

PERIPROSTHETIC JOINT INFECTION FOLLOWING TOTAL HIP ARTHROPLASTY: DIAGNOSIS, BACTERIOLOGICAL PROFILE AND TREATMENT

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1. INTRODUCTION & BACKGROUND

Total hip arthroplasty (THA) is a major orthopedic procedure that provides substantial pain relief and functional improvement for patients suffering from degenerative and inflammatory hip joint diseases [1, 42]. However, periprosthetic joint infection (PJI) remains a devastating complication that severely compromises joint mobility and imposes an enormous socio-economic and psychological burden [1, 44]. PJI carries significant clinical risks, with associated mortality rates estimated between 1.0% and 2.7%, and treatment costs reaching up to \$93,600 per revision procedure, accumulating a massive annual burden of \$730 million in the United States alone [44].

Overall Incidence	Patient Mortality	Mean Revision Cost
3.55% IMKO Series (26/732)	1.0% - 2.7% Global Literature	\$93,600 Per Infected Case

2. STUDY OBJECTIVES

- **Determine the incidence**, demographic distribution, and clinical presentation of PJI following primary total hip arthroplasty.
- **Map the bacteriological spectrum** and anti-microbial resistance profiles of isolated peroperative Pathogens.
- **Evaluate the clinical efficacy** of various medical and surgical strategies (Lavage-Debridement vs. Two-Stage Revision).
- **Assess functional outcomes** and identify key predisposing prognostic risk factors of reinfection to guide local clinical practice.

3. PATIENTS & METHODS

Study Design: A retrospective, descriptive, and analytical cohort study spanning a 13-year period (January 2010 to December 2022) conducted at the Orthopedics Department of IMKO, Tunis, Tunisia.

Inclusion Criteria: Patients (age ≥ 18 years) treated for confirmed periprosthetic infection following a primary total hip arthroplasty (THA) performed in our department.

Exclusion Criteria: Suspicion of infection without biological/microbiological confirmation, revision/reconstruction THAs, and intermediate hemi-arthroplasties.

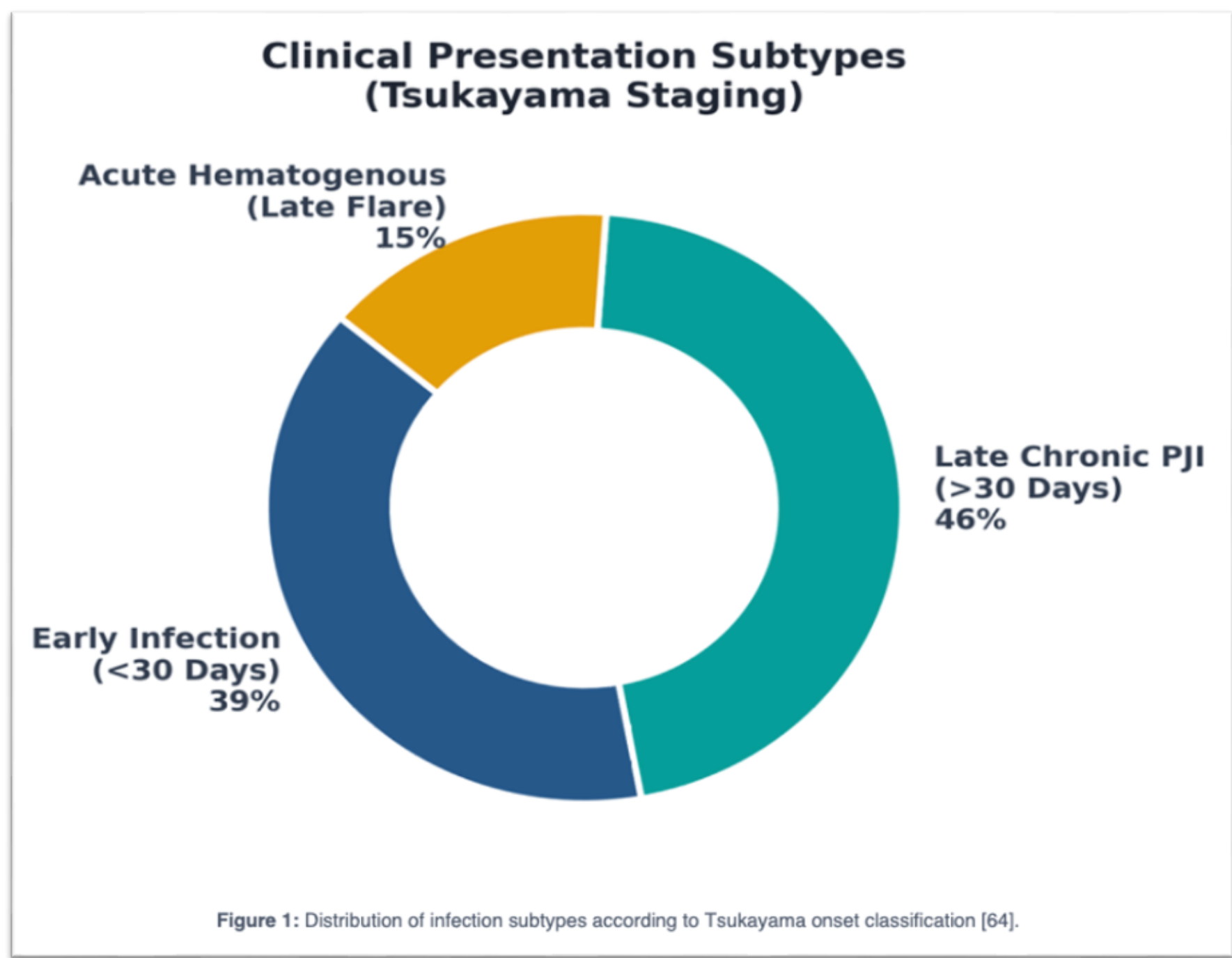
Diagnostic Definition & Staging: PJI was strictly defined based on the European Bone and Joint Infection Society (EBJIS 2021) consensus criteria [52]. The clinical onset was classified according to the Tsukayama staging system (Early post-op, Late chronic, and Acute hematogenous).

