

Prosthetic Joint Infection



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Concordia
JOINT
REPLACEMENT
GROUP



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OF MANITOBA

Disclosures Eric Bohm



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Mitigation: no mention of any of these entities in my talk

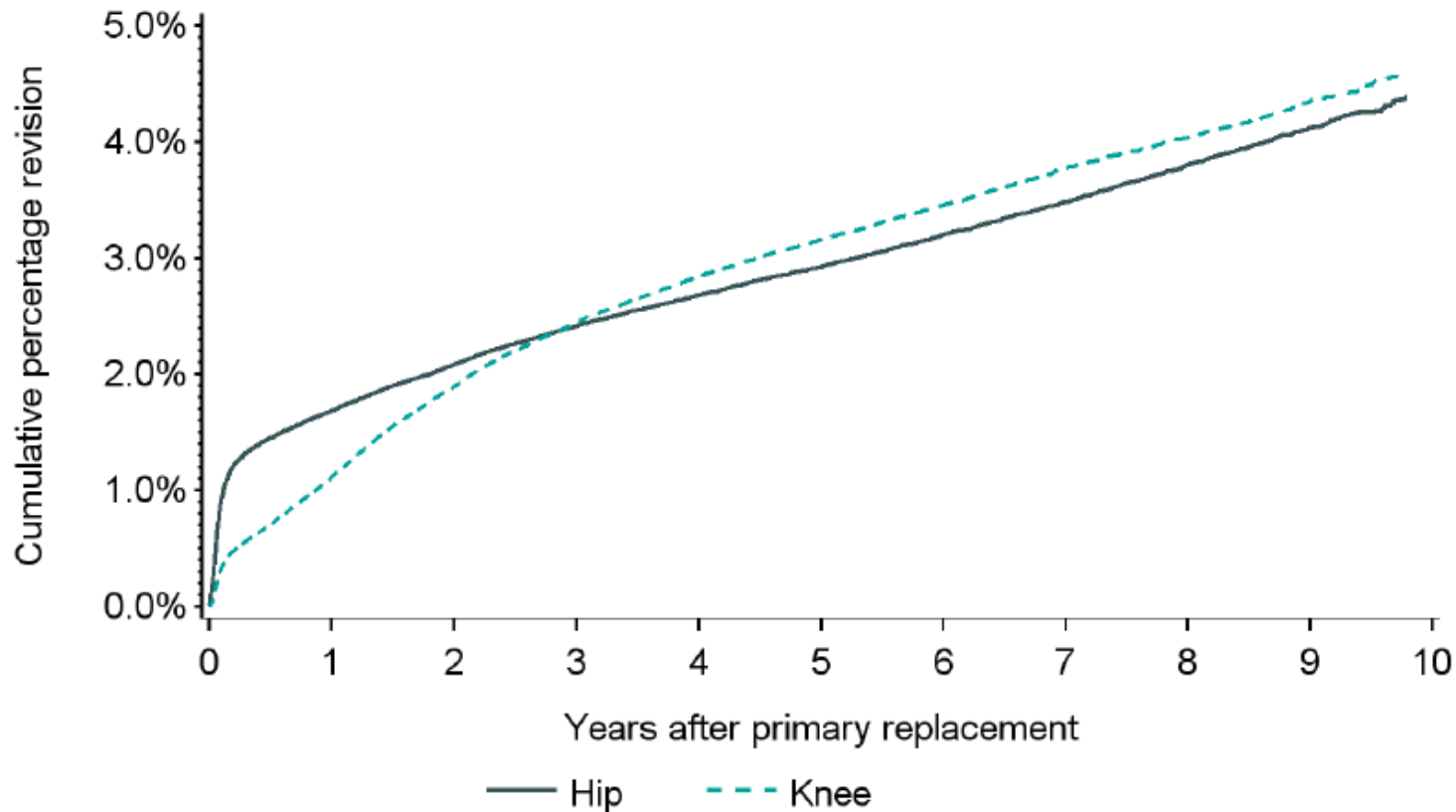
Objectives



1. Be familiar with common presentation
2. Undertake initial assessment
3. Aware of treatment options for infection

CJRR Annual Report – Key Findings

Cumulative percentage revision for primary hip and knee replacement due to degenerative arthritis, Canada, 2009–2010 to 2018–2019



At 1 year, revision risk was higher for hips (1.7% versus 1.1%).

