



Septic Joints: Native and Prosthetic

Dr. Chris Chong

Rheumatology Rounds

July 18, 2006



The Obligatory Outline

- **Part 1: Septic Arthritis Native Joint**
 - Clinical features
 - Diagnosis
 - Treatment
- **Part 2: Septic Arthritis Prosthetic Joint**
 - Clinical Features
 - Diagnosis
 - Treatment



Septic Arthritis Of Native Joint



Septic Arthritis Of Native Joint

Clinical Features: Epidemiology

■ Epidemiology

- < 2-5 cases/100 000; 28-38/100 000 in RA

■ Risk Factors

- Damaged joints
- Skin infection
- Elderly
- Immunocompromised , DM
- IVDU/central line insertion
- Geographical (Lyme, fungi)
- STIs



Septic Arthritis Of Native Joint

Clinical Features: Bug Epidemiology

Bug (very ~ %)	Patient type
Staph. aureus (~40 – 50%)	Healthy, skin breakdown, damaged joint
Streptococcus (~ 10 - 20%)	Healthy, splenic dysfunction
Neisseria (~10%)	Healthy, sexually active, -ve gram stain/culture
Gram –ve (~10%)	Immune-compromised, GI, IVDU, elderly
Polymicrobial (~5%)	Trauma, GI



Septic Arthritis Of Native Joint

Clinical Features: Presentation

- **Majority acute monoarticular arthritis**
 - Oligoarticular 10-20% of time, esp RA patients
 - Knee involved 50% of times
 - IVDU: SI joints, sternoclavicular
- **Tenosynovitis common in gonococcal**
- **Usually have fever**
 - but often < 39°C; rigors/spikes uncommon



Septic arthritis of native joint

Diagnosis: Lab

■ Synovial fluid cell count

- 50 000 WBCs, >75% PMNs BUT Sn only 64%!!
- Can be < 28 000 WBCs in malignancy, steroids, IVDUs

■ Synovial fluid micro

- Gram stain
 - Non-gonococcal: Sn 50-75%, Sp "high"
 - Gonococcal: Sn < 10%
- Culture:
 - Non-gonococcal: Sn 85%; Sp >90%
 - Gonococcal: Sn 10-50%
- PCR techniques??

■ Blood culture

- +ve in about 50-60% cases



Septic Arthritis Of Native Joint

Diagnosis: Imaging

■ X-Ray

- Most commonly distention joint capsule evidenced by “fat pad” sign

■ Triphasic bone scan

- Useful only for bacterial sacroilitis

■ MRI

- Helpful for extra-articular infection

■ CT/US

- Can detect effusion better than plain films, but rarely needed



Fat Pad Sign



Treatment: Empiric Antibiotics

- **At risk for STI**

- 3rd Ceph (e.g. ceftriaxone)
- If gram stain shows GPCs, add **Vancomycin**
Not at risk for STI
- **Vanco** + 3rd Ceph or quinolone

- Note: **General move away from clox/cefazolin to vanco for initial GPC coverage b/c of increasing MRSA in U.S. Appropriate for Canada??**



Septic Arthritis Of Native Joint

Treatment: Antibiotics Tailor To C&S

Bug type	Typical antibiotic (consider step-down to oral after 2 wks IV)	Duration (depends on who you read!)
MSSA	Clox/Ancef	14 - 28d
MRSA	Vanco/Linezolid	14 - 28d
Strep	Pen G	14 - 28d
Gonococcus	Ceftriaxone	7 - 14d
Gram -ve	Based on sensitivity	21 - 28d



Septic Arthritis Of Native Joint

Treatment: Non-antibiotic

- **Repeated needle aspiration**

- For accessible joint w/ "big" or recurrent effusion
- In first 7 days w/ synovial fluid decreasing cell count/volume

- **Arthroscopic debridement, open drainage, tidal irrigation...**

- For "poor" response in 7 days, inaccessible joints
- Really depends on local orthopedic preferences

- **Physical therapy**

- Maintain joint in functional position
- ROM exercises when pain subsides
- Weight bear when inflammation/pain gone

Think Outside The Box...

- **When things aren't working after ~5 days, consider not only just orthopedic debridement, but...**
 - Reculture, re-examine for crystals
 - Consider Lyme
 - Synovial bx → fungus? TB?
 - Reactive arthritis? → NSAID
 - Consider osteomyelitis?



