

G29 – Are former COVID-19 patients undergoing major orthopedic procedures at risk for subsequent periprosthetic joint infection (PJI) and surgical site infection (SSI)?

Response/Recommendation:

Former COVID-19 patients undergoing major orthopedic procedures have a significantly increased risk of periprosthetic joint infection (PJI) and surgical site infection (SSI), particularly when COVID-19 infection occurs preoperatively or intraoperatively. Postoperative COVID-19 infection appears to have no statistically significant association with PJI risk but remains associated with a higher probability of SSI.

Strength of recommendation: Strong

Delegate Vote:

Rationale:

The COVID-19 pandemic is one of the greatest health challenges of the 21st century, imposing a significant social and economic burden, particularly on vulnerable populations such as the elderly, with chronic diseases, and those requiring urgent medical interventions, including trauma care (1-4). Despite several articles have highlighted the negative impact of the pandemic on the outcomes of orthopedic surgeries including a high mortality rate (5-9), the effect of COVID-19 on the incidence of PJI and SSI is still unclear and no comprehensive review has investigated the effect of COVID-19 on PJI and SSI after orthopedic surgeries(7, 10-17). We conducted a systematic review and meta-analysis to investigate the effect of COVID-19 based on the time of infection (Pre-op, during and post-op) on the outcomes of PJI and SSI after orthopedic surgeries. The inclusion criteria consisted of observational studies examining the effect of patients presenting with COVID-19 on PJI and SSI complications following major orthopedic surgeries, including all fractures and joint replacements with at least one month of follow-up. Preoperative, intraoperative, and postoperative COVID-19 were defined based on a positive test within 90 days before surgery, on the day of surgery, and within 90 days after surgery, respectively. Seventeen studies met the inclusion criteria for analysis. 19157(2.1%) of the patients had a positive perioperative COVID-19 test. The pooled prevalence of PJI and SSI in COVID-19-positive patients who underwent orthopedic surgery was 1.8% (95% CI: 1.2%–2.5%) and 2% (95% CI: 1.5%–2.5%), regardless of the timing of COVID-19 positivity. Pooled estimation of 13 studies showed that, regardless of the time of infection, COVID-19 positivity was associated with an increased probability of PJI (OR: 2.25, 95% CI: 2.68, 2.83, I²:93.7%), and SSI (OR: 2.01, 95% CI: 1.74, 2.28, I²:73.6%), in major orthopedic surgeries. The probability of PJI occurrence was significantly higher in patients who tested positive for COVID-19 preoperatively and intraoperatively compared to those without COVID-19. However, the probability of PJI was not significantly associated with post-operative COVID-19 positivity (OR: 1.5, 95% CI: 0.67–2.33, I²: 76.3%). The probability of SSI in patients with COVID-19 preoperatively, intraoperatively, and postoperatively was significantly higher compared to those without COVID-19.

Several studies provide insights into the potential risks and mechanisms by which a history of COVID-19 infection impacts SSI and PJI in orthopedic patients. COVID-19 leads to prolonged immune system dysregulation, including hyperinflammation, T-cell dysfunction, and increased prothrombotic states. These factors collectively impair wound healing and increase infection susceptibility(18, 19). A recent study showed significantly elevated risks for venous thromboembolism (VTE), sepsis, and 30-day mortality in patients undergoing spinal surgery within 2 weeks of a COVID-19 diagnosis. However, patients operated on beyond 6 weeks showed no significant differences in complications, highlighting the importance of delaying surgery(19). COVID-19-associated systemic inflammation and vascular damage may predispose patients to SSI and PJI. For example, one study reported a 4.65-fold increase in PJI risk after total joint arthroplasty in patients with a postoperative COVID-19 diagnosis(18). An analysis of Japan's national surgical database found that heightened hygiene protocols during the pandemic had no significant effect on overall SSI rates in orthopedic surgeries, suggesting the need for targeted infection prevention strategies(20). Studies recommend postponing elective orthopedic procedures for at least 6-12 weeks post-COVID-19 diagnosis to allow for immune recovery and stabilization. Another study evaluating trauma patients undergoing surgery demonstrated that the presence of COVID-19 significantly increases the likelihood of perioperative complications, including infections, due to systemic inflammation(21). Finally, COVID-19 protocols implemented during primary and revision total hip arthroplasty highlighted the importance of institutional infection control measures and their role in mitigating risk(21, 22). These findings emphasize the need for a cautious approach in managing former COVID-19 patients undergoing major orthopedic procedures, balancing surgical urgency with the risks of postoperative complications.

Meta-analyses show that COVID-19 significantly increases postoperative mortality and complications in orthopedic trauma patients. KC Wang et al. (7) reported a 32.6% early mortality rate in hip fracture patients, 5.66 times higher than non-COVID-19 patients, while another study found a 7.72-fold increase in mortality (8). SK Tripathy et al. (9) and VK Jain et al. (23) confirmed higher risks of mortality, pneumonia, severe complications, and prolonged hospitalization in COVID-19-positive patients. These outcomes are linked to advanced age, immunosuppression, inactivity, and limited rehabilitation, increasing risks of PE, DVT, PJI, and SSI (24-31).

Conclusion:

This meta-analysis revealed a higher prevalence of PJI and SSI in COVID-19-infected patients undergoing orthopedic surgery compared to those without COVID-19. Infection during the preoperative and perioperative periods increased the risk of PJI in major orthopedic procedures by over twofold, while postoperative infection showed no significant association. Additionally, COVID-19 increased the likelihood of SSI across all periods. Future research should explore the optimal timing for elective surgeries after COVID-19 and develop preventive strategies to reduce PJI and SSI risks.

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