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Monopolar Revision Reverse Shoulder Arthroplasty Using Manufacturer-Mismatched Implants

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Case Report

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Abstract

Background: Shoulder reverse arthroplasty revision is a technically demanding procedure. When only one prosthetic component fails and infection is excluded, monopolar revision may be chosen to preserve bone stock and reduce surgical morbidity. The new glenoid or humeral implants are usually from the same company. However, in selected cases, it could be a safer procedure to mismatch implants.

Technique: Three cases of aseptic glenoid loosening managed by monopolar revision using implants form a different company than the stem are described. A literature review about shoulder mismatch implants was analyzed.

Results: Patients showed functional improvement and pain relief without perioperative or late complications at short and mid-term. The use of mismatch implants is validated by 3 recent studies. An analysis of all companies implants characteristics allowed us to established a table of possible combinations regarding the sphere diameter.

Conclusion: Monopolar revision mismatch is a viable option in selected cases of isolated component failure. This approach may reduce surgical morbidity and preserve bone stock.

Keywords: Reverse Shoulder Arthroplasty; Revision Surgery; Industrial Mismatch; Monopolar Revision

Introduction

Reverse shoulder arthroplasty (RSA) is used for massive cuff tear arthropathy, complex proximal humeral fractures and osteoarthritis. 4% of patients will require a revision during their life [1]. Revision of RSA remains challenging and is associated with higher complication rates than primary procedures due to bone loss and implant extraction difficulties [2,3].

When one component fails and infection has been excluded, monopolar revision may represent an attractive strategy. It can reduce operative time, bone loss, and complications [4].

Reverse glenoid mobilization requiring replacement surgery may rarely occurs after primary RSA without humeral stem loosening [5]. Bone defects may often require the use of a reconstructive glenoid implant from another company as the humeral stem. Therefore, there are two options: change the whole prosthesis with possible issues regarding the humeral stem or keep the stem and mismatch components. This last option is considered off-label use.

While mismatch has been discussed in hip arthroplasty [6], evidence in shoulder surgery is limited: 3 recent

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studies investigating outcomes of mismatched shoulder implants found no differences in short term outcomes and complications [4,7,8]. We sought to report our experience about 3 cases of mismatched RSA revision.

Surgical Technique

Preoperative Evaluation

Infection must be excluded when indicated. Standard radiographs and computed tomography assess implant loosening and glenoid bone stock. The existing components must be precisely identified. Implant compatibility is evaluated preoperatively using dimensional comparison of available glenosphere diameters. Only implants with identical diameters are considered to preserve prosthetic biomechanics.

Patient Positioning and Surgical Approach

Surgery is performed under general anesthesia with the patient in a beach-chair position. The previous surgical approach is reused whenever possible to minimize soft tissue damage.

Exposure and Implant Removal

After joint exposure, extensive synovectomy and debridement are performed, particularly in the presence of metallosis. Multiple bacteriological samples are systematically collected. The humeral insert is removed while preserving a well-fixed humeral stem to avoid fracture risk. The loose glenoid component is extracted, and glenoid bone defects are carefully prepared.

Glenoid Reconstruction

Structural bone grafting is performed when required with allograft. A reconstruction baseplate is implanted to correct glenoid deformity and restore the version. The glenosphere is then secured according to manufacturer guidelines.

Humeral Adaptation and Reduction

A new humeral insert matching the selected glenosphere diameter is impacted onto the preserved stem. The reduction confirms joint stability and satisfactory range of motion.

Cases

We had three quite identical cases with glenoid implants mechanical failure replaced by reconstructive baseplate and glenospheres from a different company. The humeral stems were not replaced. A reconstructive platform was used because of glenoid bone defect with allograft when needed. The humeral socket was always changed matching the sphere size.

