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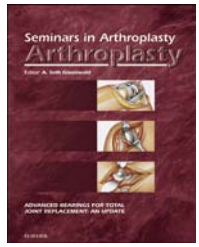

The emerging role of the non-cemented glenoid in total shoulder arthroplasty

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ABSTRACT

In an effort to address the relatively high rate of glenoid component lucent lines, loosening and failure, tantalum/trabecular metal glenoid implant fixation has evolved as it has in hip and knee arthroplasty. Trabecular metal-anchored glenoid implants used in this consecutive patient case series has demonstrated a lower failure rate than traditional all-polyethylene cemented glenoids. Although the radiographs of some patients demonstrated small focal areas of lucency, none have become loose, and only one has actually demonstrated glenoid component failure due to a fracture 6 years after the index procedure. One with glenoid loosening was due to poly wear from a massive cuff tear occurring 8 years after the index procedure. Most patients experienced significant improvements in shoulder range of motion and reduction in pain. Trabecular metal glenoids when carefully implanted do not produce excessive failure rates, but rather result in functional improvements while decreasing operative time.

1. Introduction

Total shoulder arthroplasty (TSA) has been shown to provide pronounced pain relief and improvement in shoulder range of motion when used for the treatment of end-stage osteoarthritis [1–4]. There has been an increase in the growth in the number of TSA cases performed each year, due to the aging population and advances in techniques [5]. However, the rates of radiographic and clinical glenoid component loosening remain a troublesome concern for patients and surgeons [2,3,6]. This also places a financial strain due to the increased number of expensive revision surgeries, which evolve from the greater number of primary procedures we are experiencing [5].

Historically, metal-backed glenoid components were developed with the intention of avoiding a cement-bone interface behind the glenoid component; therefore, preventing the complication of glenoid lucency [7]. However, prior studies of early metal-backed components did not reveal improvements in rates of radiographic or clinical loosening. Previous studies of the monoblock metal-backed glenoids have rather shown worse survivorship [3,8,9].

The trabecular metal-anchored glenoid (TMAG) (Zimmer, Warsaw, IN), based on experience with this technology in hip and knee implants, was developed in an effort to improve ease and speed of insertion, enhance fixation, and clinical longevity of glenoid components.

This implant is a monoblock construct with a porous tantalum surface that allows for bone ingrowth while permitting flush apposition of the polyethylene surface on the prepared native glenoid (Fig. 1).

The first generation had a concerning reported failure rate in limited studies due to Trabecular Metal (TM) fracture

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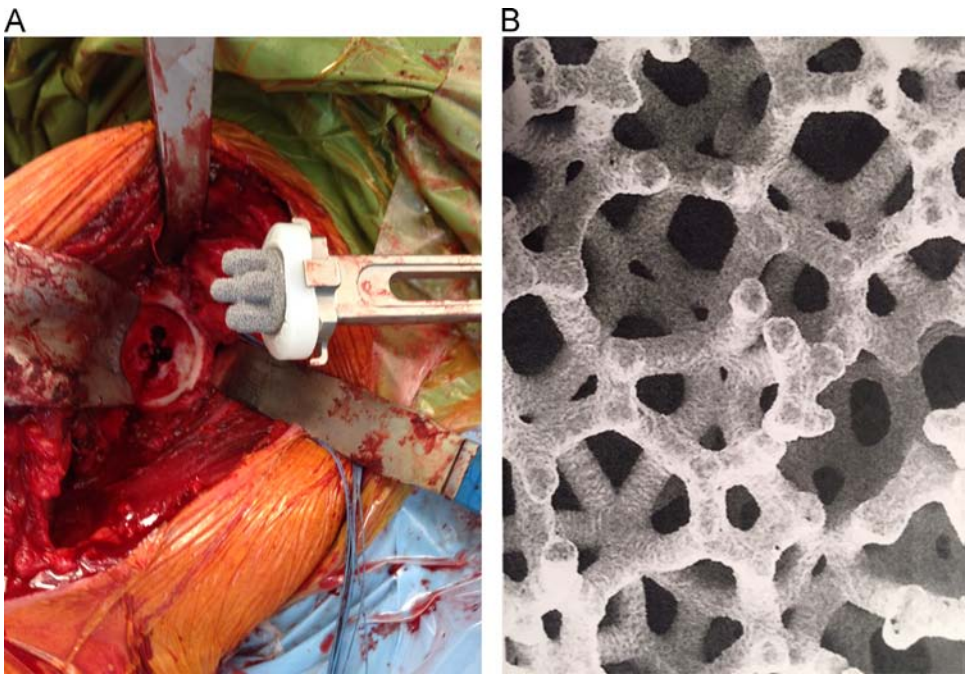

Figure 1 – (A) Trabecular metal glenoid (second generation glenoid, produced by Zimmer). Intraoperative photo. (B) Microscopic appearance of the porous TM implant which allows intimate bone ingrowth.

because of a prominent TM surface. Therefore, a second generation was developed to improve fixation and minimize fracture risk [10]. A recent case series, using the first-generation implant, demonstrated improvements in patients' pain and function; however, there was also a reported 21% glenoid component failure rate due to fracture at the keel-glenoid junction [11]. As a result, the authors cautioned against the use of trabecular metal glenoid components due to this unacceptably high failure rate.

The purpose of this study is to retrospectively report the clinical and radiographic outcomes of the tantalum-anchored glenoid components implanted by a single subspecialty trained upper extremity surgeon for anatomic TSA.

2. Materials and methods

Indications for use of the TMAG were patients with end-stage osteoarthritis of the glenohumeral joint who previously would have been a candidate for implantation of a traditional cemented polyethylene glenoid component. Contraindications for use of this implant included any active infection or incompetent rotator cuff.

All of the surgeries were performed by the senior author, who is an experienced shoulder arthroplasty surgeon. An anatomic humeral implant and a matching TMAG (Zimmer) were used in all the cases. None of the authors have financial interest in the implant.

3. Surgical technique

The standard deltopectoral interval was used to approach the shoulder with the patient in the beach chair position. The subdeltoid and subacromial spaces were then freed of adhesions and the superior 1 cm of the pectoralis major tendon was released. The conjoint tendon was identified and any adhesions between it and the subscapularis were released taking care to protect the axillary and musculocutaneous nerves. Blunt retractors were placed under the deltoid and conjoint tendon to expose the rotator cuff. The long head of the biceps tendon was identified and released when present, and a biceps tenodesis was performed. A subscapularis tenotomy was performed, leaving a 1 cm stump for later repair. The inferior capsule was released and a blunt retractor was placed in the glenohumeral joint as it was dislocated anteriorly. Humeral osteophytes were removed. A series of intramedullary reamers were used to gradually increase the diameter of the proximal humerus until a snug cortical purchase was obtained. The cutting guide was affixed to the reamer as an intramedullary guide and the humeral cut was made in anatomic 30 degrees of retroversion, while protecting the rotator cuff insertion.

The glenoid was then exposed using a modified Fukuda retractor to translate the humerus posteriorly. Capsular releases were performed and osteophytes removed to allow circumferential exposure of the glenoid. The labrum was then excised and any tight capsule was released taking care to protect the axillary nerve. The glenoid was prepared by surface reaming to remove any remaining glenoid irregularities. This provided a clear view of the glenoid prior to instrumentation. The glenoid size was then determined using trials.

The next few steps were critical to obtaining an optimal outcome by assuring secure seating of the glenoid component. A 2.5 mm pin was then inserted into the center of the glenoid in appropriate version using the drill guide. The pin was precisely placed within the vault of the glenoid based on