

Functional Hip Spacer

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Disclosures

- Consultant
 - MicroPort Orthopedics
 - United Orthopedic Corporation

Introduction

- The incidence of periprosthetic joint infection (PJI) is 1 to 2% of primary arthroplasties
- Become the primary indication for revision arthroplasty following both total hip arthroplasty (THA) and total knee arthroplasty (TKA)
- Annual cost of hip and knee PJI predicted to reach \$1.85 billion by the year 2030 in the United States
 - Ayoade et al, StatPearls 2024
- Two-stage historically “gold-standard”
- 20% failure rate

Introduction

- MSIS Criteria
 - Parvizi J et al. J Arthroplasty 2018

Major criteria (at least one of the following)	Decision
Two positive cultures of the same organism	Infected
Sinus tract with evidence of communication to the joint or visualization of the prosthesis	

Preoperative Diagnosis	Minor Criteria		Score	≥6 Infected 2-5 Possibly Infected ^a 0-1 Not Infected
	Serum	Elevated CRP <u>or</u> D-Dimer	2	
		Elevated ESR	1	
	Synovial	Elevated synovial WBC count <u>or</u> LE	3	
		Positive alpha-defensin	3	
		Elevated synovial PMN (%)	2	
		Elevated synovial CRP	1	

Intraoperative Diagnosis	Inconclusive pre-op score <u>or</u> dry tap ^a		Score	≥6 Infected 4-5 Inconclusive ^b ≤3 Not Infected
	Preoperative score		-	
	Positive histology		3	
	Positive purulence		3	
	Single positive culture		2	

Introduction

McPherson Classification

Systemic host grade (medical and immune status)	A	Uncompromised (no compromising factors)
	B	Compromised (one to two compromising factors)
	C	Significant compromise (more than two compromising factors) or one of the following: Absolute neutrophil count less than 1000 CD4 T cell count less than 100 Intravenous drug abuse Chronic active infection, other site Dysplasia or neoplasm of the immune system

- Systemic host compromising factors
- Age $\geq$ 80 years
 - Alcoholism
 - Chronic active dermatitis or cellulitis
 - Chronic indwelling catheter
 - Chronic malnutrition (albumin $\leq$ 3.0 g/dL)
 - Current nicotine use (inhalation or oral)
 - Diabetes (requiring oral agent and/or insulin)
 - Hepatic insufficiency (cirrhosis)
 - Immunosuppressive drugs (methotrexate, prednisone, cyclosporine)
 - Malignancy (history of or active)
 - Pulmonary insufficiency (room air arterial blood gas O₂ less than 60%)
 - Renal failure requiring dialysis
 - Systemic inflammatory disease (rheumatoid arthritis, systemic lupus erythematosus)
 - Systemic immune compromise from infection or disease (human immunodeficiency virus, acquired immunodeficiency virus)
- Local extremity grade (wound)–compromising factors
- Active infection present more than 3-4 months
 - Multiple incisions (creating skin bridges)
 - Soft-tissue loss from prior trauma
 - Subcutaneous abscess greater than 8 cm²
 - Synovial cutaneous fistula
 - Prior periarticular fracture or trauma about joint (especially crush injury)
 - Prior local irradiation to wound area
 - Vascular insufficiency to extremity (absent extremity pulses, chronic venous stasis disease, significant calcific arterial disease)

Table adapted from McPherson et al. [20].

Introduction

- Static Spacers
 - Higher elution of antibiotics because of the increased surface area
 - The ability to protect deficient bone and the ability to immobilize the periarticular soft tissues.
 - For hips, high likelihood of spacer dislocation
- Articulating spacers
 - Improved ambulation and easier motion for the patient
 - Maintenance of soft tissue tension
 - Easier surgical reconstruction at the time of the second stage
 - May minimize the risk of dislocation following the second stage reconstruction.

Technique

- **Prosthesis with Antibiotic-Loaded Acrylic Cement**

Technique

- 50:50 PI-HP 5 minute lavage!
- Dual surgical set-up
- Katakam et al. J Arthroplasty 2020
- Prefabricated
- Hip molds
- Self-constructed

