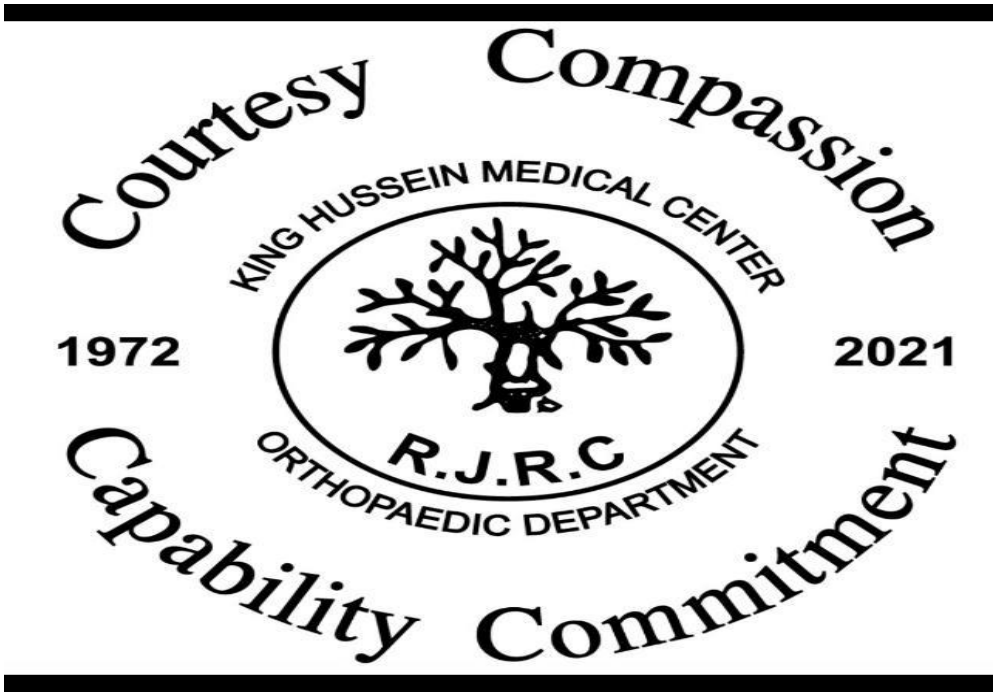
PLEASE CLICK ON THE FOLLOWING LINK TO WATCH THE LECTURE ONLINE:-

https://www.youtube.com/watch?v=8yFEQiR7rBc&list=PLuBRb5B7fa_dtajIUw2Eo1E-8Uv8vVNmR&index=6

