

Intraoperative Liposomal Bupivacaine Is Associated With Improved Pain, Opioid Use, Functional, and Length of Stay Outcomes After Total Knee Arthroplasty: Real-world Evidence

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OBJECTIVE

To evaluate the real-world effectiveness of liposomal bupivacaine (LB) versus conventional local anesthetics (LAs) in patients undergoing primary total knee arthroplasty (TKA)

CONCLUSIONS

- 1 Intraoperative/Postoperative LB is associated with improved pain control and functional outcomes as well as reduced opioid use after TKA compared with conventional LAs over 3 months of postsurgical follow-up
- 2 The reduction in length of stay (LOS) with LB is especially relevant in ambulatory surgery rapid recovery protocols



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REFERENCES: 1. Stevenson et al. *J Clin Orthop Trauma*. 2018;9(1):40-45. 2. Dasa et al. *Ther Adv Musculoskelet Dis*. 2024;16:1759720x241304193.

INTRODUCTION

- Optimized perioperative pain control for TKA is imperative to shorten LOS and facilitate enhanced outcomes¹
- There is an unmet need for real-world data on pain, opioid, and recovery outcomes with LB, a long-acting LA that can extend postoperative analgesia
- The Innovations in Genicular Outcomes Registry (IGOR) is a prospective, multicenter, longitudinal, observational registry in which clinical decision-making is performed in a collaborative manner by treating physicians and their patients, with collection of data repeatedly including clinical data, assessments of patient-reported outcomes, reimbursements, and healthcare resource utilization²

METHODS

- Data were collected from IGOR for patients who underwent unilateral primary TKA between September 2021 and December 2024 for up to 3 months of follow-up after surgery (Figure 1)
 - The numerical rating scale (NRS) was used to assess acute pain during the first postsurgical week, and the Brief Pain Inventory-Short Form (BPI-SF) was used to assess chronic pain for subsequent time points
 - Opioid use was evaluated by an analgesic questionnaire
 - Functional outcomes were measured with the Knee Injury and Osteoarthritis Outcome Score for Joint Replacement
 - LOS (hours from facility admission to discharge) was also recorded
- Case and control patients were determined on the basis of intraoperative analgesia (LB and conventional LAs [bupivacaine or ropivacaine], respectively)

RESULTS

- Overall, 225 patients who did not receive opioids on the night before surgery or in the preoperative area were included (LB, n=42; conventional LAs, n=183) (Table)
 - Patients were predominantly female with a mean age of 67 years
 - Those receiving LB had higher baseline pain severity scores and lower baseline physical function scores than those receiving conventional LAs

