Review of Fracture Healing and Outcomes Assessment

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Background/Objective: Long bone fractures are of the most common and costly medical traumas humans experience. Adequate characterization of the fracture healing process and development of potential medical interventions generally involves fracture induction operations on animal models of varying treatment or genetic groups, then analyzing relative repair success via synthesis of diverse assessment methodologies. This review discusses the procedures, relevant parameters, special considerations, and key correlations of these major methodologies of fracture repair quantification.
Methods: A literature review was conducted for articles discussing the procedures or identifying correlations between each of the major fracture healing assessment methodologies.
Results: These methodologies include biomechanical testing, which provides the most direct quantification of skeletal functionality; micro-computed tomography, which enables high resolution visualization of fracture callus architecture; histology which helps elucidate the intricate processes underlying fracture repair; and x-ray which offers a non-invasive and clinically relevant view of fracture repair progress. Each of these methodologies measure parameters directly correlating to restored functionality of fractured bone.
Conclusion: When appropriately integrated, synthesis of relevant parameters from each methodology of fracture repair assessment enables a comprehensive understanding of varying fracture healing outcomes and associated causalities.
Scientific/Clinical Policy Impact and Implications: This review may guide the interpretation and planning of fracture healing studies utilizing murine models.