CENTRES DE RÉFÉRENCE
POUR LES INFECTIONS OSTÉO-ARTICULAIRES COMPLEXES
DU GRAND OUEST
CRIOGO

Infections ostéoarticulaires chez le sujet âgé

Point de vue de l'orthopédiste

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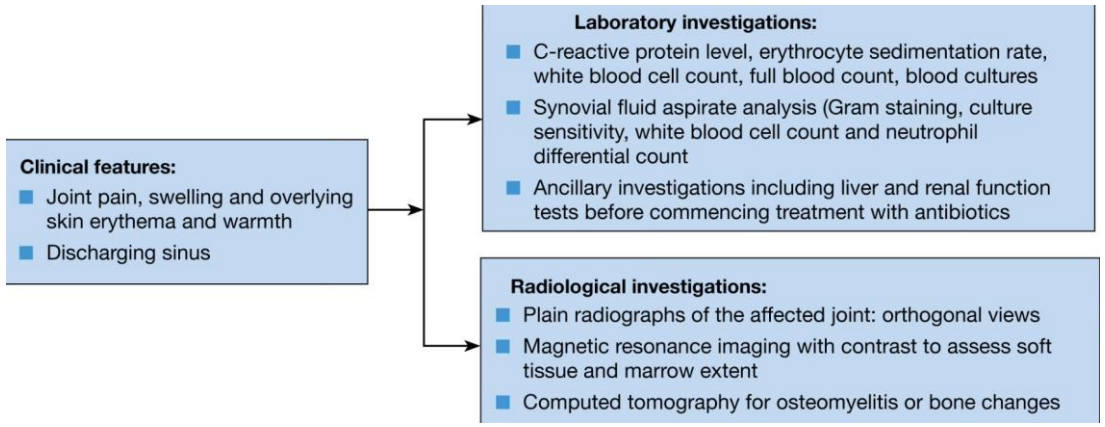
Introduction

- Diagnostic
  - Critères cliniques, microbiologiques, cytologiques, radiographiques[1,2].



Definition of Periprosthetic Joint Infection

Based on the proposed criteria, definite PJI exists when:

1. There is a sinus tract communicating with the prosthesis; or
2. A pathogen is isolated by culture from at least two separate tissue or fluid samples obtained from the affected prosthetic joint; or
3. Four of the following six criteria exist:
   1. Elevated serum erythrocyte sedimentation rate (ESR) and serum C-reactive protein (CRP) concentration,
   2. Elevated synovial leukocyte count,
   3. Elevated synovial neutrophil percentage (PMN%),
   4. Presence of purulence in the affected joint,
   5. Isolation of a microorganism in one culture of periprosthetic tissue or fluid, or
   6. Greater than five neutrophils per high-power field in five high-power fields observed from histologic analysis of periprosthetic tissue at ×400 magnification.

PJI may be present if fewer than four of these criteria are met.

1. EBJS, MSIS (Parvizi et al. 2011)
2. Sharoff et al, 2024.

Introduction

Category		Infection Unlikely (all findings negative)	Infection Likely (two positive findings)*	Infection Confirmed (any positive finding)
Clinical and blood workup	Clinical features	Clear alternative reason for implant dysfunction (e.g., fracture, implant breakage, malposition, tumor)	1) Radiological signs of loosening within the first five years after implantation 2) Previous wound healing problems 3) History of recent fever or bacteremia 4) Purulence around the prosthesis	Sinus tract with evidence of communication to the joint or visualization of the prosthesis
	C-reactive protein		> 10 mg/l (1 mg/dl)	
Synovial fluid cytological analysis	Leukocyte counte (cells/µl)	≤ 1,500	> 1,500	>3,000
	PMN (%)	≤ 65%	> 65%	> 80%
Synovial fluid biomarkers	Alpha-defensine		Positive immunoassay or lateral-flow assaye	
Microbiology	Aspiration fluid	All cultures negative	Positive culture	≥ two positive samples with the same microorganism
	Intraoperative (fluid and tissue)		Single positive cultureg	
	Sonicationh (CFU/ml)	No growth	> 1 CFU/ml of any organismg	> 50 CFU/ml of any organism
Histologyc	High-power field (400x magnification)	Negative	Presence of ≥ five neutrophils in a single HPF	Presence of ≥ five neutrophils in ≥ five HPF Presence of visible microorganisms
Others	Nuclear imaging	Negative three-phase isotope bone scan	Positive WBC scintigraphyh	

European Bone Joint Society

1. Sousa et al, 2022

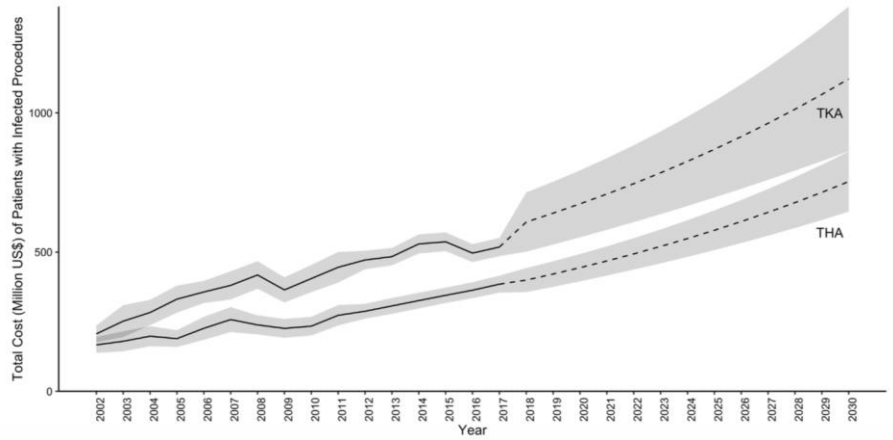
Introduction

- **Enjeu fonctionnel et vital**
  - « infection de prothèse (IPA) après PTG: probablement la complication post-opératoire la plus sévère et la plus dévastatrice » [1]
  - risque de mortalité pour IPA à un an: identique à celui de nombreux **cancers** courants, tel le cancer du sein [2]

