



**Unusual Organism causing
Periprosthetic Joint Infection**

Unusual Organism causing Periprosthetic Joint Infection

BY DR.DHRUV PATEL

Moderator

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CASE STUDY

- ▣ A 73 yr. old female,from rural background
- ▣ Hypertensive since 5 years.
- ▣ P/H/O
 - left TKR in 2014.
 - COVID-19 infection in December 2020, recovered at home with medical management
- ▣ presented with c/o
 - left knee pain & swelling since last 4yrs, increasing in severity since last 2-3months.
 - Fever without chills, moderate grade, intermittent since 2-3 months.
- ▣ No complaint of other joint pain, skin rash, symptoms pertaining to RS, CVS, GI
- ▣ H/o NSAIDs abuse
- ▣ H/o unpasteurised milk consumption.

EXAMINATION

- ▣ G/E
 - Temperature: normal
 - B.P: 150/82mmhg in supine position
 - Pulse: 72bpm regular
 - No Pallor, icterus, cyanosis, clubbing, oedema or lymphadenopathy
- ▣ S/E
 - CVS: S1,S2+
 - RS: AEBE, no added sounds
 - P/A: Soft, no organomegaly
 - CNS: no focal neurological deficit
- ▣ L/E of left knee
 - Swelling +, Erythema+
 - Warmth+ , Tenderness++

Laboratory Investigation:

- ▣ Hb:10 Gm%
- ▣ TC: 10,350/uL (N:52.4, L:37.3, E:1.6, M:8.4, B:0.3)
- ▣ PC: 3,53,000/uL
- ▣ ESR: 59 mm
- ▣ CRP: 16mg/L (normal range:0-5)
- ▣ RBS: 98mg/dl
- ▣ Creatinine : 1.34 mg/dl (<1.02 mg/dl)
- ▣ HIV/HBsAg : Negative

Radiology

Skeletal
Scintigraphy (bone
scan):

Skeletal Scintigraphy (bone scan): s/o Mild infective changes in left TKR (both femoral & tibial component prosthesis).

USG Local part

Diffuse synovial thickening of 2mm is seen in left knee joint- appears postoperative changes. Minimal fluid with internal thread like elongated echogenic fibrotic tissue is seen in left knee joint

USG Abdomen
with Pelvis:

Small sized atrophied left kidney with right side early renal parenchymal disease.

Hence....

- ▣ Patient was advised for two-step revision TKR.
- ▣ Debridement of left knee joint, removal of implant and cement spacer was inserted.
- ▣ Intra-operative tissue & fluid sent for microbiological investigation.

Desired investigations

- Intra op tissue/pus for
 - Routine micro (fluid)
 - Primary stain
 - GeneXpert
 - Bacterial culture
 - Mycobacterial culture
 - Fungal culture
 - HPE



Etiologic agents

- ▣ Gram positive cocci:

- Staphylococcus spp
- Streptococcus spp
- Enterococcus spp

- ▣ Gram negative bacilli:

- E coli
- Klebsiella
- Enterobacter
- Pseudomonas aeruginosa
- Acinetobacter spp

- ▣ Mycobacteria:

- MTB / NTM

- ▣ Anaerobes:

- Cutibacterium, Peptostreptococcus
- Bacteroides, Fusobacterium

- ▣ Fungal pathogen:

- Candida spp.

Result

- ▣ PRIMARY STAIN: Negative
- ▣ GENEXPERT MTB/RIF: Negative
- ▣ BACTERIAL CULTURE: NO GROWTH TILL 48 HOURS
- ▣ FUNGAL CULTURE: Negative
- ▣ MYCOBACTERIAL CULTURE : In incubation
- ▣ HPE: was not ordered by operating surgeon

BACTERIAL CULTURE : grew Brucella melitensis on 6th day.