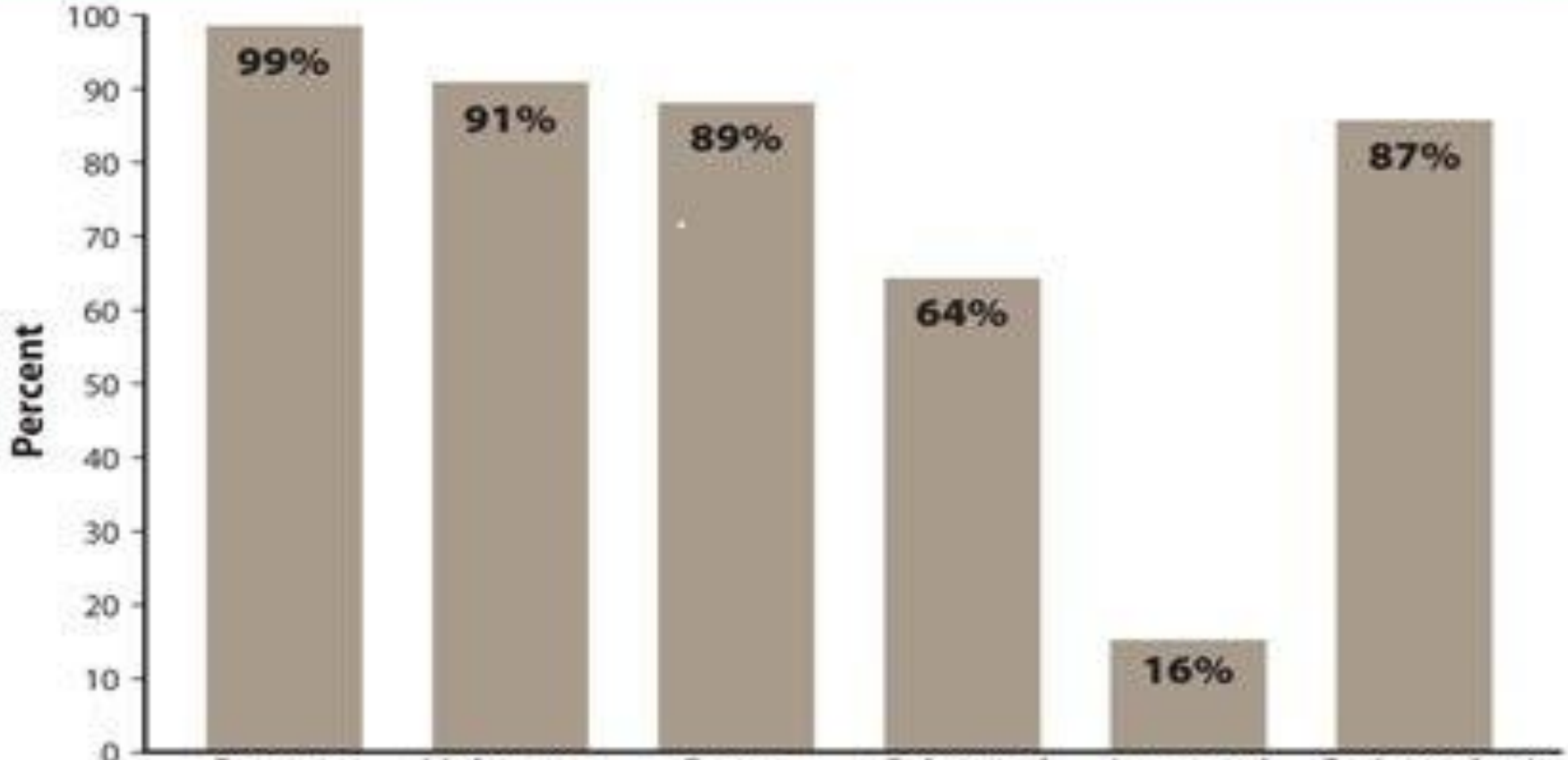


Prosthetic joint infection

Hamed Alsarhan,MD.