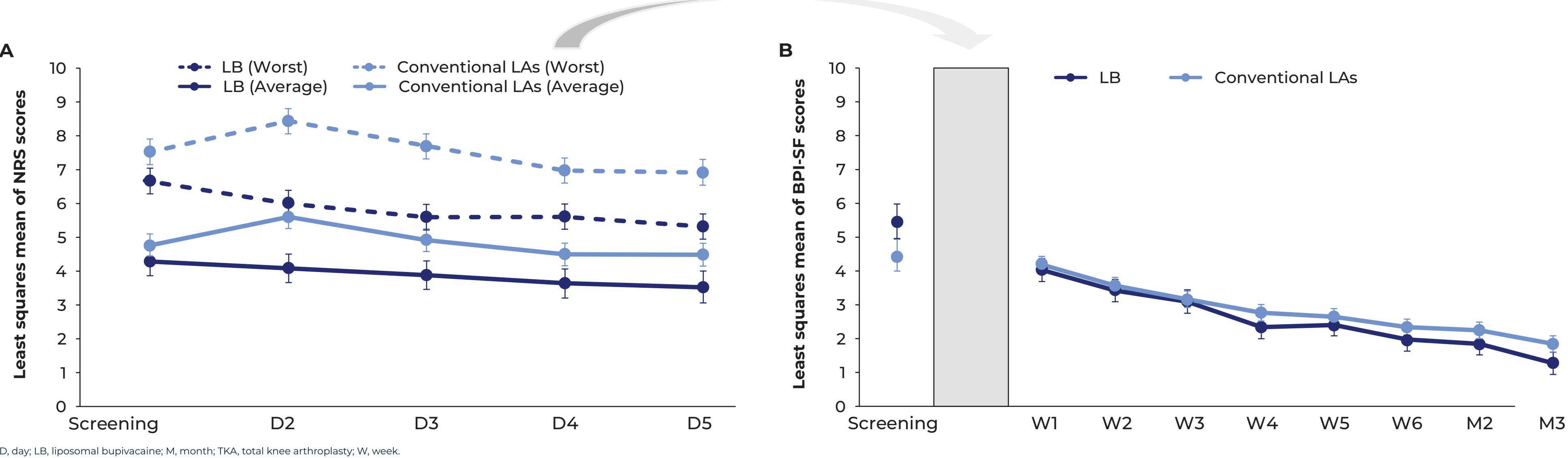
Table. Baseline Demographics

	LB (n=42)	Conventional LAs (n=183)	Total (N=225)	P value
Days since TKA, mean (SD)	470.5 (159.9)	250.7 (130.1)	291.7 (160.6)	<0.001
Age, mean (SD), y	66.3 (7.4)	67.3 (8.3)	67.1 (8.1)	0.418
Sex, n (%)				
Male	14 (33.3)	78 (42.6)	92 (40.9)	
Female	28 (66.7)	105 (57.4)	133 (59.1)	
Race/Ethnicity, n (%)				<0.001
Asian	1 (2.4)	2 (1.1)	3 (1.3)	
Black or African American	16 (38.1)	6 (3.3)	22 (9.8)	
White	25 (59.5)	171 (93.4)	196 (87.1)	
Other/Unknown	0	4 (2.2)	4 (1.8)	
BMI, mean (SD)	32.9 (6.89)	30.8 (5.58)	31.2 (5.89)	0.052
K-L grade, n (%)				0.254
2 (mild)	2 (4.8)	2 (1.1)	4 (1.8)	
3 (moderate)	3 (7.1)	11 (6.0)	14 (6.2)	
4 (severe)	37 (88.1)	170 (92.9)	207 (92.0)	
Baseline PCS, mean (SD)	25.4 (15.5)	17.1 (11.1)	18.6 (12.4)	0.003
Baseline pain severity, ^a mean (SD)	6.1 (2.5)	4.3 (2.0)	4.6 (2.2)	<0.001
Baseline physical function, ^b mean (SD)	40.2 (17.9)	51.3 (13.1)	49.3 (14.7)	<0.001

BMI, body mass index; BPI-SF, Brief Pain Inventory-Short Form; K-L, Kellgren-Lawrence; KOOS, JR, Knee Injury and Osteoarthritis Outcome Score for Joint Replacement; LA, local anesthetic; LB, liposomal bupivacaine; PCS, Pain Catastrophizing Scale; TKA, total knee arthroplasty. ^aBPI-SF. ^bKOOS, JR.

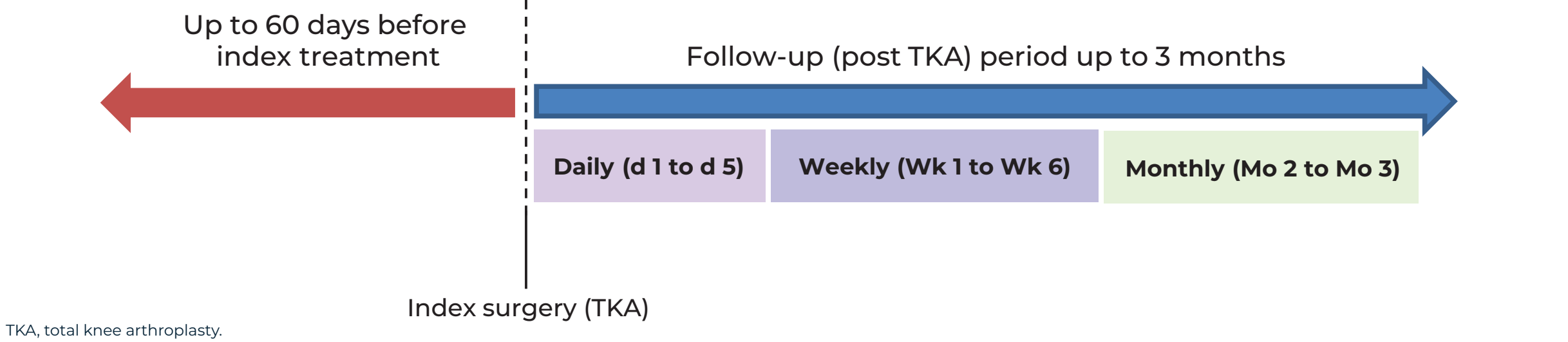
- Patients receiving LB demonstrated lower average and worst pain scores (as measured by NRS) than those receiving conventional LAs in the first 5 days (average pain, 3.9 vs 4.9 [$P<0.001$]; worst pain, 5.9 vs 7.1 [$P<0.001$]) as well as lower average pain scores measured by BPI-SF scores in the subsequent 3 months (2.6 vs 2.9; $P=0.03$) after TKA (Figure 2)
 - Worst pain scores within the first 5 days were also significantly lower among patients receiving LB compared with those receiving conventional LAs ($P<0.001$)

Figure 2. (A) Average and worst numerical rating scale scores within 5 days after TKA. (B) Average pain severity within 3 months after TKA.



