



## Response to Werthel et al regarding: “Clinical results of bony increased-offset reverse shoulder arthroplasty (BIO-RSA) associated with an onlay 145° curved stem in patients with cuff tear arthropathy: a comparative study”

*In reply:*

Dear Editor, with great pleasure I find myself responding to a letter sent to you regarding our article “Clinical results of bony increased-offset reverse shoulder arthroplasty (BIO-RSA) associated with an onlay 145° curved stem in patients with cuff tear arthropathy: a comparative study.” This makes us understand how this subject is of considerable interest and that it is at the center of an important debate.

First of all, I think it is clear from the title that the lateralization we mean in this study is caused not only by a variation of the neck-shaft angle but by the association of a curved stem with an onlay insert.

Secondly, according to the authors of the letter, I believe that the glenoid lateralization and the humeral lateralization both have beneficial effects and that they have a different way of improving the outcomes of the reverse shoulder arthroplasty. Similar to shoulder instability with a bony defect, we must not concentrate only on the effect of one of the 2 ways of lateralizing but above all on how to use the combination of the 2 ways of lateralization in order to find a fair compromise.

Third, I would like to state that scapular notching cannot be considered a mere complication but that it points to a real problem in Grammont’s design, as the incidence of this “complication” in some cases exceeds 60%, which is not compatible with the concept of complication but that of a real design flaw. I agree that the concept of scapular notching with impingement-free range of motion must be distinguished.

The data published in the literature are not totally in agreement with what is stated by the author of the letter, in fact, as recently published in a systematic review by Erickson et al.<sup>2</sup> In this systematic review of 38 studies and 2222 shoulders, the authors found that the rate of scapular notching was significantly higher with the 155° prosthesis than with the 135° prosthesis with a lateralized

glenosphere. These results allow us to understand how both glenoid lateralization and humeral lateralization are important. The important thing to understand is how to join the 2 lateralizations, remembering that notching is a limitation of the implant that must be improved because at one point it results in failure of the implant and returns poor outcomes.<sup>3,8,10</sup> Improved clinical outcomes and implant survival are our real goals. The objective of our work<sup>4</sup> was to observe whether associating a glenoid lateralization with a humeral lateralization led to an improvement in the outcomes also because the rate of notching in the group without glenoid lateralization was already low (17%). At this moment, nobody is certain of what constitutes the ideal implant. Obviously, the tendency is to make the reverse prosthesis as similar as possible to the anatomic prosthesis, the so-called anatomic reverse. In this context, the concept of impingement-free range of motion is important. In a recent paper by Hettrich et al<sup>7</sup> based on finite element models, the authors found that glenoid lateralization is effective in increasing impingement-free range of motion but also increases the deltoid force required to perform identical tasks. Therefore, the goal is to provide long-term impingement free motion while protecting the deltoid and rotator cuff, so they may function properly. In a biomechanical study, Giles et al<sup>6</sup> found that rotator cuff repair, especially in conjunction with glenosphere lateralization, produces an antagonistic effect that increases deltoid and joint loading. Although the long-term effects of this remain unknown, combining these factors may prove undesirable. Humeral lateralization improves joint compression through deltoid wrapping and increases the deltoid’s mechanical advantage, and therefore, could be used in place of rotator cuff repair, thus avoiding its complications. Similar results have been found in our previous clinical work in which abduction reduction occurred in patients with glenoid lateralization and reattached subscapularis.<sup>5</sup> In another study of cadavers published by Giles et al,<sup>6</sup> the authors found how humeral lateralization was the only parameter that improved joint and muscle loading, whereas

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glenosphere lateralization resulted in increased loads. Humeral lateralization may be a useful implant parameter in countering some of the negative effects of glenosphere lateralization, but this should not be considered the sole solution for the negative effects of glenosphere lateralization. Finally Athwal et al<sup>1</sup> in a recent comparative cohort study of 40 patients (20 in each cohort, RSA vs. BIO-RSA) found that although the scapular notching rate was significantly higher in the standard RSA group, no other outcome measures were significantly different, including range of motion, strength, and validated outcome scores.

This does not mean that performing a glenoid lateralization with BIO-RSA is a bad thing as it does not amount to a humeral lateralization. The most important thing is to try to understand how much and how to lateralize. Recently, Warner et al<sup>9</sup> in a study carried out on 3D CT elaborated with Blueprint tried to identify the best compromise between glenoid lateralization and humeral lateralization. The authors found that lower humeral neck-shaft angle and glenoid lateralization are effective for improvement in range of motion after RSA. The 135° model with 5 mm of glenoid lateralization provided the best results in impingement-free range of motion, except for abduction.

What is yet to be understood is whether we will have the same results by introducing this type of implant to our patients. But the thing we should be able to answer is if a glenoid lateralization of only 5 mm can be performed with bone? Many studies and a lot of time are certainly needed but the good thing is that we are here to discuss ways to improve the quality of our reverse prostheses.

### Disclaimer

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