Case 1

An 84-year-old woman developed painful functional impairment three years after RSA (Arrow 1, FH) for fracture. Imaging confirmed aseptic glenoid loosening. Glenoid revision was performed using a reconstructive baseplate and a 39-mm glenosphere (Reverse perform, Stryker) while maintaining the cemented humeral stem. At 3.5-year follow-up, the Constant score improved from 17 to 51 with satisfactory clinical and radiographic outcomes (Figure 1).

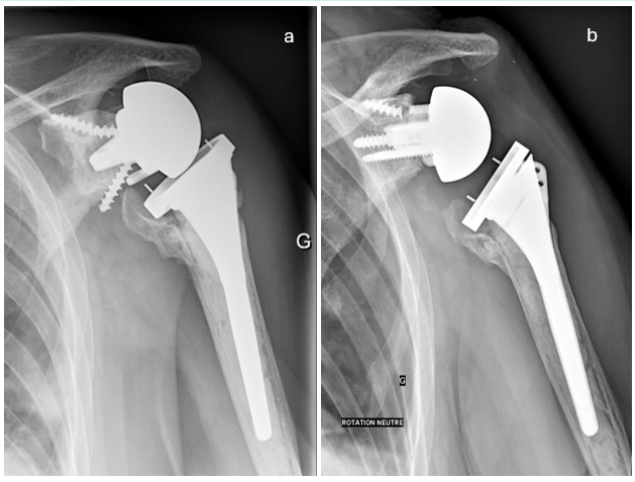


Figure 1: Mechanical loosening of the FH glenosphere (a), revision surgery using components from different manufacturers but of identical size (39 mm): FH cup and Stryker glenosphere (b).

Case 2

An 80-year-old woman had functional loss five years after RSA (Arrow 1, FH) for cuff tear arthropathy. Imaging demonstrated aseptic glenoid loosening with screw fracture.

Isolated glenoid revision was performed using a reconstructive baseplateand a 36-mm glenosphere (Reverse Perform, Stryker) while preserving the humeral stem. Central glenoid bone defect was reconstruct using an impacted bone allograft before screwing the reconstructive platform. At 2-year follow-up, the Constant score improved from 4 to 48. The patient was pain-free, and radiographs showed stable fixation (Figure 2).

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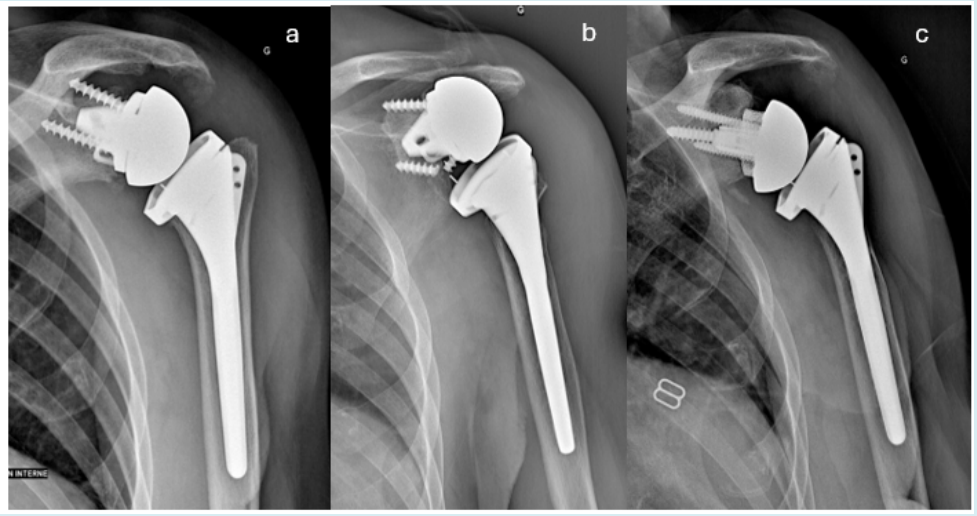


Figure 2: FH Arrow RSA (a), glenoid component loosening at 4-year follow-up (mechanical failure) (b), revision surgery using components from different manufacturers but of identical size (36 mm) : FH cup and Stryker glenosphere (c).