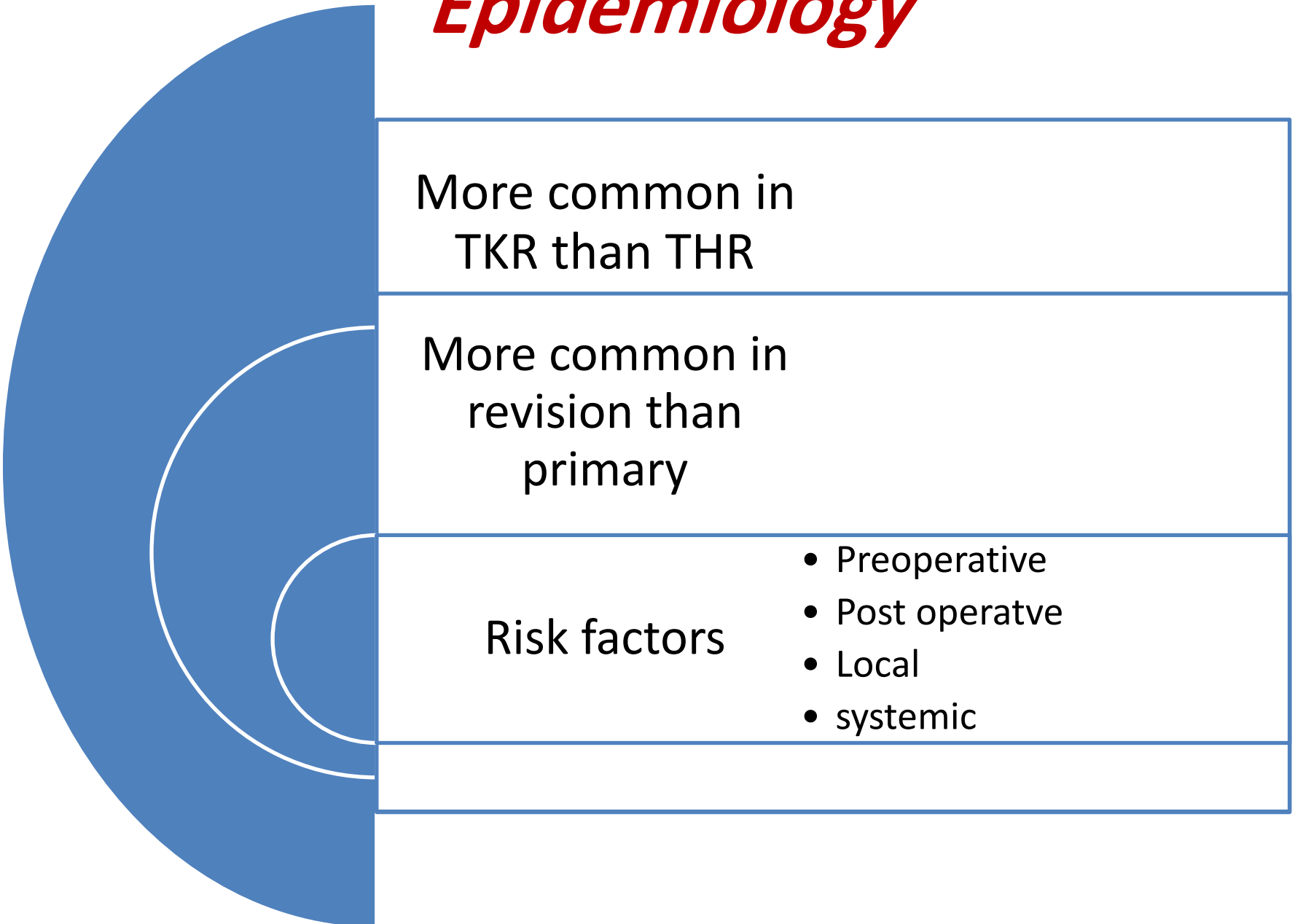
PJI challenges

Relative survival

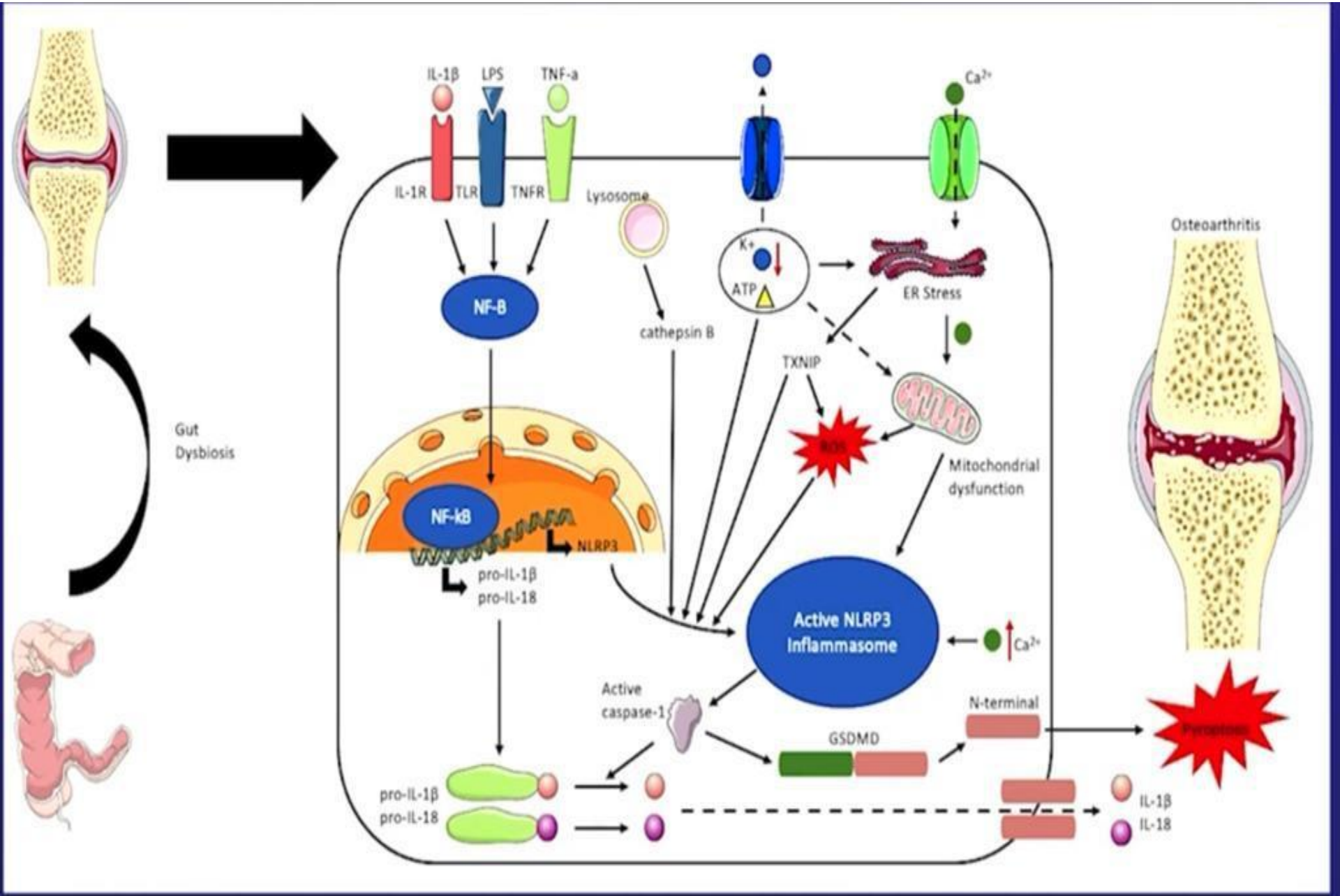


Source: American Cancer Society

Epidemiology



Osteoarthritis &microbiome



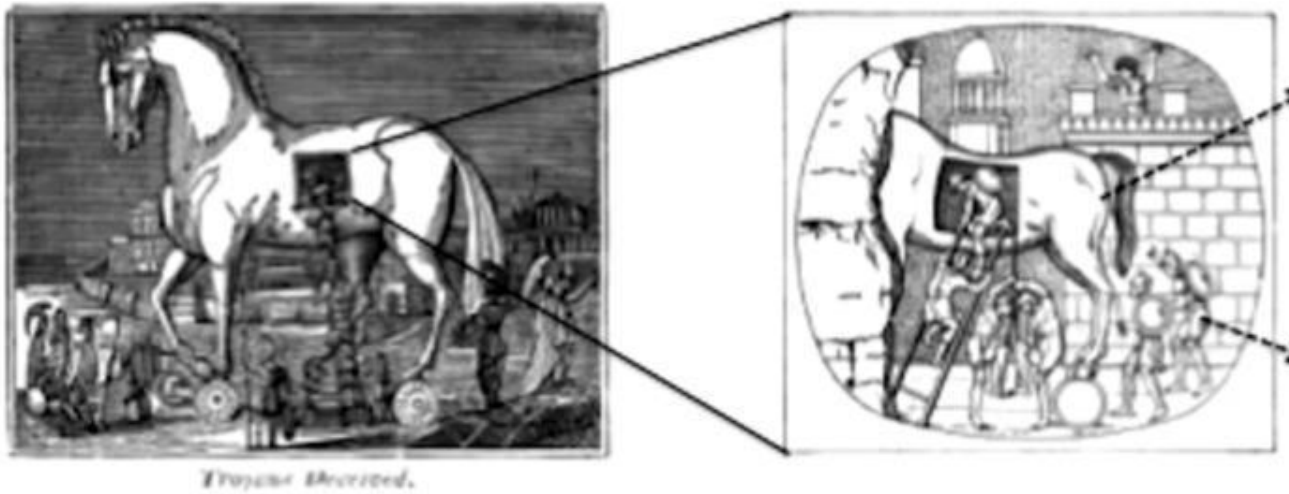
Pathogenesis

- Most commonly bacterial

1. Staphylococcus aureus
2. Staphylococcus epidermis(chronic hip PJI)
3. Coagulase negative staphylococci (chronic).

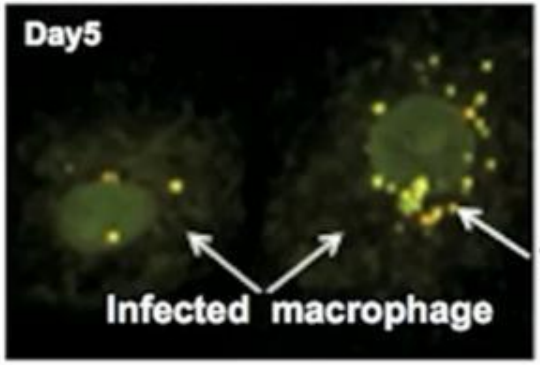
- Fungal candida

How does *S. aureus* translocate from the surgical site to internal organs?



- ***S. aureus* persists inside macrophages for several days without affecting the viability of these mobile cells**

