Actigraphy-Based Assessment of Sleep Patterns in Total Knee Arthroplasty Patients Administered Dronabinol

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Dronabinol use may be a safe way to manage postoperative pain without disturbing sleep.

INTRODUCTION

Surgery, including TKA, can disrupt the sleep-wake cycle and lower sleep quality, particularly in the immediate postoperative period[1]. The extent of disturbance has not been defined, and it is unknown if novel therapies involving cannabis can help. Actigraphy is a non-invasive way to examine sleep quality and sleep-wake cycles over time to identify sleep disturbances. Dronabinol, which targets neuropathic pain and the apnea/hypopnea index in obstructive sleep apnea patients, has garnered interest for perioperative use[2].

OBJECTIVE

Our objective was to determine whether dronabinol (compared to placebo) was associated with improved (actigraphy-measured) sleep patterns after TKA.

METHODOLOGY

This clinical trial was approved HSS IRB (#2019-1416) and published on clinicaltrials.gov (NCT04734080).

- Between March 2021 and October 2023, 114 TKA patients were randomized to placebo or dronabinol.
- Both groups received neuraxial anesthesia, adductor canal and IPACK blocks, and standardized multimodal pain management.
- A wearable ActiLife wGT3X-BT wrist device (Figure 1) was placed on subjects in the PACU for 24-48 hours after surgery.

This analysis used secondary outcome variables from a larger prospective randomized controlled trial.

KEY FINDINGS

- The median duration of sleep (in minutes) during the major sleep period (total sleep time; TST) was 596 minutes for the control and 570 minutes for the dronabinol (Table 2).
- Sleep efficiency (SE) was 89.0 minutes for control and 88.2 minutes for dronabinol (Table 2).
- Both groups had similar oxygen desaturation events.
- The ActiLife monitor revealed no significant differences in sleep quality (efficiency and wake after sleep onset) between groups.

Figure 1. Actigraphy Timeline

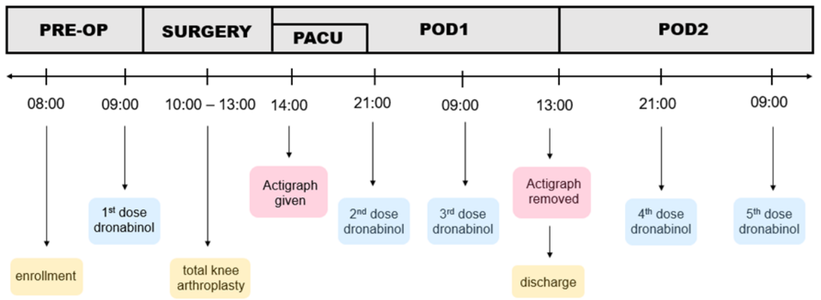

Table 2. Actigraphy Sleep Outcomes by Group

	Control (n=49)	Dronabinol (n=49)	P-value
Total sleep time, minutes	596 [363-1024]	570 [432-732]	0.6351
Sleep efficiency	89 [86.1-91.1]	88.2 [85.7-91.3]	0.7769
Wake after onset sleep	69 [45-95]	77 [56-95]	0.7986
Number of awakenings	20 [16-34]	23 [13-26]	0.8122

Note. All values reported in Median [IQR]

Table 1. Subject Demographics

	Control (n=49)	Dronabinol (n=49)
Gender		
Male	26 (53.1)	19 (38.9)
Female	23 (47.0)	30 (61.2)
Mean age (SD)	61.7 (5.1)	61.2 (6.0)
Race		
Asian	1 (2.0)	3 (6.1)
Black or African American	2 (4.1)	5 (10.2)
White	43 (87.8)	39 (79.6)
Other/Decline to Answer	3 (6.1)	2 (4.1)
Ethnicity		
Hispanic or Latino	3 (6.1)	3 (6.1)
Not Hispanic or Latino	45 (91.8)	43 (87.8)
Unknown/Declined to Answer	1 (2.0)	3 (6.1)
ASA		
1	1 (2.1)	0 (0.0)
2	45 (93.8)	49 (100.0)
3	2 (4.2)	0 (0.0)
Missing	1 (2.0)	0 (0.0)

CONCLUSIONS

In the first 24-28 hours following TKA, both dronabinol and placebo groups had similar sleep patterns. A standardized multimodal perioperative pain treatment may have influenced our patients' sleep. Sleep observation beyond nerve block resolution, opioid cessation, differed anesthesia, and other surgery subtypes needs more research.

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REFERENCES