

# Six Week Radiographic Outcome Comparison of HipGrid® Drone™ and PhantomMSK® Hip

## METHODOLOGY

A retrospective evaluation was conducted for a consecutive cohort of patients having undergone unilateral total hip arthroplasty via the direct anterior approach between January 2017 and January 2020. All procedures were performed at a single site, by a single, fellowship trained orthopedic surgeon. Intraoperative fluoroscopy was supplemented by either the HipGrid®Drone™ (Drone) or PhantomMSK® Hip (Phantom) (OrthoGrid Systems Inc., Salt Lake City, UT, USA) to assist in the positioning of total hip arthroplasty components including cementless, short femoral stem and acetabular cup. The pre-defined target leg length discrepancy (LLD) and global hip offset (GHO) was <10mm and acetabular cup abduction angle (ABD) target was 45°±10° for the Drone and 42°±10° for the Phantom. Accuracy of component placement was evaluated on the six-week post-operative, weight bearing radiographs. Fluoroscopy times were recorded directly from the c-arm imaging device and surgical times were defined as incision to wound closure. Percentages of patients achieving each component placement goal, as well as reaching all three accuracy goals, were also evaluated. Continuous variables were non-parametric, therefore, group differences were determined by the Mann-Whitney U test and categorical data were evaluated with the Fisher Exact test.

**Table 1. Patient Demographics by Fluoroscopic Imaging Supplementation**

	<b>Drone (N=185)</b> N / Mean (SD)	<b>Phantom (N=182)</b> N / Mean (SD)	<i>p-value</i>
Gender	M: 86; F: 99	M: 99; F: 83	0.079
Age (years)	66.84 (11.04)	66.12 (9.51)	0.413
Body Mass Index (kg/m <sup>2</sup> )	26.61 (4.44)	27.90 (5.44)	0.029
Surgical Time (min)	71.12 (11.04)	68.75 (12.69)	0.022
Fluoroscopic Time (sec)	10.45 (4.36)	9.30 (3.84)	0.043

SD = standard deviation; N = number of patients; M = male; F = female

**Table 2. Radiographic Evaluation for Fluoroscopic Imaging Supplementation**

	<b>Drone (N=185)</b> Mean (SD)/N (%)	<b>Phantom (N=182)</b> Mean (SD)/N (%)	<i>p-value</i>
GHO (mm)	3.64 (2.44)	4.53 (2.81)	0.003
LLD (mm)	3.15 (2.68)	3.54 (2.59)	0.116
ABD (°)	45.14 (4.03)	46.40 (4.55)	0.007
GHO<10mm	184 (99.5%)	178 (97.8%)	0.181
LLD<10mm	183 (98.9%)	180 (98.9%)	0.682
ABD >35°;<55°	184 (99.5%)	177 (97.3%)	0.104
All Three Goals	181 (97.8%)	171 (94.0%)	0.052

SD = standard deviation; N = number of patients; mm = millimeter; ° = degree; GHO = global hip offset; LLD = leg length discrepancy; ABD = acetabular cup abduction angle

## DISCUSSION

Compared to previous literature<sup>1-5</sup>, both the Drone and Phantom were either consistent or an improvement for the accuracy of all three component placement. Although the Drone appears to be slightly more accurate for ABD and GHO, this is unlikely to be clinically significant as there was no difference in the percentage of patients falling within the targeted safe zone. The Phantom provides this accuracy with reduced surgical time, which may be an added benefit for high volume arthroplasty surgeons.

## INDICATIONS FOR USE

PhantomMSK Hip is an image-processing software indicated to assist in the positioning of Total Hip Replacement components. It is intended to assist in precisely positioning Total Hip Replacement components intraoperatively by measuring their positions relative to the bone structures of interest provided that the points of interest can be identified from radiology images. Clinical judgement and experience are required to properly use the device. The device is not for primary image interpretation. The software is not for use on mobile phones. HipGrid Drone is intended for use in orthopaedic hip procedures requiring anatomic alignment or re-alignment.

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