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DIAGNOSTICS, SURGICAL TREATMENT, AND REHABILITATION OF PATIENTS WITH COMPLEX FRACTURED HAND INJURIES

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Abstract

The article presents a comprehensive review of the diagnosis, surgical treatment, and rehabilitation of patients with complex hand fractures, with a particular focus on phalangeal fractures. It highlights the prevalence of such injuries, especially in low- and middle-income countries, and underscores the significant socio-economic burden they impose due to healthcare costs and loss of productivity.

The review compares various diagnostic tools, including conventional radiography, multislice computed tomography, and cone beam computed tomography, emphasizing the latter's potential for reducing radiation exposure while maintaining diagnostic accuracy. It also explores the use of automated diagnostic systems supported by deep learning techniques like convolutional neural networks, though noting their limited clinical application due to cost and accessibility.

In terms of treatment, the article discusses both conservative and surgical approaches, with a detailed examination of external fixation methods, particularly the Ilizarov method and newer dynamic distraction external fixators. The Wide-Awake Local Anesthesia No Tourniquet technique is highlighted for its effectiveness and cost-efficiency in surgical settings. Rehabilitation strategies, including mirror therapy, robotic exoskeletons, and the use of 3D printing for custom-fit splints, are also reviewed, offering insights into improving functional outcomes post-surgery.

As a result of the review, it is concluded that despite the availability of various diagnostic and treatment methods, further research is necessary to establish more effective, evidence-based protocols, particularly in resource-limited settings.

This review serves as a valuable resource for microsurgeons and healthcare providers, emphasizing the need for continued innovation and research to improve the quality of care for patients with complex hand fractures.

Keywords: *hand injuries, diagnostics, microsurgery, rehabilitation.*

Introduction

Complex fractured hand injuries, such as fractures of the phalangeal bones, represent a significant and urgent medical challenge. These fractures are the second most common fractures of the upper extremities [*Ramlatchan S et al., 2020*], with an incidence rate ranging from 10% [*Karl J et al., 2015;*

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