

G12: Does asymptomatic urinary bacteriuria increase the risk of Surgical Site Infection (SSI)/periprosthetic joint infection (PJI) in patients undergoing major orthopaedic surgery?

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Response/Recommendation: Although there seems to be a correlation between asymptomatic bacteriuria (ASB) and an elevated risk of periprosthetic joint infections (PJI) / deep surgical site infections (SSI) in patients undergoing major orthopaedic surgeries, the microorganism causing SSI/PJI is almost always different from that identified in ASB.

Level of Evidence: Moderate

Delegate Vote:

Rationale

Recent studies have indicated a potential link between asymptomatic bacteriuria (ASB) and an elevated risk of PJI and wound infections (1, 2). They suggest that ASB may lead to bacterial colonization of the genitourinary tract, which can cause infections in prostheses due to hematogenous seeding or skin contamination through continuity (3). The Infectious Diseases Society of America (IDSA) defines ASB as being diagnosed with isolation levels of at least 10^5 colony-forming units (CFUs)/mL in urine cultures (UCs), without any indications or symptoms of a urinary tract infection (UTI) (4). The IDSA, the American Society of Anesthesiologists, and the International Consensus Meeting (ICM) in 2018 do not recommend routine preoperative urine screening, including UC and urinalysis, before non-urologic surgeries for ASB patients (5-9). Conversely, the British Orthopaedic Association recommends conducting preoperative urine screening (10).

We performed a comprehensive systematic review and meta-analysis of the literature to address the relationship between the ASB and postoperative SSI/PJI. A comprehensive database search, including PubMed, Embase, Web of Science, and Scopus, yielded 602 papers. After two screening steps, 14 papers met the inclusion criteria (2, 3, 11-22), which focused on studies comparing the rates of SSI or PJI in adult patients who have ASB who underwent major orthopaedic surgeries.

Among the included studies, nine reported data on the incidence of PJI in patients who have ASB who underwent major orthopaedic surgeries, in comparison to non-ASB patients (2, 3, 11, 13-15, 19, 21, 22). In total, there were 27,410 patients in the non-ASB group and 2,159 in the ASB group. A random-effects meta-analysis indicated that patients who have ASB undergoing major orthopaedic surgeries had a significantly higher relative risk of PJI than those who do not have ASB, with a relative risk (RR) of 3.14 (95% confidence interval [CI]: [1.22 – 8.10], $P = 0.0244$). Three studies reported data on the incidence of superficial wound infections (2, 11, 21). The non-ASB group comprised 20,227 patients, while the ASB group included 1,512 patients. A random-effects meta-analysis revealed no significant difference in the incidence of superficial wound infections between ASB patients and the control group (RR: 2.24, 95% CI: [0.20–25.76], $P = 0.2906$).

Finally, we conducted a comprehensive meta-analysis of all studies for the incidence of SSI, including superficial wound infections, deep incision infections, and PJI. The analysis encompassed 43,292 patients, with 40,596 individuals in the control group and 2,696 patients in the ASB group. All studies employed UC for the preoperative examination of ASB in patients, except the study by Peng et al., which utilized an automated urine analyzer to quantify bacteriuria (2). The prevalence of ASB among patients varied significantly, ranging from 3 to 31%, depending on the inclusion criteria. A random-effects meta-analysis indicated that patients who have ASB undergoing major orthopaedic surgeries faced a markedly higher relative risk of SSI compared to those who do not have ASB (RR = 2.99, 95% CI: [1.62 – 5.51], $P = 0.0019$) (**Figure 1**). Similarly, a meta-analysis conducted by Wang et al. (2018) examined whether ASB increases the risk of PJI in patients undergoing TJA (23). By analyzing data from five studies that included 3,588 joint arthroplasties and 441 ASB cases (with a 12.3% incidence), the researchers found that the ASB group exhibited a significantly higher risk of PJI compared to the control group (RR = 2.87, 95% CI: 1.65 – 5.00, $P < 0.005$).

Additionally, seven of the included studies reported the organisms isolated in the perioperative UC of ASB patients and the pathogens identified in subsequent SSI (13-15, 19-22). All of these seven studies examined PJI in patients. Notably, none of the studies found a concordance between the organisms responsible for ASB and the pathogens isolated during the subsequent PJI. *Escherichia coli* was identified as the most prevalent microorganism in the UCs of the ASB group before surgery, while *coagulase-negative Staphylococci* emerged as the most commonly isolated pathogens in PJIs after surgery.

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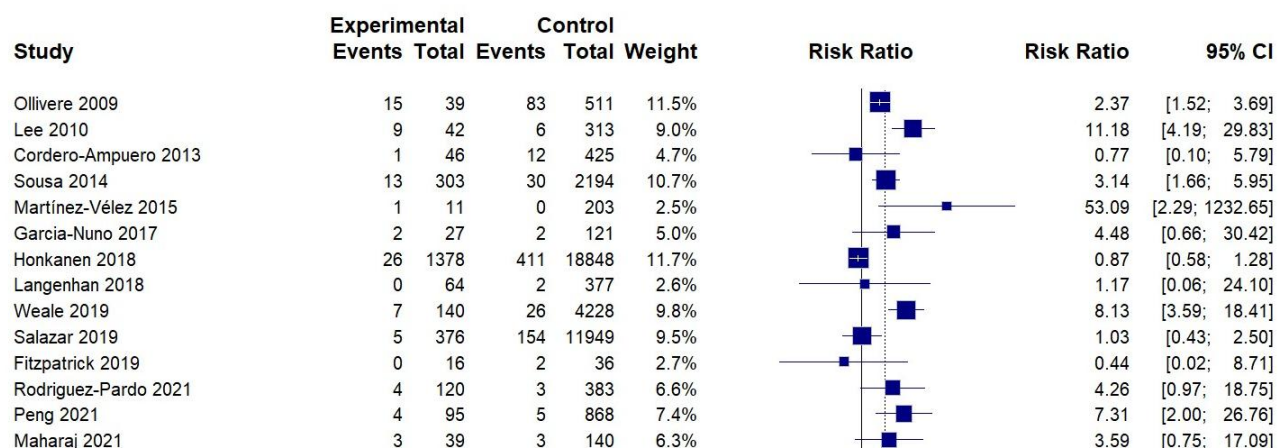


Figure 1. Random-effects meta-analysis using the Hartung-Knapp method of included studies. All statistical analyses were conducted using R software (version 4.0.0) with the 'meta' package.

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