Identifying Key Risk Factors in Elective 1 or 2 Level Lumbar Spine Fusion Patients: A Focus on Patients Classified High Medical Risk Cannabis Users

Heeren Makanji, Andrea Kwaczala, Caitlin M McCracken, Charlotte Hillery, Matthew J. Solomito

INTRODUCTION:

As laws surrounding cannabis use change, patients seem more willing to use and/or disclose use to medical providers. Despite the growing body of literature concerning the medical benefits and ramifications of cannabis use, few studies have explored cannabis' influence on recovery following elective lumbar fusion. Numerous studies have demonstrated the positive influence of cannabis use on pain control; however, these findings are still somewhat controversial. Given that pain is a major factor related to lumbar spine pathology and surgical recovery there is a clear need to understand the effect cannabis has on this patient population. Therefore, the purpose of this study was to investigate how cannabis may influence recovery following elective lumbar fusion in patient's identified as having an increased risk of complications due to their medical history.

METHODS:

This was a retrospective study that included patients between the ages of 35 and 80 years old who were treated and followed for an elective single- or two-level lumbar fusion between January 2022 and May 2025. Patients were excluded if they had underwent a surgery secondary to trauma or pathological condition (e.g. cancer), had a known history of opioid dependence or illicit drug use. All patients were classified as "high risk" or "normal risk" during their preoperative optimization visit based on our institutional protocols that consider several risk factors including demographic, lifestyle, medical comorbidities, physical function and patient reported outcome scores. Four groups of patients were created based on cannabis use and their risk level: high risk cannabis users (HC), high risk non-users (HR), normal risk cannabis users (NC), and normal risk non-users (NR). All patients indicating cannabis use during their preoperative visit were advised to discontinue use at least 2 weeks prior to surgery. Variables of interest (inpatient opioid use, self-reported pain from the preoperative assessment through 1 year post fusion, Oswestry Disability Index (ODI) scores) were compared using Chi-squared contingency tests and single factor ANOVAs with Scheffe' post-hoc testing.

RESULTS:

A total of 575 patients were included in this study, with 142 (24.7%) classified as high-risk, and 30 (5.2%) within this group were cannabis users. A total of 433 (75.3%) patients were considered normal risk, of which 101 (23.3%) were cannabis users. Demographic differences among groups indicated that cannabis users were significantly younger than non-users ($p<0.001$), and the HR non-user group had a significantly higher BMI than the NR ($p<0.01$, Table 1). Cannabis users presented with higher levels of pain and worse self-reported function at their preoperative appointment. In both high-risk groups, pain levels showed positive improvements post-operatively at 3 months but rebounded towards preoperative levels by 12 months ($p=0.065$, Figure 1). HR cannabis users showed two-fold higher opioid use when in the hospital, significantly higher than all other groups ($p<0.001$) and had a longer length of stay ($p<0.001$). High-risk cannabis users had significantly higher incident of surgical site infections (10%) compared to controls (1.2%, $p<0.01$) and had more incidents of any post-operative complications (23%) compared to controls (13.2%) although this was not significant ($p =0.20$).

DISCUSSION AND CONCLUSION:

Although cannabis users tend to be younger than non-users, they presented with higher levels of pain and reduced function based on the ODI. Those classified as high-risk patients had worse outcomes regardless of cannabis use, but high-risk cannabis users had higher long-term pain and worse outcomes than any other study group. Results of this study, suggest that cannabis use may have a negative synergistic effect on pain and functional recovery following elective lumbar fusions. Therefore, cannabis users that also present with numerous medical comorbidities should be recognized as a high-risk patient population. Given that studies have shown that pain is linked to poor outcomes, and this study demonstrated increased pain throughout the course of recovery for the HC cannabis users, this group may benefit from increased monitoring of both opioid needs and pain levels. Additionally, patients with numerous medical comorbidities who are known cannabis users, may require additional preoperative interventions to improve their medical conditions prior to surgery and additional interventions during recovery.

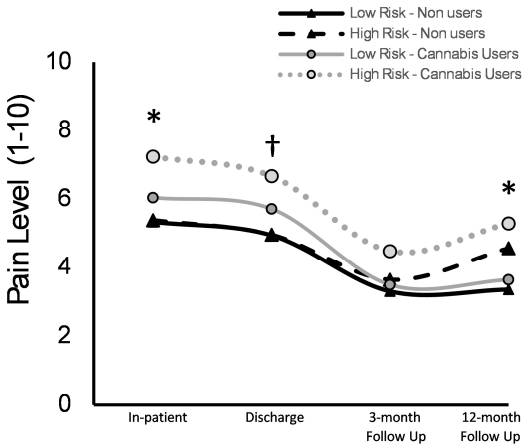

Figure 1. Longitudinal pain levels reveal healthy recovery in non-risk groups but rebound in pain in both high-risk groups after lumbar fusion. High risk cannabis users (dotted gray – circles) started with the highest level of pain compared to controls ($p<0.01$). Low risk non-users (solid black- triangles) and low risk cannabis users (solid gray – circles) both showed long-term pain relief while high risk non users (dotted black – triangles) and high risk cannabis users (dotted gray – circles) both had rebounding pain levels at 12 months after lumbar fusion (One-Way ANOVA, post-hoc: Scheffe's test, † $p<0.01$, * $p=0.065$).

Table 1: Comparison of patient demographics, preoperative metrics, and surgical outcomes across study groups.

	Non-Users		Cannabis Users	
	Normal Risk	High Risk	Normal Risk	High Risk
Total Count	333	112	101	30
Population				
Age	65 ± 11	65 ± 11	60 ± 14†	54 ± 13†
BMI	30 ± 6.0	33 ± 6.5†	31 ± 6.1	32 ± 6.5
Preop Concerns				
Preop ODI	43 ± 17	48 ± 16	49 ± 18†	57 ± 16†
Pre-Op Pain Levels	5.3 ± 3.6	5.4 ± 3.8	6.0 ± 3.9	7.2 ± 2.6*
Inpatient Opioid Usage (MME)	136 ± 203	163 ± 162	165 ± 139	432 ± 630*
Pain at Discharge	4.9 ± 2.6	5.0 ± 2.6	5.7 ± 2.4	6.7 ± 2.1†
Recovery Stats at 3 month follow up				
Pain Levels (1-10)	3.3 ± 2.3	3.6 ± 2.4	3.5 ± 2.2	4.5 ± 2.2
Change in ODI	14.6	16.6	15.5	15.8
Recovery Stats at 12 month follow up				
Pain Levels (1-10)	3.4 ± 2.5	4.6 ± 3.0*	3.6 ± 2.6	5.3 ± 1.5*
Change in ODI	19	17.9	15.7†	12.7†

BMI: Body mass index, morphine milligram equivalent, SSI: Surgical site infection, ODI: Oswestry disability index. One-Way ANOVA, post-hoc: Scheffe's test: †: significantly different, *: approaching significance $p<0.065$ when compared to the control (low risk non-user group) within each time point.