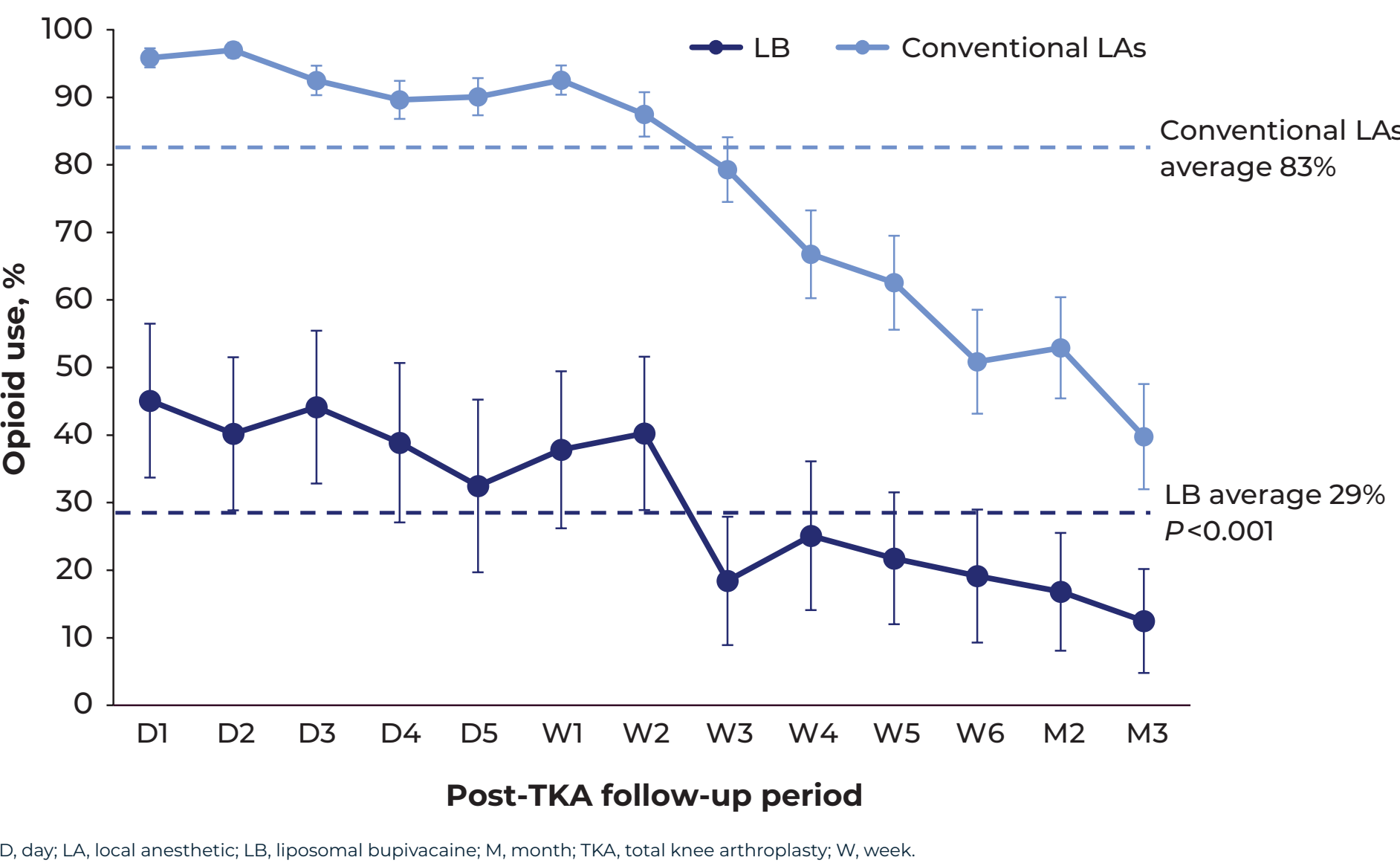
- Comparative analyses of longitudinal outcomes were performed with multivariable generalized linear mixed-effects models with appropriate distributions (eg, LOS was compared via multivariable negative binomial regression modeling)

Figure 1. Study design.