Case 3

The third case had a mechanical failure of an FX solution glenosphere diameter 36 mm implanted 5 years ago for cuff tear arthropathy in a 63-year-old women. The FX solution socket was changed in front of a Stryker glenosphere diameter 36 mm on a reconstructive half wedge reverse Perform platform (Figure 3). Superior glenoid bone defect was reconstruct using an impacted bone allograft before screwing the reconstructive platform. At 1 year follow-up she had satisfactory clinical and radiographic outcomes (Figure 3).

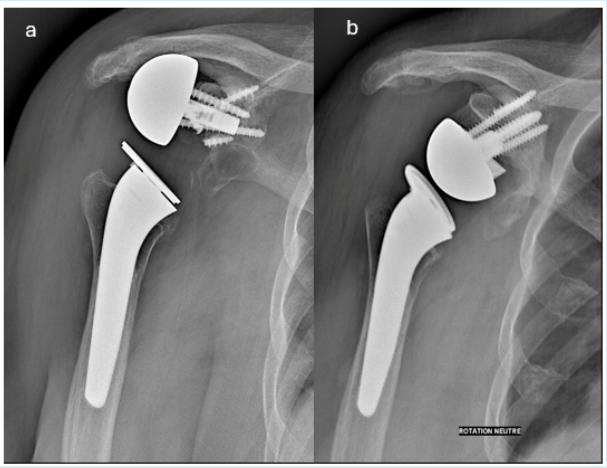


Figure 3: Mechanical failure of an FX solution glenosphere diameter 36 mm implanted 5 years ago (a) FX solution socket changed for a new one in front of a Stryker glenosphere diameter 36 mm on a reconstructive half wedge reverse Perform platform and a massive superior allograft (b).

Literature Review and Discussion

Matching implants from different companies is common and authorized for total hip replacement as long as the diameters of the head and the socket are the same [6]. It is still debated for reverse shoulder arthroplasty. Few recent publications support that manufacturer-mismatched can be an effective procedure [4,7,8].

Stadecker, et al. [8] compared outcomes between patients with matched versus mismatched implants. There was no difference in functional outcomes at one year follow-up, even when the diameter of the socket and the glenosphere were different (11 cases over 44). This situation should however be avoided as the joint incongruence could logically led to prothesis instability and early wear debris.

Smith, et al. [7] reported a series of mismatched implants in primary RSA. They found no difference in their cohort of 39 mismatched prothesis in functional outcomes and complications in comparison to matched implants at two years follow-up.

Sogbein, et al. [4] reported a series of mismatched implants in primary and revision RSA. They demonstrate that companies-mismatching has comparable postoperative function, complications, and revision rates to the existing literature about matched protheses.

The most manufacturer-mismatched components used by Sogbein et al. was a Stryker stem and socket in front of a TM Zimmer glenosphere. This combination allowed only one diameter of 36 mm. Smith, et al. [3] matched Stryker, Medacta, Arthrex and FX Solutions with the use of a 36 mm

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glenosphere in 86 % of their cases.

Stadecker, et al. [8] mismatched 25% of their cases (11/44) in manufacturer and size. None of the 11 cases required re-revision within the available follow-up period. For them, mismatches with larger glenospheres than sockets are afforded increased impingement-free range of motion. However, size mismatch is mechanically at higher risk of early polyethylene wear and should logically be avoided.

Conclusion

Monopolar revision with mismatch is a valuable option in selected cases. This technique may preserve bone stock and reduce surgical morbidity. Manufacturers generally do not guarantee performance when their components are combined. Therefore, this strategy should be reserved for carefully selected cases, with meticulous dimensional assessment and explicit informed consent. Our cases demonstrate that monopolar revision using identical-size mismatched components can achieve satisfactory mid-term outcomes. We do not recommend combining implants of different diameters.

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