After the 3-year mark, revision risk was higher for knees.

Sources

Discharge Abstract Database, Hospital Morbidity Database and National Ambulatory Care Reporting System, 2009–2010 to 2018–2019, CIHI.

1 in 3

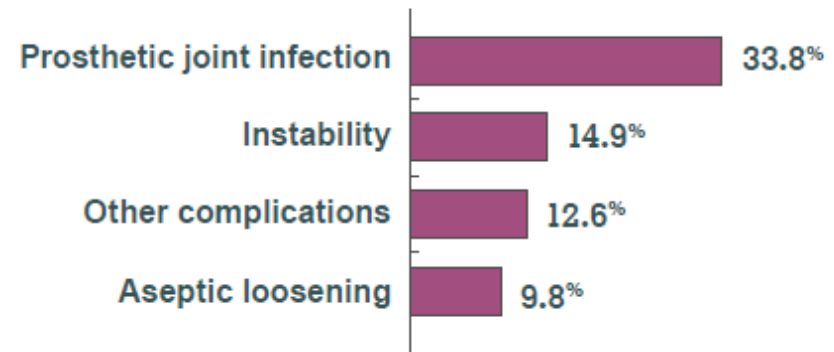
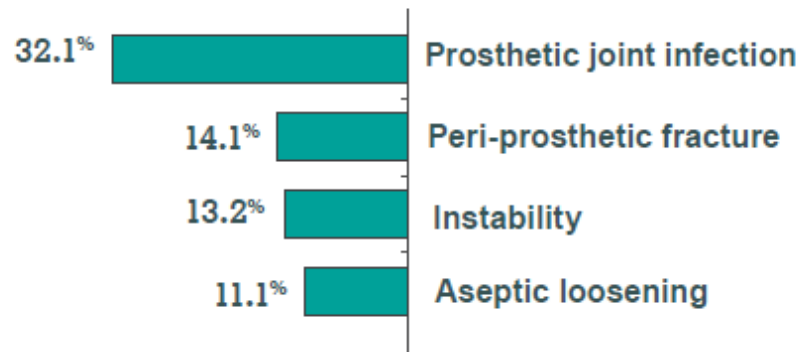
early hip and knee revisions*
are due to prosthetic joint infection

Hip



Knee

Top reasons for early hip and knee revisions



Note

* Early revisions are defined as within 2 years of the primary surgery.

Source

Canadian Institute for Health Information. *1 in 3 early hip and knee revisions are due to prosthetic joint infection*. Ottawa, ON: CIHI; 2020.

Hip



Average costs per hospital stay for hip and knee replacements



Knee



\$10,031

Primary surgery

\$9,184

\$23,125

Revisions due to prosthetic joint infection

\$17,999

Other reasons
\$15,647

Other reasons
\$12,973

Source

Canadian Institute for Health Information. *1 in 3 early hip and knee revisions are due to prosthetic joint infection*. Ottawa, ON: CIHI; 2020.

Risk Factors for Infection



- Increasing age
- Male sex
- TKA > THA
- Immunosuppressed
 - RA, DM, meds
- Previous surgery
- Alcohol abuse
- Smoking
- Malnutrition
- Obesity
- IV drug use

Pre-Operative Optimization?



Diabetes

- Good short and long term glycemic control reduces infection risk

Obesity

- Infection rates \uparrow with BMI $> 40 \text{ kg/m}^2$
- 20x higher with BMI $> 50 \text{ kg/m}^2$
- Bariatric surgery doesn't appear to lower risk

Smoking – Stop

ETOH intake - normalize

Smith, T.O et al. (2016). "Does bariatric surgery prior to total hip or total knee arthroplasty reduce post-operative complications and improve clinical outcomes for obese patients?." [BJJ 2016;98-B:1160-6.](#)

Superficial Wound Infection

- Early – within weeks of surgery
- Erythema
- Minimal systemic symptoms
- Minimal intra-articular symptoms
- Stitch abscess or cellulitis
- Typically quickly responds to oral antibiotics (Keflex)



Prosthetic Joint Infection– Early

- Typically within weeks of surgery
- Increasing pain
- Redness
- Drainage
- Fever, elevated WBC



Prosthetic Joint Infection – Late



Acute

- Hematogenous spread
- Sudden pain, swelling, fever, elevated WBC/ESR/CRP
- Systemically unwell
- Staph Aureus, E.Coli, others