Management:

- ▣ Patient was treated with Inj. Doxycycline 100mg iv BD & Rifampicin 600mg orally OD
- ▣ After 3 days, creatinine was 0.97 mg/dl so Inj. Amikacin 750mg IV OD was added
- ▣ Creatinine increased to 1.8 after 3 doses of amikacin & hence discontinued.
- ▣ Follow up at 2 weeks:
 - Significant decrease in swelling and pain
 - No fever
 - No requirement of analgesics

Prosthetic joint infection

Definition of periprosthetic joint infection

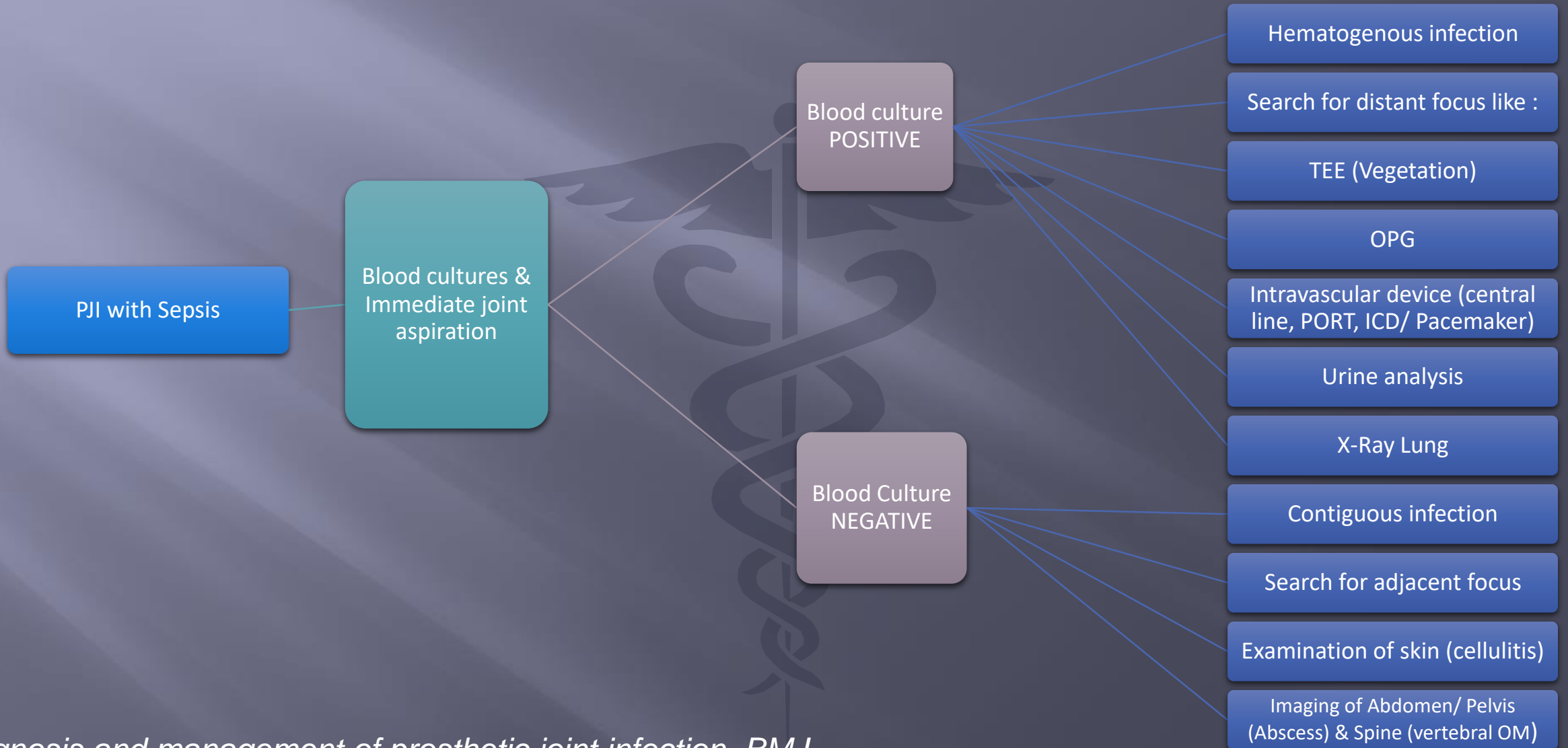
Periprosthetic joint infection is diagnosed, if ≥ 1 criterion is fulfilled.

