



# Range of Motion comparison of 6 Reverse Shoulder designs

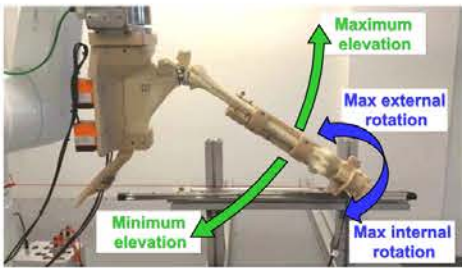
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## 1. Introduction

• The goal of this biomechanical study is to compare the range of motion of 6 different reverse shoulder designs

• Range of motion comparison:

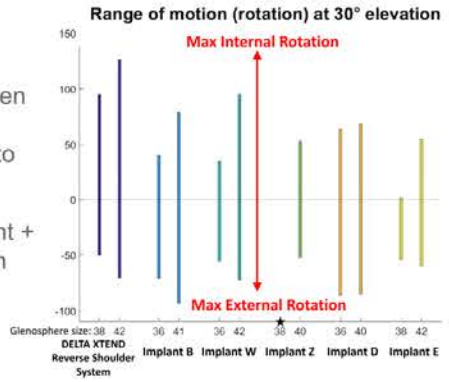
- Minimum and maximum elevation in the scapula plane.
- Maximum Internal & external rotation at 30° of abduction.
- Motion controlled by a robot.



## 3. Results

• There is a wide variation of the rotational RoM between the 6 reverse shoulder designs.

- The internal rotation varies between 1° to 126°.
- External rotation ranges from 50° to 93°.
- The bigger rotational RoM (Max int + Max ext rotation) was reached with the DELTA XTEND™ Reverse Shoulder System (RoM variation: 55° to 196°)



## 4. Discussion

• The RSA implants goals are pain relief and shoulder function improvement, however the functional RoM after RSA are frequently limited by bony conflicts.

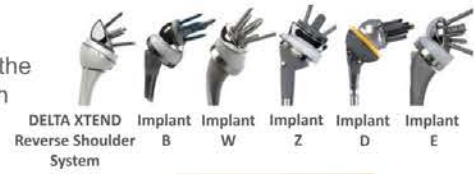
- This study has a number of limitations. The point of contact was evaluated visually, the soft tissue was not taken into account neither the scapula-thoracic motion which influences the total ROM in daily activities.
- The designs that were placed more superior on the glenoid were correlated with reduced abduction, adduction and less internal rotation due to scapular conflict.
- The improved ROM found in this study is the result of an increased prosthetic overlap of the glenosphere created by the use of a bigger glenosphere and/or a low position of the metaglene, which is consistent with the findings of De Wilde et al.<sup>1</sup>

<sup>1</sup> Prosthetic overhang is the most effective way to prevent scapular conflict in a reverse total shoulder prosthesis; Lieven F de Wilde, Didier Poncet, Bart Middemacht, and Anders Ekelund; Acta Orthopaedica 2010; 81 (6): 719-726

## 2. Methods

• The DELTA XTEND™ Reverse Shoulder System (DePuy Synthes), and 5 other reverse shoulders from the competition were implanted on Sawbone Foam Models.

• All six implant systems were evaluated using the smaller and the larger standard glenosphere, with the smaller humeral cup depth.



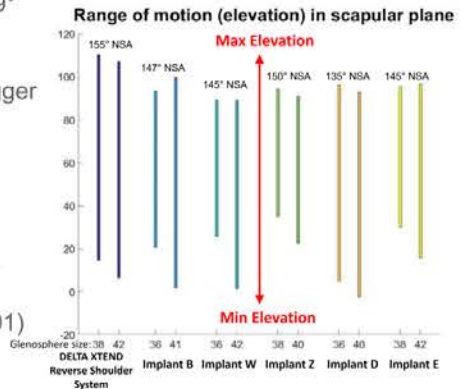
• The Range of Motion was controlled by a robot until contact between the PE cup and the scapula determining the minimum and the maximum elevation; the maximum internal & external rotation.



## 3. Results (Cont.)

• The total range of elevation in the scapular plane ranges between 59° and 100.7°.

- The DELTA XTEND™ Reverse Shoulder System provided the bigger RoM for the elevation (Max – Min elevation) in the scapula plane compared to the 5 other reverse systems.
- A bigger glenosphere diameter improves the adduction (p<0.001)
- A bigger Neck Shaft Angle increases the abduction (p<0.001)



## 5. Conclusion

• There is a wide variation in the measured glenohumeral ROM between the six reverse shoulder implant designs.

- There are some **big differences in terms of rotational RoM** (Max Internal Rotation + Max External Rotation) between the 6 reverse shoulder designs, **varying from 55° to 196°**.
- There is a very strong correlation between the use of a **bigger glenosphere diameter** (increasing the inferior overlap) and the **improvement of the adduction** (p<0.001).
- **A bigger Neck Shaft Angle (155°)** results in **improved abduction** compared to a smaller one (135°) (p<0.001) **but compromised adduction** (p<0.001)

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Please refer to the instructions for use for a complete list of indications, contraindications, warnings and precautions.

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