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CASE REPORT

The use of computer navigation in reverse shoulder arthroplasty revision: a case report

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Abstract. Revision shoulder surgery is always a challenge, especially in the management of periprosthetic joint infection. Staged surgery with antibiotic-loaded cement spacer, seems to yield satisfactory and encouraging results. New technologies such as computer navigation are additional tools that could aid surgeons in particular conditions where the native anatomy is distorted. This study presents the unique experience of revision shoulder surgery with computer navigation assistance. Benefits related to this approach could lead to better prosthesis longevity and survivorship. (www.actabiomedica.it)

Key words: Revision shoulder surgery, GPS navigation, two-stage surgery, infection.

Introduction

Periprosthetic shoulder infections have a reported incidence of 0.4 - 2.9%, and this rate increase for each subsequent revision (1); the most common microorganisms involved are *Staphylococcus epidermidis* and *Propionibacterium acnes* (2). Strong evidences regarding the correct management of these cases are limited and controversial and often the therapeutic treatment options derive from algorithms used in the management of hips and knees' periprosthetic infections (3,4). On the basis of the timing of symptoms onset, several strategies are purposed: i) suppressive antibiotic therapy which, however, has a failure rate greater than 60%; ii) joint washing and debridement with replacement of the polyethylene liner; iii) prosthesis revision that can be carried out in one-stage or two-stage, after the placement of an antibiotic spacer (5). Despite the variety of options available, the specific indications and the expected clinical results remain debated and the revision rate after reimplantation is unfortunately nearly 30% (6,7). Common complications are joint dislocation, chronic instability, acromion fracture, lack of superficial wound healing or formation of hematomas (8). In particular, the glenoid bone-stock in revision surgery seems to be a limiting factor for conventional reverse shoulder arthroplasty (RSA) implants, leading to instability, poor positioning of the components and implant failure during revision (9). Moreover, prosthesis longevity is considered highly dependent on accurate positioning (10,11) and for all these reasons we try to take advantage of GPS navigation technology in revision shoulder surgery. Reporting this clinical case, we want to describe the history, the clinical signs and the two-stage treatment of a prosthetic septic failure and how we have managed the revision with GPS navigation assistance.

Case report

A 52-year-old patient with cuff tear arthropathy underwent reverse total shoulder arthroplasty with the aid of GPS navigation in July 2020. Preoperatively CT scans were uploaded with Orthoblue software (Exactech, Gainsville, FL, USA) for bone 3D evaluation and GPS reconstruction. In our case, the native glenoid

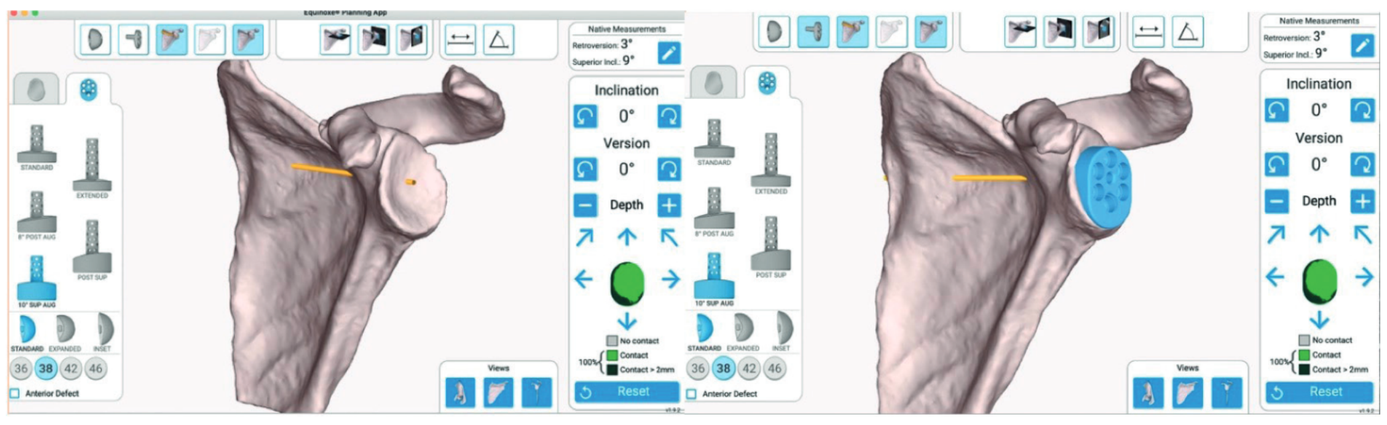

Figure 1. On the left side preoperative 3D reconstruction of the glenoid and on the right side the planned implant.