| Test | Criteria | Sensitivity | Specificity |
|--|--|----------------|----------------|
| Clinical features | Sinus tract (fistula) or purulence around prosthesis ^a | 20–30% | 100% |
| Leukocyte count in synovial fluid^b | $> 2000/\mu\text{l}$ leukocytes or $> 70\%$ granulocytes (PMN) | $\approx 90\%$ | $\approx 95\%$ |
| Periprosthetic tissue histology^c | Inflammation (≥ 23 granulocytes per 10 high-power fields) | 73% | 95% |
| Microbiology | Microbial growth in: | | |
| | • Synovial fluid ^d or | 45–75% | 95% |
| | • ≥ 2 positive tissue samples (of at least 3 collected) ^d or | 60–80% | 92% |
| | • Sonication fluid (> 50 CFU/ml) ^e | 80–90% | 95% |

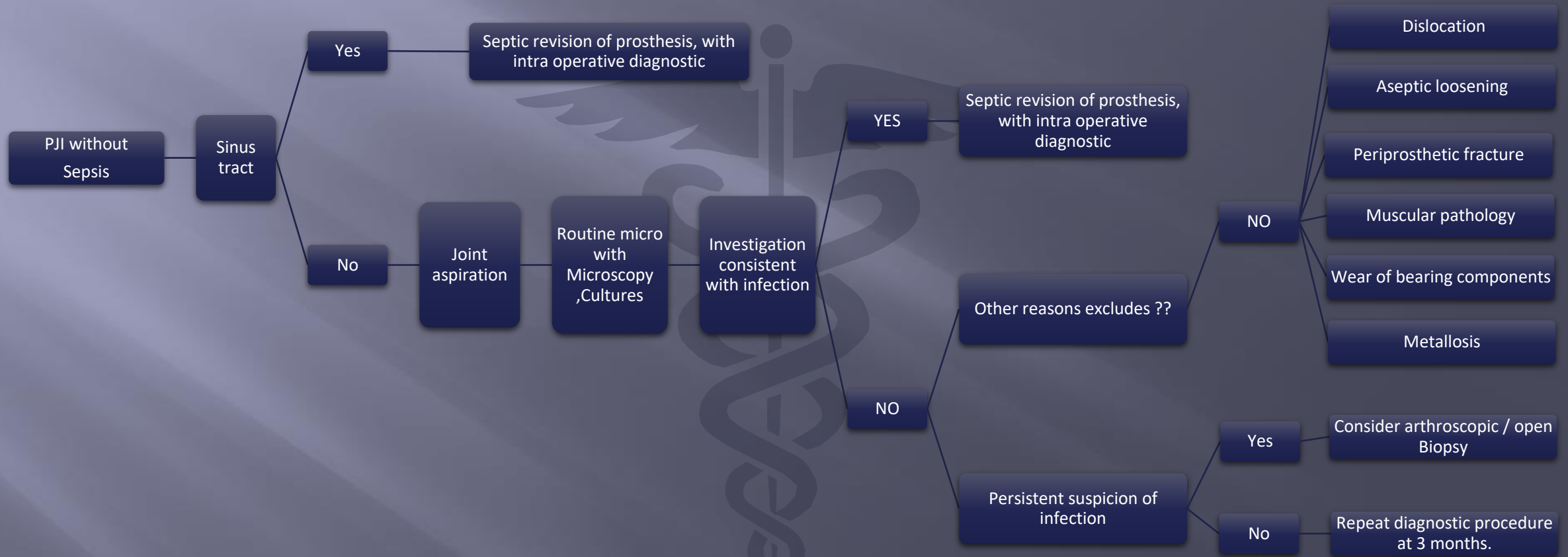
Acute and Chronic PJI

| PATHOGENESIS | ACUTE PJI | CHRONIC PJI |
|--------------------|--|---|
| PERIOPERATIVE | <4 WEEKS AFTER SURGERY | >4 WEEKS AFTER SURGERY |
| CLINICAL FEATURES | ACUTE PAIN LOCALLY ,FEVER,RED/SWOLLEN JOINT, PROLONGED POST OPERATIVE DISCHARGE(>7-10 DAYS) | CHRONIC PAIN,LOOSENING OF PROSTHESIS,SINUS TRACT(FISTULA) |
| CAUSATIVE ORGANISM | HIGH VIRULENCE:STAPHY AUREUS,GNB(E COLI,ENTEROBACTER,KLEBSIELLA,PSEUDO MONAS) | LOW VIRULENCE:CONS(STAPHY EPIDERMIDIS),CUTIBACTERIUM SPECIES |
| SURGICAL TREATMENT | DEBRIDEMENT AND RETENTION OF PROTHESIS(CHANGE OF MOBILE PARTS) | COMPLETE REMOVAL OF PROSTHESIS(EXCHANGE IN ONE OR TWO STAGES) |