1. Wignadasan, OTSC, 2023
2. Zmistowski B, JBJS Am 2013

Introduction

- **Enjeu socio-économique**
  - Incidence des IOA (en augmentation) :
    - Première intention [1,2]:
      - PTG: 0,4 à 2,5 %
      - PTH: 0,5 à 3 %
      - PTE: 0 à 4 %
      - PTC : 3%
    - Révision:
      - de 4 à 8 % pour les révisions de PTG (RPTG)
      - 7 % pour les révisions de PTH (RPTH) [3,4]



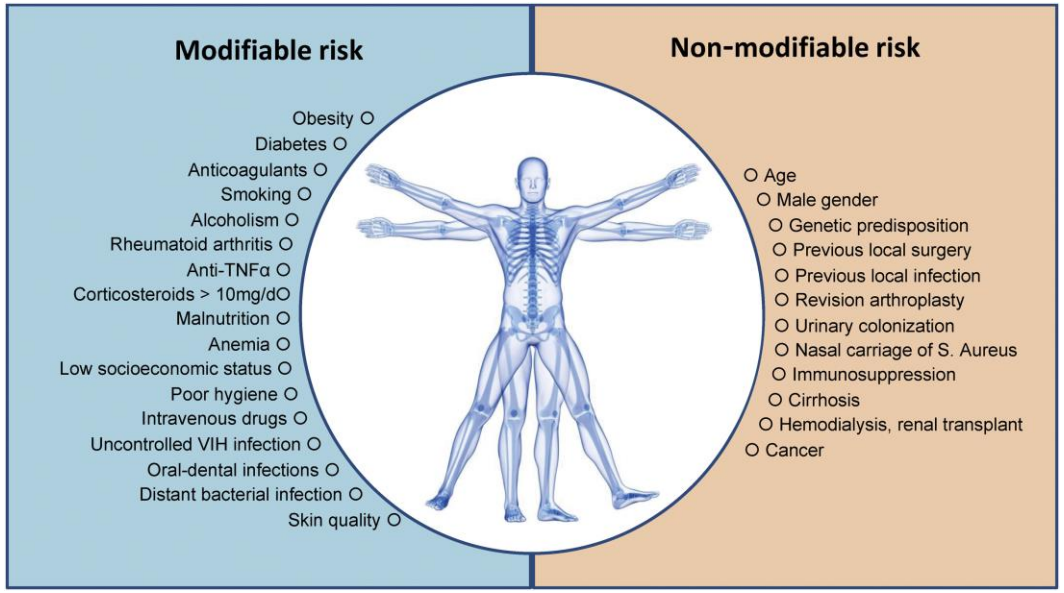
Projected Economic Burden of Periprosthetic Joint Infection of the Hip and Knee in the United States

Ajay Premkumar, MD, MPH [a,*], David A. Kolin, MSc [b], Kevin X. Farley, BS [c], Jacob M. Wilson, MD [d], Alexander S. McLawhorn, MD, MBA [a], Michael B. Cross, MD [a], Peter K. Sculco, MD [a]

1. Springer BD, Arthroplast Today, 2017
2. Cooper ME, JBJS Rev, 2019
3. Lee CR JBJS Am, 2023
4. Bukowski, J Arthroplasty, 2022
Image. Kurtz S, JBJS, 2007

Introduction

- Facteurs de risques



S. MARMOR, Y. KERROUMI

Risque élevé
- Facteurs de risque majoritairement non modifiables
- Renoncer à l'intervention si le risque infectieux et ses conséquences sont supérieurs au bénéfice escompté de l'arthroplastie

Risque modéré
- Facteurs de risque majoritairement modifiables
- Correction préopératoire
- Report éventuel de l'intervention
- Information renforcée sur le risque infectieux