Chronic

- Persistent, chronic pain and swelling
- Vague, no systemic symptoms

Diagnosis

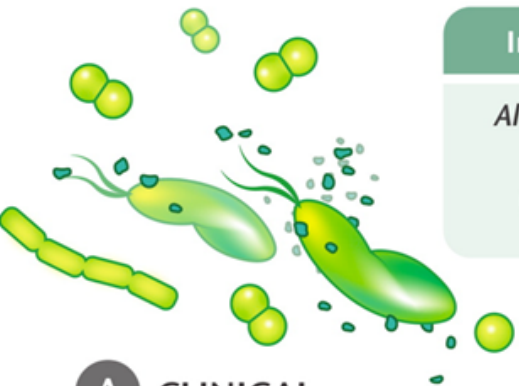


Early infections (superficial or deep) are largely a clinical diagnosis supplemented by CBC, CRP and aspirate

Late infections (deep)

Acute infections – diagnosis similar to early infections

Chronic infections – difficult



A CLINICAL

Clinical features



Clear alternative reason for implant dysfunction

C-reactive protein



B LABORATORY

Synovial fluid



Leukocyte count ≤ 1500
PMN $\leq 65\%$

Microbiology



All cultures negative
No growth on sonication

Histology



Negative

C RADIOLOGY

Nuclear imaging



Negative 3-phase isotope bone scan

Infection Unlikely

All findings negative
A ~~X~~ B ~~X~~ C ~~X~~

Infection Likely

Two positive findings
A ~~X~~ B ~~X~~ or A ~~X~~ C ~~X~~

Infection Confirmed

Any positive finding
A ~~X~~ or B ~~X~~

- Early radiographic loosening
- Wound healing problems
- Recent fever/bacteraemia
- Purulence around prosthesis
- CRP > 10mg/l

Sinus tract communication with the joint +/- visualization of prosthesis

- Leukocyte count > 1500
- PMN > 65%

- Leukocyte count > 3000
- PMN > 80%
- Positive Alpha-defensin

- Single positive culture (aspiration or intra-operative)
- > 1 CFU/ml any organism on sonication

- ≥ 2 positive samples with the same microorganism
- > 50 CFU/ml any organism on sonication

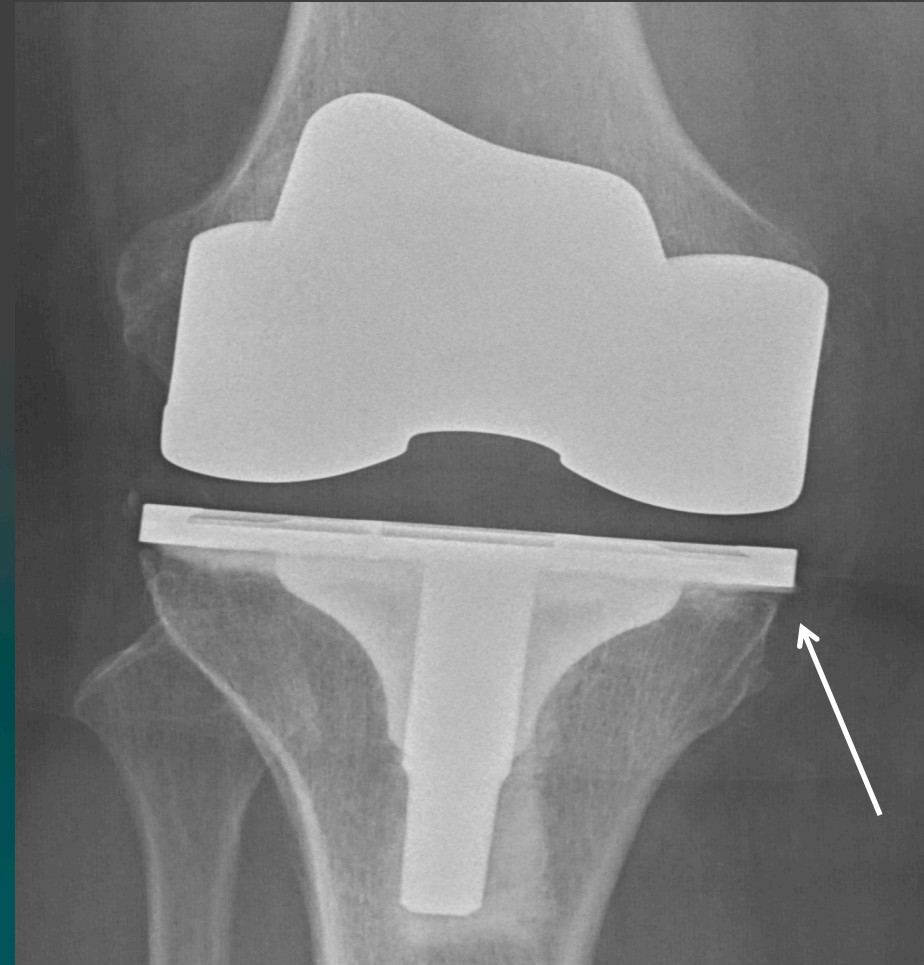
Presence of ≥ 5 neutrophils in a single HPF

