Open Peer Review on Qeios

Fracture-related infection

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Source

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Confirmatory criteria for FRI

1. Fistula, sinus or wound breakdown (with communication to the bone or the implant).
2. Purulent drainage from the wound or presence of pus during surgery.
3. Phenotypically indistinguishable pathogens identified by culture from at least two separate deep tissue/implant (including sonication-fluid) specimens taken during an operative intervention. In case of tissue, multiple specimens (≥3) should be taken, each with clean instruments (not superficial or sinus tract swabs). In cases of joint effusion, arising in a joint adjacent to a fractured bone, fluid samples obtained by sterile puncture may be included as a single sample.
4. Presence of microorganisms in deep tissue taken during an operative intervention, as confirmed by histopathological examination using specific staining techniques for bacteria or fungi.

Suggestive criteria for FRI

1. Clinical signs — any one of:
   - Pain (without weight bearing, increasing over time, new-onset)
   - Local redness
   - Local swelling
   - Increased local temperature
   - Fever (single oral temperature measurement of ≥38.3°C (101°F))

2. Radiological signs — any one of:
   - Bone lysis (at the fracture site, around the implant)
   - Implant loosening
   - Sequestration (occurring over time)
   - Failure of progression of bone healing (i.e. non-union)
   - Presence of periosteal bone formation (e.g. at localizations other than the fracture site or in case of a consolidated fracture)
3. A pathogenic organism indentified by culture from a single deep tissue/implant (including sonication-fluid) specimen taken during an operative intervention. In case of tissue, multiple specimens (≥3) should be taken, each with clean instruments (not superficial or sinus tract swabs). In cases of joint effusion arising in a joint adjacent to a fractured bone, a fluid sample obtained by sterile puncture is permitted.
4. Elevated serum inflammatory markers: In musculoskeletal trauma, these should be interpreted with caution. They are included as suggestive signs in case of a secondary rise (after an initial decrease) or a consistent elevation over a period in time, and after exclusion of other infectious foci or inflammatory processes:
   - Erythrocyte sedimentation rate (ESR)
   - White blood cell count (WBC)
   - C-reactive protein (CRP)
5. Persistent, increasing or new-onset wound drainage, beyond the first few days postoperatively, without solid alternative explanation.
6. New-onset of joint effusion in fracture patients. Surgeons should be aware that FRI can present as an adjacent septic arthritis in the following cases:
   - Implant material which penetrates the joint capsule (e.g. femoral nailing)
   - Intra-articular fractures