Surgical Site Infections in Orthopaedics: An Introduction

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Surgical site infections (SSIs) are defined as infections of tissues, organs or spaces exposed by surgeons during the performance of an invasive procedure, that occur within 30 days of surgery or within 1 year of surgery involving implants[1]. In the USA, SSIs are ranked third amongst all reported cases of inpatient nosocomial infections [2,3]. Approximately, 5,00,000 SSIs are reported in the USA every year (2.8 per 100 operations) [4], accounting for 16% of nosocomial infections in all hospitalized patients [5]. Between 30,000- 35,000 SSIs are reported annually in the USA following the performance of an orthopaedic invasive procedure[6]. In a developing nation such as India where surgeries are performed in operating theatres with varying standards and practice of asepsis, the incidence of SSIs is estimated to be many folds higher. As our horizons continue to expand, and we are called upon to perform more complex procedures on patients who are elderly, immuno-compromised and with multiple medical comorbidities, the incidence of SSIs is likely to rise further.

Orthopaedic surgeons have always dreaded SSIs. They compromise the outcome of an otherwise successful surgery resulting in increased suffering, disability, morbidity and mortality and may often compromise the eventual outcome. Besides SSIs result in more extended hospitalization, increased direct and indirect costs, loss of work hours and even job loss. Whitehouse et al. performed a case-controlled study to look at the outcomes following SSIs in orthopaedics [7]. They reported an increase in hospital stay by a median of 2 weeks per patient, approximately double rehospitalization rates and increased healthcare costs by more than 300%. They also found patients with SSIs to have substantially higher physical limitations and significant reductions in health-related quality of life.

Early detection of wound infection requires careful vigilance by the operating team. Pain that is out of proportion to the nature of surgery, fever and difficulty in moving the limb are early signs of infection that may appear even before the surgical site shows signs of infection such as local warmth, tenderness, redness, shininess, oedema, induration and discharge. Laboratory tests and x-rays are of limited use in diagnosing an early infection. In the immediate postoperative setting, an MRI scan is also of limited use because soft tissue hyperintensities and fluid collections are typically seen within the wound at this time. Obtaining a tissue sample to isolate an organism is vital in planning the subsequent treatment.

SSIs in orthopaedics is especially challenging because of the large muscle bulk, the problem of persistence of infection within the bone and the formation of biofilms on dead bone and implants. The treatment of an established SSI entails source control, coupled with targeted antibiotics. Source control involves drainage of purulent material, physical debridement of dead and infected tissue including bone, and copious irrigation of the wound. Implants can be retained, removed or replaced based on the progress of bone healing, the formation of biofilms and the fixation of the implant within the bone. A variety of techniques can be used to obtain local control of infection including antibiotic-loaded cement beads, biocomposites like Stimulan coupled with antibiotics or application of silver nitrate solution. In severe infections, especially in the presence of implants, primary wound closure is avoided and negative pressure wound therapy is used to obtain a reduction in local infection, to promote granulation and healing of the wound. Occasionally, especially for extremity wounds, a flap may be required to cover exposed implant/ bone/ joints/ tendons / nerves. Antibiotics must be targeted to the organism isolated and administered for prolonged periods (8 to 12 weeks or even longer). Rifamycins are active against biofilms of staphylococci and fluoroquinolones against those of gram-negative bacilli.

The endpoint of stopping antibiotics and declaring complete eradication of infection has not yet been clearly outlined in the literature. No single investigation or clinical sign in isolation can help determine the healing of the infection. Clinical improvement wound

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healing, reduction in CRP, ESR and Total WBC count, MRI evidence of reduction in soft tissue hyperintensities, fluid collection and bone marrow oedema, fatty conversion of bone marrow with fusion, and a negative bone scan are some of the features of a healed infection.

In spite of considerable improvements in the operating room environment, surgical techniques and aseptic practices, SSIs continue to constitute a significant challenge for the medical team and healthcare institutions. A multipronged approach involving surveillance, antimicrobial prophylaxis, eradication of carrier status, infection control programmes and education is vital to reduce the risk of SSI. The old adage, "An Ounce of Prevention is better than a Pound of Cure" is aptly suited to the problem of surgical site infections in orthopaedics.

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