Diagnostic algorithm for PJI

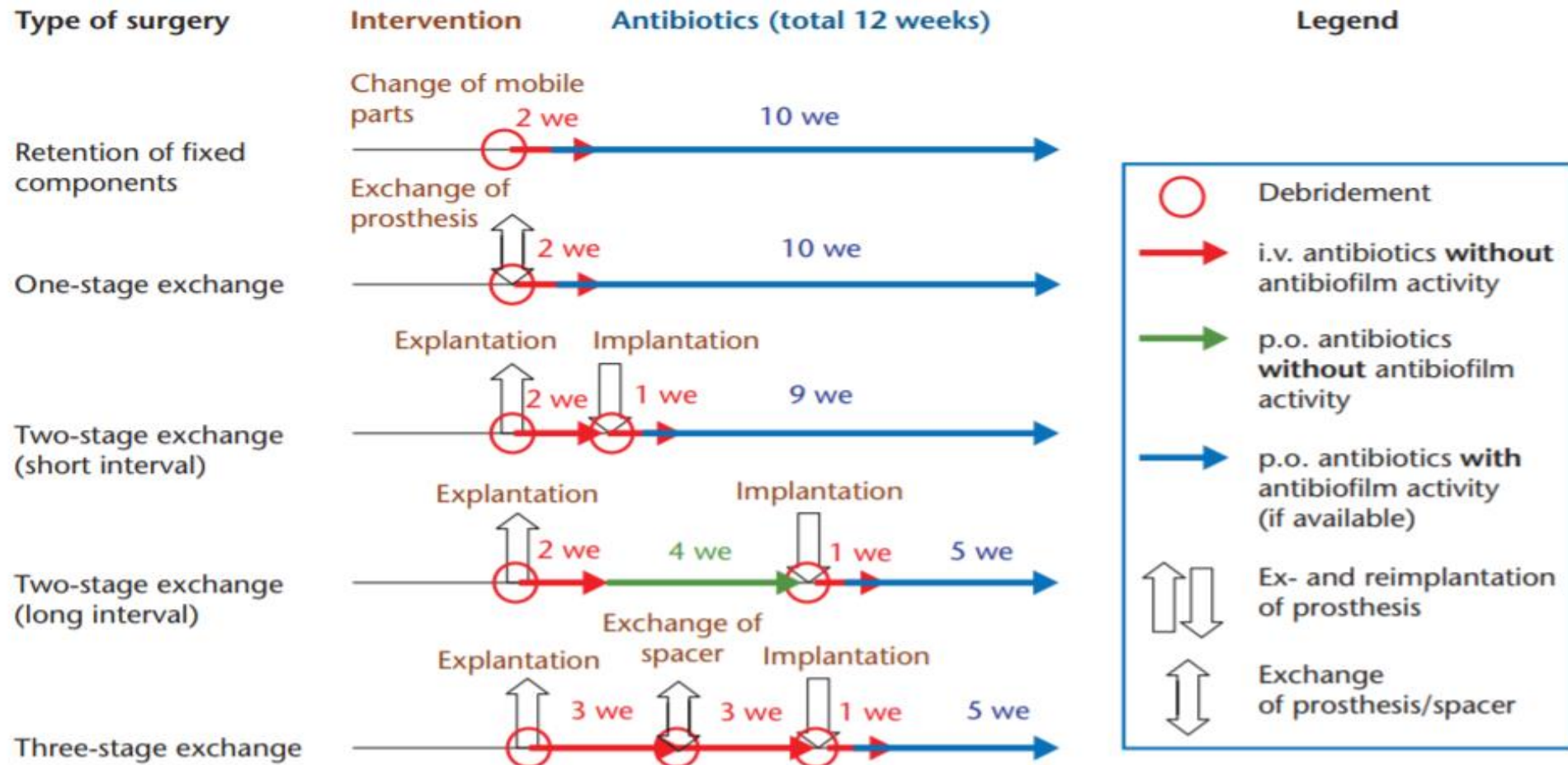


Diagnostic algorithm for PJI



Different approaches

SURGICAL PROCEDURES



Indications and guidelines for debridement and implant retention for periprosthetic hip and knee infection. Curr RevMusculoskelet Med 2018;11:347–356.

