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### QUESTION 3: What indicators/metrics would compel a surgeon to perform resection arthroplasty and antibiotic spacer insertion, delaying the arthroplasty to a later date, in a patient with prior septic arthritis undergoing primary arthroplasty?

**RECOMMENDATION:** Patients with active septic arthritis or chronic osteomyelitis of the hip or knee may be best treated with a two-stage arthroplasty. Evidence would suggest a limited risk of infections recurrence following a one-stage arthroplasty in the presence of a quiescent septic arthritis.

**LEVEL OF EVIDENCE:** Limited

**DELEGATE VOTE:** Agree: 85%, Disagree: 11%, Abstain: 4% (Super Majority, Strong Consensus)

#### RATIONALE

Although degenerative joint diseases are a common sequela of septic arthritis in a native hip or knee, the incidence of septic arthritis is relatively low. Therefore, orthopaedic surgeons are not regularly confronted with the difficult decision regarding the treatments of degenerative joint disease in patients with prior septic arthritis. Due to the low incidence, we are confronted with a paucity of literature to guide our treatment decisions.

In the reporting of outcomes, the literature has differentiated between active and quiescent septic arthritis/osteomyelitis of the hip or knee. Patients with quiescent septic arthritis/osteomyelitis often had a distant history of infections and the investigation of serum, synovial aspirate and imaging studies demonstrated no signs of active infections. Given the differentiation made in the literature, we have reviewed the two different hip and knee patient populations.

Among the reporting of total hip arthroplasties (THAs), seven publications with 98 hips and nine publications with 398 hips were identified as reporting on active or quiescent hip septic arthritis/osteomyelitis, respectively (Table 1). All reports of active hip infections were only treated with a two-stage arthroplasty, which demonstrated a 10.2% recurrence of infection. Unlike the active hip infections, all quiescent hip infections were treated with a one-stage arthroplasty with a 1.5% recurrence of infection.

Even fewer publications were available on total knee arthroplasties (TKA), which had seven publications with 46 knees and five publications with 89 knees reporting on active and quiescent knee septic arthritis/osteomyelitis, respectively (Table 2). Among the reports of active knee infections, all but three knees were treated with a two-stage arthroplasty demonstrating a 4.7% recurrence of infection, while the three knees treated with a one-stage arthroplasty had no recurrences. Similar to quiescent hip infections, all quiescent

knee infections were treated with a one-stage arthroplasty and had a 4.5% recurrence of infection.

The literature suggests performing routine two-stage arthroplasty for active infections at the time of arthroplasty and one-stage arthroplasty for quiescent infections at the time of arthroplasty. Although the rates of infections are relatively low utilizing these parameters, there is conversely limited data about the failure rates after one-stage arthroplasty with an active infection and no data about two-stage arthroplasty for quiescent infections. As a result, it is possible that these recommendations could change with additional future research.

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**TABLE 1. Publications reporting on active and quiescent hip septic arthritis/osteomyelitis**

Lead Author, Year	Infection Classification (Active vs. Quiescent)	Procedure (One- vs. Two-stage)	Number of Hips	Average Follow-up Duration (Months)	Number of Infection Recurrence
Kim (2003)[1]	Quiescent	One-stage	170	119	2
Park (2005)[2]	Quiescent	One-stage	75	70	1
Lustig (2007)[3]	Quiescent	One-stage	17	72	1
Chen (2008)[4]	Active	Two-stage	28	77	4
Kim (2009)[5]	Quiescent	One-stage	62	156	1
Yoo (2009)[6]	Quiescent	One-stage	38	100	1
Gao (2010)[7]	Quiescent	One-stage	19	34	0
Bauer (2010)[8]	Active / Quiescent	Two-stage / One-stage	13 / 9	60	2 / 0
Huang (2010)[9]	Active	Two-stage	15	42	0
Fleck (2011)[10]	Active	Two-stage	10	28	1
Shen (2013)[11]	Active	Two-stage	5	40	0
Anagnostakos (2016)[12]	Active	Two-stage	16	45	3
Papanna (2017)[13]	Active / Quiescent	Two-stage / One-stage	11 / 7	70 / 72	0 / 0

