



Modular implants for revision arthroplasty in orthopedics

During the last decades, we observed a trend of constant increase in primary total hip (THA) and knee (TKA) arthroplasties. THA and TKA revision procedures as well are projected to grow by 137% and 601%, respectively, between 2005 and 2030 in the US with similar trends observed among European countries (1,2). These data mainly reflect the changes in global demography hence with the increase of life expectancy even active elderly patients that require joint arthroplasty are more common.

Aseptic loosening is still the most common cause of failure and revision for both THA and TKA, often associated with bone loss and massive bone defects (3). Moreover, the increasing rate of periprosthetic femoral fractures around hip and knee arthroplasty has been defined as the “next fragility fracture epidemic” leading frequently to inevitable revision surgery due to poor bone quality and concomitant bone loss (4). Even in the case of periprosthetic joint infections or recurrent dislocation joint anatomy can be severely subverted.

While in the past, joint revision arthroplasty was considered a “salvage surgery” often leading to suboptimal functional results, nowadays surgeons approach revision surgeries as challenging procedures but still aim to restore biomechanics, achieve good and durable implant fixation and therefore a fully functional joint. The concept of a personalized precision surgery is, thus, a goal for revision arthroplasty.

More and more often orthopaedic surgeons deal with complex cases. When massive bone loss and surrounding soft tissue disruption have already occurred, specific revision implants are needed to restore host bone anatomy and joint stability.

Modern revision systems incorporate modular options to improve implant fixation and joint stability, allowing to adapt the implant to the specific host bone morphology and patient’s needs. Modular femoral stems enable fine-tuning of the joint with substantial surgical versatility, even if their mono-block counterparts still have a prominent role. Metal augments are extensively used on both hip and knee bone defects, offering a valuable alternative to structural allografts. Metal sleeves and cones are used to improve the metaphyseal fixation as well as modular stems. Nevertheless, new trabecular and porous biomaterials enhance primary fixation and osseointegration.

Therefore, modularity represents a powerful weapon in the hands of the surgeon who’s facing revision surgery, particularly if associated with precise preoperative planning to fulfil the surgical strategy. Innovative diagnostic tools, such as advanced computed tomography protocols and 3D modelling-based reconstructions, offer support to preoperative planning, improving the accuracy of joint reconstruction.

We are delighted and honored to have been able to gather thoughts and manuscripts from experts in the field focusing on key aspects of “Modular Implants for Revision Arthroplasty in Orthopedics”.

This special series aims to provide a comprehensive overview of the concepts for the surgical management of revision arthroplasty and attempt to shed some clarity on controversial aspects around modular implants. The importance of diagnostics imaging and future insights into preoperative planning strategies are highlighted.

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