Review of literature

***Brucella melitensis* prosthetic joint infection in a traveller returning to the UK from Thailand: Case report and review of the literature**



Joseph M. Lewis ^{a,b,*}, Jonathan Folb ^c, Sanjay Kalra ^d,
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Nick J. Beeching ^{a,c,e,f}

Conclusion from ROL

- ▣ Brucella related PJI is a late complication of joint arthroplasty, median onset after 36 months.
- ▣ Diagnosis can be difficult due to lower sensitivity of blood and joint aspiration culture, 30% and 75% respectively.
- ▣ Intra op tissue sample provide best yield.
- ▣ Optimal treatment duration is unknown
- ▣ Aminoglycoside less regimen will have high relapse rate.

Carry home message

- ▣ In chronic PJI high index of suspicion for brucella is to be kept in mind
- ▣ If repeated culture are negative, long incubation should be ordered.
- ▣ consumption of unpasteurized milk and milk products, contact with cattle, farming is important in history.
- ▣ Ordering and sending sample to reference laboratory makes sense.

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**Wisdom lies not in the amount
of knowledge acquired, but on
the degree of its application.**

- Swami Vivekanand



Thanks

Table 1 Summary of 24 patients with *Brucella* spp. prosthetic joint infection.

| Reference | Age | Sex | Country of exposure | Traveller | Occupation | Prosthetic implant | Time since implantation (months) | Brucella SAT titre | Radiographic changes | Blood cultures positive | Joint aspirate culture positive | Species | Antibiotics used | Antibiotic course length (weeks) | Surgical management | Follow up (months) | Outcome |
|--------------------------|-----|-----|---------------------|-----------|--------------------|------------------------------|----------------------------------|--------------------|----------------------|-------------------------|---------------------------------|----------------------|---|---|--|--------------------|-------------------------|
| Jones et al., 1983 [4] | 54 | M | USA | No | Dairy farmer | R THR | 6 | 640 | No loosening | No | No | <i>B. abortus</i> | Tetracycline 500 mg QID Streptomycin 500 mg BID | 6 – failed therapy; followed by 52 weeks; Streptomycin first 6 only | One stage revision once medical treatment failed | 24 | Asymptomatic |
| Agarwal et al., 1991 [5] | 24 | F | Saudi Arabia | No | NR | Bilateral TKR | 2 | 2560 | No loosening | No | Yes | <i>B. melitensis</i> | Rifampicin 300 mg BID Co-trimoxazole 980 mg BID | 76 | None | 19 | Pain free, flexion 0–90 |
| Orti et al., 1997 [6] | 60 | M | Spain | No | "Works with goats" | R TKR | 14 | 160 | No loosening | No | Yes | <i>B. melitensis</i> | Doxycycline 100 mg BID Rifampicin 900 mg QD Streptomycin 1 g QD | 6 Streptomycin first 3 only | None | 8 | Symptom free |
| Navarro et al., 1997 [7] | 54 | M | Spain | No | Shepherd | L internal fixation of femur | 324 | 160 | Loosening | No | NR | <i>B. melitensis</i> | Doxycycline 100 mg BID Gentamicin 240 mg QD | 34 Gentamicin first 1 only | Removal of implant and debridement | 18 | Asymptomatic |
| Malizos et al., 1997 [8] | 74 | M | Greece | No | Shepherd | Bilateral TKR | 5 | 160 | No loosening | Yes | Yes | <i>B. melitensis</i> | Doxycycline Streptomycin Co-trimoxazole | 20 Streptomycin first 3 only | None | 24 | Asymptomatic |
| Ortega et al., 2002 [9] | 63 | | Spain | No | Cattle owner | R THR | 60 | NR | Loosening | No | NR | <i>B. melitensis</i> | Doxycycline 100 mg BID Rifampicin 900 mg QD Streptomycin 1 g QD | 12 Streptomycin first 3 only | Two-stage revision | 6 | "Satisfactory" |
| Weil et al., 2003 [10] | 38 | M | Israel | No | Artist | L THR | 48 | 1600 | Loosening | NR | No | <i>B. melitensis</i> | Doxycycline 200 mg QD Rifampicin 600 mg QD | 12 6 prior to surgery, 6 after | Two-stage revision | 12 | Asymptomatic |
| Weil et al., 2003 [10] | 61 | M | Israel | No | Retired | R TKR | 60 | 1600 | Loosening | NR | No | <i>B. melitensis</i> | Doxycycline 200 mg QD Rifampicin 600 mg QD | 12 6 prior to surgery, 6 after | Two-stage revision | 12 | Free of joint pain |
| Weil et al., 2003 | 67 | M | Israel | No | Retired | L TKR | 168 | 1600 | Loosening | NR | Yes | <i>B. melitensis</i> | Doxycycline | 12 | Two-stage | 12 | Free of joint |