Options



Options









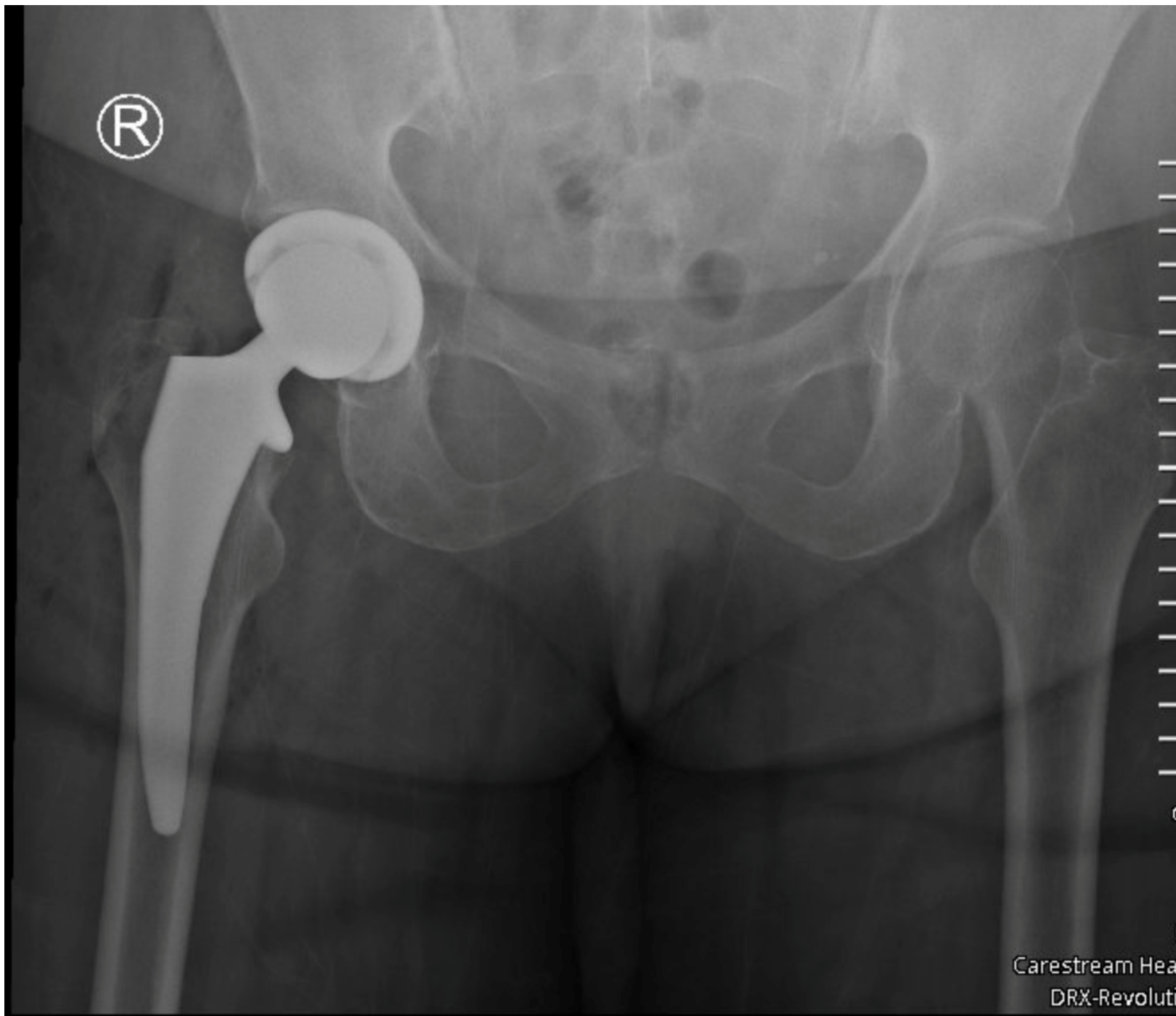
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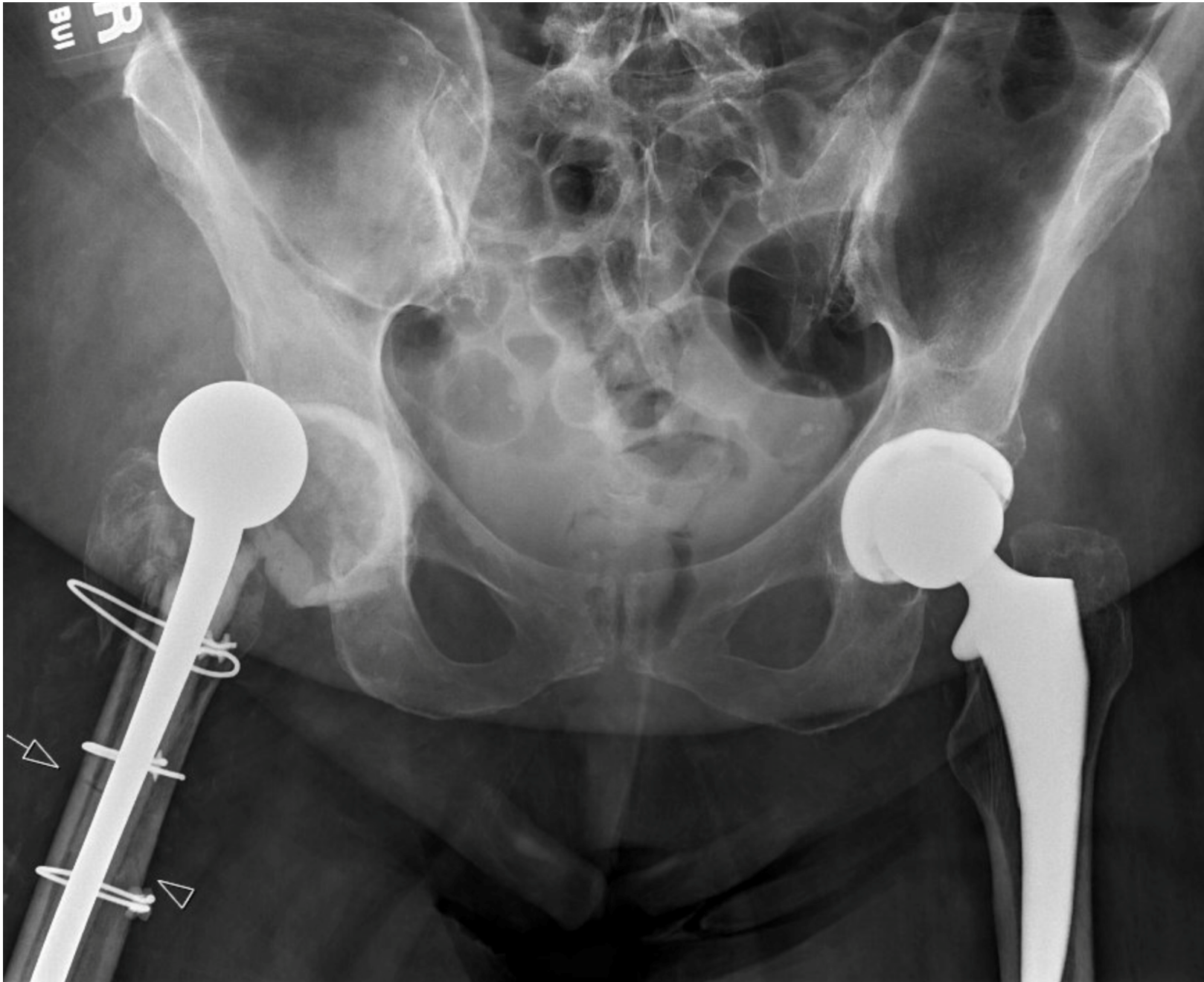