→ Serve as vehicles for the dissemination of infection

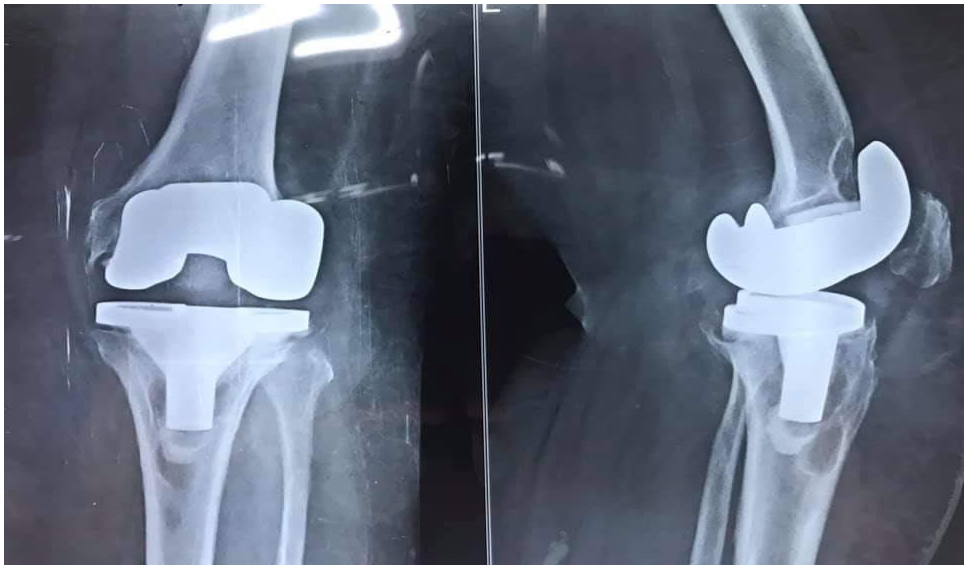


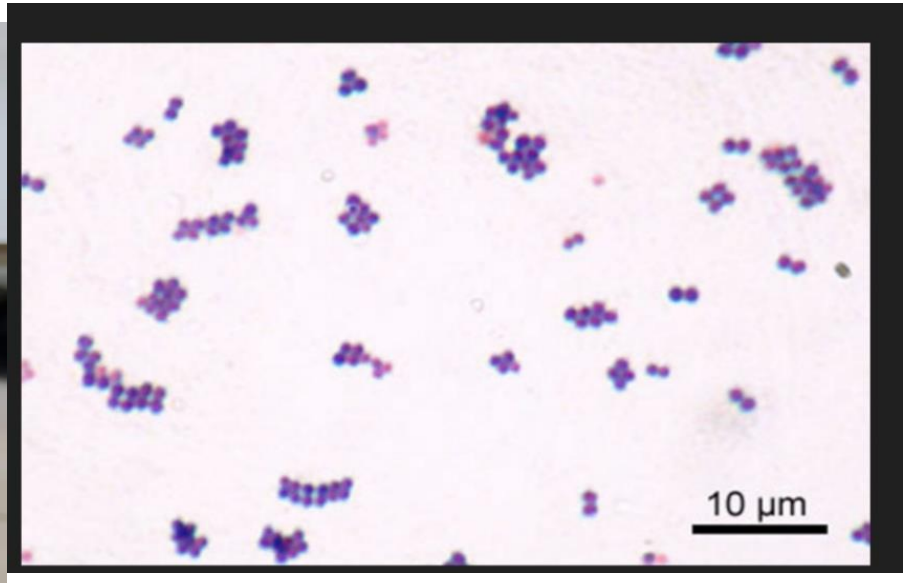
Kubica M et al. *PLoS One* 2008
Hamaza T et al. *BMC Microbiology* 2014

Classification

- time
  - Early : in the fist 3 months
  - Delayed: 3-24 months .
  - Late: > 24 month
- SOURCE OF INFECTION
  - Direct invasion
  - Hematogenous infection

DIAGNOSIS





diagnosis

❖Clinical presentation

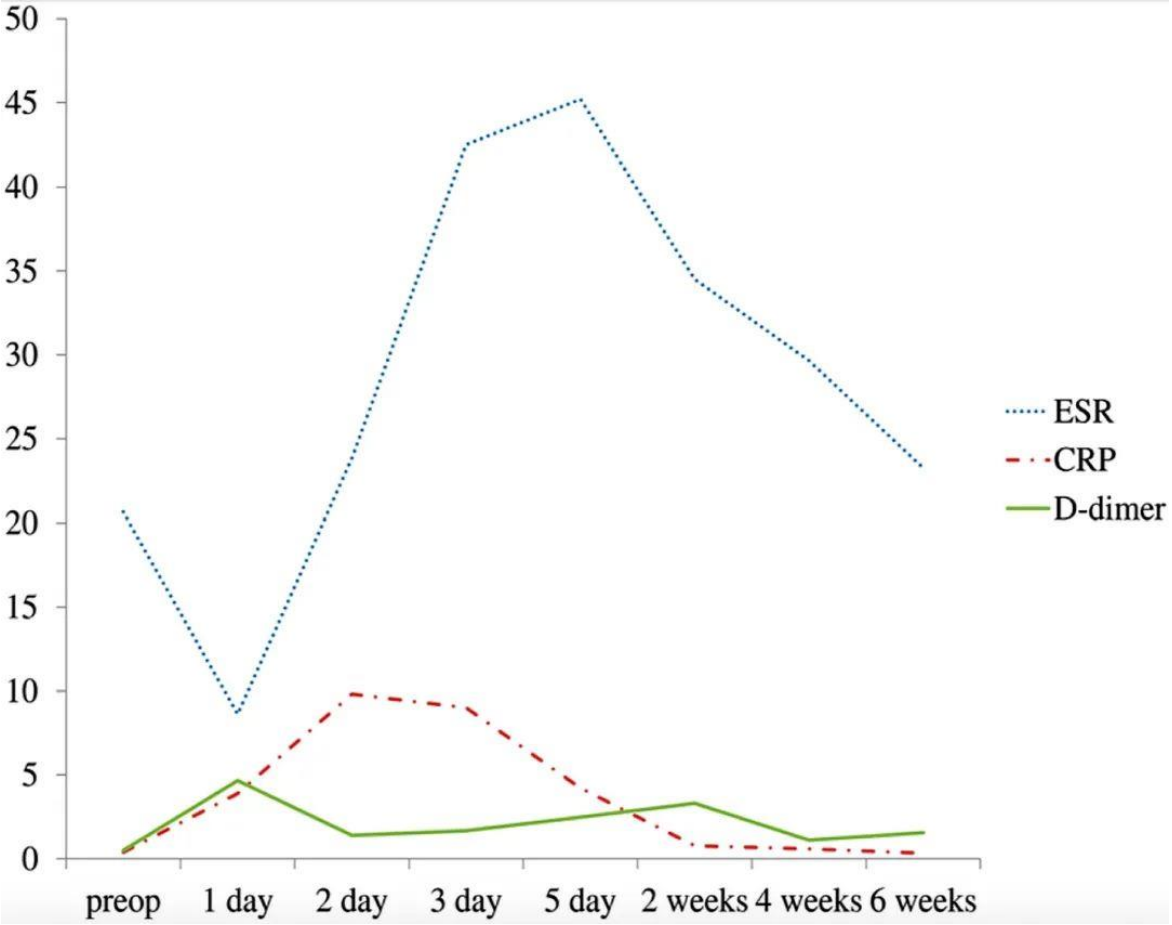
- None is pathognomic
- Depending on virulence of the microrganism,mode of infection, host immune response, surrounding soft tissue structure.
- Pain is the most reported complain.
- Drainage from the surgical site.
- Systemic signs more common in hematogenous PjI.

