

Introduction

- As total knee arthroplasty (TKA) increasingly shifts to outpatient and short-stay models, effective non-pharmacologic strategies to manage early post-operative pain and reduce opioid reliance are increasingly important [1].
- Diaphragmatic breathing is a simple, low-risk technique that may offer pain relief while avoiding the adverse effects of opioids, such as nausea, sedation, and ileus.
- We hypothesized that incorporating diaphragmatic breathing into the perioperative care of TKA patients would result in lower pain scores, reduced opioid consumption, and decreased anxiety in the early post-operative period.

Methods

- This single-center, non-randomized clinical study evaluated the impact of diaphragmatic breathing on post-operative outcomes in patients undergoing outpatient primary total knee arthroplasty (TKA) for osteoarthritis.
- The intervention group (n=34) received preoperative instruction in diaphragmatic breathing exercises. The control group (n=34) consisted of patients who underwent TKA at the same surgical center one year prior, using similar perioperative protocols. Patients undergoing revision TKA were excluded.
- Pain scores, anxiety levels, opioid use (measured in morphine milligram equivalents), heart rate (HR), and mean arterial pressure (MAP) were recorded at baseline, 15 minutes, 1 hour, 6 hours, and 1 day post-operatively. Pain and opioid use were compared between groups at each time point. Anxiety, HR and MAP were also assessed between groups. Statistical significance was set at $p < 0.05$.

Results

- The intervention group demonstrated significantly lower pain scores at 24 hours ($T = -3.85$, $p = 0.0002$). No significant pain differences were observed at earlier time points. Anxiety levels showed no significant changes across time points (all $p > 0.05$).
- Opioid use was 11 MME lower on average in the intervention group, though this difference was not statistically significant ($p = 0.131$). HR and MAP were also similar between groups at all intervals (all $p > 0.05$).

Time Point	Prospective			Retrospective			T-Statistic	P-Value
	Mean Pain Score	Std Dev	Sample Size	Mean Pain Score	Std Dev	Sample Size		
Prior to intervention	1.26	3.00	34	1.26	2.94	34	0.0	1.0
15 minutes after intervention	1.06	2.55	34	1.41	2.88	34	-0.53	0.59
1 hour after Intervention	1.62	2.82	34	1.79	2.69	34	-0.26	0.79
6 hours After Intervention	3.35	2.77	34	3.5	2.408	34	-0.23	0.81
1 day After Intervention	2.59	2.02	34	4.5	2.08	34	-3.85	0.0002

Table 1. Pain Score Comparison Across All Time Points (Prospective vs Retrospective)