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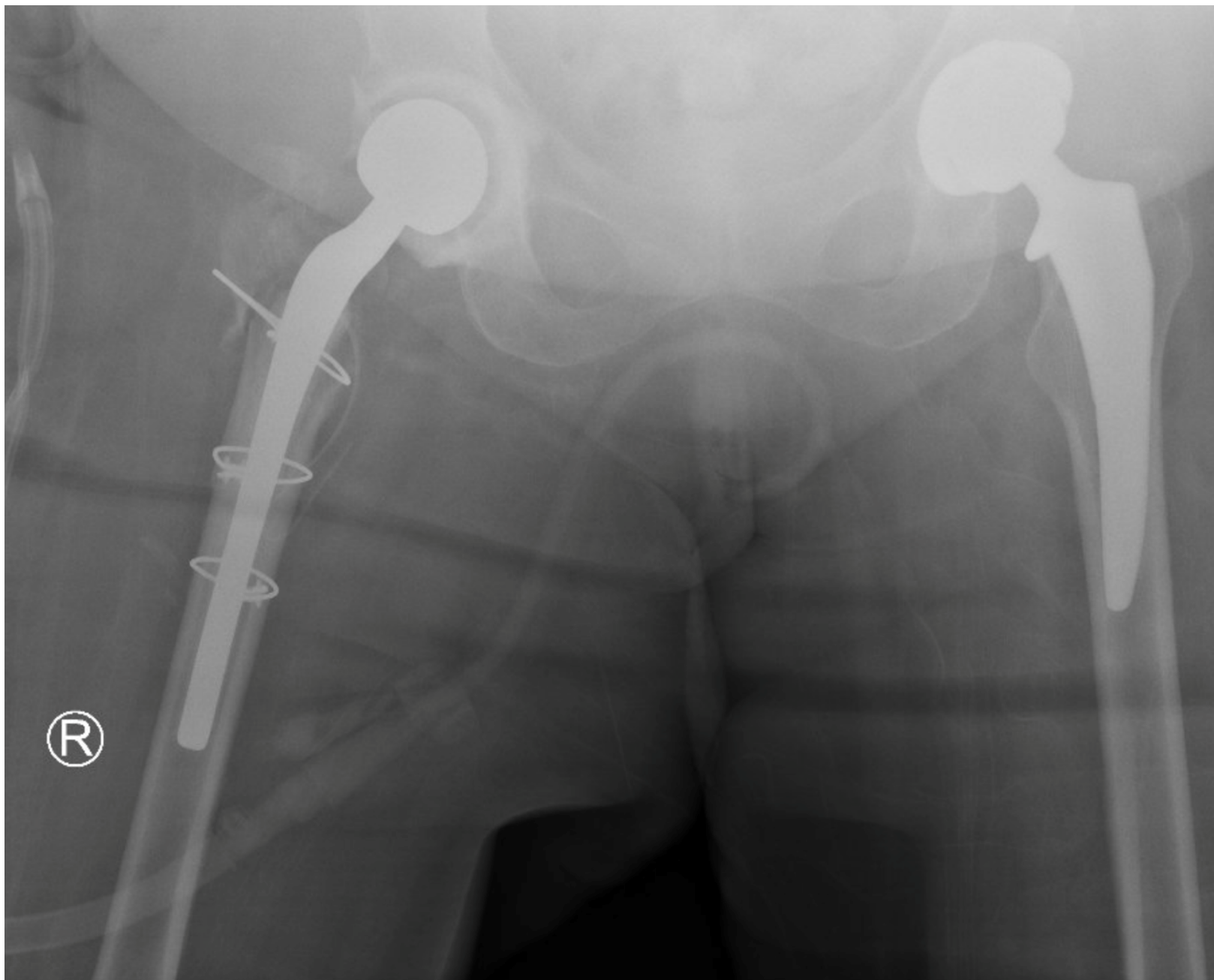
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Options



