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QUESTION 2: Is there a role for single-stage exchange arthroplasty for patients with infected oncologic endoprosthesis?

RECOMMENDATION: In principle, despite the lack of sufficient evidence, single-stage exchange arthroplasty can be performed in patients with infected oncologic endoprosthesis if the general requirements to perform a single-stage procedure are fulfilled. However, a single-stage revision without removing the anchorage components is not recommended, since better infection control can be achieved when prostheses were removed rather than salvaged.

LEVEL OF EVIDENCE: Limited

DELEGATE VOTE: Agree: 100%, Disagree: 0%, Abstain: 0% (Unanimous, Strongest Consensus)

RATIONALE

Periprosthetic joint infections (PJIs) are serious complications of reconstruction of defects created by tumor resection. The reconstruction in tumor surgery usually involves the use of modular endoprostheses. Infection following tumor surgery and reconstruction is relatively common, occurring in 8 to 35% of primary implants [1–3]. As limb salvage surgery has gained popularity over the recent years, the number of reconstruction procedures after tumor resection, and the ensuing infections, have increased [1–3].

Despite the high incidence of PJI following oncologic reconstruction, and perhaps because of the relatively low volume of tumor reconstruction cases, there is a universal lack of high-quality studies related to PJI following oncologic reconstructions. The review of current available literature reveals only 12 relevant articles on infections following oncologic reconstructions using tumor endoprostheses. Only six published articles reported the outcomes of single-stage exchange arthroplasty [2,4–8]. However, it must be noted that some of the authors perform a single-stage revision with removal of all exchangeable and polyethylene components with debridement of surrounding soft tissues but without removal of the fixation anchoring components [2,4–8].

As presented by Buchholz et al. in the 1970s, the concept of classic single-stage exchange arthroplasty after infected total joint replacement is the radical debridement and removal of all foreign materials [9]. Morii et al. found that infection control rates were significantly higher when prostheses were removed rather than salvaged in a series of 57 patients with PJI of tumor endoprostheses [4]. According to Hardes et al., an optimal soft tissue condition is imperative for a successful limb salvage procedure [7].

Currently, there is no concrete evidence in the literature to answer the question, "What role, if any, does one-stage exchange arthroplasty play in the management of PJI after oncologic reconstruction using modular endoprostheses?" However, borrowing from the hip and knee adult reconstruction literature, one can state that the rate of infection control is usually better when all prosthetic and foreign material are removed and new implants used either at the same time (one-stage exchange) or at a later date. It is also an agreed principle that the rate of infection control correlates with the extent of debridement and bioburden reduction. Applying these principles, we can state that one-stage exchange arthroplasty does have a role in the management of acute or chronic PJI following oncologic reconstruction. The question that remains and is somewhat unique to oncologic reconstruction is whether all foreign material needs to be removed during one-stage exchange or some parts, such as the anchoring portion of the prosthesis in the bone, can be retained. The tendency would be to advocate that all foreign material should be removed during one-stage exchange. However, removal of the anchoring part of the prosthesis may not be possible or removal of this part may preclude a later reconstruction. Under these circumstances, sub-radical resection arthroplasty may be performed. It is critical, however, that the retained prosthesis is cleaned physi-

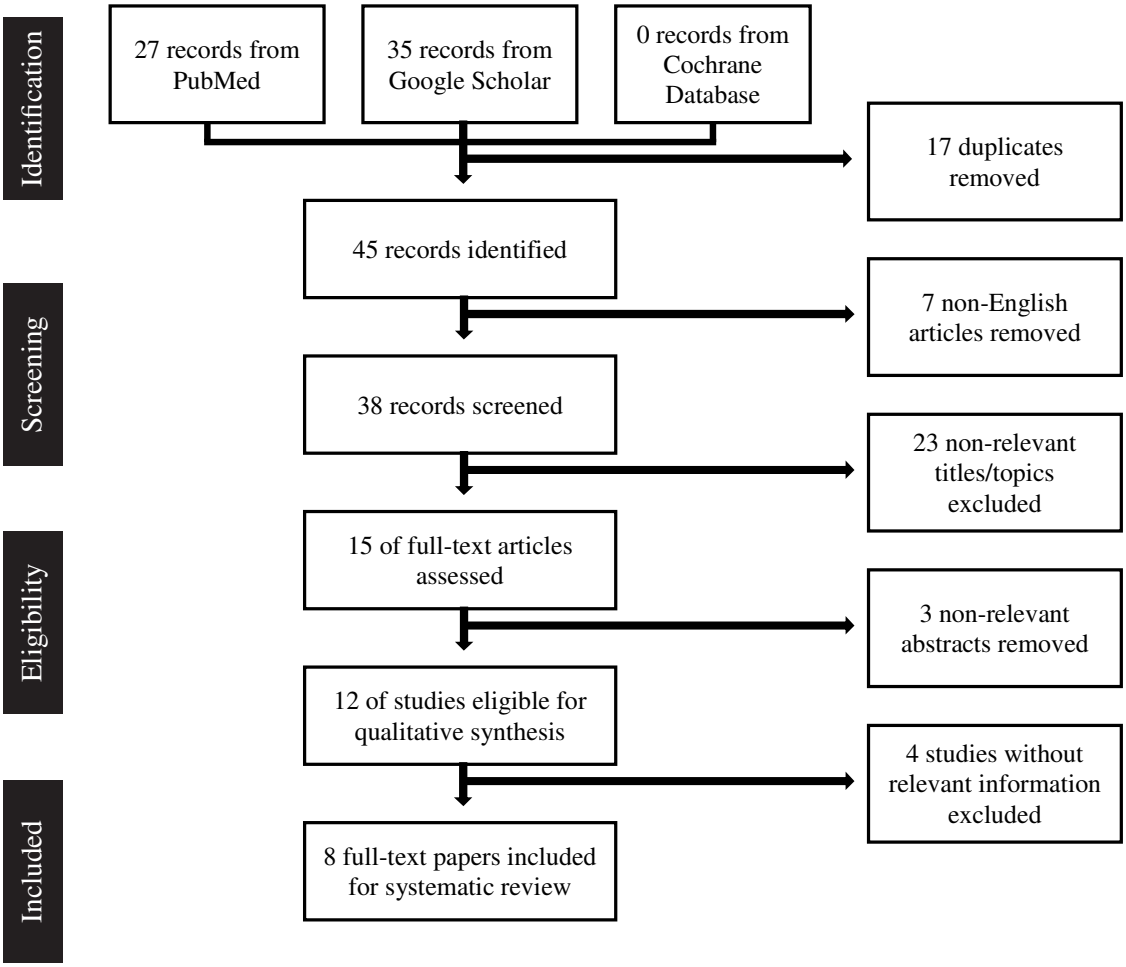

FIGURE 1. PRISMA Flowchart showing the identification of relevant studies during the review process.

cally and chemically with agents such as chlorhexidine or povodine iodine scrubs and washed thoroughly. Obeying the general principle of infection surgery is likely to allow some patients with infected oncologic prostheses to be treated by one-stage exchange arthroplasty. Future research is needed to determine which group of patients would most benefit from one-stage exchange arthroplasty versus two-stage exchange arthroplasty.

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