

QUESTION 5: (A) What upper body mass index (BMI) threshold is associated with an increased risk of surgical site infection/periprosthetic joint infection (SSI/PJI)? (B) Does implementation of these cutoffs reduce the incidence of SSI/PJI?

RECOMMENDATION:

- A) Obesity increases the risk of SSI/PJI after total joint arthroplasty (TJA). The risk increases gradually throughout the full range of BMI rather than surging at a certain cutoff point. A substantially increased risk is noticed in patients with a BMI > 40 Kg/m² and the risks of surgery must be carefully weighed against its benefits in these patients.
- B) Weight reduction prior to surgery may have a benefit in mitigating risk for SSI/PJI for all patients with a BMI above normal.

LEVEL OF EVIDENCE: A) Strong, B) Consensus

DELEGATE VOTE: Agree: 95%, Disagree: 2%, Abstain: 3% (Unanimous, Strongest Consensus)

RATIONALE

Obesity has been shown to play a negative role throughout the natural history of osteoarthritis, from the development and progression of the disease to the occurrence of postoperative complications [1–5]. Among the range of complications that can occur following TJA, infection has proven to be a significant source of morbidity and mortality in its own right [6–9]. Numerous studies have examined the association between obesity and infection following TJA [10–13]. While the importance of these studies in ascertaining the importance of BMI as a potentially modifiable risk factor is acknowledged, there is a lack of a distinct threshold to be used in the preoperative period.

We conducted a systematic review to evaluate the threshold above which BMI is associated with SSI/PJI and found 17 studies meeting the inclusion criteria to answer this question. Most studies compared patients above and below BMI of 30 Kg/m² and limited their analysis to this dichotomous group. A recent meta-analysis examining the influence of obesity on complications following TKA concluded that patients with BMI ≥ 30 Kg/m² are at increased risk for infection [14]. Re-infection is also increased in obese patients who undergo revision for an infection of their primary or revised implant [13,15]. Lübbecke et al. [16] categorized patients into five groups based on their BMI levels in an attempt to specify which group had the highest risk for PJI. These investigators concluded that a BMI ≥ 35 Kg/m² should serve as a cutoff for increased risk for PJI. However, recent evidence suggests that a cutoff of 40 kg/m² [17,18] and even 50 kg/m² [19,20] should serve as the threshold above which the risk for PJI increases substantially.

The highest evidence to answer this question stems from two recent studies that used their large institutional databases (approximately 20,000 patients in each institution) to show a 10% increased risk for PJI for each BMI unit above normal (25 Kg/m²) [17,18]. In both studies, the risk became progressively more pronounced for the group of patients with BMI values above 40 kg/m² with a three-times higher risk for SSI/PJI. The study by Shohat et al. [18] specifically aimed to determine whether there is a distinct BMI threshold above which the risk for infection increases substantially. The authors reported a linear increased risk with higher BMI with no distinct cutoff performing better than random chance.

To our knowledge there are no prospective randomized studies that directly address the subject of implementation of these BMI cutoffs (the majority of studies are retrospective reviews of databases or registries). While bariatric surgery did not seem to reduce complications following TKA, [21] it did show a reduction in complications after THA [22]. A recent systematic review of five studies with a total of 23,348 TJA patients showed no statistically significant difference in infection rates (superficial or deep) after bariatric surgery [23]. There are ongoing studies following obese patients undergoing bariatric surgery versus those who decline bariatric surgery, but no definitive conclusions are available on this subject at this time.

Our results suggest that the risk for infection increases gradually throughout the full range of BMI above 30 kg/m², and patients with a BMI above 40 kg/m² are at substantial (three-times) risk for infection. These results should encourage surgeons to encourage all overweight patients to reduce weight prior to surgery with a special emphasis on patients who have a BMI above 40 kg/m². Further studies should prospectively examine the influence of BMI reduction on reducing the risk for infection.

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