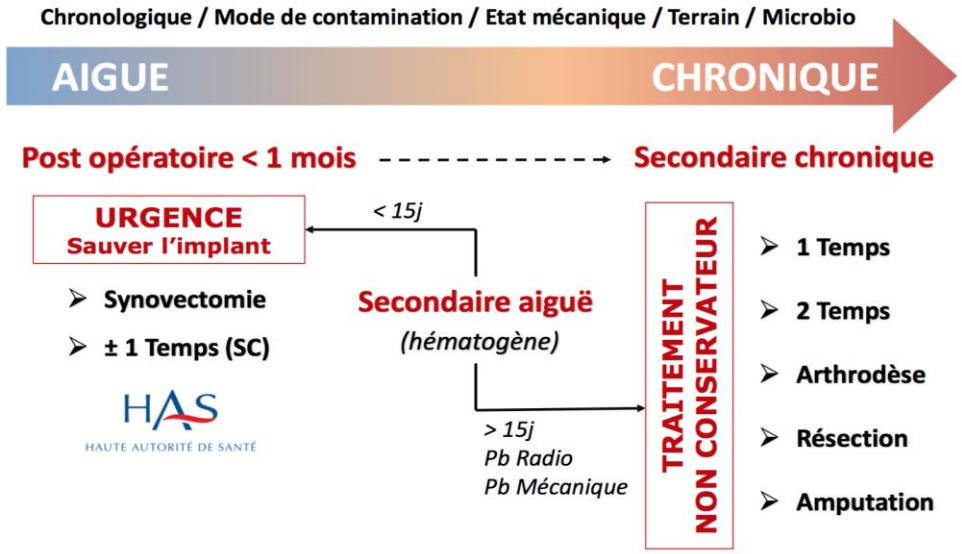
Risque faible
- Absence de facteurs de risque d'infection
- Mesures usuelles de prévention
- Information classique

Marmor S, Kerroumi Y. Patient-specific risk factors for infection in arthroplasty procedure. Orthop Traumatol Surg Res. 2016

Traitement

- Question principale : temporalité ?
  - Aigüe < 4 semaines
  - Retardée/chronique > 4 semaines

- Principe général : CHIRURGIE + ATB
  - DAIR
  - Un-temps
  - Deux-temps



Coventry et al, 1975
WP Kuiper 2014
Pellegrini et al, 2022

Traitement de l'aigüe

- DAIR (Debridment, antibiotics, implant retention)
  - Débridement, lavage et conservation de l'implant
  - Changement de l'insert
  - Antibioprophylaxie avant l'incision
  - Antibiothérapie Probabiliste puis adaptée, 3 mois au total.

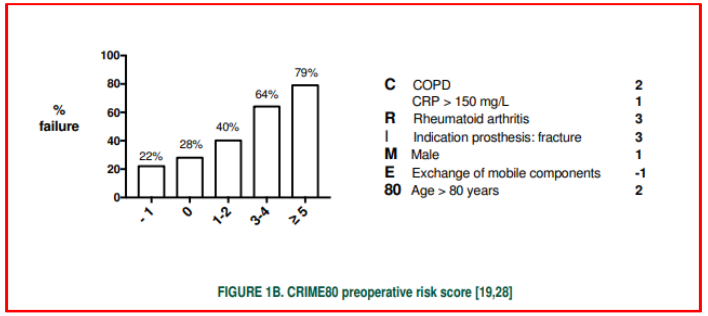


FIGURE 1B. CRIME80 preoperative risk score [19,28]

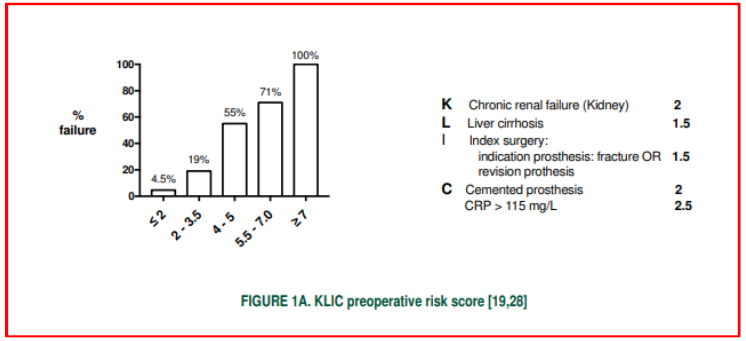
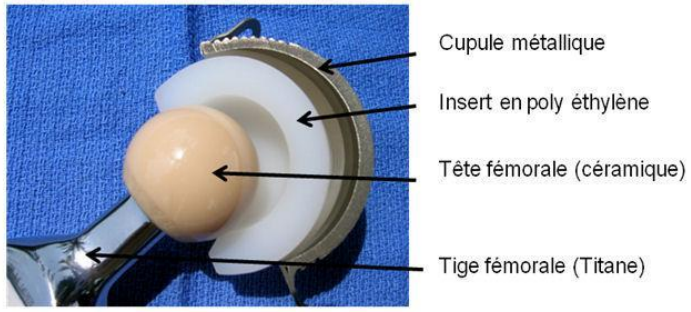
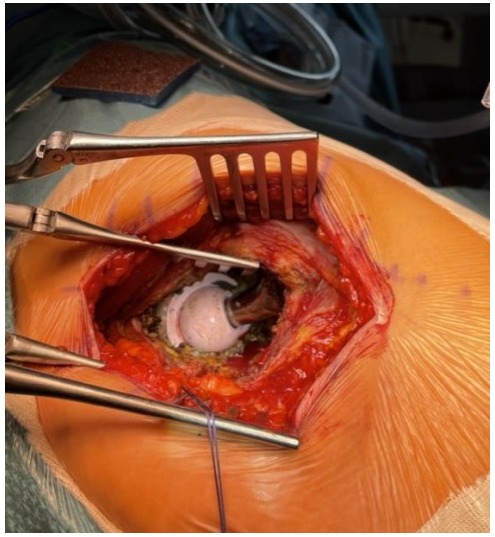


