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Breast

Effects of Marijuana Use in Patients Undergoing Abdominal Free Flap Breast Reconstruction

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Background: Marijuana use has been associated with vascular inflammation and clotting, resulting in endothelial damage and arteritis. As marijuana use rises in the United States, few studies have evaluated its impact on surgical outcomes and wound healing in free flap breast reconstruction.
Methods: A retrospective cohort study of patients undergoing abdominal free flap breast reconstruction between 2016 and 2022 at a large metropolitan healthcare system was performed. Patient demographics, comorbidities, procedural details, and complications were analyzed. Minor complications were defined as skin or fat necrosis not requiring intervention, nipple loss, any wound requiring management in the clinic, hematoma, and seroma. Major complications were defined as reoperation, flap loss, cardiac or thromboembolic events, and hospital readmission. Active marijuana users were those with marijuana use within 12 weeks of surgery.
Results: In total, 168 patients underwent 276 deep inferior epigastric artery-based flaps for breast reconstruction. There were 21 active marijuana users. There were no significant differences in patient demographics, cancer treatment, or minor and major complications. However, there were higher rates of active nicotine use ($P = 0.001$) and anxiety/depression amongst active marijuana users ($P = 0.002$). Active users had higher rates of bilateral breast reconstruction ($P = 0.029$), but no significant differences in other operative details.
Conclusions: Active marijuana use of unknown frequency may be safe in patients undergoing breast free flap reconstruction. Advising marijuana abstinence preoperatively may not alter patient outcomes. Further studies of greater sample size are needed to evaluate marijuana's impact on outcomes associated with breast reconstruction using free flap. *(Plast Reconstr Surg Glob Open 2024; 12:e5657; doi: 10.1097/GOX.0000000000005657; Published online 1 March 2024.)*

INTRODUCTION

As more light is shed on the realities of potential complications with implant-based reconstruction, and with the growing experience in microsurgery techniques, the use of autologous free flap reconstruction is becoming the preferred method for breast reconstruction in appropriate patients.[1,2] Autologous reconstruction has been associated with higher aesthetic satisfaction and improved sexual well-being among patients, contributing to an overall improved quality of life.[3–6] Use of an autologous free flap based on the deep inferior epigastric artery perforator (DIEP) has become the preferred method due to its lower donor site morbidity, better aesthetic outcome, and lower rates of adverse surgical outcomes.[1,7] In contrast, implant-based reconstruction has been associated with greater risk of short- and long-term complications, specifically infection, capsular contracture, reoperation, explantation, and aesthetic changes over time.[3–6] As patients gravitate toward more natural reconstructive options, autologous flap surgery has become a rising contender for women seeking breast reconstruction. To minimize complications and to ensure reconstructive success in these more complex cases, patient optimization should be performed. The use of medicinal and recreational cannabis has increased throughout the nation in

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conjunction with recent changes in state laws surrounding its legality, and more patients seem to be presenting reporting a history of chronic use.[8] However, its increased use has not been studied on the effect of surgical outcomes, such as wound complications and its effect on microvascular anastomosis.

Cannabis use in the United States is on the rise, making it the most used recreational drug and the third most used drug following alcohol and cigarettes.[9,10] The legalization of cannabis around the United States has created a rapid rise in everyday use, with 45% of Americans reporting having tried marijuana at least once.[9,11] Data collected by the National Survey on Drug Use and Health shows that perception of cannabis has become more positive among adolescents and is increasingly perceived as harmless by adults.[10,12] Despite these beliefs, recent literature has outlined particular adverse effects of cannabis use on health outcomes.

Cannabis use has been linked to adverse health effects on multiple organ systems. Its pulmonary effects include inflammation of the large airways, lung hyperinflation, increased airway pressures, and chronic bronchitis.[12,13] Cardiovascular effects seen include vasculitis, which can cause myocardial infarction (MI); transient ischemic attacks; and strokes, as well as tachycardia; increased blood pressure; postural hypotension; and increased carboxyhemoglobin, resulting in a decreased oxygen-carrying capacity.[12,14,15] Mittleman et al found that the risk of MI onset was increased 4.8-fold within the first hour post marijuana smoking and 1.7-fold in the second hour.[14] This finding was confirmed by a study from Goel et al, which analyzed a large group of patients undergoing elective surgery and found that there was a 1.88-fold higher risk for postoperative MI in patients with reported active cannabis use.[15] From an anesthetic standpoint, marijuana use has been seen to potentiate the effects of atropine and epinephrine, and patients who chronically use cannabis require greater amounts of propofol and opioids for sedation and pain control.[16–18]

Regarding healing, marijuana users have been found to require nearly twice the time to heal fractures due to its effects on osteoblast-osteoclast regulation.[19] Endocannabinoid receptors are also present within the skin and subcutaneous tissues; agonism of the CB-2 receptors within the soft tissues was seen to decrease neutrophil and macrophage infiltration and led to decreased levels of inflammatory cytokines.[20] Higher rates of venothromboembolism and pulmonary embolism after knee arthroplasty as well as vascular graft complications after lower extremity bypass have been noted in marijuana smokers.[13]

Despite its prevalence and clinical relevance, marijuana's impact on mastectomy with reconstruction is not clearly known, specifically in patients undergoing autologous tissue reconstruction. As the use of abdominal free flap reconstruction increases, it is important to understand the impact of cannabis use on surgical complications, wound healing, patient recovery, and general health outcomes. We sought to explore the association between patient-reported marijuana use and surgical outcomes in patients undergoing immediate or delayed abdominal free flap reconstruction.

