

Sp38: What are the incidence and risk factors of mixed bacterial infections in PSI?

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Response/Recommendation:

Polymicrobial infections in spinal surgery occur in a significant proportion of surgical site infections (SSIs), particularly in cases involving complex procedures, prolonged operative time, revision surgeries, and surgeries involving the sacrum. High-risk factors include immunocompromised states, diabetes, obesity, malnutrition, prior infection history, and prolonged wound drainage. Surgical teams should adopt rigorous infection control measures and tailored empiric antibiotic regimens in high risk cases.

Strength of recommendation: Moderate

Delegate Vote:

Rationale:

Surgical site infections (SSIs) are a major complication in spinal surgery, leading to prolonged hospitalization, increased treatment costs, and poorer clinical outcomes. The reported incidence of SSIs in spinal surgery ranges from 2% to 6%, with polymicrobial infections accounting for 27.6% to 68.8% of deep infections [1,2,3]. Identifying risk factors and understanding the microbiological profile of polymicrobial infections can guide targeted antibiotic prophylaxis and improve surgical outcomes.

Incidence of Polymicrobial Infections

Studies indicate that polymicrobial infections are a frequent finding in postoperative spinal infections:

- In a study of 51 patients with post-instrumentation SSIs, 27.6% of deep infections without myonecrosis and 68.8% of deep infections with myonecrosis were polymicrobial [1].
- A retrospective review of 5770 spinal surgeries reported that 41.4% of SSIs were polymicrobial [2].
- Among 239 patients with SSIs, 41.4% of cases were polymicrobial, with a notable correlation between sacral procedures and polymicrobial infections ($P = 0.020$) [3].

These findings highlight that nearly half of spinal SSIs may involve multiple organisms, necessitating broad-spectrum antimicrobial coverage.

Risk Factors for Polymicrobial Infections

Several factors contribute to an increased risk of polymicrobial infections in spinal surgery:

1. **Surgical Complexity and Operative Factors**
 - Revision surgeries are more likely to result in polymicrobial infections (47.4% vs. 28.0% in primary surgeries; $P = 0.003$) [3].

- Prolonged operative time and multiple-level fusions increase the risk of bacterial contamination [4].
 - The presence of instrumentation creates a favorable environment for biofilm formation, reducing antibiotic efficacy [5].
2. **Patient-Related Risk Factors**
- **Immunosuppression:** Diabetes mellitus, chronic steroid use, and cancer increase susceptibility to polymicrobial infections [1,4].
 - **Obesity:** Higher body mass index (BMI) is associated with prolonged wound healing and increased bacterial colonization [6].
 - **Malnutrition:** Low serum albumin levels (<2.5 g/dL) significantly increase the risk of postoperative infections, including polymicrobial infections [1].
 - **Prior Infections:** Patients with a history of previous infections, urinary tract infections, or other systemic infections are at higher risk [2].
3. **Microbiological Findings**
- The most common bacteria involved in polymicrobial infections include *Staphylococcus aureus*, *Staphylococcus epidermidis*, *Enterococcus* spp., *Escherichia coli*, and *Pseudomonas aeruginosa* [3].
 - Sacral surgeries are associated with an increased incidence of gram-negative bacteria and polymicrobial infections ($P < 0.001$) [3].
 - Cefazolin-resistant gram-negative organisms accounted for 61.6% of gram-negative infections, raising concerns about the efficacy of standard perioperative prophylaxis [3].

Conclusion:

Polymicrobial infections are common in spinal surgery and are associated with increased morbidity, revision surgeries, and longer hospital stays. High-risk factors include revision procedures, instrumentation, extended operative time, and patient comorbidities such as diabetes, obesity, and immunosuppression. Sacral and multi-level surgeries are particularly prone to polymicrobial infections, often involving gram-negative bacteria. Preventive strategies should focus on optimizing perioperative prophylaxis, improving surgical techniques to minimize contamination, and early aggressive management of SSIs. Future research should explore tailored antibiotic regimens to address polymicrobial and resistant infections effectively.

References:

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