An Algorithm for the Management of Acute and Posttraumatic Bone Defects

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Purpose: The management of bone defects resulting from complex trauma has always been an extremely difficult problem, with even greater challenges to surmount in the presence of infection or associated soft-tissue defects. Many centers now work closely with plastic surgeons in an integrated orthoplastic approach. This approach has expanded the limb salvage options, as the ability to use all-internal fixation methods have become possible due to the robust soft-tissue coverage offered by plastic surgeons at the time of definitive stabilization. This has meant that early complex decisions are required, and we propose an algorithm for the management of bony defects based on our clinical experience and present a retrospective analysis to support this proposal.

Methods: Patients who had an acute bony defect following debridement were analyzed intraoperatively and declared incomplete, subcritical, and critical/segmental as per the classification proposed by the OTA on bone defects. Patients underwent fixation at the time of definitive closure, and bony defects were managed according to their size with a synthetic bone void filler, a cement spacer followed by a 2nd-stage Masquelet technique, or bone transport with an internal lengthening nail.

Results: A synthetic bone void filler was used in 83 patients with 56 patients (67%) achieving infection-free union and consolidation of the bone defect. The Masquelet technique was performed in 20 patients; consolidation of their bony defect resulted in 17 (85%) patients. An internal lengthening device was used in 4 patients with 100% consolidation of the regenerate and union of the docking site.

Conclusion: An orthoplastic approach to the management of complex trauma and posttraumatic conditions such as infection has allowed orthopaedic surgeons to use alternative methods for the management of bony defects.

We propose an algorithm to guide surgeons in their decision-making for these complex problems.