Seminars in Arthroplasty 25 (2014) 250–258

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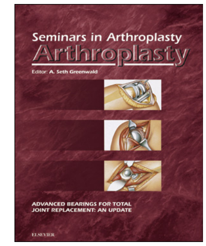

Severe glenoid retroversion is best treated with asymmetric reaming in total shoulder arthroplasty—Affirms

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ARTICLE INFO

Keywords:
Total shoulder arthroplasty
Glenoid retroversion
Posterior glenoid wear
Glenoid bone grafting
Glenohumeral stability
Asymmetrical wear

ABSTRACT

Osteoarthritis in the shoulder is frequently associated with and complicated by a substantial degree of posterior glenoid wear. It is present to some degree in the majority of patients. The optimal management of posterior erosion has been debated; however, the true anatomic version of the glenoid compared to the degree of posterior erosion is unknown, because of the mobile nature of the scapula and variations in spinal posture and thoracic shape. The fact remains that in order to suitably achieve a stable gleno-humeral implant arthroplasty, the majority of osteoarthritic shoulders can be managed with asymmetric reaming. In certain cases where subluxation is present or retroversion is still greater than 15°, new techniques of supplemental bone grafting can be employed, without resorting to offset, built-up, asymmetrical implants, which have a track record of failure.

1. Introduction

Osteoarthritis remains the most common indication for total shoulder arthroplasty (TSA). A prime goal of surgeons performing TSA should be to minimize the need for revision surgery. Meticulous attention for employing the optimal surgical technique for managing posterior erosion is essential to avoid failure and therefore revision. A meta-analysis of longer follow-up studies suggests that the complication rate in TSA is greater than 14% [1]. The most common complication resulting in the need for revision TSA is glenoid failure. There are several studies that have identified factors associated with an increased risk of early failure. All of these studies highlight the importance of a well-contained stable glenoid implant in a neutral version.

Specifically, component malposition, insufficient glenoid vault, and increased joint reaction forces have been associated with early glenoid aseptic loosening. Moreover, the position of the glenoid component may be the most critical factor for survival. Moskal et al. [2] found that almost 50% of failed TSAs had glenoid component malversion. Establishing the version of the component is closely linked to the position of the implant within the glenoid vault. By preparing the glenoid for the implant, the goal is twofold. First, enough skeletal architecture must be maintained so as to contain the glenoid's fixated component. At the same time, a complete rim of bone must be

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http://dx.doi.org/10.1053/j.sart.2015.02.004
1045-4527/

established to fully seat the glenoid surface component. If this is not accomplished, incomplete seating can lead to eccentric loading of the implant and advanced wear [3]. Furthermore, biomechanical studies have demonstrated that abnormal joint reaction forces can be mitigated by neutralizing retroversion with reaming. Conversely, a statistically significant increase in joint reaction forces is seen with a persistently retroverted component of 15° or more [4].

Despite these known risk factors, the ideal glenoid version for stable implantation remains undefined and probably varies from patient to patient based on scapula "posture." Even with the advance of three-dimensional computer tomography and other imaging modalities, a reproducible "normal" glenoid version is hard to establish. Glenoid version (compared to the scapula) on an average ranges between 2° of anteversion and −3.5° of retroversion, but it ranges widely from 14° of anteversion to −12° of retroversion across multiple studies [5–7]. There is no strict numerical value for ideal version for a myriad of reasons. The native anatomic version of the glenoid compared to the degree of posterior erosion is unknown. In addition, scapula position changes with patient aging in multiple planes because of scoliosis, kyphosis, thoracic shape, and scapula musculature support. Despite the known risk factors, the surgical correction of posterior erosion may require maintaining some degree of retroversion in certain cases. This was originally suggested by Farron et al. [8] in a finite element analysis. It is the senior author's opinion, based on his experience, that 5°–10° of retroversion is acceptable in a well-fixed and contained glenoid component, especially considering that the goal should be to maintain the skeletal architecture of the glenoid vault to adequately contain the glenoid implant.

Significant posterior erosion from osteoarthritis is typically classified as either a Walch B2 or C glenoid [9] (Fig. 1). The reality of attempting to correct every B2 or C glenoid to a completely neutral version will result in inadequate bone stock for implantation in many cases. This has been established through three-dimensional modeling studies as well as cadaveric investigations. Meticulously planning and correcting these retroverted glenoids is essential in order to ensure long-term survivorship. Walch et al. [10] reported their experience and revealed that B2 and C glenoids are associated with higher rates of revision surgery, glenoid loosening, instability, and soft tissue problems. This was also shown by Ho et al. [11], where post-operative radiographic osteolysis was visible as early as 3.8 years if the post-operative retroversion was greater than 15°.

The surgical options for correcting severe glenoid retroversion (Fig. 2) include the following: reaming the high side alone (Fig. 3A and B), reaming the high side and bone grafting the eroded side (Fig. 4), or reaming and utilizing an augmented glenoid system (Fig. 5). However to date, there have been no clear guidelines for correction of version. We propose that the majority of severe retroversion can be corrected with asymmetric reaming while correcting the version to 5°–10° of

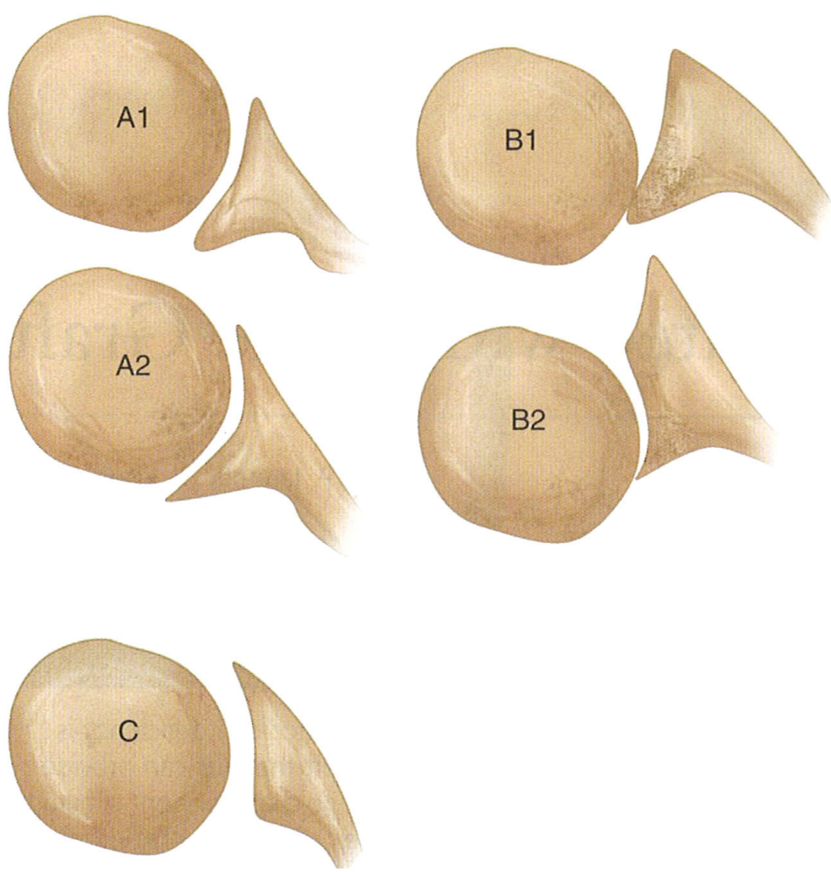

Figure 1 – The Walch Classification of Glenoid Erosion is depicted here. Types B2 and 2C are representative of cases of severe posterior erosion.