Early Optimal Recovery as a Composite Outcome to Measure Value of Care in Patients Undergoing Primary Total Knee Arthroplasty with a New Implant Design

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BACKGROUND

Total knee arthroplasty (TKA) has been rising steadily over time. While TKA is associated with positive outcomes, approximately 20% of patients report dissatisfaction regarding pain and functionality following the procedure[1-3]. Additionally, health resource utilization (HRU) in TKA is high, particularly with respect to length of stay (LOS) and operating time[4].

Evaluation of TKA success using specific, individual metrics may fail to capture the extent of the procedure and can lead to significant variability in outcome reporting among studies.

Thus, a novel, composite, all-or-none metric, early optimal recovery (EOR) was designed to capture the full complexity of TKA and ensuring that a successful procedure reflects satisfactory outcomes across all aspects of care,

OBJECTIVES

This study aims to investigate the impact of an innovative TKA implant design on a new composite outcome "early optimal recovery (EOR)", an overall measure for value of care which combines early clinical outcomes and healthcare resource utilizations (HRU).
The outcome EOR was designed to capture patient-reported pain, functionality measures, short-term complications, re-admissions, prolonged LOS (>48 hours), and additional outpatient visits.

METHODS

In this retrospective observational study patients that underwent a primary TKA between January 2017 and December 2020 with the comparator (Attune® knee) or control device (LCS® knee) were included.

EOR included no complications, no extra outpatient visits, length of hospital stay within 48 hours, ideal range of motion and ideal pain perception.

METHODS (Cont'd)

Database: Data were collected from a specialized clinic for elective surgeries in the Netherlands. Data were extracted from patients' medical records and anonymized.

Outcomes:

- Primary: proportion of patients achieving EOR following TKA assessed at 3-month follow-up and defined as no negative outcome measures
- Secondary: individual outcome measurements (ROM, pain perception, complication rate and type, total number of outpatient visits, ≤48-hour LOS) were compared between the two groups

A logistic regression model was used to compare the EOR between the comparator and control group. Results were adjusted for differences in baseline characteristics.

RESULTS

A total of 566 (62% female, mean age 67 years) patients were included for analysis of which 185 (33%) patients underwent TKA with the comparator device.

Most baseline characteristics were similar between the study and control groups. However, significant differences were observed in ASA II status (72.4% versus 25.7%; p<0.001), Charnley score A (38.4% versus 20.5%; p<0.001), and previous knee surgeries (32.4% versus 8.1%; p<0.001), for the study device group and the control device group respectively.

Table 1: Adjusted probability of study outcomes

Outcome, % (95% CI)	Control device (n=381)	Study device (n=185)	OR	p value
LOS ≤48 h	61.4 (54.7–67.7)	77.2 (67.7–84.5)	0.47	0.018
Ideal ROM	99.4 (96.2–99.9)	98.8 (91.9–99.8)	1.86	0.639
Pain-free	78.2 (71.0–83.9)	93.3 (85.7–97.0)	0.26	0.016
≤2 outpatient visits	84.3 (78.8–88.5)	89.9 (81.7–94.7)	0.60	0.273
Readmissions	2.1 (0.9–4.6)	2.2 (0.6–7.2)	0.96	0.962
Complications	3.6 (1.9–6.9)	2.3 (0.7–7.4)	1.59	0.555
EOR	38.9 (32.8–45.3)	65.8 (55.1–75.2)	0.33	<0.001

RESULTS

A total of 566 (62% female, mean age 67 years) patients were included for analysis of which 185 (33%) patients underwent TKA with the comparator device.

A multivariate logistic regression analysis showed that 66% in the comparator group achieved EOR in comparison to 39% in the control group (p<0.05) (Odds ratio 3.03; 95% confidence interval: 1.66-5.71) (Figure 1). 77% versus 61% (comparator versus control) of the patients were discharged within 48 hours and 93% versus 78% (comparator versus control) of the patients were pain-free after three months follow-up (Table 1).

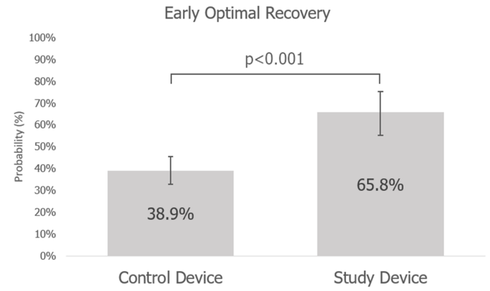

Figure 1: Probability of achieving EOR

CONCLUSIONS

Procedures performed with the study device had a greater probability of achieving EOR, indicating that use of the study device leads to improved quality of care.

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ASA: American Society of Anesthesiologists, BMI: body mass index, EOR: early optimal recovery.