control and the risk of surgical site infection, mainly periprosthetic joint infection.¹ Six studies were included in the meta-analysis and had stratified glycemic control using a distinct A1C cutoff. The pooled results did not demonstrate a statistically significant association between an A1C level of greater than 7%

and surgical site infection or periprosthetic joint infection (pooled odds ratio = 0.87; 95% CI, 0.57 to 1.32; $P = .51$). Heterogeneity among the studies was statistically significant ($I^2 = 54.25\%$; $P = .05$).

A 2017 retrospective cohort study (7,736 patients) analyzed the link between perioperative A1C and periprosthetic joint infections, as well as a potential threshold for risk stratification.² The risk of infection in patients with diabetes increases as perioperative A1C increases (odds ratio = 2.6; 95% CI, 1.9 to 3.4; $P < .0001$). Out of 877 patients with an A1C level of 7.5 mg per dL (75 mg per L) or greater, 21 were infected (2.4%). In comparison, among those with an A1C level of less than 7.5 mg per dL, 69 out of 6,859 were infected (1.0%).

A 2017 retrospective multicenter study was designed to evaluate the potential link between A1C and subsequent periprosthetic joint infection, and to determine the optimal A1C threshold.³ A total of 1,645 patients with diabetes were included in the analysis. Overall, 22 cases of periprosthetic joint infection occurred by one year (1.3%). A1C at a threshold of 7.7% was distinct for predicting periprosthetic joint infection. Using this threshold, periprosthetic joint infection rates increased from 0.8% (11 of 1,441) for patients with an A1C of less than 7.7% to 5.4% (11 of 204) in those with an A1C above 7.7%. In the

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stepwise logistic regression analysis, periprosthetic joint infection was the only variable associated with higher A1C (odds ratio = 1.5; 95% CI, 1.2 to 2.0; $P = .0001$). There was no association between high A1C levels and other complications.

Recommendations from Others

The American Diabetes Association, American Association of Clinical Endocrinologists, American College of Endocrinology, and European Association for the Study of Diabetes support long-term target A1C levels below 6.5% to 7%, which can be a difficult goal for many adult patients.⁴⁻⁶ The American Orthopaedic Association states that there is limited-strength evidence showing that patients with diabetes are at an increased risk of periprosthetic joint infection with hip or knee arthroplasty.⁷

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