Protocol for infected joint replacements

Portsmouth Arthroplasty Group 2007
Biofilms are communities of the same (occasionally multiple) bacteria that develop in association with a surface. The bacteria demonstrate phenotypic differences to genetically identical planktonic bacteria, often living in a polysaccharide matrix.
Clinical importance of biofilms

- They are responsible for the two key features of implant infection:
  - **Failure of antibiotic treatment / relapse**
  - **Chronic, persisting infection**
Biofilm formation on implants
Small Colony Variants (SCV)

- SCV can survive inside phagocytes, so evading antibiotic therapy
- Decreased electron transport
- Produce slime
Biofilms and antibiotic treatment failure

[Chart showing concentrations of different antibiotics (Gent, Vanc, Clind, Ceph) in MIC and MBEC]
Considerations

- Antibiotic must reach the bacteria
- Bone penetration
- Haematoma / pus penetration
- Antibiotic must reach intracellular bacteria, especially in chronic infections
- Importance of SCV
- Importance of biofilm maturation
Implant infection

- **Treatment:** once biofilm has developed, implant removal is usually necessary.

**BUT:** combination therapy with antibiotics that penetrate macrophages? Zimmerli et al 1998, Trampuz et al 2005: rifampicin plus ciprofloxacin or minocycline or trimethoprim; also linezolid or quinopristin - dalfopristin, or tigecycline?
Acute infection

- 6 weeks or sooner from operation
  - Wound redness or erythema
  - With or without discharge
  - Increased inflammatory markers
  - Positive microbiology
Acute infection

- Aspirate if closed & await micro
  - If positive then washout as below
- Open washout if discharging
  - Daytime, consultant led procedure
  - Multiple samples (>6)
  - Thorough débridement & synovectomy
  - Change poly insert/femoral head/liner
  - Manually clean other prosthetic surfaces
  - Start Abx after samples taken
    - Vanc & Gent as 1st line
  - Washout with chlorhex saline x plenty
  - 2 drains – deep & superficial
  - CLOSE WOUND!!!
Acute infection

- Minimum 6/52 Abx
  - IV until wound healed and CRP↓ (weekly CRP max)
  - Oral after until CRP normal
  - Discuss with micro
  - If CRP stays high, implants loose or pt fails to settle:
    - 1st stage revision with insertion of cement spacer

- Figures from big centres suggest 68% long term retention of prosthesis
Subacute infection

- 3/12-1 year post op
  - Either ‘slow acute’ or haematogenous
- Index of suspicion
  - Hi CRP & ESR
  - Pyrexia
  - Swelling & pain
  - X-ray changes suggestive of loosening
Subacute infection

- If index of suspicion high
  - Aspirate under sterile conditions
    - ? USS
    - Start Abx if suitable sample obtained
  - Washout as before
    - ??arthroscopy for TKR
      - Little support in literature
  - Higher risk of failure of salvage
    - i.e. usu need 2 stage revision
Late infection

- > 1 year post implantation
- Consider if persistently painful
- Early x-ray changes
- Attempt to obtain samples prior to revision
  - Aspiration
  - Specify sensitivity
- Planned 2 stage unless acutely unwell
Late infection

- **1st stage** – removal of implants & débridement
  - Cement spacer
  - Specific Abx added

- **Minimum 6/52 Abx**
  - 2/52 IV then oral

- **Consider 2nd stage when CRP & ESR↓**
  - Usu <6/12 after 1st stage
  - ?role of frozen section