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** ROBOTIC BIOMECHANICAL EVALUATION OF REVERSE SHOULDER IMPLANTS **

- Shoulder pain
- Cuff arthropathy, Arthrosis
- (Reverse total shoulder arthroplasty) rTSA
- 30 brands Reverse polarity
- Same functional outcome
- Restricted ROM (Range of motion)
- Understanding Impact of
  - Design ≠ brands
  - Glenosphere size on ROM
- Improve Surgery: Case selection

Methods: Robotic biomechanical evaluation of 6 frequently implanted prosthesis in the most common configuration

- Setup implant placement
- Scapula registration
- Robotic testing

Results:

Methods: Robotic biomechanical evaluation of 6 frequently implanted prosthesis in the most common configuration

- 6-DOF robot for active control of the humeroscapular joint
- Cuff muscles simulated by tensioned draw wire encoders
- Repetitive Sawbone® clamping with 3D printed guides
- Spherical joint with rotary encoders

Results:

- Range of motion (elevation) in 90° humeral plane
- Range of motion (elevation) in scapular plane
- Range of motion (rotation) at 30° elevation

Discussion:

A wide variation in the ROM is discovered between the six most frequent implanted prosthesis. A larger glenosphere results in a better ROM in all different brands. These significant differences in ROM can be clinically important as it can result in impingement and restricted functionality of the humeroscapular joint. This implies that each clinical case should be matched with the best implant by comparison of the biomechanical properties of the different implant systems. This pilot study showed a large variation in biomechanical parameters after implantation. This variation could be used to select the most optimal implant design for every patient based on numerical simulations.