

CORR Insights®: Delays to Surgery and Coronal Malalignment Are Associated with Reoperation after Open Tibia Fractures in Tanzania

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Where Are We Now?

Open fractures have an increased risk of not only infection but also nonunion and malunion. Previous studies have stated that operative débridement of open fractures within 6 hours of injury may minimize the risk of subsequent infection. More recent studies have shown that the 6-hour guideline is not always applicable,

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and that some open fractures such as those caused by low-velocity gunshot wounds and other low grade and upper extremity open fractures, do not require or benefit from formal operative débridement. Some surgeons have utilized this information to justify delay or avoidance of operative débridement for a wide variety of open fractures [3, 6, 13, 16, 17]. The results of the current study [2] show that timely débridement of open fractures of the tibia remains important to reduce the likelihood of infection.

Fracture reduction, particularly coronal angulation, is another important factor associated both with the risk of reoperation but also of outcomes including pain scores, patient reported outcome scores, satisfaction scores, self-perceived function scores, radiographic outcomes, and physician-diagnosed symptomatic malunions. Varus (apex lateral) angulation correlated with the need for reoperation. Still, the results serve as an important reminder to US surgeons that restoration of alignment is important in the treatment of tibia shaft fractures. Nails do not automatically restore alignment and special techniques including blocking screw,

percutaneous clamps, open reduction, temporary plates, supra patellar nailing should be utilized to achieve adequate reduction [5, 12, 19]. This is particularly true when there is extensive (more than three fragments) comminution of tibia shaft fractures captured by the Orthopaedic Trauma Association Open Fracture Classification (OTA-OFC) as Type C [14].

Fracture care in resource-poor environments is different than most reports, and the current study by Albright and colleagues [2] demonstrates that reasonable results can be achieved as well as identifies particular considerations that are important to achieve good results including the use of either nails or external fixation, timely débridement, and restoration of adequate alignment. These results are likely applicable to other resource-poor environments.

Where Do We Need To Go?

Future studies on open tibia fracture treatment should focus on clearer delineation of which open fractures do not require operative débridement and the best timing for those who benefit from operative débridement. The more-specific OTA-OFC [1, 9, 14] should replace the more-general Gustilo and Anderson classification [8]. The Gustilo Classification was

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historically useful but plagued with limited reliability [4, 10, 11], lack of prognostic value [15, 18] in general, and with Type IIIB in particular. Although the Gustilo Classification has its limitations, the OTA-OFC was developed to address some of those concerns and has been shown to have better reliability and more specificity [1, 7].

When operative débridement is helpful, we need to identify the most-appropriate timing criteria for specific open fracture types and the OTA-OFC may be a useful tool in that effort. Tibia shaft fractures treatments (nails, external fixation) generally achieve relative stability with secondary fracture healing that does not require anatomic reduction but do benefit from restoration of length, rotation and alignment. Future studies should identify the acceptable ranges of alignment (especially in the coronal plane), and the techniques that are most useful to obtain that alignment. In resource poor environment additional studies on how well these results can be reproduced in other countries and the relative indications for nailing versus external fixation to healing for open tibia shaft fractures would be useful.

How Do We Get There?

We need to identify which open fractures other than low-velocity gunshot wounds can be satisfactorily treated without operative débridement. A multicenter randomized comparison trial of sufficient power could help us determine whether there are any clinically important differences between operative and nonoperative débridement, particularly rate of deep infection. The utilization of the OTA Open Fracture Classification is suggested to increase the likelihood of comparing

similar injuries. Achieving sufficient numbers in this patient population for a randomized trial will be difficult, but such a study is important.

We also need to identify the best and acceptable time to débridement for those open fractures that are shown to benefit from operative débridement. This trial should also be multicenter and should focus on the more-severe cases (Gustilo and Anderson Type IIIB or OTA-OFC categories with severe involvement of skin, muscle, bone, or contamination.) The timeframes studied should include less than 6 hours, less than 12 hours, less than 24 hours, and more than 24 hours. Particular attention should be paid to whether or not any of the OTA-OFC categories are helpful in prioritizing patients for timely débridement. Both the time from injury and the time from hospital admission should be reported. Acceptable alignment of tibia shaft fractures should be similar for open and closed fractures, which should make patient acquisition for study purposes easier. Particular attention should be paid to coronal plane angulation, especially apex lateral (varus) to identify postoperative deformities that are predictive of patient problems or physician determined need for revision surgery.

Regarding managing open tibia shaft fractures in other resource-poor countries, the methodologies employed by the authors of the current study are an excellent model for study design and data acquisition. Repeating this study would be of value to determine generalizability of the findings. Additional studies comparing variations in fixator and nail designs would also be of value to help other countries select the optimal implants.

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