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QUESTION 5: Does simultaneous bilateral hip or knee arthroplasty (SBTHA or SBTKA) increase the risk of subsequent surgical site infections/periprosthetic joint infections (SSIs/PJIs) compared to unilateral or staged bilateral arthroplasty?

RECOMMENDATION: SBTHA or SBTKA does not increase the risks of SSIs/PJIs compared to unilateral or staged bilateral arthroplasty.

LEVEL OF EVIDENCE: Moderate

DELEGATE VOTE: Agree: 79%, Disagree: 15%, Abstain: 6% (Super Majority, Strong Consensus)

RATIONALE

Since Jaffe and Charnley reported the first SBTHA in 1971 [1], and Ritter and Randolph performed the first detailed study of the functional outcome in 1976 [2], there has been ongoing discussion regarding the advantages and disadvantages of simultaneous bilateral procedures in the patients with bilateral arthritis.

In the absence of a randomized and prospective trial with an adequately powered sample to compare the infection rates in simultaneous bilateral joint arthroplasty with staged bilateral total arthroplasty, knowledge regarding infection rates mostly comes from retrospective studies. Many of these studies are biased, by selection bias, misclassification bias and/or follow-up time bias. Studies analyzing large numbers of patients allow for comparisons to be made regarding complications that occur infrequently, such as infection, but the validity of these comparisons is not known [3].

The reviews of the studies that analyze the probabilities of developing periprosthetic joint infection after simultaneous bilateral total arthroplasty have reported contradictory results. There have been three meta-analyses in recent years, in which the outcomes of SBTKA have been compared with staged bilateral total knee arthroplasty (BTKA). Hu et al. [4] and Hussain et al. [5] concluded that the infection rates were similar between the two groups. Other studies did not observe differences in the infection rate between simultaneous and unilateral or staged BTKA [6–15]. On the other hand, Fu et al. [16] in another meta-analysis concluded that SBTKA was associated with a lower infection rate. Similarly, Poultsides et al. [17] published the only study focused on comparing the rate of infection in a long retrospective series of patients undergoing SBTKA, staged BTKA, or unilateral total knee arthroplasty (TKA). They observed that the overall infection rate after SBTKA (0.57%) was lower compared to the staged (1.39%) or unilateral (1,1%) cohorts. The rate of superficial infection was significantly lower in the simultaneous cohort (Simultaneous: 0.28% vs. Staged: 1.04% vs. Unilateral: 0.87%; P = 0.003), but the rate of deep infection was similar among the groups (Simultaneous: 0.32% vs. Staged: 0.35% vs. Unilateral: 0.24%; P = 0.65).

Meehan et al. [18] used a more sophisticated epidemiologic methodology in an attempt to minimize the selection bias inherent in most published studies. They analyzed the California Patient Discharge database to create an intention-to-treat cohort of patients who originally were scheduled to undergo separate-admission staged BKTA. Important findings included that the SBTKA cohort had significantly lower risks of periprosthetic joint infection (odds ratio (OR) = 0.6, 95% confidence interval (CI), 0.5 to 0.7]; unadjusted rate, 8.7 per 1,000 for the SBTKA cohort compared with 16.5 per 1,000 for the separate admission staged BTKA cohort).

In a retrospective study [19], SBTKA, compared to the unilateral, was associated with increased superficial wound infection (6.0 vs. 0.7%; p = 0.003) and deep prosthetic infection (3.5% vs. 0.7 %; p = 0.02). The rationale behind these studies is that the prolonged operative time, an increased blood loss, an increased number of assistants in the operating room, changing instruments during BTKA and bilateral total hip arthroplasty (BTHA) and no redraping or rescrubbing may predispose these patients to a higher rate of infection [20,19]. Della Valle AG et al. [21] did not demonstrate a statistically significant difference in the rate of deep or superficial infections among patients undergoing simultaneous hip arthroplasty using different or the same set of surgical instruments, arguing that the use of the same set of instruments for the second side arthroplasty appeared to be safe.

Shao et al. [22] found in their meta-analysis, four studies that provided data on infectious complications (including deep and superficial infection) and the pooled data showed a statistically higher infection rate in simultaneous versus staged BTHA (OR = 2.17; 95% CI = 1.27 to 3.71; P = 0.004). In the same way, Berend et al. [23] reported a SSI complication rate of 1.8% SBTHA, which was significantly higher than the rate for staged BTHA. However, Della Valle [21] observed a 0.1% infection rate for SBTHA using the same lateral decubitus position. Other studies comparing SBTHA and unilateral total hip arthroplasty (THA) did not find increased rates of SSI [24–26]. There is only one [27] prospective, randomized, controlled study in literature comparing simultaneous bilateral and staged hip arthroplasties, and no significant difference was found in the incidence of infection between the two hip arthroplasty groups.

It is well known that simultaneous bilateral total joint arthroplasty (SBTJA) is associated with increased blood loss and need for allogeneic blood transfusion compared to unilateral or staged bilateral arthroplasty [8,23–25,27–36]. Pulido et al. [37] found, after multivariable logistic regression analysis in a retrospective study, that with simultaneous bilateral surgery (compared with unilateral procedures) the transfusion of allogenic blood units were independent predictors of PJI after primary joint arthroplasty. Nevertheless, there is contradictory evidence in the different studies on the relationship between allogeneic transfusions and the risk of PJI [38–41].

Having evaluated all available published reports, we believe that the incidence of infection following bilateral TJA (BTJA) performed under the same anesthesia is not significantly higher than the rate of infection following unilateral or staged BTJA.

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1.7. PREVENTION: PROSTHESIS FACTORS

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QUESTION 1: Are there implant materials that mitigate the risk for surgical site infections/ periprosthetic joint infections (SSIs/PJIs) after total joint arthroplasty (TJA)?

RECOMMENDATION: There are various implant materials that can be utilized to reduce the chance for SSIs/PJIs in patients undergoing TJA.

LEVEL OF EVIDENCE: Limited

DELEGATE VOTE: Agree: 49%, Disagree: 30%, Abstain: 21% (NO Consensus)

RATIONALE

The skyrocketing increase in number of joint arthroplasty surgeries and their associated failures have raised serious concerns in the field of medicine. Failures of medical devices due to infections have resulted in an increase in number of revision surgeries, and even fatality. Biomaterial-associated infections are fearsome complications of modern orthopaedic surgery, that often leads to prolonged