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Perspective

Use of printed carpal bones in three dimensions for various carpal pathologies

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Abstract

Anatomical reconstruction that is patient-specific is now possible thanks to Three-Dimensional (3D) printing technology. The objective of this study is to compile and evaluate the most recent research on 3D-printed carpal bone implants used to treat different wrist diseases. With few issues, 3D-printed carpal bone implants improved results in terms of pain and function. The present investigation only documented one postoperative event and no intraoperative problems. According to these findings, large-scale clinical research contrasting the available choices with the accepted standard of treatment would offer greater insights for suggestions and counseling, even if 3D-printed carpal bone implants are still being refined.

Keywords: Three-dimensional (3D), printing technology, implants

INTRODUCTION

The mainstay of therapy for advanced autoimmune- and degenerative-mediated bone disease is carpal bone joint replacement. As the search for the optimum carpal bone implant is still underway, other surgical procedures are now more advantageous. Dislocation, aseptic loosening, subluxation, and chronic discomfort are among the frequent side effects of carpal joint implant arthroplasty that lead to high rates of revision and morbidity. Therefore, these restrictions may be overcome with the development of three-dimensional (3D) technology that allows for optimal congruency with the restoration of normal anatomy. In several fields of medicine, especially orthopedics, where it is now routine to use 3D printing technology for knee, hip, and ankle replacements, the use of this technology has grown significantly over the past few years to decades. Better surgical planning and patient-specific anatomical restoration are made possible by 3D-printed implants. Due to their highly ordered microstructures, these implants are more resistant to compressive stresses and, as a result, less commonly experience issues including subluxation, postoperative discomfort, long-term implant life, and restricted range of motion. The transition to 3D implants may enhance the functional results and complication rates of present carpal joint replacements, but in order to lead future efforts, a synthesis and critical analysis of the available research are required. With an emphasis on clinical and functional results, the current study seeks to evaluate and synthesize the existing literature on 3D-printed implants for carpal bone implants.