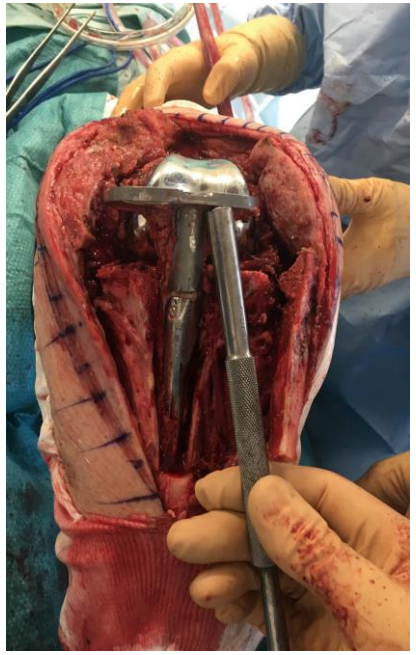
FIGURE 1A. KLIC preoperative risk score [19,28]





Tsang 2017
Osmon 2013
Achermann 2014

Traitement du chronique



- **Changement en 1 temps**:
  - Extraction et réimplantation prothétique dans le même temps opératoire
    - Antibiothérapie post-opératoire

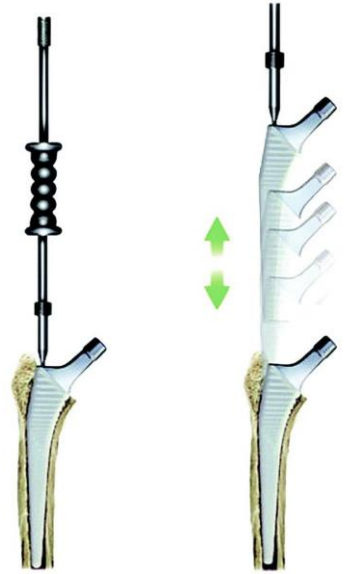


Table 2 Contraindications to single-stage revision

Local factors	Host factors	Organism factors
• Significant compromise to soft tissue	• Immunosuppression	• Polymicrobial organisms
• Significant loss of bone precluding cement reconstruction	• Reinfection	• Multi-resistant organisms (MRSA)
• Peripheral vascular disease	• Systemic disease	• Atypical commensals
	• Concurrent sepsis	• Unusual resistance profiles
		• Unidentified infective organisms

Traitement du chronique



- **Changement en 2 temps:**
  - 2 interventions séparée d'un intervalle de temps avec une antibiothérapie:
    - Dépose prothétique +/- espaceur
    - Réimplantation prothétique
  - Espaceurs articulés ou non
    - Ciments aux antibiotiques
      - de préférence adaptée à la sensibilité du germe infectant
    - Principes: conserver la fonction et l'espace, administration locale d'ATB


Nelson JP. Deep infection following total hip arthroplasty. J Bone Joint Surg Am 1977;59:1042–4.

Traitement

Changement en 1 temps:

- Risque chirurgical et anesthésique unique
- Mortalité et morbidité réduite
- Hospitalisation unique et durée réduite

- Durée de réhabilitation raccourcis, mieux supportée

- Coût sociétal réduit

Changement en 2 temps:

- Deux débridements

- Echec: prélèvements bactério au 2e temps (fenêtre)

- Couverture cutanée avant réimplantation
  - Fistule, Lambeau?

- Guérison du sepsis ou collections régionales avant réimplantation

W Blom 2022

Humphries 2025

Taux de survie sans infection similaire

Alternatives et dernier recours

- DAIR + ABS
- Amputation (transfémorale)
- Arthrodèse
- Ablation de matériel sans réimplantation
- Antibiothérapie suppressive

