



PSI Guided Total Shoulder Replacement Prosthesis Osteoarthritis Based On A PSI Shoulder Model And Measurements From The Normal Opposite Side

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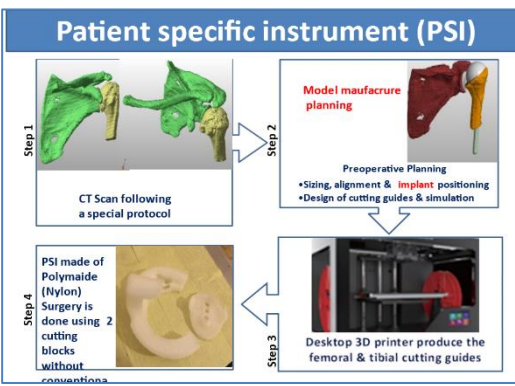
Aim

Based on the fact that the shoulder muscular biomechanics were functioning according to certain bony measures of the glenohumeral joint in respect of size and angles, the outcome of the anatomic total shoulder arthroplasty in cases of advanced osteoarthritis in the literature are very controversial. The aim of this in vivo study was to assess the accuracy of a new technique of PSI (patient specific instrumentation) total shoulder replacement in case of advanced osteoarthritis using measurements from the normal opposite shoulder and a preoperative PSI planning model of the affected side as well as cutting PSI guides, in a consecutive series at a single center.

Methods

We proposed a new technique which is a device and method for preparing a shoulder joint in a patient undergoing arthroplasty surgery. The device is patient specific, based on a method comprised of image-based the affected and the normal opposite shoulder 3D preoperative planning (CT, MRI or computed X-ray) to design the templates (PSI) that are used to perform the shoulder surgery by converting them to physical templates using computer-aided manufacturing.

Twelve consecutive TSA were performed using custom-made patient-specific positioning guides for the head component and the glenoid component as well as a planning PSI model.



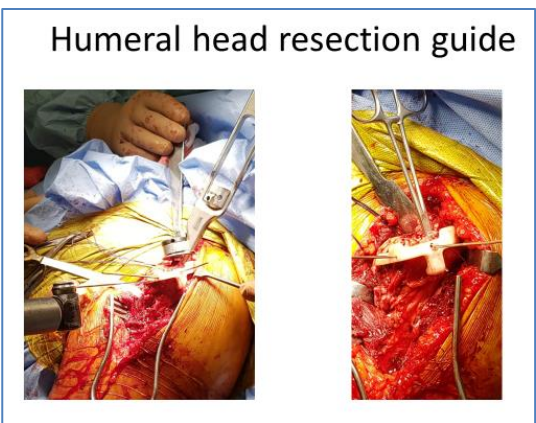
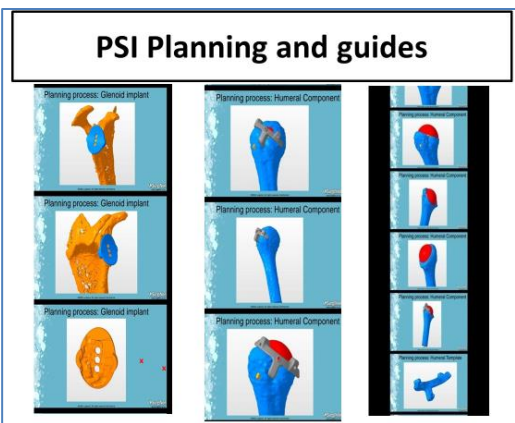
Measurements of the damaged side compared to the normal side

Left Side Measurements

Parameter	Value (in mm)
1. Head width	49.93
2. Head height	25.87
3. Inclination angle	90%
4. Neck angle	94.87
5. Shaft center offset	18.15
6. Head center	1.25
7. Shaft width @ 10 cm	14.21
8. Glenoid depth	23.59
9. Glenoid width	24.36
10. Glenoid version angle	83.85
11. Glenohumeral offset	35.42

Damaged Side Measurements

Parameter	Value (in mm)
1. Head width	44.59
2. Head height	24.74
3. Inclination angle	90%
4. Neck angle	98.39
5. Shaft center offset	6.39
6. Head center	1.47
7. Shaft width @ 10 cm	14.36
8. Glenoid depth	27.73
9. Glenoid width	28.41
10. Glenoid version angle	88.87
11. Glenohumeral offset	12.89





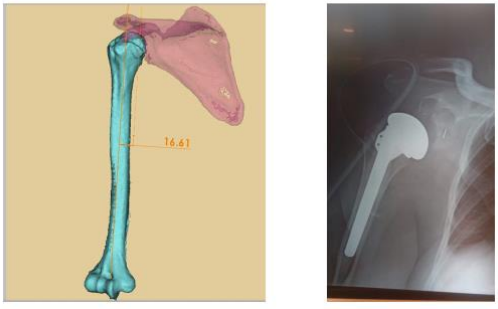
Results

Twelve TSA were done for twelve patients four of them had also reconstruction of the fractured glenoid with bone graft. The size of the head, its retroversion, height, valgus angle and head offset were done according to measurements of the normal opposite side as well as the glenoid. All cases had a range of motion between 150° to 180° elevation and 40 to 70 degrees external rotation, both active and passive after an average of 12 weeks from surgery. There is 30% reduction in surgical time According to Neer classification the results were excellent in 10 cases and satisfactory in two.

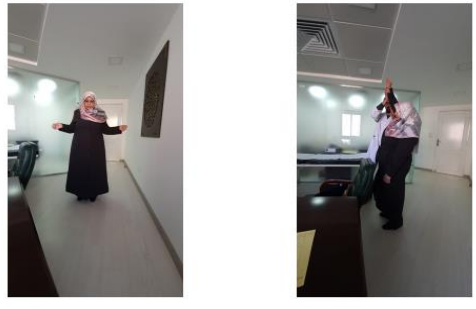
EARLY TREATMENT BETTER SURGERY



Total shoulder replacement



3 months post operative



Conclusions

This technique of PSI guided anatomical total shoulder prosthesis in osteoarthritis using the other normal shoulder measurements and PSI guide devices increase accuracy in the placement of the humeral component, which improves the likelihood of an optimal outcome. It reduces the surgical time about 30%.