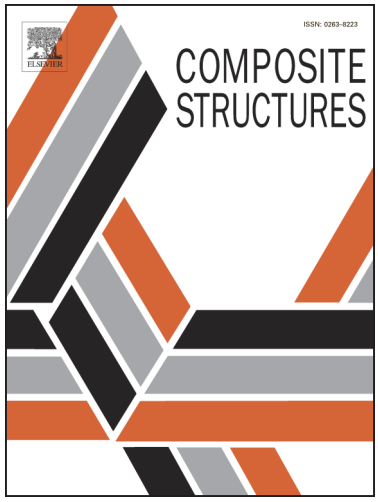

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Application of composites to orthopedic prostheses for effective bone healing: A review

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Abstract

This paper aims to provide useful and practical information on the design of composite prostheses for healing bone fractures and describes the material properties of living tissues such as cartilage, structural materials and loading conditions according to various cases, and modeling techniques for the simulation of tissue differentiation during bone healing. In addition, the present review paper provides an overview of composite materials for the design of prostheses and highlights the merits of using composites. The history and recent trends in fixation methods and types, types of materials used for prostheses, loading conditions, mechano-regulation theories, and modeling techniques for finite element analyses to estimate the healing of bone fractures are also introduced. The healing process of bone fractures is fully influenced by the biomechanical characteristics of an orthopedic prosthesis and the injured bone such as fracture configurations, prosthesis shape, material properties, and degradation rate of the material. The appropriate parameters are highlighted for the optimal design of composite prostheses to heal bone fractures successfully.

Keywords: Composite materials; Prostheses; Mechano-regulation theory; Bone healing; Finite element analysis.

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