LABS

- CBC : wbc
- ESR &CRP:

96% Sensitive

To rule out PJI



LABS

- **Serum IL6:**

- **Produced by stimulated monocytes and macrophages**
- **Rapidly returned to normal (peak same day , normal 2-3 days after surgery)**
- **100% sensitivity , 95%specificity**
- **False +ve in RA,AIDS,MS, and Pargets disease**

Synovial fluid analysis

- Can be obtained preoperative or intraoperative.
- Provide valuable data
- Cell count and neutrophil differential:
- Synovial WBC >3000 cells/ul
- PMN >804%
- 95% Specificity and sensitivity
- Cell count may be elevated due to hemarthrosis,RA,metal on metal hip arthroplasties

Synovial fluid analysis

- Other synovial fluid markers :
- Alpha- defensin 100% sensetive
- Synovial fluid CRP
- Synovial fluid IL6
- Procalcitonin
- Synovial fluid leukocyte Esterase:
- It is enzyme present in neutrophils
- Colorimetric strip test
- A++ reading is 100% specific

LABS

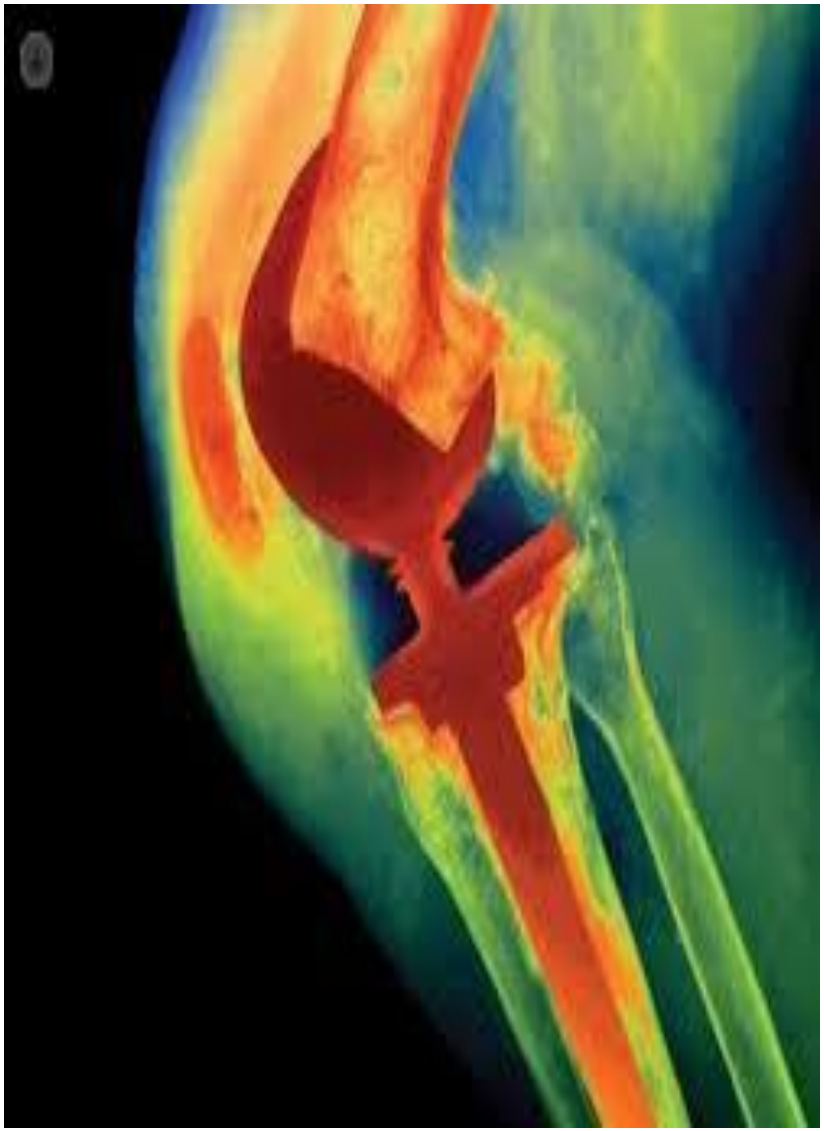
- Microbiology:

- Definitive diagnosis
- Organism obtained by aspiration
- At least 5 periprosthetic specimens should be obtained (3 of 5 diagnostic)
- Single +ve culture regarded as a contaminant
- Tissue culture better than swab

LABS

- Histological analysis of periprosthetic tissues:
- Indicated in equivocal cases
- Frozen-section analysis
- Advantage: result not changed by preoperative Abs
- Disadvantage: need for trained pathologist.
- Need presence of at least 5 PMN per high power field in at least 5 separate microscopic fields.
- Sensitivity 85% and up to 95% specificity.

