Does Marijuana Use Affect Perioperative Outcomes in Adolescent Idiopathic Scoliosis Patients

Nazgol Tavabi, Gabriel Linden, Craig M. Birch, Timothy Hresko, Daniel J. Hedequist, Grant Hogue, Ata M. Kiapour
Department of Orthopedic Surgery, Boston Children's Hospital and Harvard Medical School, Boston, MA
Nazgol.Tavabi@childrens..harvard.edu

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INTRODUCTION: There are more than 11.8 million young adults in the United States who report personal marijuana (MJ) exposure. As marijuana use increases, it is critical to determine if marijuana poses a safety risk to orthopaedic surgical safety, or if it could serve as an alternative to postoperative opioid therapy. However, marijuanna usage is not regularly documented in clinical practice; and if so, it is documented within patients' unstructured clinical notes, in an unstandardized manner; adding to the challenges of studying effects of its usage on clinical outcomes. This study investigated if preoperative marijuana use is associated with differences in postoperative complication risk, surgical outcomes, inpatient pain scores, and opioid use after spinal fusion for adolescent idiopathic scoliosis (AIS). patients' information was extracted using a novel Natural Language Processing (NLP) pipeline, processing more than 23 million notes from 370,087 musculoskeletal patients to identify 1-AIS patients and 2-patients with positive marijuana usage. After cohort identification, effects of marijuana usage were studied on clinical outcomes of AIS patients.

METHODS: AIS patients with evidence of self-reported preoperative marijuana use in their medical records were matched to patients with no history of marijuana use. Matching criteria included age at surgery, sex, initial curve magnitude, Lenke classification, and number of levels fused. Propensity score matching was conducted using logistic regression models to produce maximum 5:1 matching. Inclusion required an AIS diagnosis, spinal fusion from 2011-2019, and an age of 11-20 at index surgery. Perioperative outcomes, inpatient pain scores, drug use, and postoperative outcomes were collected.

RESULTS: Thirteen AIS patients who reported using marijuana were matched to 65 control patients with no marijuana usage. The median age at surgery was 18.1 years, and 65% of the cohort was female. Median initial curve magnitude was 54 degrees, and median number of levels fused was 9. There was a difference detected in the median operative time per level fused between groups (p=0.03). However, this association was no longer significant when controlling for propensity score (p=0.08). Inpatient pain scores were not significantly different between cohorts (p=0.19). Opioid consumption during the inpatient stay was not significantly different between groups (p=0.69). The median discharge opioid amount for the marijuana group was 435 morphine milligram equivalents (MME), compared to 600 MME for the non-marijuana group (p=0.09).

DISCUSSION: There is a dearth of research investigating MJ effects on orthopedic outcomes, however, previous findings such as negative associations with the administered opioids and shorter length of stay after the surgery, highlights the importance of such researches. Although marijuana patients in this cohort had a statistically significant lower operative time than non-MJ users (p=0.03) and required less opioid units upon discharge (p=0.09), this was insignificant when controlling for propensity score. Leveraging NLP pipelines for cohort identification gave us the ability to process large amounts of clinical notes without the need for manual reviews and with high accuracy (AUROC=0.94, Accuracy=0.95).

SIGNIFICANCE: This study is the first to document the effects of marijuana in the AIS population, demonstrating that marijuana use did not hinder nor benefit patients undergoing spinal fusion. Further prospective research with larger sample sizes is needed to confirm if marijuana use is a safety hazard for pediatric orthopaedic patients, or if it has the potential to serve as an adjunct therapy to opioids to mitigate early narcotic dependence.

Table 1. Perioperative outcomes of Idiopathic Scoliosis operation for the case (MJ users) and control (non MJ users) group.

Outcomes (N=78)	**Reported MJ use (n=13)**		**No MJ use (n=65)**		
Intraoperative outcomes	**Median**	**(IQR)**	**Median**	**(IQR)**	**P-value**
Operative time per level fused *(min)*	33	(30-38)	28	(22-33)	**0.03**
EBL per level fused (*cc; n=77*) *	67	(39-96)	50	(27-83)	0.41
Inpatient outcomes	**Median**	**(IQR)**	**Median**	**(IQR)**	**P-value**
Pain score reported per day (*n=74*) *	6	(5-7)	5	(4-6)	0.19
Number of days pain score collected	2	(2-3)	3	(2-3)	0.18
Morphine use *(mg)*	0	(0-30)	30	(0-60)	0.11
Hydromorphone use *(mg)*	0	(0-15)	0	(0-0)	0.09
Oxycodone use *(mg)*	120	(50-160)	92	(65-145)	0.77
Ondansetron use *(mg)*	8	(2-16)	6	(2-12)	0.35
Opioid use (*mme; n=77*) *	241	(182-304)	225	(150-285)	0.69
Length of stay *(d)*	4	(3-4)	4	(3-5)	0.43
Postoperative outcomes	**Median**	**(IQR)**	**Median**	**(IQR)**	**P-value**
Discharge hydromorphone amount (*n=70*) *	0	(0-0)	0	(0-0)	0.73
Discharge oxycodone amount (*n=64*) *	290	(150-350)	300	(210-500)	0.16
Discharge ondansetron amount (*n=69*) *	0	(0-10)	0	(0-0)	0.49
Discharge opioid amount (*n=64*) *	435	(262-525)	600	(375-750)	0.09
Curve correction at the first-erect visit *(%)*	67	(64-72)	66	(57-72)	0.26

MJ, marijuana; IQR, interquartile range; MME, morphine milligram equivalents.
*The number in parentheses represents the number of cases with available data for the given characteristic.