| | | | | | | | | | | | | | | | | | |
|-----------------------------|----|----|----------|-----|---------------------|----------------|-----|-----|--------------|----|-----|----------------------|--|---|---|-----|--|
| Cairo et al., 2006 [12] | 71 | M | Spain | No | Farmer | R THR | 36 | NR | Loosening | No | NR | <i>B. melitensis</i> | Doxycycline 100 mg BID Rifampicin 600 mg QD Streptomycin 750 mg QD | 24 Streptomycin first week only | Initially one stage revision (infection not suspected); later revision THR after failure of medical therapy | 36 | Well, negative <i>Brucella</i> titres |
| Cairo et al., 2006 [12] | 74 | F | Spain | No | NR | L tibial plate | 180 | 80 | NR | NR | NR | <i>B. melitensis</i> | Doxycycline 100 mg BID Rifampicin 300 mg TID Streptomycin 1 g QD | 32 Doxycycline/streptomycin first week Doxycycline/rifampicin for remainder | Initially bone graft and medical therapy – failed – then two stage revision | 36 | Satisfactory range of movement 0 – 100° knee |
| Ruiz-Iban et al., 2006 [13] | 66 | F | Spain | No | Housewife | THR | 36 | NR | Loosening | NR | Yes | <i>B. abortus</i> | Doxycycline 200 mg QD Rifampicin 900 mg QD | 6 | Two-stage revision | 66 | Asymptomatic |
| Ruiz-Iban et al., 2006 [13] | 71 | M | Spain | No | Agricultural worker | THR | 28 | 640 | No loosening | NR | No | <i>B. melitensis</i> | Doxycycline 200 mg QD Rifampicin 900 mg QD Streptomycin 200 mg QD | 24 Streptomycin first 6 only | Debridement | 60 | Asymptomatic |
| Marbach et al., 2007 [14] | 67 | NR | Sicily | Yes | NR | Bilateral TKR | 48 | NR | Loosening | NR | NR | <i>Brucella</i> spp. | Doxycycline 100 mg BID Rifampicin 450 mg BID | 12 | Two-stage revision | 15 | Good range of movement |
| Tena et al., 2007 [15] | 56 | M | Spain | No | Farmer | L THR | 60 | 80 | Loosening | No | Yes | <i>B. melitensis</i> | Doxycycline 100 mg BID Rifampicin 900 mg QD Streptomycin 1 g QD | 8 Doxycycline/streptomycin first 2 weeks Doxycycline/rifampicin for remainder | Two-stage revision | 60 | Asymptomatic, good joint function |
| Tassinari et al., 2008 [16] | 68 | M | Italy | No | NR | R TKR | 24 | 800 | No loosening | NR | Yes | <i>B. melitensis</i> | Doxycycline 100 mg BID Rifampicin 250 mg QD | 8 | None | 12 | Pain disappeared, no radiographic changes |
| Dauty et al., 2009 [17] | 65 | F | Portugal | Yes | NR | Bilateral TKR | NR | NR | Loosening | NR | NR | <i>B. melitensis</i> | Doxycycline 200 mg QD Rifampicin 900 mg QD | 12 | Two-stage revision | 120 | Pain free, walking distance > 1 km |