Alternatives et dernier recours

- DAIR + ABS
  - Infection chronique avec matériel extensif

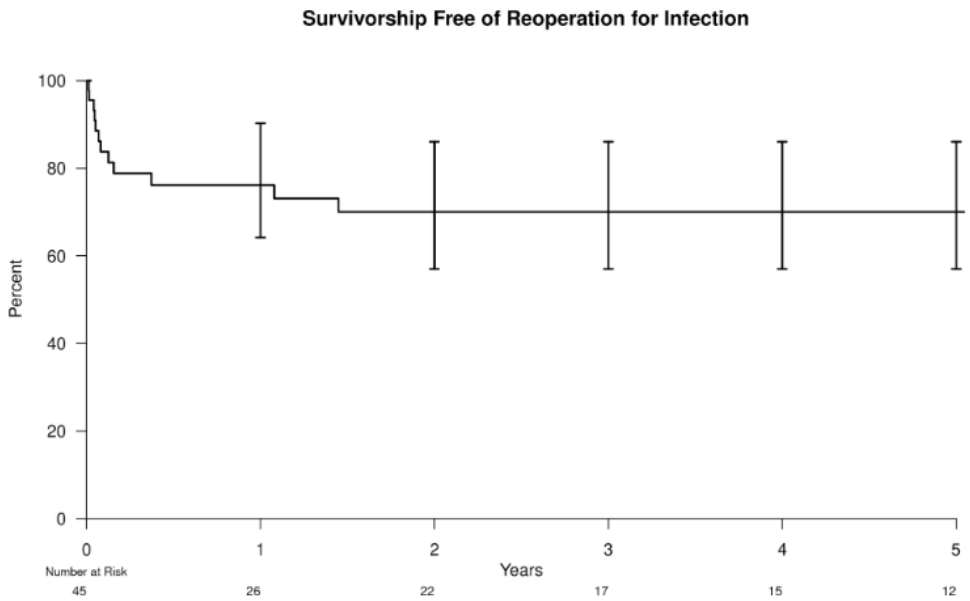
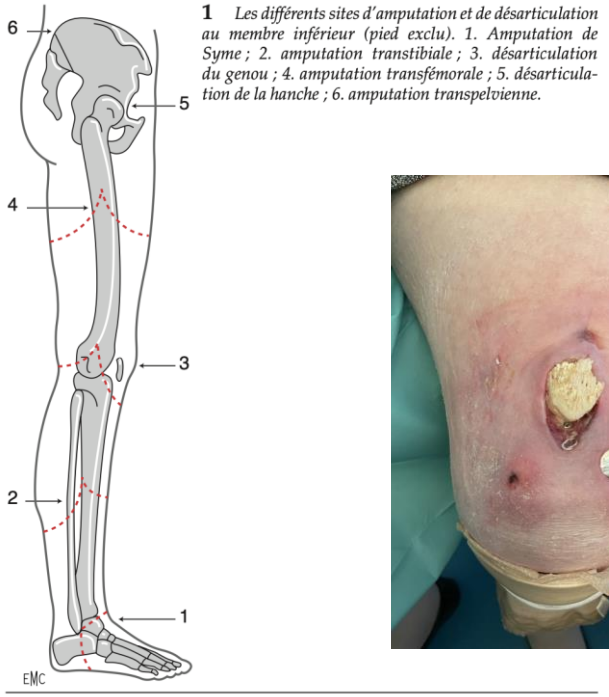


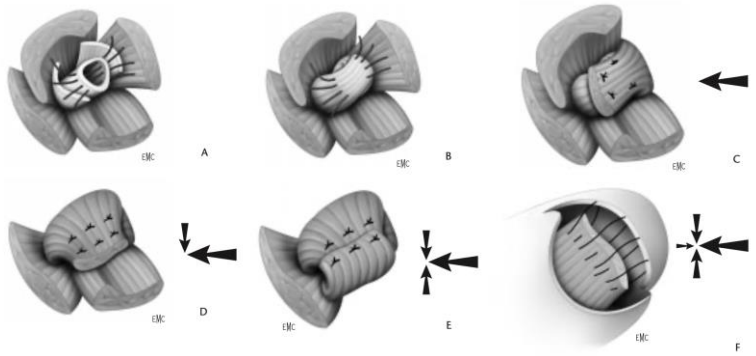
Figure 1.
Kaplan-Meier survivorship free from reoperation for infection

Harold I. Salmons 2023
Barry et al. J BoneJoint SurgAm. 2021

Amputation et arthrodèse



1 *Les différents sites d'amputation et de désarticulation au membre inférieur (pied exclu). 1. Amputation de Syme ; 2. amputation transtibiale ; 3. désarticulation du genou ; 4. amputation transfémorale ; 5. désarticulation de la hanche ; 6. amputation transpelvienne.*



H. Wu 2014
Hungerer 2017

Clinical Orthopaedics and Related Research®
Wolters Kluwer
www.clinorthop.org
PUBLISHED SINCE 1953

Clin Orthop Relat Res. 2017 Feb 24;475(12):2905–2913. doi: 10.1007/s11999-017-5285-x

What Are the Frequency, Associated Factors, and Mortality of Amputation and Arthrodesis After a Failed Infected TKA?

Min-Sun Son [1,✉], Edmund Lau [1], Javad Parvizi [2], Michael A Mont [3], Kevin J Bozic [4], Steven Kurtz [5]

44 490 ISO sur PTG entre 2005 et 2014 chez des patients de 74 ± 7ans dont :

