EXACTECHGPS GUIDANCE SYSTEM DOES NOT INCREASE OPERATIVE TIME WHEN COMPARED TO CONVENTIONALLY INSTRUMENTED TOTAL KNEE ARTHROPLASTY

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Introduction

Although total knee arthroplasty (TKA) is a common procedure for knee arthritis, approximately one in five of the patients who undergo the surgery are not satisfied with the outcome [1]. Clinical success of such procedure depends on many factors, such as design of the implant, stability of the component fixation, proper soft tissue balancing, and last but not the least, accurate coronal, sagittal, and axial alignment of the reconstructed joint [2]. Computer assisted orthopedic surgery (CAOS) improves implant alignment in total knee arthroplasty (TKA) [3,4]. However, one perceived drawback for its adoption relates to the increased surgical time compared to the use of standard mechanical instrumentation. This study compared the time efficiency between a next generation CAOS system (ExactechGPS®, Blue-Ortho, Grenoble, FR) and conventional mechanical instrumentation, and assessed the impact of surgeon experience level on the efficiency.

Method

Surgical time was retrospectively reviewed on 63 primary TKAs performed by a board-certified orthopedic surgeon (PP) using the Optetrak Logic® PS knee system (Exactech, Gainesville, FL), grouped as 1) Group I (control): 21 TKAs using conventional mechanical instruments; 2) Group II: 21 KAs performed using the CAOS system with an early experience level (first 21 cases); and 3) Group III: 21 TKAs using the CAOS system with an advanced experience level (beyond 30 cases). All surgeries were performed under spinal anesthesia with tourniquet inflated. Patient condition (age, BMI, gender, etc.), surgical technique (excluding the use of the guidance system), and post-operative guidelines were similar across the three groups. No cases were lost and no patient had any intra-operative complications. Surgical time was compared across the three groups with significance defined as $p<0.05$.

Results

A summary of the surgical time is presented in Table 1. Compared to the TKAs using conventional mechanical instrumentation, the average surgical time for the navigated TKAs performed with an early experience was 7 minutes longer. However, with an advanced experience level, the average surgical time was 2 minutes less than the time required using conventional mechanical instrument. Further, navigated TKAs with an advanced experience level exhibited the least variability among the three groups. None of the time differences were significant ($p>0.20$).

Discussion

Integrating new technology into the operating room (OR) may impact the surgical time efficiency during TKA, possibly caused by the learning phase that both the OR staff and the surgeon will experience while familiarizing with setting up and preparing the instrumentation, as well as conducting the surgery. The results demonstrated that there was no significant difference in TKA surgical time for the evaluated CAOS system (both within or pass the learning curve) compared to the conventional instrumentation. Nevertheless, once the learning curve was reached, the system decreased the time variability compared to conventional mechanical instrumentation.

In contrast to data on traditional navigation systems [5-7], the efficiency reported in this study relative to the conventional mechanical instrumentation may be attributed to the unique features of the ExactechGPS system, such as indication for use inside the sterile field, blood occlusion-resistant tracker design, customizable operative technique tailored to the surgeon's preference, and compact and reduced number of instruments. The system may provide an advantageous solution for reducing surgical cost and improving clinical outcomes compared to traditional CAOS technologies.

References

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Group	I (Control)	II	III
Surgical Technique	Conventional Instrumentation	Early Experience ExactechGPS®	Advance Experience ExactechGPS®
Surgical Time (Minutes, Mean ± SD)	99 ± 15.2	106 ± 17.7	97 ± 13.9
Range (Minutes, Min - Max)	79 - 134	71 - 144	79 - 131
P-value (Compared to Group I)	n.a.	0.20	0.69

Table 1. Surgical time for each TKA group.