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Editorial

Role of Prophylactic Antibiotics in Orthopaedics: Current Concepts

Narsaria N[1] and Singh AK[2]*

[1]*Associate Professor, GCRG Medical College, Lucknow, India*

[2]*Associate Professor, Department of Orthopedics, Government Medical College, Banda, India*

***Corresponding Author**: AK Singh, Associate Professor, Department of Orthopedics, Government Medical College, Banda, India.

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Infection is a catastrophic complication in orthopaedic surgery. Surgical site infections (SSIs) account for approximately 38% of all postoperative infections which affect final outcome after treatment of long bone fractures. Incidence of infection is reported to be in range from 1 to 4% [1-3]. To control infection, various methods are used including laminar-flow operating rooms, surgical discipline and use of antibiotics. The World Health Organization (WHO) has recommended 19 items surgical safety check list to be adapted during any surgical procedure to reduce complications and prophylactic antibiotics are one of them [4]. Perioperative antibiotic prophylaxis can help prevent SSI, and studies have shown the benefit of administering antibiotics before skin incision in trauma surgeries by reducing the risk of infection [5-7].

Implants are used commonly in orthopaedics and infection in cases with implant poses great challenge to orthopaedic surgeons because antibiotics reach to implant only by diffusion method. The staphylococcal infections of the orthopaedic implants are a major problem in trauma surgeries. The most frequent cause of infection of implant are is the perioperative contamination. The most common organisms causing infection are *Staphylococcus aureus*, coagulase-negative *staphylococcus* and gram negative *bacilli*. Antibiotics can eliminate bacteria before they colonize implants or are established intracellularly in the macrophages.

In 1928, Alexander Fleming discovered penicillin which was used in high amount during World War II. After emergence of antibiotic resistance in bacteria, other antibiotics like cephalosporins, aminoglycosides, the glycopeptides (vancomycin, quinolones and clindamycin were derived and now being used more commonly for treating infection in orthopaedic cases.

There is controversy regarding selection of proper antibiotic and its dosing for prophylaxis against infection. According to American Society of Health System Pharmacists (ASHP), cefazolin was the most used antibiotic in preoperative prophylaxis and combination of cefazolin with gentamicin was the second most common regimen used in western countries [8]. The Centers for Disease Control (CDC) Infection Control guidelines recommend that antibiotics should be re-administered if the duration of surgery is expected to exceed the time [1]. As per American Academy of Orthopaedic Surgeons guidelines, perioperative antibiotic treatment should include a single preoperative dose and intraoperative re-dosing based on procedure length and blood loss [9]. The choice of single- versus multiple-dose antibiotics is decided by factors such as injury severity, comorbidities and duration of surgery.

Various studies has reported that antibiotics should be administered before the skin incision. Niimi., *et al.* in their study, administered antibiotics 30 minutes before surgery [10]. Yeap., *et al*. administered antibiotics 30 - 60 min before the surgery [11] and they reported very minimal infection rate. Antibiotics are less effective if given after skin incision or inflation of tourniquet.

Duration of prophylactic antibiotic is controversial and debatable issue in orthopaedic surgery. Various studies has recommended different duration. Some studies reported that there is no additional benefit when antibiotic prophylaxis was continued beyond 24 hours [12,13]. Thonse., *et al*. recommended antibiotics at time of induction of anesthesia and other two doses at 8 and 16 hours postoperatively [12]. Stefɑnsdóttir., *et al*. recommended two doses, one at the time of induction and another 6 h after surgery [13]. Zalavaras., *et al.* used antibiotic prophylaxis for 3 days in cases with bone grafting or any major surgical procedure [14]. A longer duration of the antibiotic prophylaxis increases the risk of microbial resistance and the cost of the treatment.

After reviewing literature, we can conclude that second and 3rd generation cephalosporins (Cefuroxime and ceftriaxone) are most commonly used prophylactic antibiotics. Antibiotics should be administered at least 30 minutes before skin incision and should be continued for 1 day to 3 days depending upon patient profile, comorbidities, hospital environment and type of surgery.

Bibliography

1. Mangram AJ., *et al*. "The Hospital Infection Control Practices Advisory Committee. Guideline for prevention of surgical site infection". *Infection Control and Hospital Epidemiology* 20.4 (1999): 250-280.
2. Mazza A. "Ceftriaxone as short-term antibiotic prophylaxis in orthopaedic surgery: A cost-benefit analysis involving 808 patients". *Journal of Chemotherapy* 12.3 (2000): 29-33.
3. Mini E., *et al*. "Preliminary results of a survey of the use of antimicrobial agents as prophylaxis in orthopedic surgery". *Journal of Chemotherapy* 1.1 (2001): 73-79.
4. Sewell M., *et al*. "Use of the WHO surgical safety checklist in trauma and orthopaedic patients". *International Orthopaedics* 35.6 (2011): 897-901.
5. Andersson AE., *et al*. "The application of evidence-based measures to reduce surgical site infections during orthopedic surgery - report of a single-center experience in Sweden". *Patient Safety in Surgery* 6.1 (2012): 11.
6. Haynes AB., *et al*. "A surgical safety checklist to reduce morbidity and mortality in a global population". *New England Journal of Medicine* 360.5 (2009): 491-499.
7. AlBuhairan B., *et al*. "Antibiotic prophylaxis for wound infections in total joint arthroplasty: A systematic review". *Journal of Bone and Joint Surgery-British* 90.7 (2008): 915-919.
8. Bratzler DW., *et al*. "Clinical practice guidelines for antimicrobial prophylaxis in surgery". *Surgical Infections (Larchmt)* 14.1 (2013): 73-156.
9. Prokuski L. "Prophylactic antibiotics in orthopaedic surgery". *Journal of the American Academy of Orthopaedic Surgeons* 16.5 (2008): 283-293.
10. Niimi R., *et al*. "One-day antibiotic infusion for the prevention of postoperative infection following arthroplasty: A case control study". *ISRN Orthopedics* (2011): 839641.
11. Yeap JS., *et al*. "Prophylactic antibiotics in orthopaedic surgery: Guidelines and practice". *Medical Journal of Malaysia* 61.2 (2006): 181-188.
12. Thonse R., *et al*. "Timing of antibiotic prophylaxis in surgery for adult hip fracture". *Annals of the Royal College of Surgeons of England* 86.4 (2004): 263-266.
13. Stefánsdóttir A., *et al*. "Inadequate timing of prophylactic antibiotics in orthopedic surgery. We can do better". *Acta Orthopaedica* 80.6 (2009): 633-638.
14. Zalavras CG and Patzakis MJ. "Open Fractures: Evaluation and Management". *Journal of the American Academy of Orthopaedic Surgeons* 11.3 (2003): 213- 215.

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