Statistical Computation: Data capture and analyses were conducted using SPSS version 20.0 [58]. Continuous variables are summarized as mean ± SD, and categorical variables as frequencies and percentages.

4. DEMOGRAPHICS & CLINICAL SUBTYPES

Among 732 total hip arthroplasties performed in our department, 26 cases of infection were confirmed, establishing an overall incidence rate of **3.55%**.

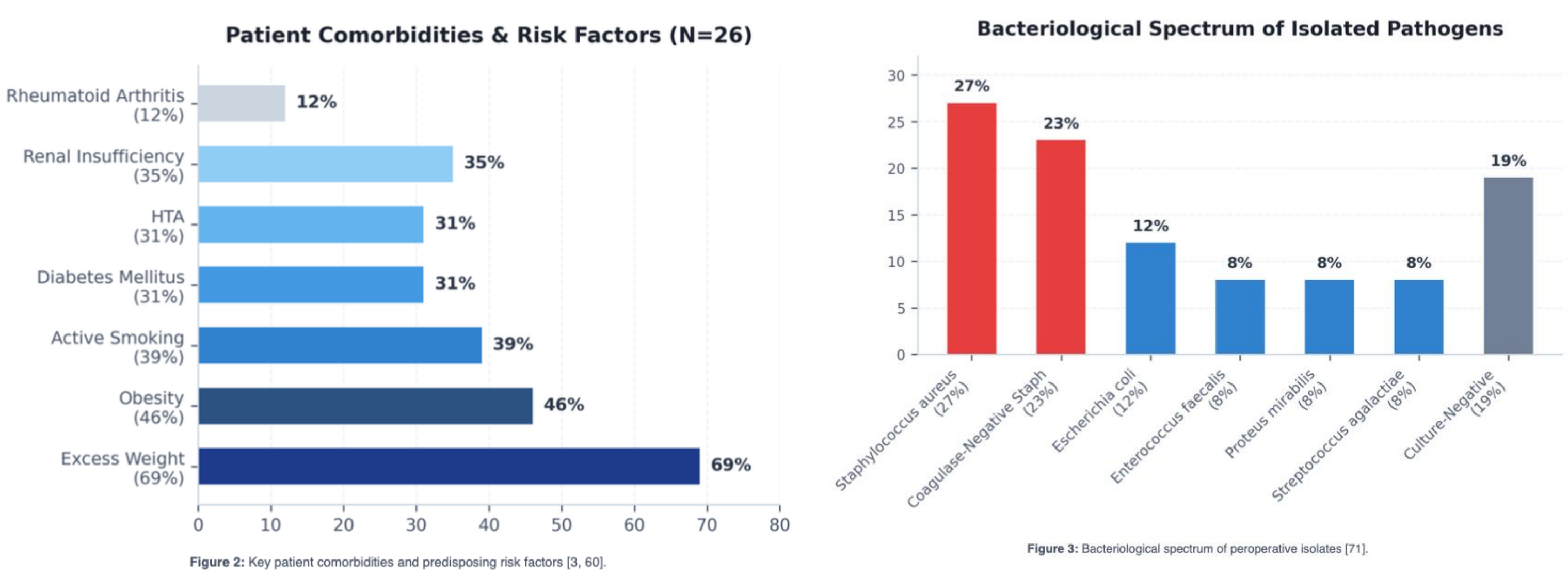
- **Age Distribution:** Mean age of 63 years (range: 46-88 years), with the 61-80 age group being the most represented.
- **Gender Distribution:** Net male predominance with 15 men (57.7%) and 11 women (42.3%), resulting in a sex-ratio of 1.3.
- **Onset Timings (Tsukayama):** Infections occurred at a mean of 630 days (range: 2 to 5,760 days) following index surgery.