Optio



A.



B.



Options



Survivorship



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Complications - Infection

Retained Functional Antibiotic Hip Spacers Have High Rates of Stem Loosening, Subsidence, and Reoperation



Mario A. Vargas-Vila, MD, PhD, Matthew P. Siljander, MD, Travis S. Scudday, MD, Jay J. Patel, MD, Steven L. Barnett, MD, Nader A. Nassif, MD *

Hoag Orthopedic Institute, Irvine, California



- Retrospective review of 43 hips
- January 1, 2014 and November 30, 2021
- 28 hips that completed 2-stage exchange (TS group) and were reimplanted at mean 4 months (range, 2 to 10)
- 15 hips underwent planned spacer retention (RS group). Mean follow-up was 2.9 years (range, 1 to 6.1 years).
- The RS group was older (74 versus 66 years, $P = .005$) and had a higher age-adjusted Charlson Comorbidity Index (4.4 versus 3.3, $P = .04$) compared with the TS group.

Survivorship



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- Overall survivorship free of reinfection was 91% at 1 year and 86% at 5 years.
- There were 6 RS hips that underwent reimplantation for spacer failure at a mean of 23 months (range, 6 to 71 months)
- 8 had radiographic stem loosening/subsidence
- Patients who had a retained spacer at final follow-up were more likely to require a walker ($P = .005$) or wheelchair ($P = .049$) compared with patients who underwent reimplantation.

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- Can decrease overall surgical burden
- Associated with high rates of stem loosening, subsidence, and unplanned reoperation
- Planned spacer retention should be undertaken with caution in patients healthy enough to undergo reimplantation.

Survivorship



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Managing Periprosthetic Infections: Understanding 1-, 1.5-, and 2-Stage Revisions
1.5-Stage Revision for the Treatment of Periprosthetic Joint
Infection: A Systematic Review



Michael Khnanisho, BS ^{a, b}, Carly Horne, BS ^{a, c}, David G. Deckey, MD ^{a, d, *},
Saad Tarabichi, MD ^a, Thorsten M. Seyler, MD, PhD ^d, Joshua S. Bingham, MD ^a

- The overall success rate was 86.8% in the 1.5-stage cohort
- The mean failure rate due to infection in the 1.5-stage cohort was 12.6%
- In the six studies that evaluated two-stage revision, the mean success rate was 81.5% with a mean failure rate of 18.7%.
- Six studies that reported infection-free survivorship between 1.5 versus two-stage revision, with five studies showing no significant difference
- While Nace et al. indicated an 11% greater infection-free survivorship (94 versus 83%) for the 1.5-stage exchange when compared to the two-stage exchange cohort

- Khnanisho et al, J Arthroplasty 2025