Management Periprosthetic Joint Infections

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Periprosthetic Joint Infection (PJI)

- Deep SSI.
- Biofilm produces within hours, maturates by week 4.
- Biofilm micro-organisms are up to 1000 times more resistant to antibiotics.
- Direct inoculation: 2/3rd of cases.
- Skin and soft tissue infections (e.g. Staphylococcus aureus).
- Respiratory tract infections (e.g. Streptococcus pneumoniae).
- Gastrointestinal infections (e.g. Salmonella, Bacteroides, Streptococcus gallolyticus).
- Urinary tract infections (e.g. Escherichia coli, Klebsiella, Enterobacter spp.).
- Dental procedures, especially viridans group streptococci.

PJI Classification

- Acute Early infection: within three weeks of the procedure, or in the case of a late haematogenous infection, within three weeks of symptoms.

 - high-virulent pathogens (e.g. Staphylococcus aureus, streptococci, enterococci)

- Late: > 3 weeks.

 - low-virulent organisms (e.g. coagulase-negative staphylococci or Cutibacterium species, candidiasis).

** The distinction between early and late PJI is based on the assumption that within three weeks organisms can form a biofilm on the surface of the components. However, it has recently been shown that organisms can form a biofilm within hours and at most a few days!*

- Acute/early infection

- Early PJI

- Acute haematogenous PJI

- Chronic PJI

- Chronic PJI

- Late PJI

key factors for the success of management of PJI

- Reliable Diagnosis
- Knowledge of Bacteria
- MDT approach.
- Radical debridement.

Reliable Diagnosis

- A validated tool/algorithm with high sensitivity and specificity.
- A clear and timely PJI diagnosis.
- Endorsed by wider T&O team.
- Reliable diagnostic tests.

- *The 2018 validated & score-based ICM definition for PJI: Sensitivity 97.7% Specificity 95.5%*

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	

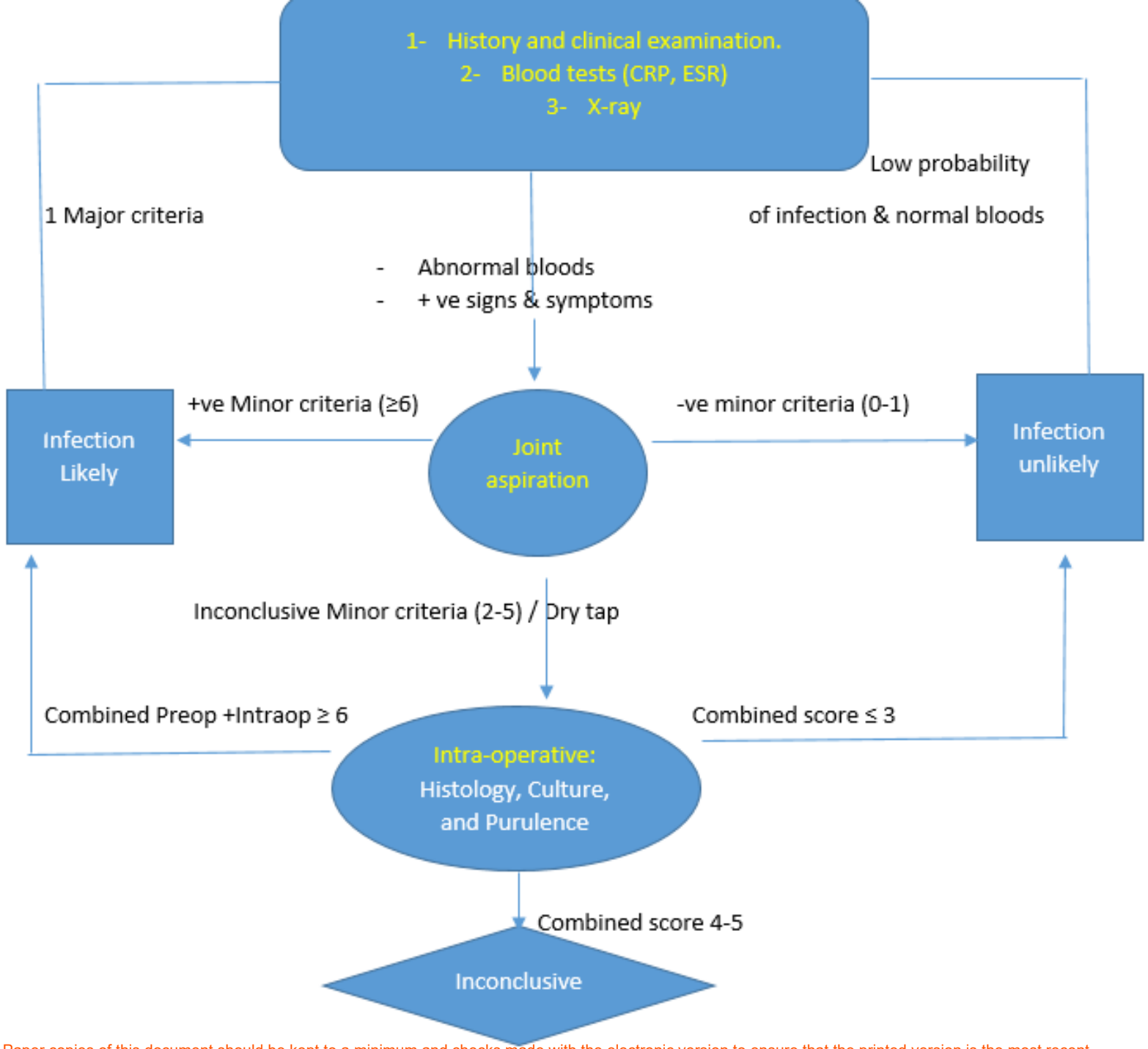
Preoperative Diagnosis		Minor Criteria	Score	Decision
	Serum	Elevated CRP *or* D-Dimer	2	≥6 Infected
		Elevated ESR	1	
	Synovial	Elevated synovial *WBC count or LE*	3	**2-5 Possibly Infected [a]**
		Positive alpha-defensin	3	
		Elevated synovial PMN (%)	2	0-1 Not Infected
		Elevated synovial CRP	1	

