Use of Prophylactic Antibiotics in Preventing Infection of Traumatic Injuries

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KEYWORDS

• Prophylactic • Soft tissue • Infection • Trauma

Approximately 11.8 million wounds were treated in the emergency departments in the United States in 2005.[1] At least 7.3 million lacerations are treated annually[2] and an additional 2 million outpatient visits each year occur for treatment of wounds caused by cutting or piercing objects.[3] Half of these traumatic wounds are located on the head and neck,[3,4] This makes it important for clinicians to understand how best to prevent infections following traumatic soft tissue injuries, as well as traumatic bony injuries, in these areas.

The primary goal in the management of traumatic wounds is to achieve rapid healing with optimal functional and esthetic results.[5] This is best accomplished by providing an environment that prevents infection of the wound during healing. Such care includes adequate overall medical assessment of the patient; proper wound evaluation and preparation; adequate anesthesia and hemostasis; reduction of tissue contamination by wound cleansing, debridement of devitalized tissue, and removal of any foreign bodies; and correct wound closure. Several reviews describe the principles and details of this phase of wound care.[6]

Despite good wound care, some infections still occur. Accordingly, some investigators argue that prophylactic antibiotics have an important role in the management of certain types of wounds.[7] This article reviews the basis of antibiotic use in preventing wound infection in general and its use in oral and facial wounds in particular. See the article by Stefanopoulos elsewhere in this issue for a discussion of the role of antibiotics in the management of bite wounds.

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PROPHYLACTIC ANTIBIOTICS IN PATIENTS WITH SKIN WOUNDS

The term *prophylactic antibiotics* implies the use of such antibiotics as a preventive measure in the absence of an established infection.[8,9] Although virtually all traumatic wounds can be considered contaminated with bacteria to some extent, only a small percentage eventually become infected. Accordingly, it is possible that only a subset of high-risk wounds or patients stand to benefit from prophylactic antibiotics.[7] Estimates of the incidence of traumatic wound infection vary widely, depending on the method of study and the population examined, but most studies have found an incidence of 4.5% to 6.3%.[10–13] In a meta-analysis of seven studies, the wound infection rates in the control populations ranged from 1.1% to 12% with a mean of 6%.[14]

When considering the role of antibiotics in preventing wound infection, it is important to consider the risk factors for infection. These factors relate to the nature of the host, the characteristics of the wound, and the treatment used.[15] The host risk factors include extreme young or old age; medical problems, such as diabetes mellitus, chronic renal failure, obesity, malnutrition, and immunocompromising illnesses; and such therapies as corticosteroids and chemotherapeutic agents.[8,9,16,17] Wound factors that increase risk include high bacterial counts in the wound; oil contamination; and crush injury. Risk of infection also varies according to wound depth, configuration, and size.[7,18] Wounds associated with tendons, joints, and bones; puncture wounds; intraoral wounds; and most mammalian wounds are also considered at high risk for infection. Certain treatments, such as the use of epinephrine-containing solutions, may also increase the risk of infection. Furthermore, risk of infection increases with the number of sutures. Finally, risk of infection may be higher with an inexperienced treating doctor than with an experienced one.[19]

When antibiotics are used to prevent infections in traumatic wounds, certain indications are often cited. Such indications include wounds associated with open joints or fractures, human or animal bites, and intraoral lacerations. Despite limited evidence, antibiotics also are recommended for heavily contaminated wounds (eg, those involving soil, feces, saliva, vaginal secretions, or other contaminants).[20] Prophylactic antibiotics also are advocated for traumatic wounds in patients who have prosthetic devices and for preventing bacteremia in patients at risk for developing endocarditis.[20,21] Systemic antibiotics also are recommended when there is a lapse of more than 3 hours since injury, when there is lymphedematous tissue involvement, and when the host is immunocompromised.[22,23]

According to the principles of presurgical prophylaxis, antibiotics, if they are to be given at all, should be administered as soon as possible after the injury, if possible within the first 3 hours, and continued for 3 to 5 days.[7,22,24] The antibiotic therapy should also be directed against the most common skin pathogens, *Staphylococcus aureus* and *Streptococci*.[22] Cloxacillin and first-generation cephalosporins are appropriate as first-line therapy.

Despite the frequent use of prophylactic antibiotics to prevent traumatic wound infections, some clinicians still have reservations about the effectiveness of their use. Some investigators argue that most uncomplicated wounds heal without systemic antibiotic therapy.[22] In addition, in many situations, prophylactic antibiotics not only fail to reduce the overall rate of infection, but also may skew the bacteriology toward more unusual or resistant pathogens.[7] In fact, clinical studies fail to demonstrate a lower infection rate among patients with uncomplicated wounds treated with prophylactic antibiotics than among control subjects,[25] and no randomized trials have shown a clear benefit of antibiotic prophylaxis for simple wounds in immunocompetent patients.[25–30] Furthermore, a meta-analysis of randomized trials found no benefit from the use of prophylactic antibiotics for simple wounds.[24]