Imaging



Imaging

- CT scan
- MRI
- BONE SCAN:

- If infection is suspected but couldn't confirmed
- 3 phases bone scan differentiate infection from bone remodeling
- The limitation is lack of specificity (as low as 18%)
- More useful for late PJI

Imaging

- PET
- Identify high metabolic activity area
- Limitation is its high cost
- 98% sensitivity and specificity

Definition

- A workgroup convened by the Musculoskeletal Infection Society (MSIS) analyzed the available evidence to propose a new definition for PJI in August 2011

Based on the proposed criteria, definite PJI exists when: One of the Major Criteria Exists or Three Out of Five Minor Criteria Exist	
Major criteria	There is a sinus tract communicating with the prosthesis; or A pathogen is isolated by culture from at least two separate tissue or fluid samples obtained from the affected prosthetic joint;
Minor criteria	a. Elevated serum ESR and serum CRP concentration b. Elevated synovial leukocyte count OR ++ result on leukocyte esterase test strip c. Elevated synovial neutrophil percentage (PMN %) d. Isolation of a microorganism in one culture of periprosthetic tissue or fluid, or e. Greater than five neutrophils per high-power field in five high-power fields observed from histologic analysis of periprosthetic tissue at ×400 magnification

New Definition for Periprosthetic Joint Infection: From the Workgroup of the Musculoskeletal Infection Society 2018

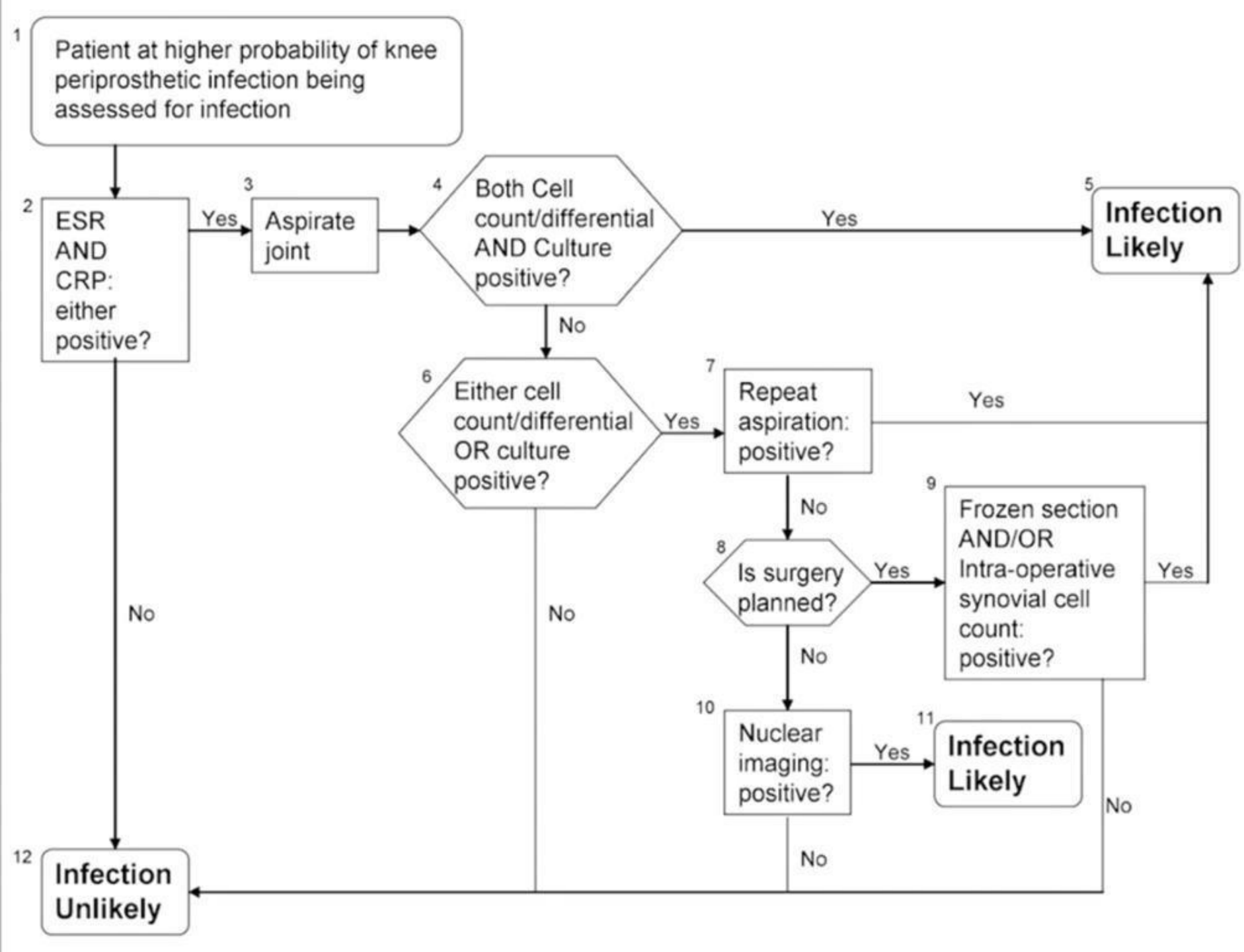
Javad Parvizi, MD,[1] Benjamin Zmistowski, BS,[1] Elie F. Berbari, MD,[2] Thomas W. Bauer, MD, PhD,[3] Bryan D. Springer, MD,[4] Craig J. Della Valle, MD,[5] Kevin L. Garvin, MD,[6] Michael A. Mont, MD,[7] Montri D. Wongworawat, MD,[8] and Charalampos G. Zalavras, MD[9]