- 1182 arthrodèses,
- 1864 amputation trans fémorale

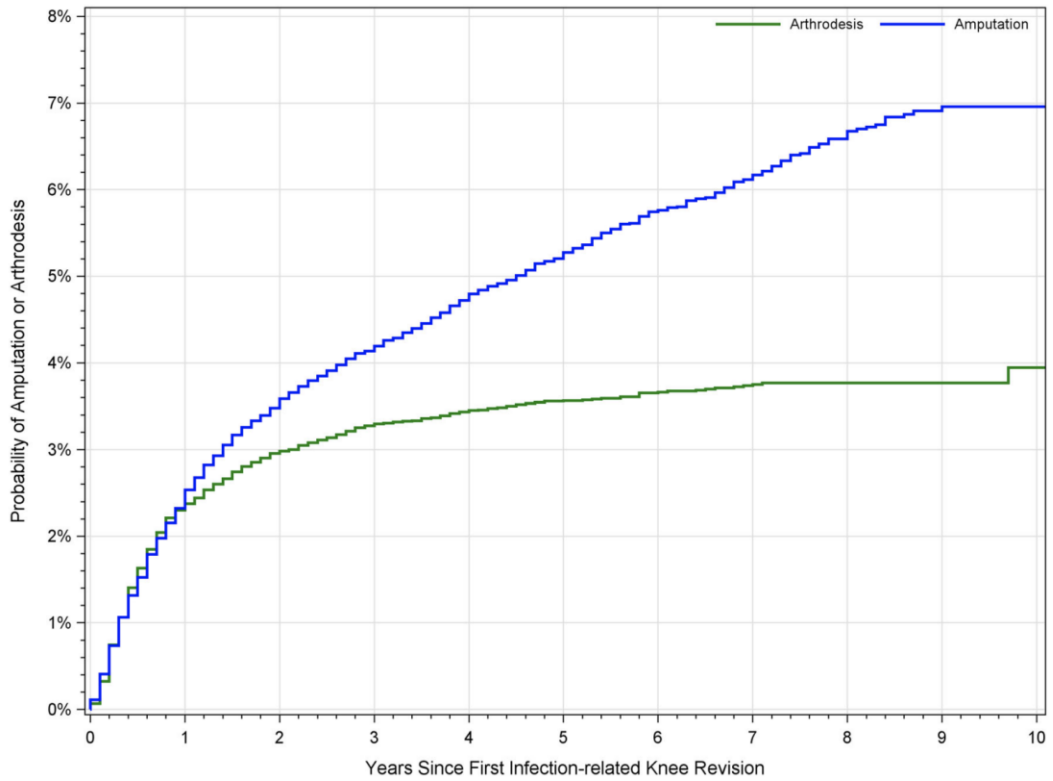


Fig. 1 Cumulative incidence function for amputation and arthrodesis after infection-related knee revision is presented.

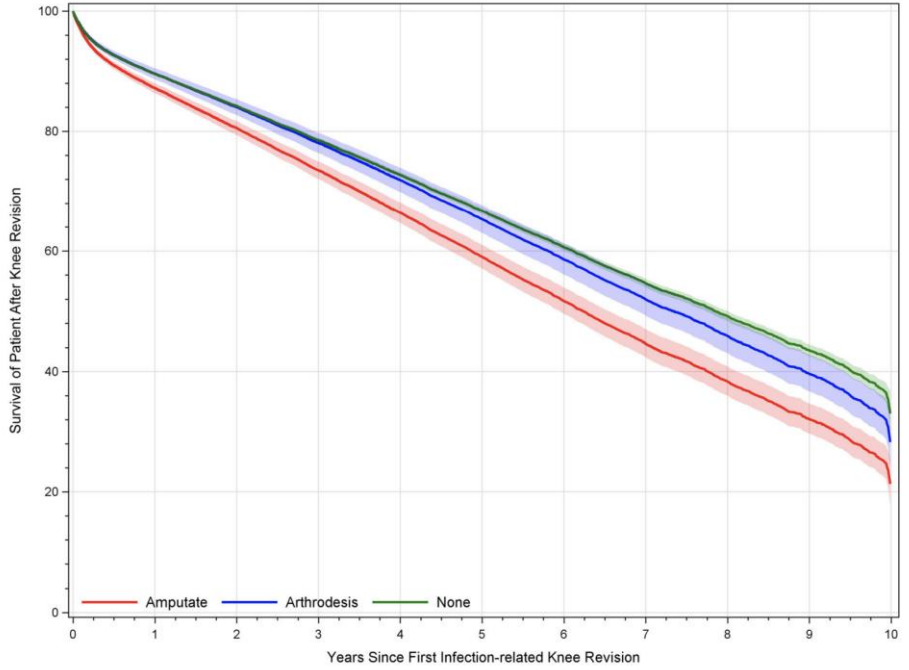


Fig. 2 The percentage of patient survival after the initial infection-related knee revision is shown for patients who received an amputation or arthrodesis in addition to patients who did not receive either of these salvage operations.

Amputation et arthrodèse

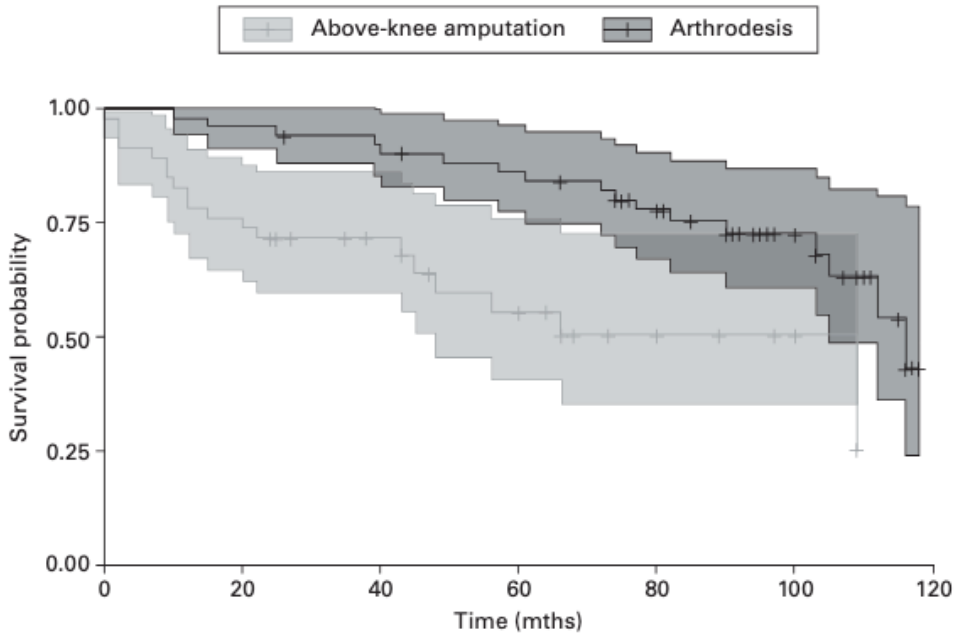


Fig. 3

Kaplan-Meier survival curve for the cumulative risk of mortality after arthrodesis and above-knee amputation ($\chi^2 = 10.668$; $p = 0.001$).