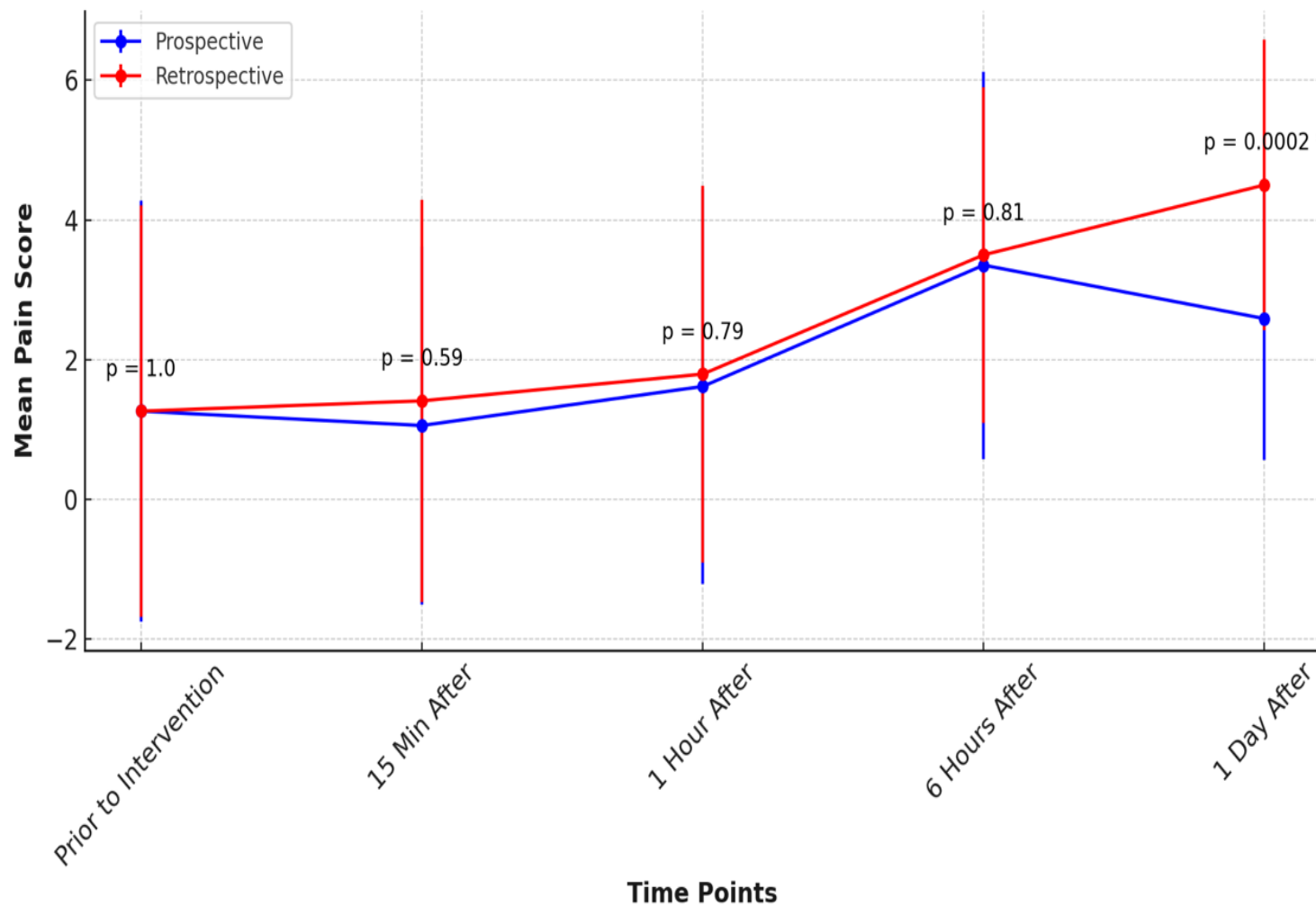


Figure 1. Pain score comparison across timepoints: Prospective vs retrospective groups

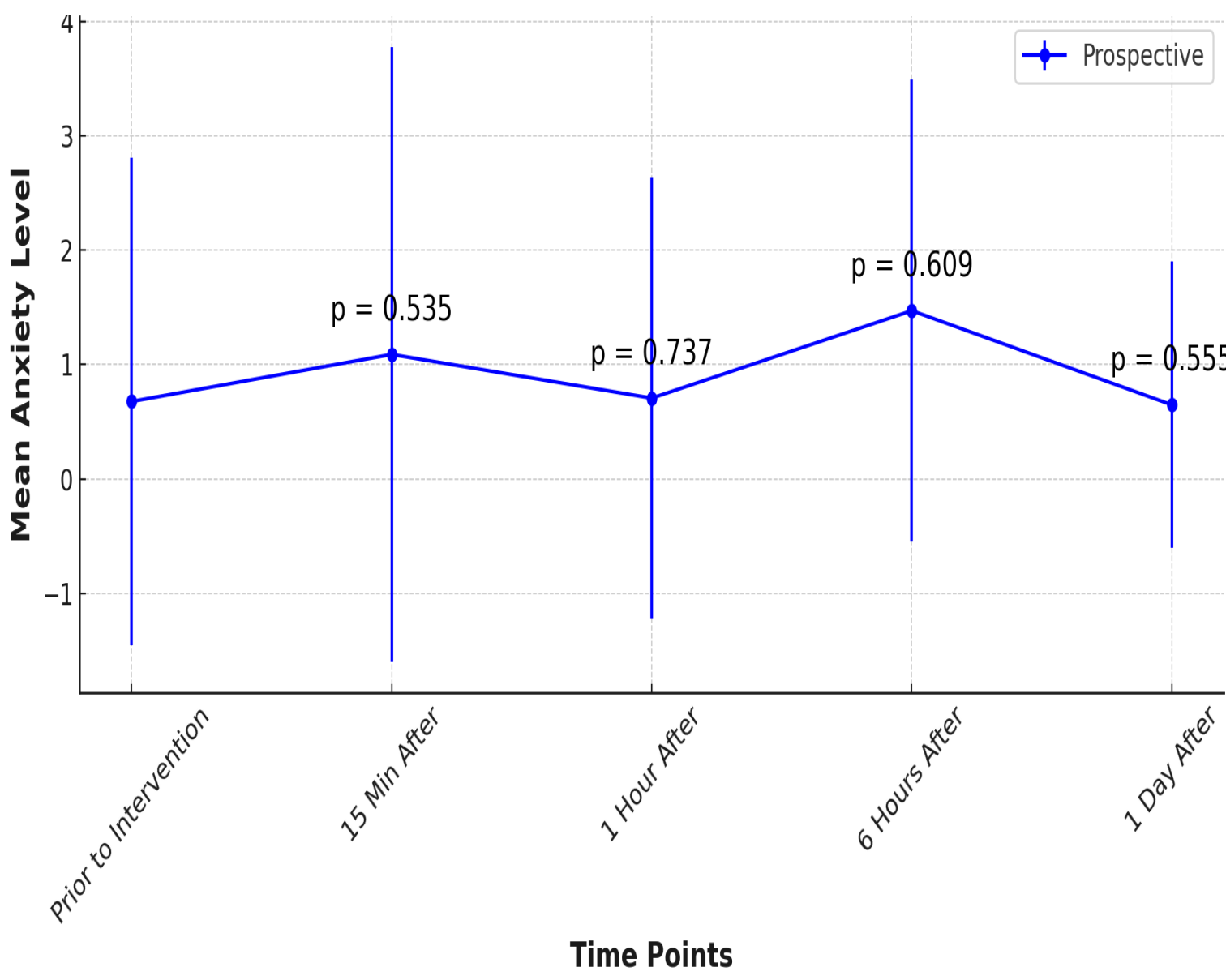


Figure 2. Anxiety level comparison across timepoints: Prospective vs retrospective groups