- Evidence-based
- Multi-institutional data
- Pretest probability
- Step-wise approach
- Preoperative diagnosis is possible

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	Decision
Serum	Elevated CRP *or* D-Dimer	2	≥6 Infected
Serum	Elevated ESR	1	
Synovial	Elevated synovial *WBC count or LE*	3	**2-5 Possibly Infected [a]**
Synovial	Positive alpha-defensin	3	
Synovial	Elevated synovial PMN (%)	2	0-1 Not Infected
Synovial	Elevated synovial CRP	1	

Intraoperative Diagnosis	Inconclusive pre-op score *or* dry tap [a]	Score	Decision
	Preoperative score	-	≥6 Infected
	Positive histology	3	**4-5 Inconclusive [b]**
	Positive purulence	3	
	Single positive culture	2	≤3 Not Infected


1
Patient at higher probability of knee periprosthetic infection being assessed for infection
2
ESR AND CRP: either positive?
Yes
3
Aspirate joint
4
Both Cell count/differential AND Culture positive?
Yes
5
Infection Likely
No
6
Either cell count/differential OR culture positive?
Yes
7
Repeat aspiration: positive?
Yes
No
8
Is surgery planned?
Yes
9
Frozen section AND/OR Intra-operative synovial cell count: positive?
Yes
No
No
No
10
Nuclear imaging: positive?
Yes
11
Infection Likely
No
No
12
Infection Unlikely

Management

prevention

prevention

- Proper preoperative assessment.
- Identification and optimization of any modifiable risk factors,
- Reduction of skin flora: Mupicrocin nasal ointment for s.aureus nasal colonization, chlorhexidene bathing.
- Perioperative AB prophylaxis reduce risk of surgical site infection by > 80%.
- Cefazolin,vancomycin 30 minutes prior incision and at least 10 m before tourniquet
- Laminar air flow and d suits
- Antibiotic loaded bone cement at prosthesis implantation

Management

- The goals of treatment are eradicate infection , restore pain free function of the infected joint

And minimize the related morbidity &mortality

- Treatment options are:
- Debridement and prosthesis retention(DAIR)
- ONE-stage arthroplasty exchange
- TWO-stage arthroplasty exchange

DAIR

- Acute infection ,stable implant, no sinus tract.
- Open arthrotomy
- Aggressive Irrigation and debridement of any necrotic or infected tissues.
- Assessment of prosthesis stability
- Replacement of any exchangeable component.
- Multiple cultures
- IV antibiotics 6 weeks.
- Average Success rate 24%
- If DAIR fail go for 2 stage arthroplasty exchange.

One-stage replacement arthroplasty

- Less frequently performed.
- Healthy pt. with adequate remaining bone stock(no bone graft needed),no sinus tract, low virulence organism with good AB sensitivity.
- Lower cost than 2 stage, and early mobility.
- Higher risk of continued infection
- Success rate up to 75%??

Two-staged replacement arthroplasty

- It is gold standard and the most definitive strategy
- First stage: all component and PMMA removed, all infected tissues debrided, cultures obtained ,and antibiotic impregnated PMMA spacer implanted in the joint space to deliver local antibiotic and maintain limb length, IV antibiotic 4-6 weeks, then followed by 2-6 weeks antibiotic free period
- Pt. follow up using inflammatory markers
- If there is evidence of infection repeat debridement.

Two-staged replacement arthroplasty

- 2nd stage:
- If it possible at the time of implantation biopsy specimens obtained for frozen-section histopathological examination
- If the result is negative , a new prosthesis is implanted using antibiotic impregnated bone cement.

Antibiotic-loaded PMMA spacer


ALON AESTHETICS
PLASTIC SURGERY

Pre - Operation

Post - Operation

Take home massage

- **Prevention**
- **Prevention**
- **prevention**

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