

Computer Assisted Navigation Of The Glenoid In Total Shoulder Arthroplasty: Intra-operative Efficacy and Complications

Gabriel Larose¹, MD; Alexander Greene, BS; Amaury Jung, BS; Sandrine Polakovic, MS; Noah Davis, BS; Joseph D Zuckerman MD¹; Mandeep S Virk, MD¹

¹*Division of Shoulder and Elbow Surgery, Department of Orthopedic Surgery, NYU Grossman School of Medicine, NYU Langone Orthopedic Hospital, NYU Langone Health, New York, NY*

² *Exactech Inc., Gainesville, FL*

Background:

Pre-operative planning software and intraoperative guidance technology in the form of computer-assisted navigation surgery (CAN) is being increasingly used for managing complex glenoid deformity in total shoulder arthroplasty (TSA). The aim of this study is to review the intraoperative efficacy and complications of computerized assisted navigation surgery for managing glenoid deformity in anatomic and reverse TSA.

Methods:

A retrospective review of all TSAs implanted with a single computer navigation shoulder system (Exactech GPS, Exactech, Inc., Gainesville, FL) was performed. The intraoperative navigation guidance report, preoperative plan of glenoid and operative data was reviewed for each patient. The intraoperative accuracy of CAN for the glenoid was determined by calculating the difference between the final direction of the drill guide in the glenoid, as determined on the navigation guidance report, compared to the position of the central cage of the glenoid component (version and inclination) on the preoperative planning software. Details of intraoperative complications

such as coracoid fracture and the number of times the navigation system was abandoned intraoperatively was collected.

Results:

A total of 16,723 TSAs (anatomic and reverse) performed worldwide with this navigation system were included in this review. 16,368 cases (98%) completed every step in the navigation procedure without abandoning usage. The surgeon abandoned the use of CAN intraoperatively most of the time during the acquisition phase or less commonly during the implantation phase. There were 8 intraoperative coracoid fractures (0.05%) reported in this cohort. Comparison of the glenoid implant position on the preoperative plan and the final executed trajectory of the cage drill guide in the glenoid (representing final implant position) demonstrated a mean deviation of $0.58^{\circ} \pm 1.96$ for version, mean deviation of $0.23^{\circ} \pm 2.04$ for inclination, and mean deviation of $1.90\text{mm} \pm 1.2\text{ mm}$ for the starting point on the glenoid face.

Conclusion and Discussion:

The CAN system has a low risk of intraoperative complications and is very effective in translating the preoperative plan for the glenoid component implantation in total shoulder arthroplasty. Future studies should continue to focus on the impact of CAN on longevity and survival of the glenoid component and improving the cost-effectiveness of this technology.