Septic Arthritis Of Native Joint

Take Home Management Points

- **Initial empiric treatment:
vanco+ceftriaxone pending gram
stain/culture**
- **Allowed to have negative cultures/gram
stain for gonococcal infection**
- **Duration of treatment usually 14-28d
depending on bug**
- **Debridement if poor response in 7 days**



Septic Arthritis Of Prosthetic Joint



Septic Arthritis Of Prosthetic Joints

Why So Different From Native...

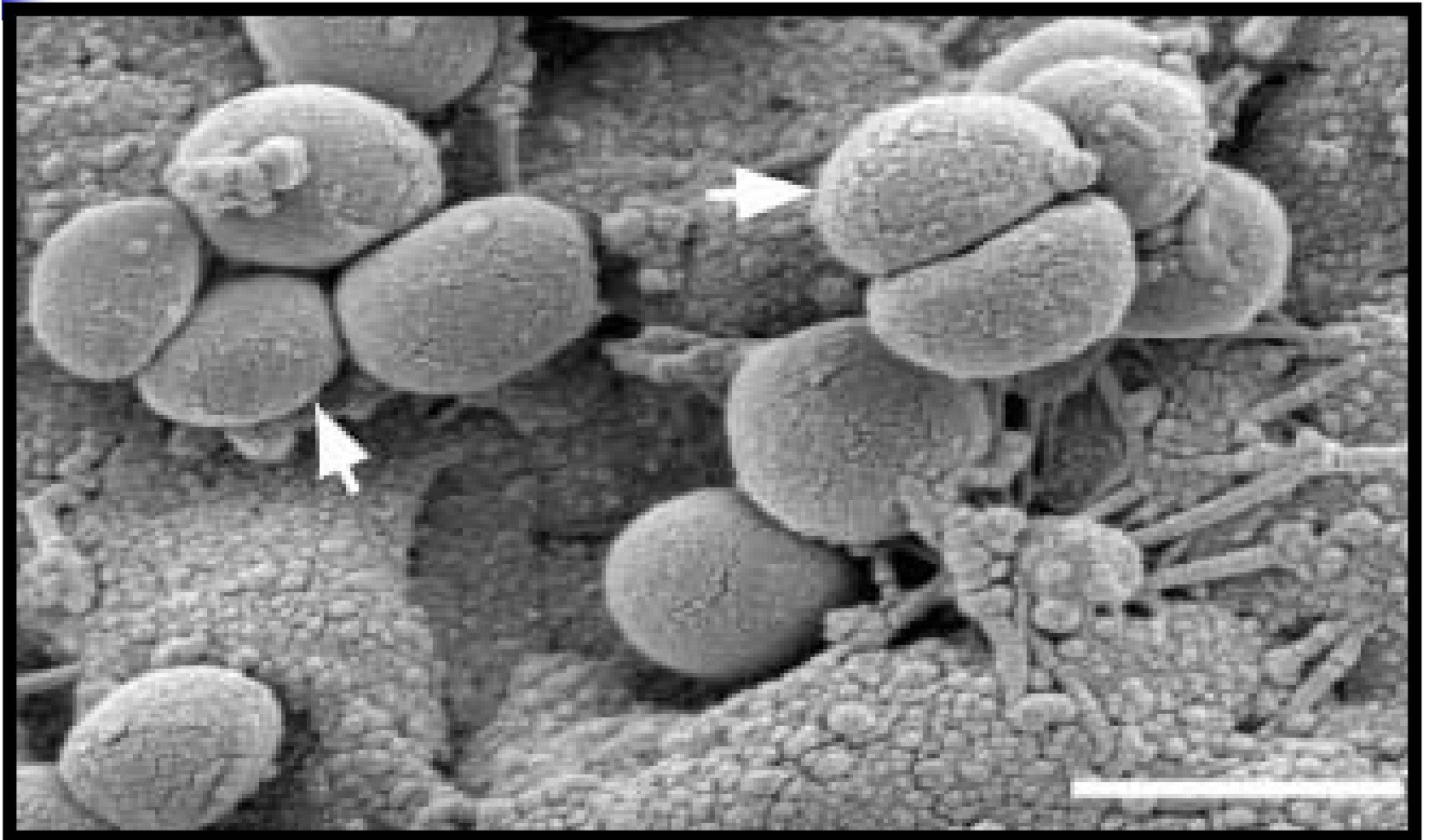
■ **Creation of a biofilm**

- Enter slow growing, stationary state b/c of depleted metabolic sources/waste product elimination
- 1000x more resistant to antibiotics
- Become like multicellular organism
 - Water channels
 - Quorum sensing changes DNA expression
 - Programmed cell death

■ **Foreign body**

- Easier to stick to
- Decreases infecting dose of *S. aureus* by 100 000 fold

A biofilm...ewww...





