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Is There a Difference Between Modular Versus Monoblock Femoral Stems Used During Revision Total Hip Arthroplasty?

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Is there a difference between modular versus monoblock femoral stems used during revision total hip arthroplasty?

Response/Recommendation: The literature delineates distinct differences between modular and monoblock femoral stems in revision total hip arthroplasty each presenting unique advantages and limitations. Modular stems offer intraoperative flexibility, enabling precise restoration of leg length and offset. However, they are associated with complications such as junctional fatigue, corrosion, and implant breakage, and they incur much higher costs compared to monoblock stems. In contrast, monoblock stems provide enhanced mechanical stability and no risk of modular junction complications, though their implantation is technically more challenging. Both modular and monoblock femoral stem designs perform well in revision total hip arthroplasty, exhibiting no significant differences in long-term (3 to 5 years) clinical outcomes or subsidence rates. The choice between modular and monoblock stems should be tailored to individual patient needs and specific clinical scenarios.

Level of Evidence: Moderate.

Delegates Vote: 92.7% Agree, 5.7% Disagree, 1.7% Abstain.

Rationale

A comprehensive literature search was conducted using PubMed, Embase, and Cochrane Library databases. The search terms included "Revision Arthroplasty, Hip," "Femoral Stem,"

"Modular Femoral Stem," "Monoblock Femoral Stem," "Complications," "Outcomes," and "Prosthesis Design." Articles were limited to English-language publications from the past 15 years. Inclusion criteria were studies involving adult patients undergoing revision total hip arthroplasty (THA) with modular or monoblock femoral stems, with outcomes related to stability, mechanical complications, and clinical performance. Exclusion criteria included case reports, nonrevision THA studies, and studies not comparing modular and monoblock stems. Data extracted included study design, population characteristics, outcomes, and complications. A total of 789 articles were identified, with 25 meeting the inclusion criteria after title and abstract screening and full-text review.

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The literature suggests no significant differences between modular and monoblock femoral stems in revision THA. Modular femoral stems offer intraoperative flexibility, allowing surgeons to customize components for optimal fit and alignment. This flexibility is particularly advantageous in complex revisions where restoring leg length, offset, and achieving stable fixation is critical. However, modular stems are associated with specific complications such as junctional fatigue, corrosion, and implant breakage, which can lead to mechanical failure over time. Despite these concerns, modern modular implants have been designed to mitigate these issues, with improved materials and designs reducing the incidence of such complications [1–5].

In contrast, monoblock femoral stems, constructed from a single piece of material, eliminate the risk of modular junction complications. These stems provide increased mechanical stability and durability, which can be particularly beneficial in patients who have poor bone quality or extensive bone loss. However, the lack of intraoperative modularity can limit the ability to make precise adjustments during surgery, and their implantation can be technically more challenging [6–9].

Modular stems are generally more costly than monoblock stems, which is an important consideration in their routine use. The cost implications must be weighed against the potential benefits of modular stems in achieving better biomechanical restoration and patient-specific customization [10,11].

Clinical outcomes between the two types of stems also vary. Studies have shown that modular stems can achieve better restoration of biomechanics and improved functional outcomes in the short term (1 to 3 years). In contrast, monoblock stems have demonstrated lower revision rates and fewer mechanical failures in the long term (3 to 5 years) [12,13]. Additionally, no significant differences were found between modular and monoblock tapered stems regarding postoperative hip function, re-revision rates, and complications [7,9,14].

Overall, the choice between modular and monoblock femoral stems should be individualized based on patient-specific factors, including bone quality, the extent of bone loss, and the need for precise biomechanical restoration. Surgeons must weigh the benefits of intraoperative flexibility against the potential risks of mechanical complications associated with modular stems.

CRediT authorship contribution statement

Alisina Shahi: Writing – original draft, Investigation. **Hari Bezwada:** Investigation. **Daniel Kendoff:** Investigation. **Fouad**

Sadek: Investigation. **Margarita Veloso Duran:** Investigation. **Heinz Winkler:** Investigation. **Weijun Wang:** Investigation. **Xiaogang Zhang:** Investigation.

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