Antibiotic prophylaxis for open extremity fractures: What should your Trauma Center's practice be?

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Open long-bone extremity fractures continue to be a significant contributor to morbidity at trauma centers across the United States. Evidence-based guidelines continue to emphasize that prompt surgical washout, debridement and stabilization of theses fractures remains the top priority for initial management in order to reduce the significant morbidity associated with infectious wound complications in these injuries.[1,2] Additionally, the timely administration of prophylactic antibiotics has also been shown to reduce wound infection rates up nearly 50% and remains a key adjunct treatment per current guidelines. While there is little debate that early prophylactic antibiotic administration should be included in the management of these injuries, the choice of antibiotic and duration of therapy remain hotly debated topics.

The debate centers on the competing risks and benefits of broad spectrum antibiotic administration in these often severely injured patients. The significant rates of morbidity and limb loss associated with infectious wound complications, especially in Grade III Gustillo classification (see Gustilo Classification) injuries have traditionally influenced many clinicians to err on the side of broad antibiotic coverage, often with adjunctive aminoglycoside administration, with an open-ended duration of therapy. The risk of the induction of or worsening of acute kidney injury in these patients associated with aminoglycoside use has commonly been cited as a primary criticism of this strategy. However, the true "elephant in the room" has become the well-documented epidemic of antibiotic-associated clostridrium difficile colitis, and the emergence of extended spectrum beta-lactamase (ESBL) and multi-drug resistant (MDR) organisms in injured and critically ill patients.

Given these findings, the most recent evidence-based guidelines from both the Eastern Association for the Surgery of Trauma (EAST) and the Surgical Infection Society (SIS) recommend short-course, prophylactic gram positive coverage for Gustillo Grade I and II open fractures.[1,2] Additional gram negative coverage can be considered for Gustillo Grade III fractures,[1,2] and the addition of high dose penicillin G may be considered for gross environmental contamination where there may be increased concern for anaerobic organisms. There is no consensus statement on the duration of therapy, however, current recommendations are that therapy not be continued longer than 24-72 hours after initial operative intervention.[2]

The question then remains, how do these recommendations translate to safety and efficacy in clinical practice? In order to assess this, Rodriguez et al reported their results after the implementation of an evidence and guideline-based protocol for prophylactic antibiotic administration for open lower extremity fractures at the University of Michigan.[3] This protocol included the initiation of prophylactic intravenous antibiotics within 3 hours of injury, and emergent operative irrigation and debridement within 8 hours of injury. Gustillo grade I and II

injuries received 1gm cefazolin q8 hours for 48 hours. Grade III injuries received 1g ceftriaxone q24 hours for 48 hours. Clindamycin and aztreonam were utilized in cases of penicillin allergy. Aminoglycosides, vancomycin and pencillin were completely removed from the algorithm. After analyzing pre and post-protocol implementation, they found no difference in skin and soft tissue wound infection rates (15.8% vs. 17.8%, p=0.84) while significantly decreasing the utilization of aminoglycoside and vancomycin use in this patient population.[3]

Based on these results, the current iteration of evidenced-based guidelines, and the available supporting literature, we have instituted a similar evidenced-based protocol for antibiotic prophylaxis at our institution [University of Florida]. We recommend that all trauma centers work in a multi-disciplinary fashion with Trauma Surgery, Anesthesiology, Emergency Medicine and Orthopedics to develop similar protocols to assure the timely administration of appropriate prophylactic antibiotic coverage and surgical irrigation and debridement in order to optimize patient outcomes after open extremity fractures.

References

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