**TABLE 2. Publications reporting on active and quiescent knee septic arthritis/osteomyelitis**

Lead Author, Year	Infection Classification (Active vs. Quiescent)	Procedure (One- vs. Two-stage)	Number of Knees	Average Follow-up Duration (months)	Number of Infection Recurrence
Böhler (2000)[14]	Active	One-stage	3	15	0
Lee (2002)[15]	Quiescent	One-stage	20	60	1
Nazarian (2003)[16]	Active	Two-stage	14	54	0
Bae (2005)[17]	Quiescent	One-stage	32	120	2
Kirpalani (2005)[18]	Active	Two-stage	5	38	0
Bauer (2010)[8]	Active / Quiescent	Two-stage / One-stage	17 / 14	60	2 / 1
Ashraf (2013)[19]	Active	Two-stage	2	30	0
Chen (2013)[20]	Quiescent	One-stage	22	Unreported	Unreported
Hochreiter (2016)[21]	Active	Two-stage	2	12	0

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#### QUESTION 4: Does a prior arthroscopy of the hip joint increase the risks of subsequent surgical site infections/periprosthetic joint infections (SSIs/PJIs) in patients undergoing elective total hip arthroplasty?

**RECOMMENDATION:** There is no evidence to suggest that a prior arthroscopy of the hip increases the risk of subsequent SSIs/PJIs.

**LEVEL OF EVIDENCE:** Limited

**DELEGATE VOTE:** Agree: 81%, Disagree: 11%, Abstain: 8% (Super Majority, Strong Consensus)

#### RATIONALE

The use of hip arthroscopy for the treatment of various intra-articular or extra-articular problems has gained popularity during last decade [1,2]. Hip arthroscopy is known to be a safe and effective method for the treatment of femoroacetabular impingement (FAI) [3,4]. It is assumed, that the arthroscopic management of impingement or labral pathology will delay the process of joint degenerative disease. However, a considerable number of patients with both conservatively and arthroscopically-managed FAI eventually undergo total hip arthroplasty (THA) [5,6]. A second surgery, on a previously operated hip, could be complicated by scar formation and changes in neurovascular anatomy. In addition, potential contamination of the hip during hip arthroscopy could potentially predispose the patient to SSIs/PJIs after THA.

Several studies have evaluated the functional and clinical outcomes of THA after ipsilateral hip arthroscopy [7-12]. All of the studies on this subject were case-control studies, largely focusing on functional and clinical outcomes. The available studies did not have sufficient patient numbers to determine the risk of SSIs/PJIs following previous arthroscopy. Zingg et al. [7] compared three groups of patients. One group consisting of 18 patients who underwent THA after previous ipsilateral hip arthroscopy, compared with two control groups with a minimum of one-year follow-up. One control group received identical approach and implants; and the other a paired group matched for age, Body Mass Index (BMI) and Charnley categories. In their case cohort, only one patient had a superficial wound infection due to a suture granuloma that resolved with antibiotic therapy. They reported that previous hip arthroscopy would not negatively influence the performance or short-term clinical outcome of THA.

Nam et al. [12] compared 43 patients who received hip resurfacing arthroplasty following previous hip arthroscopy to a 1:2 matched group of 86 controls. Various clinical and functional outcomes were evaluated at different time points of six weeks, three months, six months, one year, and most recent follow-up visits. No ultimate differences were reported in functional scores, range of motion or complications, including infection at final follow-up.

Haughom et al. [10], evaluated 42 hips who underwent THA after a previous hip arthroscopy at a mean follow-up of 3.3-years and compared them to an age, sex and BMI (1:2) matched cohort of primary THAs. No significant difference was observed in postoperative Harris Hip Scores (HHS), rates of complications or revisions. One patient in each group had a PJI and underwent a subsequent revision.

Charles et al. [9], compared 39 patients who underwent THAs after hip arthroscopy to a 1:1 group of patients matched for age, sex and body mass index who underwent THA without prior hip arthroscopy. The groups had no statistically significant differences in terms of postoperative superficial or deep periprosthetic infections at a minimum 1-year follow-up (mean 52 months).

In a recent study, Perets et al. [11], compared 35 THA patients with a history of prior hip arthroscopy to a group of 1:1 matched controls. The matching criteria were age, sex, body mass index, surgical approach and robotic assistance. They evaluated the Harris Hip Scores (HHS), Forgotten Joint Score-12, Visual Analog Scale (VAS), satisfaction, postoperative complications, and reoperation rates following a minimum two-year follow-up. In the case group, 2 patients (5.7%) had minor infections which were managed nonoperatively compared to zero infections/complications in the control