



Walch Golden Rules for Total Shoulder Arthroplasty Treatment

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This document describes the golden rules used by Dr. Gilles Walch for TSA treatment using BLUEPRINT™ 3D Planning Software. These golden rules, based on both the literature and his experience, are defined by five principles:

Golden Rule for TSA vs. RSA	Why do we think this is important?
1. Less Than 10° of Glenoid Implant Retroversion	Highest posterior stresses occur on glenoids when the retroversion is greater than 10°.
2. Less Than 10° of Glenoid Implant Superior Inclination	Superior inclination is directly linked to humeral head superior migration and rotator cuff wear.
3. At Least 80% Glenoid Implant Seating	Sufficient seating is needed to obtain a good fixation but achieving to 100% of seating may lead to excessive reaming of subchondral bone.
4. Less Than 80% of Humeral Head Subluxation	Humeral head dislocation of > 80% increases risk of dislocation
5. Subchondral Bone Preservation	Aggressive reaming increases risk of loosening 10 years postoperatively.

1. Positioning of the Glenoid Implant With Less Than 10° of Retroversion (Figure 1)

Ho et al.¹ showed that radiographic signs of osteolysis around the peg of the glenoid implant are correlated with glenoid component retroversion > 15°. This conclusion is strengthened by Farron et al.² who recommend that "retroversion measured with computed tomography before surgery should be corrected to remain below 10°. If correction is impossible, not replacing the glenoid should be considered." In addition, Nyeler et al.³ proved that the humeral head position and the forces received by the glenoid are directly influenced by the glenoid retroversion. Special attention should be paid when planning a TSA.

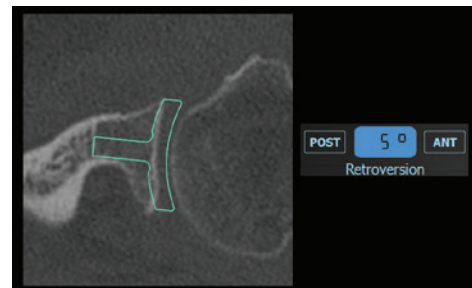


Figure 1. Axial view of the version controls.

2. Positioning of the Glenoid Implant With Less Than 10° of Superior Inclination (Figure 2)

Hughes et al.⁴ and Moor et al.⁵ demonstrated that patients with degenerative rotator cuff tears have significantly greater glenoid inclination (+ 7.6° for Hughes et al.), which is considered by the authors as the most valuable parameter to discriminate between patients with intact rotator cuff and patients with torn rotator cuff. Wong et al.⁶ highlighted the fact that more the inclination is superior, less the force required to produce superior humeral head migration is important (10° results in around 30% reduction). For Walch et al.⁷, the superior inclination is one of the three main patterns of glenoid component migration.

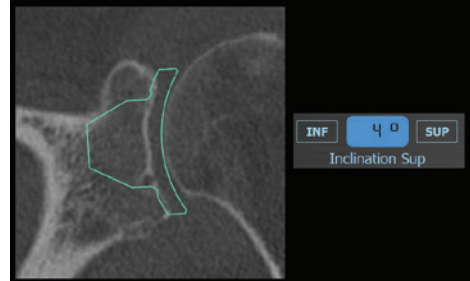


Figure 2. Coronal view of the inclination controls.

3. Positioning of the Glenoid Implant With At Least 80% of Seating (Figure 3)

In order to both preserve the subchondral bone and ensure the prosthesis fixation, a minimal value of 80% of seating is recommended. Dilisio et al.⁸ notified that "100% seating of a glenoid component may not be necessary for intermediate-term prosthesis fixation." ... "Radiolucencies around a partially cemented glenoid component were not associated with the degree of component seating. Complete seating of the glenoid component is not necessary to achieve radiographic implant fixation at a mean follow-up of 43 months."

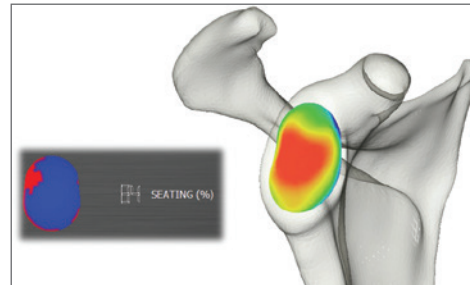


Figure 3. Glenoid component seating

4. Native Posterior Humeral Head Subluxation Less Than 80% (Figure 4)

Iannotti et al.⁹ showed that humeral head (HH) subluxation is associated with unfavorable outcome regardless of the type of shoulder arthroplasty. This result was confirmed by Walch et al.¹⁰ when they found that “subluxation of the humeral head of 80% or greater carried a risk of dislocation of 11%” (3 of 27 with a subluxation of 80% or more had a dislocation).

5. Preserve Subchondral Bone (Figure 5)

Conservation of the subchondral bone has been mainly proclaimed by Walch et al.^{7,11,12} by demonstrating that excessive reaming is detrimental and resulted in increased subsidence. They also declared that “we believe that preservation of glenoid bone stock, and in particular the sclerotic subchondral bone, is important in providing long-term resistance to the stresses imposed by the prosthetic humeral head”. In addition, Simon et al.¹³ declared that “removal of more bone may violate the dense subchondral plate and lead to insufficient bone support”.

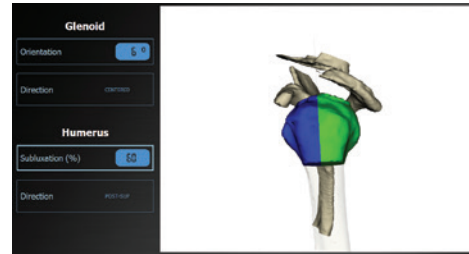


Figure 4. Measurements of the native HH subluxation.



Figure 5. Coronal view of the reaming depth controls.

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