5. COMORBIDITIES & RISK FACTORS

Specific patient-related predisposing factors play a major role in compromising local tissue perfusion and system immune response, greatly increasing susceptibility to PJI.

- **Excess Weight:** Highly prevalent, with 18 patients (69.2%) being overweight or obese, and 12 (46.2%) having an IMC ≥ 30 kg/m².
- **Diabetes Mellitus:** Diagnosed in 8 patients (30.8%). Preoperative hyperglycemia (>2 g/L) is proven to double the risk of PJI.
- **Active Smoking:** Prevalent in 10 patients (38.5%), severely impairing microvascular circulation and wound healing.
- **Renal Insufficiency:** Identified in 9 patients (34.6%) as a significant risk factor.



6. BACTERIOLOGY & CASE STUDY

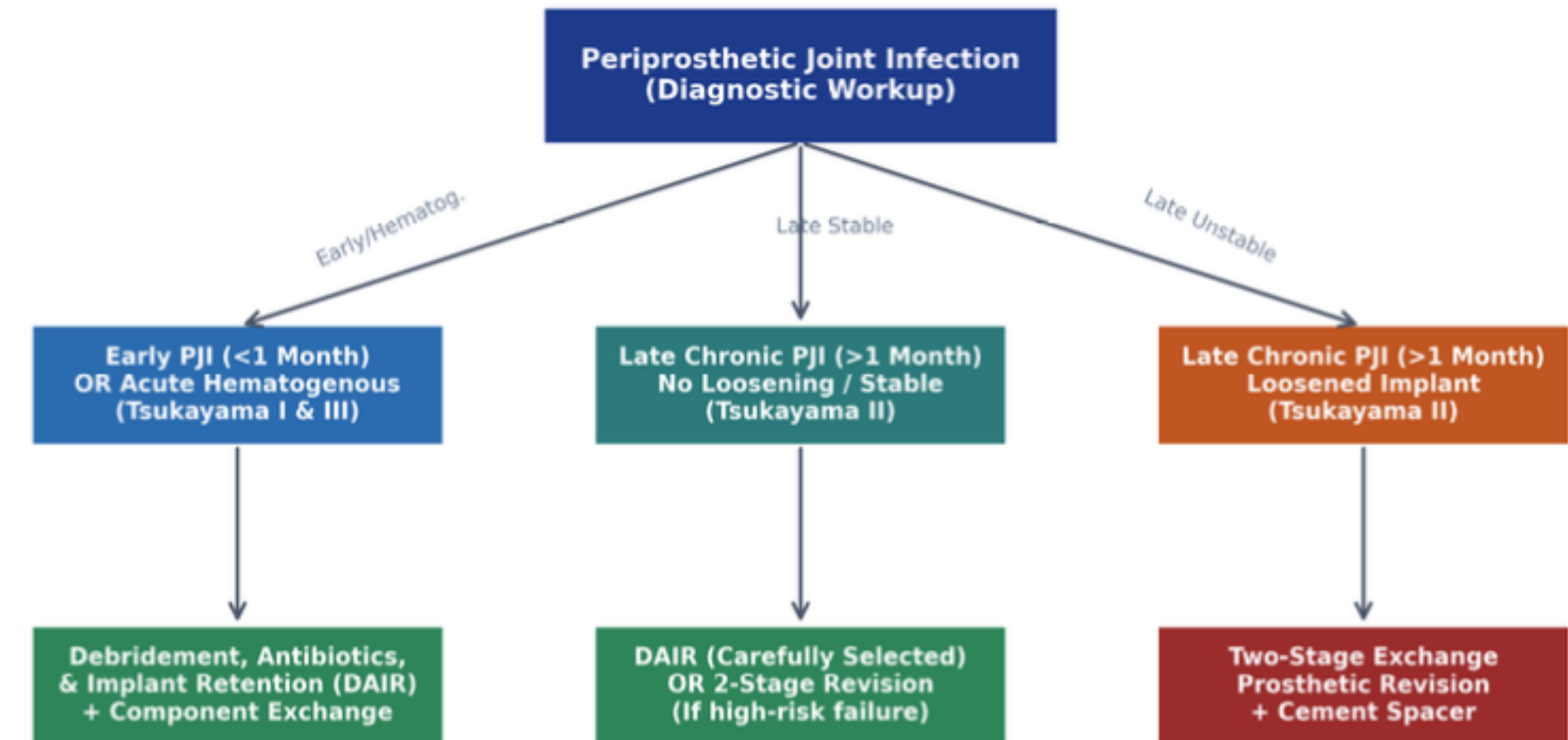
Peroperative microbiological cultures were positive in **81.0% of cases** (21 patients); no pathogen was isolated in 5 cases (19%). **Pathogen Profile:** Gram-positive cocci predominated (69% of isolates), led by *Staphylococcus aureus* (7 cases, 27%) and Coagulase-Negative Staphylococci (CoNS - 6 cases, 23%) [71]. Gram-negative bacilli accounted for 31% (*Escherichia coli*, *Proteus mirabilis*) [71]. Polymicrobial infections occurred in 6 cases.