Septic Arthritis Of Prosthetic Joints

Clinical Features: Epidemiology

- **40-68 cases/100 000 individuals**
- **Infection rate in first 2 years**
 - < 1% hip/shoulder
 - < 2% knee
 - < 9% elbow



Septic Arthritis Of Prosthetic Joints

Clinical Features: Bug Epidem

Time	Source	Bug Type
Early infection < 3mths	During surgery	Virulent bug: S. aureus (12-23%) GNB (3-6%)
Delayed infection 3 – 24mths	During surgery	Less virulent bug: CNSt (30 – 43%)
Late >24mths	Hematogenous spread	Distant foci: skin oral/resp (Strep 10%) GU



Septic arthritis of prosthetic joints

Clinical Features: Presentation

Time	%	Presentation
Early infection < 3mths	29-45%	Persistent pain, poor wound healing (erythema, edema, hematoma), fever
Delayed 3-24 mths	23-41%	Persistent pain, early loosening; may be difficult distinguish aseptic failure
Late >24mths	30-33%	Sudden onset systemic (30%) or sub acute after unrecognized bacteremia (70%)

Diagnosis: Lab

■ Synovial fluid

- Cell count cutoffs much lower than native joint
- WBC count > 1700: Sn 94%, Sp 88%
- PMNs > 65%: Sn 97%, Sp 98%

■ Pre-op synovial aspirate

- Detects bug in 45-100% cases

■ Periprosthetic tissue sample

- Ideally, 3-5 tissue samples (not swabs)
- Detects organism 65-94% of time

Diagnosis: Imaging

■ Plain films

- Rapid development radiolucent line $>2\text{mm}$
- Severe focal osteolysis

■ U/S, CT, MRI

- Useful for joint effusions, guiding aspiration
- Signal interference from joint

■ Bone scan

- Sensitive, but not specific

Radiolucent Line





Septic Arthritis Of Prosthetic Joint

Treatment: Options in Literature

Surgical Option	Indication
Debride and retain	symptom duration <3wks (maybe even < 7 days!) ; stable implant; no sinus tract; susceptible bug. (?also <3mths since implant?)
One-stage exchange	Intact or "slightly damaged" soft tissue; easy to kill bugs
Two-stage exchange w/ 2-4wks of spacer	Damaged soft tissue, abscess or sinus tract
Two-stage exchange w/ 6-8 wks without spacer	Difficult to treat/multi-resistant bug (MRSA, enterococcus, pseudo)



Septic Arthritis Of Prosthetic Joint

Treatment: Toronto Options

Surgical Option used in Toronto	Typical reason see it used in Toronto
Debride and retain	Don't want to operate again, for various reasons
One-stage exchange	Rarely seen
Two-stage exchange w/ 3 to 6 months of antibiotics - impregnated spacer	If going to be replaced, this is what you see most of the time

Treatment: Antibiotic

- **For debride and retain or 1-stage exchange**
 - 2-4wks IV antibiotics, followed by
 - 3 (hip) to 6 (knee) mths oral antibiotics
- **For 2-stage exchange**
 - IV antibiotics for chosen duration (e.g., 6wks)
 - d/c antibiotics 2-14d before re-implantation to get good intra-op sample. If still infected, continue Antibiotics another 3-6mths.



Septic Arthritis Of Prosthetic Joint

Why Is This So Confusing?

Option	Evidence	Success rate?
Debride and retain	1 small, limited RCT	86% at 3 yrs
One-stage exchange	Mainly 4 limited retrospective cohort studies	Optimistically >80%?
Two-stage exchange	About 5 cohort studies	About 90%



Septic Arthritis Of Prosthetic Joint

Long-term Suppressive Antibiotics?

- **Generally for inoperable, bedridden, debilitated patients**
- **Rarely effective for few mths to yrs if delayed-onset**
- **>80% relapse when Antibiotics stopped**



Septic Arthritis Of Prosthetic Joint

Take Home Management Points

- **Synovial fluid cell count thresholds lower for prosthetic septic joint**
- **Very limited indications for trying to salvage joint or 1-stage exchange**
- **Antibiotic duration and surgical options influenced more by local preferences than empiric evidence**
 - *Generally*, in Toronto the treatment is excise prosthetic and place spacer; 3 to 6 months IV antibiotics x; d/c antibiotics 1-2wks; new prosthetic w/ intra-op samples for C&S
 - **THERE ARE NO HARD AND FAST RULES**