had a superior inclination of 9 degrees and a retroversion of 3 degrees

Based on the pre-operative data, we decided to implant a metaglene with 10° superior augment (after asymmetric medialization of 2 mm) with a 38mm glenosphere (Equinoxe reverse system,Exactech, Gainsville, FL, USA). Planned final version and inclination were both 0 degrees (Figure 1).

Once in the operative room, deltoid-pectoral approach was performed, widened proximally of about 1.5 cm to allow a better view of the coracoid process. Flake osteotomy of the lesser tuberosity was performed. Humeral osteotomy and broaching were performed with standard instrumentation. Before glenoid exposition, the superior face of the coracoid process was prepared to coracoid tracker positioning. After the glenoid exposition the landmarks acquisition started. Pilot hole, glenoid reaming and cage hole were subsequently performed with proper toolkit following navigation guide. Glenoid component was then implanted as planned. At last, humeral component size 9 was implanted with traditional instrumentation, as well as reduction and transosseous suture of the lesser tuberosity.

The clinical and radiological post-operative follow-up was carried out without complications (Figure 2): the patient regularly performed the rehabilitation program, and at the clinical evaluation after 3 months he was satisfied without complaining pain and discomfort.

Six months after surgery, the patient reported an ingrowth of shoulder pain symptoms and redness of the skin at the surgical scar. Elevation of serum CRP (2.3 mg / dl) was recorded. A radiographic examination

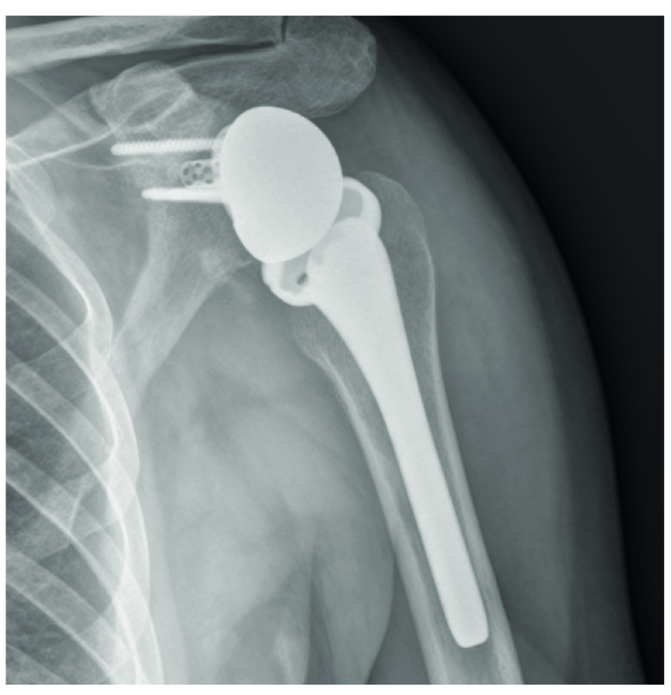

Figure 2. Post-operative x-rays examination

showed no signs of implant loosening, while the ultrasound examination showed a periprosthetic fluid area with corpuscle content.

We removed the RSA implant, replaced with modular antibiotic (Gentamycine 3gr + Tobramycine 3gr) loaded spacer (Spaceflex, G21, Italy). Intraoperatively, the stem and glenoid components showed no signs of loosening, however prosthetic components were removed gently and fortunately without significant bone loss (Figure 3A). Screw holes and cage hole were filled with morselized cancellous bone (Figure 3B,C), aiming to recover the bone stock and mimic the native glenoid. Extensive tissue debridement was