REFRACTORY MULTI-PATHOGEN PJI: CASE REPORT

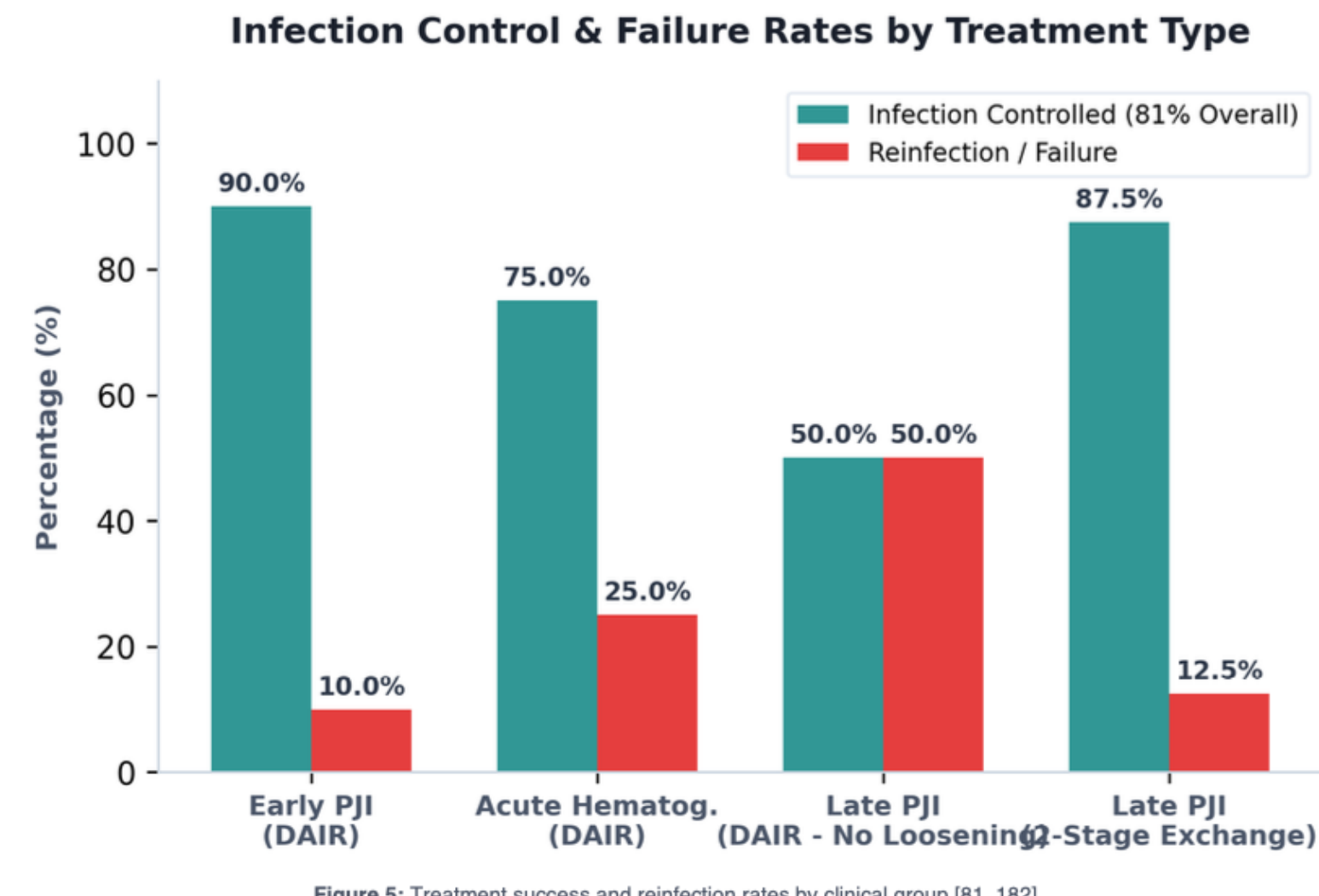
History: A 68-year-old retired male from a rural area with bilateral femoral head osteonecrosis and neglected left sub-cervical fracture underwent cemented THA [81-82]. He returned 3 months postoperatively with an inflammatory scar and chronic drainage [83]. **DAIR Failure:** Urgently treated with DAIR (lavage-debridement) [83]. Cultures isolated methicillin-resistant *Staphylococcus haemolyticus* and *Candida albicans* [83]. Due to persistent infection, the implant was removed 10 days later and a gentamicin-spacer placed [83]. After 3 months of adapted targeted therapy (Vancomycin + Rifampicin + Fluconazole), reimplantation was successfully performed at 1 year.

7. MEDICO-SURGICAL MANAGEMENT & OUTCOMES

Surgical management was adapted strictly based on Tsukayama classification, implant stability, and local soft-tissue integrity.



- **Lavage-Debridement (DAIR):** Attempted in 18 patients (69%). It is recommended as an urgent intervention for early or acute hematogenous infections with stable implants and symptoms < 2 weeks.
- **Two-Stage Revision:** Performed in 8 patients (31%) of late chronic infections or loosened implants, utilizing a temporary cement spacer loaded with gentamicine.
- **Antibiotherapy:** Post-operative empiric combination of Ofloxacin + Rifampicin (27%) or Cefotaxime + Vancomycin (19%), transitioned to targeted oral dual therapy (Fluoroquinolone + Rifampicin) for a mean of 51.3 days.



Outcomes & Key Statistical Correlates: Infection was successfully controlled in **81.0%** of the cohort (21/26 patients) at a mean 2.1 year follow-up. Functional evaluation showed 12 patients healed without sequelae, and 11 with moderate sequelae (stiffness, limping, chronic pain). Reinfection rates differed dramatically: 10% in early infections and 25% in acute hematogenous infections treated with DAIR, compared to 50% in late infections treated with DAIR. Replacement in two-stage revision achieved an excellent control rate of 87.5%.

8. CITED LITERATURE

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