The five-year survival rate after AKA has also been reported to be 51.7%, with a two-year mortality rate of 28.4%, similar to our results. Advancing age is a risk factor for mortality after AKA, as is renal failure.

Schnetz 2024
Hungerer 2017

Survie globale

IVYSPRING INTERNATIONAL PUBLISHER

Journal of Bone and Joint Infection

2019; 4(4): 198-202. doi: 10.7150/jbji.35428

Research Paper

Prosthetic-joint Infections: Mortality Over The Last 10 Years

Arnaud Fischbacher ✉, Olivier Borens

Centre hospitalier universitaire vaudois (CHUV), Service d'orthopédie et de traumatologie, Rue du Bugnon 46, 1011 Lausanne, Switzerland.

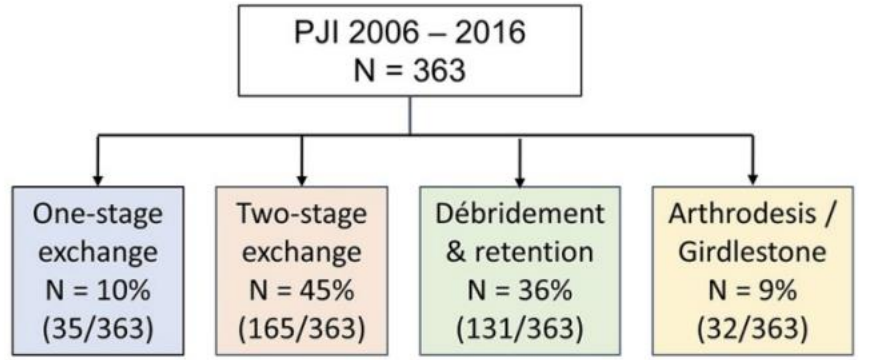
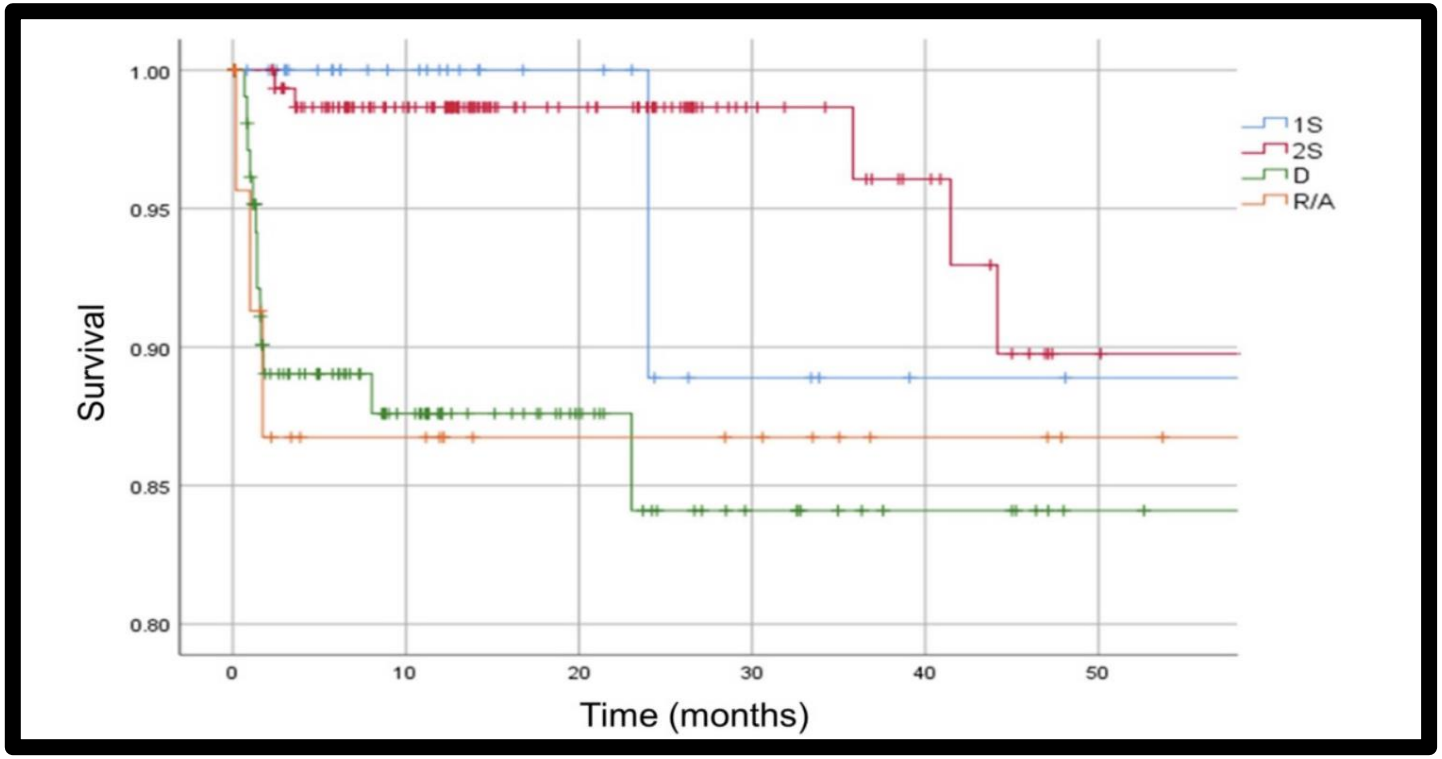
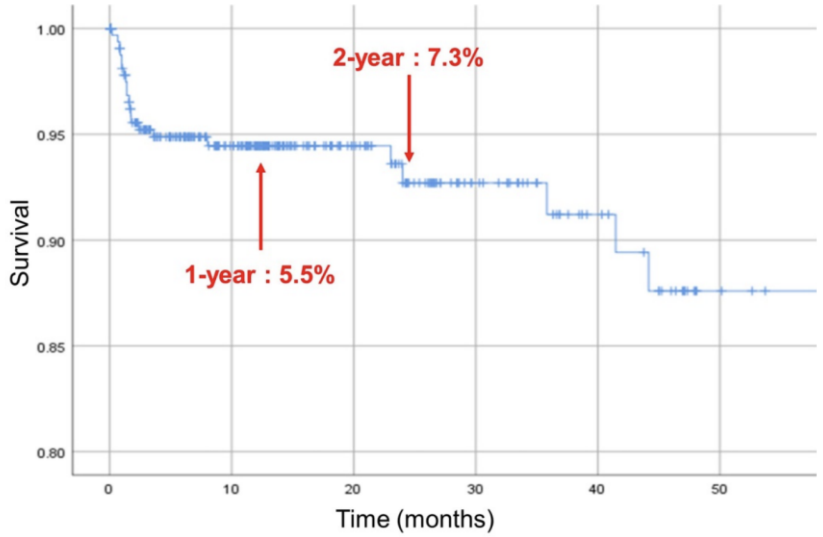
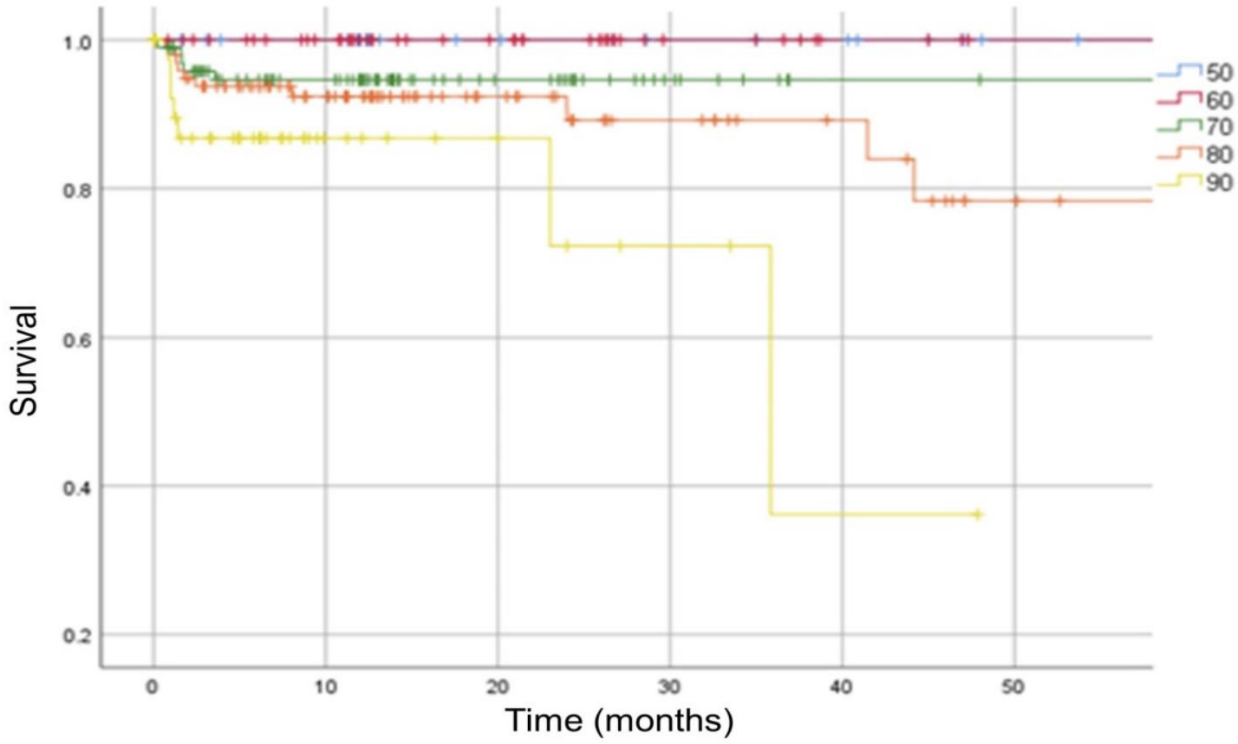


Figure 1. Flow of the patient selection.





Survie globale tout traitement



Survie en fonction de l'Age

Survie en fonction du traitement

Take home message

MERCI DE VOTRE ATTENTION