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Tridimensional Design and Printing Techniques to Obtain Personalized Prosthetic Components for Specific Cases Involving Bone Defects

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Nowadays, Orthopaedic surgery often requires implants to solve problems related to bone loss due to accidents or pathologic conditions like malignant bone lesion. Generic implants are available for some of these problems; however, they can not be fitted in disrupted bone in which its geometry has been compromised. Custom made implants are available for joints like knee and hip, but they are not readily available worldwide and their cost are beyond reach of some patients.

In this study a case of a 16-year-old male with a diagnose osteosarcoma of the left hip which caused the destruction of the acetabulum and the femoral head which precluded him to walk properly was analyzed. Specific models were then mounted in a custom-made adapter and anatomically aligned in a multiaxial servo hydraulic joint simulator (VIVO AMTI) Implants were encapsulated in a chamber with bovine calf serum as lubricant at a 37 Celsius constant temperature. An ISO hip waveform was used to simulate human gait at 2Hz and using an axial load of 460 N which matched the subject weight. More studies are necessary to support the utility of these techniques and the need of printable biocompatible materials should be encouraged since they potentially offer rapid prototyping and obtention of novel implants that could benefit patients with no access to custom made implants offered in the market.