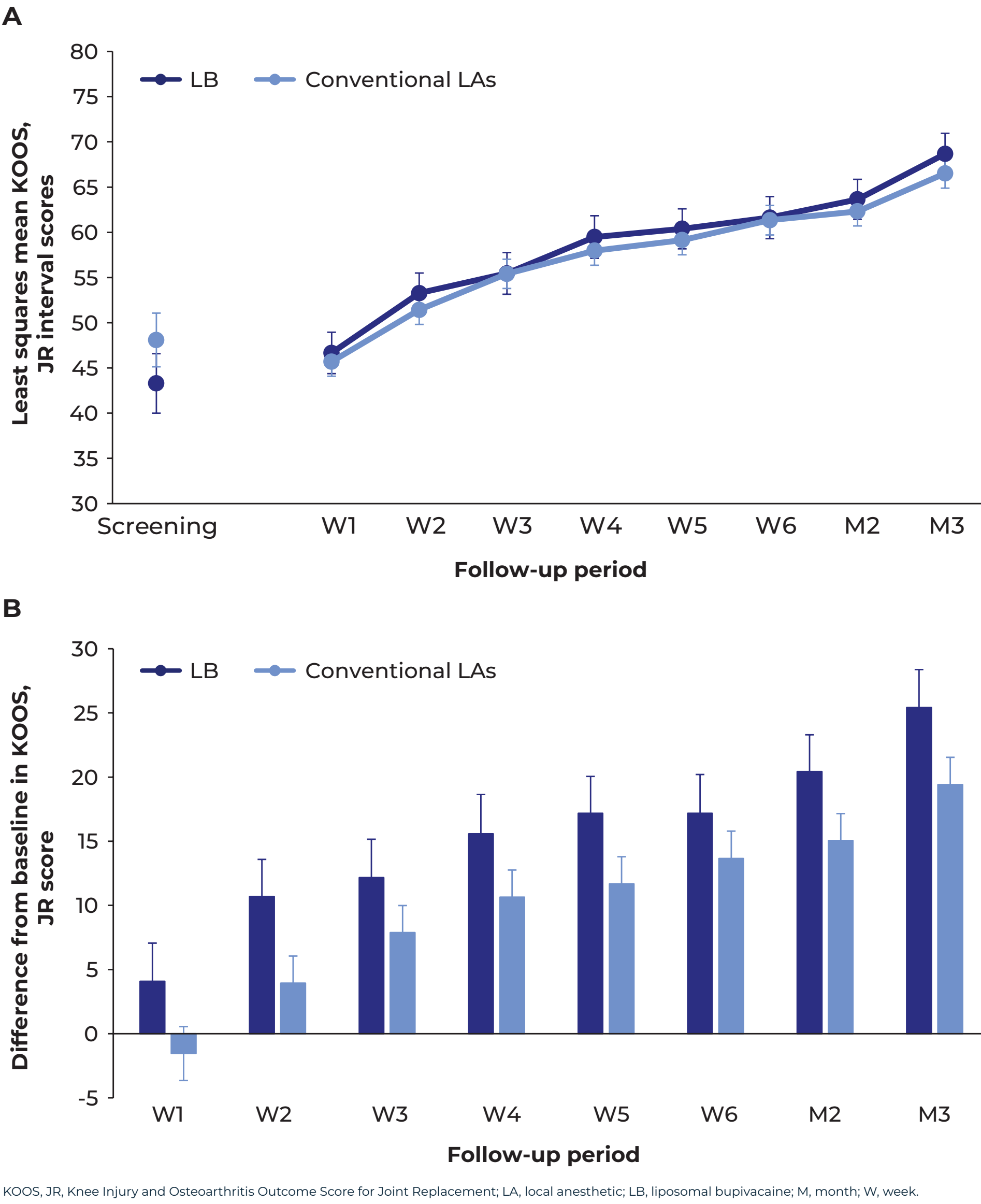
- The proportion of patients with opioid use over 3 months after surgery was also ~3-fold lower in those receiving LB compared with those receiving conventional LAs (average percentage over 3 months: 29% vs 83%; $P<0.001$) (Figure 3)

Figure 3. Self-reported opioid use.



- Patients receiving LB had improved physical function from baseline compared with those receiving conventional LAs (1.5 vs 1.0 standard deviation improvement; $P<0.001$) (Figure 4)
 - Both groups showed similar consistent improvement in joint-specific function ($P=0.174$; Figure 4A)

Figure 4. (A) Trend of physical function over 3 months of follow-up. (B) Change from baseline in physical function.



- Patients who received LB were also discharged significantly earlier than those receiving conventional LAs (15.0 vs 20.6 h; $P=0.007$)