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

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

1. Enter Answer Text

Minor Criteria	Threshold		Score	Decision
	Acute€	Chronic		
Serum CRP (mg/L) *or* D-Dimer (ug/L)	100 Unknown	10 860	2	Combined preoperative and postoperative score: ≥6 Infected 4-5 Inconclusive* ≤3 Not Infected
Elevated Serum ESR (mm/hr)	No role	30	1	
Elevated Synovial WBC (cells/µL) *or* Leukocyte Esterase *or* Positive Alpha-defensin (signal/cutoff)	10,000 ++ 1.0	3,000 ++ 1.0	3	
Elevated Synovial PMN (%)	90	70	2	
Single Positive Culture			2	
Positive Histology			3	
Positive Intraoperative Purulence¥			3	


1- History and clinical examination.
2- Blood tests (CRP, ESR)
3- X-ray
Low probability
of infection & normal bloods
1 Major criteria
- Abnormal bloods
- + ve signs & symptoms
Infection Likely
+ve Minor criteria (≥6)
Joint aspiration
-ve minor criteria (0-1)
Infection unlikely
Inconclusive Minor criteria (2-5) / Dry tap
Combined Preop +Intraop ≥ 6
Combined score ≤ 3
Intra-operative:
Histology, Culture,
and Purulence
Combined score 4-5
Inconclusive

Microbiology sampling

- The sensitivity can be diminished by long transportation time.
- This can be prevented by inoculation into paediatric blood culture bottles.
- An incubation time of 14 days is necessary to detect low-virulent and difficult-to-detect pathogens, such as Cutibacterium species.

Theatre specimens

- Microbiology **5- 6 samples** taken using different forceps and scalpels into different universal tubes and sent to microbiology. These samples should be sent as **URGENT** no matter what time of day they are taken.
- Histology samples should be taken routinely and are especially helpful if the patient had been on antibiotics prior to surgery as pathogens may not be cultured.

* Aim to hold-off antibiotics until surgical sampling in theatre

Summary PJI

- Any painful joint prosthesis should be considered a possible infection until proven otherwise.
- Evaluation of PJI should begin with a focused history and physical examination along with review of appropriate radiographs.
- There should be a locally agreed protocol to obtain a synovial fluid leucocyte count and neutrophil differential *(BOA Aug 2020).*

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