Takeaways

Question: Does active marijuana use impact autologous flap breast reconstruction surgical outcomes?

Findings: Our retrospective cohort study demonstrated that active marijuana use, within 12 weeks of operation, did not impact DIEP flap surgical outcomes. However, marijuana users had significantly higher rates of active nicotine use, anxiety and depression, and bilateral breast reconstruction.

Meaning: Active marijuana use may be safe in patients undergoing breast free flap reconstruction; however, further studies of greater sample size are needed to evaluate marijuana's full impact.

METHODS

Study Design

This is a retrospective cohort study on all patients who underwent an abdominal free flap breast reconstruction, primarily DIEP flap reconstruction, between 2016 and 2022 at a large metropolitan, quaternary care hospital system in the midwestern United States. Electronic medical records were retrieved and reviewed from a single institution. Patients were identified using CPT code 19364 and/or S2068. The study was approved by the institutional review board.

Data Collection and Classification

All EMRs were queried for surgical operation notes, plastic surgery clinical notes, and telemedicine notes. Clinical assessment included collection of demographic and baseline factors such as patient age, BMI, race, nicotine use, marijuana use, and narcotic use as well as comorbidities, including anxiety/depression, hypertension, and hyperlipidemia. Procedural details such as whether the patient underwent a nipple-sparing mastectomy, immediate or delayed reconstruction, or unilateral versus bilateral reconstruction were recorded. If the procedure was performed as a result of a cancer diagnosis, cancer stage, history of neoadjuvant or adjuvant chemotherapy, and history of pre- or postoperative radiation were noted. Length of hospital stay, duration of abdominal and breast drains, and duration of follow-up were tracked for each patient.

Patients were classified as either never, former, or active nicotine users and active or nonactive marijuana users. Those who used nicotine products, in any form, within 12 weeks of surgery, were considered to be active nicotine users. Patients were considered to be active marijuana users if their last marijuana use, in any form including but not limited to smoking and edibles, was within 12 weeks of the surgery.

Complications were classified as minor or major. Minor complications were listed as any wound managed in the clinic or necrosis that did not require intervention. This includes superficial epidermolysis mastectomy skin

Table 1. Patient-specific Demographics and Comorbidities

			Marijuana Use		Comparison Value of *P*
		All Patients (N = 168)	Nonactive (N = 147)	Active (N = 21)	*P* Value
Age		50.4 ± 9.6 (50.0)	50.7 ± 9.7 (51.0)	48.0 ± 9.4 (48.0)	0.216 (T)
BMI		30.7 ± 4.9 (30.3)	30.5 ± 4.9 (30.2)	31.5 ± 4.9 (31.3)	0.381 (T)
Race	Black	59 (36.2%)	52 (36.6%)	7 (33.3%)	0.911 (F)
	White	94 (57.7%)	81 (57.0%)	13 (61.9%)	
	Asian	6 (3.7%)	5 (3.5%)	1 (4.8%)	
	Hispanic	4 (2.5%)	4 (2.8%)	0 (0.0%)	
Nicotine use	None	107 (63.7%)	99 (67.3%)	8 (38.1%)	0.001 (C)*
	Former	53 (31.5%)	44 (29.9%)	9 (42.9%)	
	Active	8 (4.8%)	4 (2.7%)	4 (19.0%)	
History of anxiety or depression	No	94 (56.0%)	89 (60.5%)	5 (23.8%)	0.002 (C)*
	Yes	74 (44.0%)	58 (39.5%)	16 (76.2%)	

Numerical data are given as mean ± SD (median). Categorical or ordered data are given as frequency (column percentage).
(T), two-sample *T* test; (F), Fisher exact test; (C), chi-square test.
*$P < 0.05$.

necrosis, breast hematoma and seroma, nipple loss, wound infection needing antibiotics, abdominal fat necrosis, abdominal wound skin necrosis, abdominal wound dehiscence, abdominal hematoma and seroma, and umbilical necrosis. Major complications were listed as any reason for takeback or reoperation, flap loss, thromboembolic or cardiopulmonary events, and hospital readmission. This includes any takeback, takeback for incision and drainage, takeback for abdominal or umbilical wound, takeback for hematoma or seroma, full-thickness mastectomy skin flap necrosis, partial flap loss (>25%), total flap loss, fat necrosis of flap needing debridement, cardiac event, and deep vein thrombosis or pulmonary embolism.