- Presence of ≥ 5 neutrophils in ≥ 5 HPF
- Visible microorganisms

Positive white blood cell labelled scintigraphy



X-ray Findings Subtle



Diagnosis – Bottom Line



Increased pain, redness, swelling – call the surgeon
CBC, CRP, Aspirate (culture, cell count), X-ray helpful
Negative culture does not rule out infection

Treatment – Superficial Wound Infection

- Contact surgeon
- Stitch abscess
 - remove suture end, polysporin +/- oral abx
- Cellulitis
 - Oral abx, occasionally IV



Treatment – Deep Prosthetic Infection



Bacteria produce a glycocalyx (“slime”) which necessitates surgical debridement followed by antibiotics (IV +/- oral)

1. Debridement & Implant Retention “DAIR”
2. Single stage revision
3. Staged revision
 - Abx loaded spacer -> Abx IV -> final revision

DAIR



6 weeks of Abx
Normalization of
ESR and CRP

Single Stage Revision



6-12 weeks of Abx
Normalization of
ESR and CRP

Staged Revision



Staged Revision

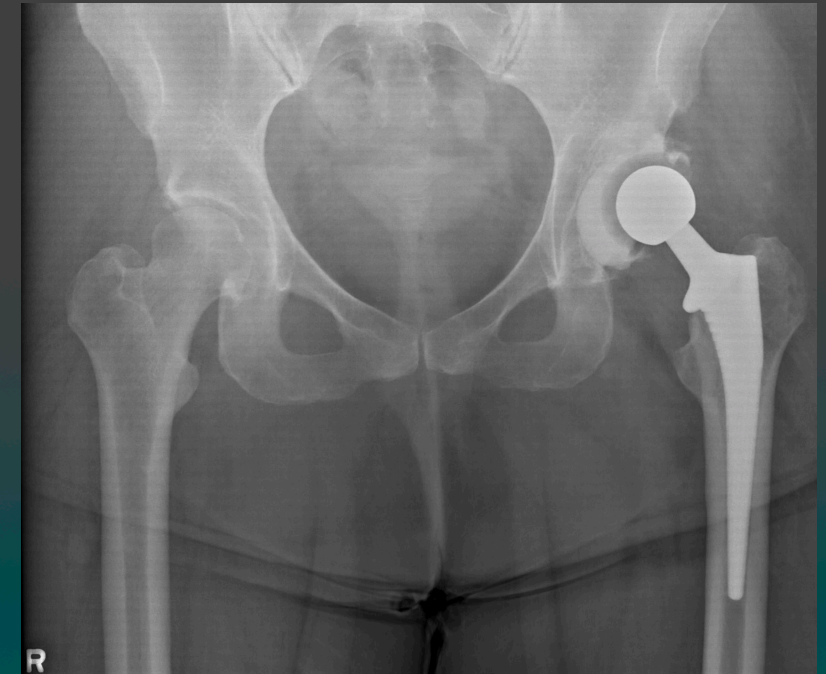


6-12 weeks of Abx
Normalization of
ESR and CRP



Long Term Antibiotic Suppressive Therapy

- Not always possible to eradicate infection
- Multiple repeat operations not always possible
- Use long term oral low dose antibiotic suppression



Summary



Presentation: pain

Investigations: physical exam, CBC, CRP, x-ray, aspirate

Treatment: contact surgeon, antibiotics only for superficial infections, surgery and antibiotics for prosthesis infections