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QUESTION 2: Is undergoing a colonoscopy or upper gastrointestinal (GI) endoscopy after total joint arthroplasty (TJA) associated with an increased risk of surgical site infection/periprosthetic joint infection (SSI/PJI)? If yes, does antibiotic prophylaxis prior to a colonoscopy or upper GI endoscopy after TJA reduce the risk?

RECOMMENDATION: Colonoscopy and upper GI endoscopy have the potential to cause transient bacteremia, though the evidence is limited to support an associated risk of SSI/PJI. There is no evidence that administration of antibiotics prior to GI procedures decreases the risk of SSI/PJI and this practice should be avoided. Further research is needed to see if this practice may be beneficial in selected or high-risk patients.

LEVEL OF EVIDENCE: Limited

DELEGATE VOTE: Agree: 84%, Disagree: 13%, Abstain: 3% (Super Majority, Strong Consensus)

RATIONALE

Transient bacteremia can occur with many procedures, including periodontal manipulation, barium enema and GI and genitourinary (GU) procedures. Endoscopic procedures, including colonoscopy and esophago-gastro-duodenoscopy (EGD), are frequently associated with transient bacteremia [1–5]. The incidence of bacteremia after standard colonoscopy has been estimated to be between 0 and 5% [6]. Rates of bacteremia increase when endoscopy is accompanied by instrumentation and tissue manipulation, such as biopsy or polypectomy and the incidence of bacteremia differs by procedure: flexible sigmoidoscopy 0.5%, colonoscopy 2.2%, EGD 4.2%, variceal ligation 8.9%, endoscopic retrograde cholangiopancreatography (ERCP) 11%, variceal sclerotherapy 15.4% and esophageal dilation 22.8% [7]. Another study showed similar results with the highest rates of bacteremia occurring with dilation of esophageal strictures and sclerotherapy of esophageal varices (approaching 45%) [2].

Although it is recognized that transient bacteremia does occur after GI endoscopic procedures, the same phenomenon occurs frequently during routine daily activity, often at rates exceeding those associated with endoscopy. EGD with dilation has been associated with transient bacteremia rates of 12 to 22% [7,8], whereas, brushing and flossing teeth has been associated with bacteremia rates between 20 to 68%. Even routine activities such as mastication have been associated with bacteremia rates of 7 to 51% [9]. These high rates compared to the relatively low frequency of bacteremia in patients undergoing GI procedures has been the rationale for the American Society for Gastrointestinal Endoscopy (ASGE) advocating that routine prophylactic antibiotics prior to endoscopic procedures in patients with orthopaedic implants is not required [10].

Evidence is lacking to support an increased risk of SSI/PJI from colonoscopy or upper GI endoscopy. There is one prospective single-center, case-control study conducted by Coelho-Prabhu et al. that found a possible increased risk of PJIs among patients undergoing EGD with biopsy (odds ratio (OR) =3, 95% confidence interval (CI): 1.1-7) [4]. Cases were defined as adult patients hospitalized for PJI of the hip or knee between 2001 and 2006. Controls were adults with hip or knee arthroplasty without a diagnosis of joint infection who were admitted during the same interval. There were 339 identified cases and 339 controls. The primary outcome measure was the odds ratio of PJI after a GI endoscopic procedure performed within the last 2 years. Procedures included flexible sigmoidoscopy, esophageal dilatation and EGD and colonoscopy both with and without biopsy. Overall, there were 21% of case patients who underwent a procedure vs. 24% among the controls. Among the procedures, only EGD with biopsy was found to have a significant association with PJI. EGD with biopsy had occurred in 19 (6%) of cases and 8 (2%) of controls (OR 2.8). After adjusting for various risk factors, the OR for PJI after EGD with biopsy was 3.8 (95% CI: 1.5-9.7). Among the PJI cases, there was no significant difference in the microbiology of PJI between the group who had undergone endoscopy and the group that did not. Both groups had coagulase-negative *Staphylococcus* species and *Staphylococcus aureus (S. aureus)* as the most common organisms, whereas, bacteria colonizing the GI tract comprised only 17% of PJIs in both.

Another study by Ainscow et al. prospectively studied 1,000 patients who underwent 1,112 hip and knee arthroplasties over six years [11]. These patients were not advised to take antibiotic prophylaxis for subsequent dental or surgical procedures. A total of 224 had undergone dental or surgical procedures. Only three cases of hematogenous infection had developed during the study period, all from a skin or soft tissue infection source [11].

In addition to the above, there have been only four case reports in the literature describing a PJI that occurred within 12 hours to 2 weeks of an endoscopic procedure [12–15]. The bacterial pathogens that were believed to have hematogenously spread to the prosthetic joint in these cases included *Streptococcus milleri*, *Group B streptococcus, Listeria monocytogenes,* and *Serratia marcescens*. Notably, these case reports were published from 1990 to 2003, when orthopaedic and gastroenterological practices differed from the current practices in 2018.

In summary, there is no clinical evidence that giving prophylactic antibiotics decreases the risk of SSI/PJI after colonoscopy or upper GI endoscopy procedures. Before deciding to give antibiotic prophylaxis, clinicians must evaluate each patient individually based on the risk factors and type of procedure and balance the benefits of antibiotic prophylaxis with the risks of increasing bacterial resistance, adverse side-effects and drug interactions.

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