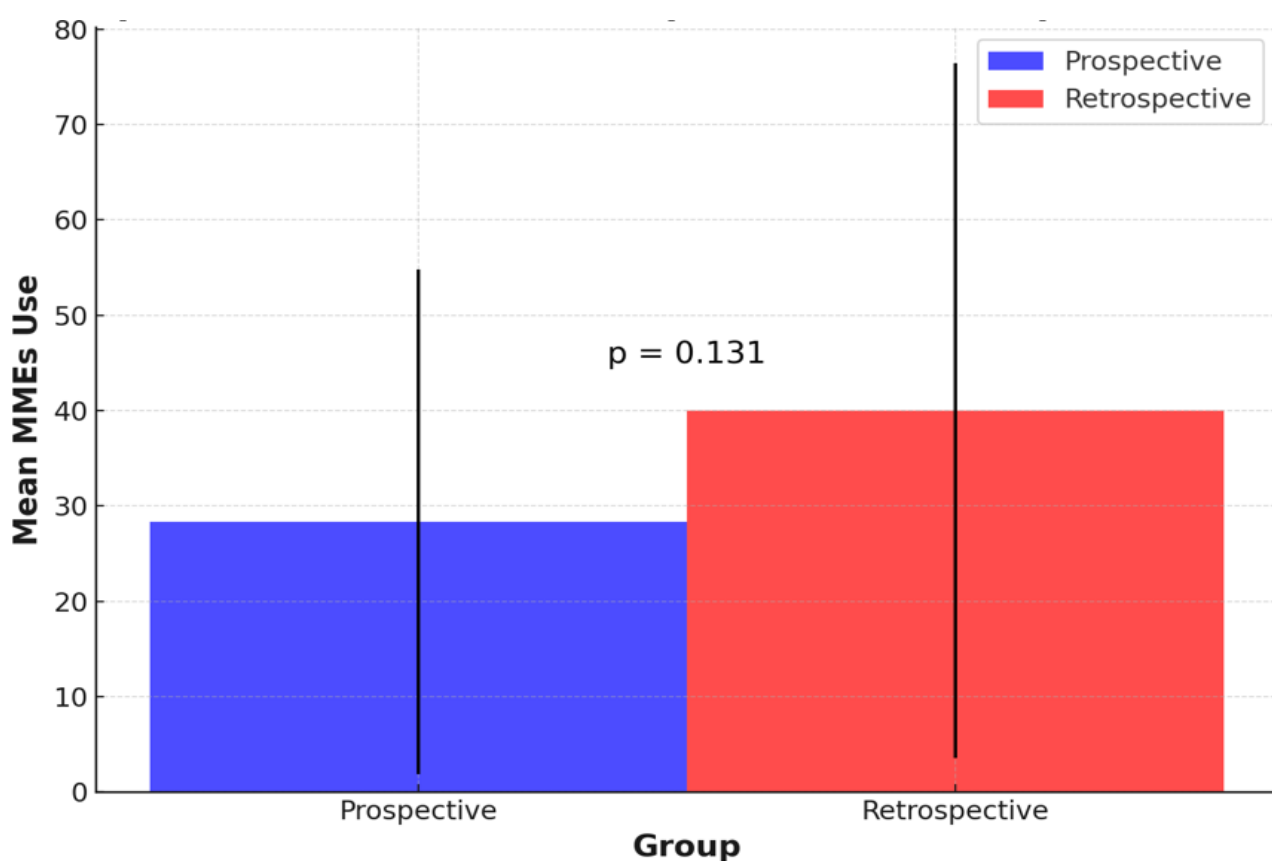


Figure 3. Comparison of MMEs use: Prospective vs retrospective groups

Conclusion and Discussion

- Diaphragmatic breathing appears to be a feasible, low-risk adjunct for post-operative pain control in outpatient TKA, with a significant reduction in pain at 24 hours.
- Opioid use was lower by ~11 MME in the intervention group (NS), but even modest reductions may be clinically meaningful in short-stay surgical pathways.
- The lack of change in post-operative anxiety suggests the intervention primarily affects pain rather than emotional stress.
- Limitations include small sample size and short follow-up. Future work should incorporate objective breathing metrics (e.g., tidal volume) and evaluate outcomes

References

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