Statistical Analysis

The data variables were analyzed as either "patient-specific variables" or "flap-specific variables." Patient-specific variables included demographics, comorbidities, type of breast reconstruction, type of chemotherapy and radiation, cancer stage, operative details, nonside specific complications (abdominal and umbilical complications, cardiac event, pneumonia, DVT, etc), and length of follow-up. Breast-specific variables included flap-specific details (nipple-sparing and immediate versus delayed reconstruction), any laterality specific complications (flap takeback, flap hematoma/seroma, flap necrosis, etc), and total number of major versus minor complications.

Numerical data were summarized as mean ± SD and median. Categorical or ordered data were summarized as a frequency and percentage. Comparisons of quantitative variables (BMI, age, etc.) were performed using a two-sample *t* test in the presence of distributional normality, otherwise using the Wilcoxon rank sum test. Categorical variables (comorbidities, complications, etc) were compared using a chi-squared test in the absence of data sparsity (expected cell counts < 5), Fisher exact test in the presence of data sparsity, or Cochran-Armitage trend test in the presence of ordered data. Multivariable generalized linear modeling was used to identify independent predictors of minor complications, major complications, and major or minor complications. Statistical analyses were determined with *P* values, and a value of *P* less than 0.05 was considered statistically significant. All calculations were done using SAS, version 9.4.

RESULTS

At our center, a total of 169 patients underwent 277 DIEP flaps for breast reconstruction, from May 2016 to December 2022. One patient was removed due to a 2-week history of breast radiation, resulting in a total of 168 patients and 276 flaps. Of those 168 patients, 21 patients were identified as active marijuana users and 147 as nonactive marijuana users. Of the patients, 108 had bilateral flap surgery and 60 had unilateral flap surgery, for a total of 276 flaps. Of the flaps, 237 belonged to nonactive marijuana users, and 39 belonged to active marijuana users.

Demographic Data and Comorbidities

No significant difference was identified in the nonactive and active marijuana users with regard to their demographic data, including age, BMI, race, and narcotic use (Table 1). However, there was a difference in nicotine use, with active marijuana users having a significantly higher rate of active and former nicotine use ($P = 0.001$). Regarding comorbidities, there was no significant difference between the two groups for history of hypertension and hyperlipidemia (Table 1). However, there was a significantly higher incidence of a past medical history of anxiety and depression in active marijuana users ($P = 0.002$).

Cancer Treatment and Stage

Nonactive and active marijuana user groups had no significant difference in preoperative cancer stage, rate of neoadjuvant or adjuvant chemotherapy, or history of radiation or adjuvant radiation (Table 2).

Operative Details

The majority of patients in both groups underwent non–nipple-sparing mastectomies with immediate reconstruction (Table 3). Of note, there was a significantly higher number of bilateral reconstructions in active

Table 2. Patient-specific Cancer Treatment and Stage

			Marijuana Use		
		All Patients (N = 168)	Nonactive (N = 147)	Active (N = 21)	Comparison Value of *P*
Chemotherapy	Neoadjuvant	37 (22.0%)	30 (20.4%)	7 (33.3%)	0.210 (F)
	Adjuvant	32 (19.0%)	29 (19.7%)	3 (14.3%)	
	Both	7 (4.2%)	5 (3.4%)	2 (9.5%)	
	None	92 (54.8%)	83 (56.5%)	9 (42.9%)	
Radiation	History of XRT	36 (21.6%)	32 (21.9%)	4 (19.0%)	1.000 (F)
	Adjuvant	18 (10.8%)	16 (11.0%)	2 (9.5%)	
	None	113 (67.7%)	98 (67.1%)	15 (71.4%)	
Cancer Stage	Prophylactic	4 (1.3%)	4 (1.5%)	0 (0.0%)	0.366 (CA)
	Stage 0 (DCIS)	17 (11.2%)	14 (10.4%)	3 (16.7%)	
	Stage 1	57 (37.5)	52 (38.8%)	5 (27.8%)	
	Stage 2	48 (31.6%)	43 (32.1%)	5 (27.8%)	
	Stage 3	24 (15.8%)	20 (14.9%)	4 (22.2%)	
	Stage 4	2 (1.3%)	1 (0.7%)	1 (5.6%)	

Categorical or ordered data are given as frequency (column percentage).
(F), Fisher exact test; (CA), Cochran-Armitage trend test.

Table 3. Flap-specific Operative Information

			Marijuana Use		
		All Flaps (N = 276)	Nonactive (N = 237)	Active (N = 39)	Comparison Value *P*
Nipple-sparing mastectomy	No	185 (67.0%)	160 (67.5%)	25 (64.1%)	0.675 (C)
	Yes	91 (33.0%)	77 (32.5%)	14 (35.9%)	
Immediate vs delayed reconstruction	Immediate	201 (72.8%)	171 (72.2%)	30 (76.9%)	0.535 (C)
	Delayed	75 (27.2%)	66 (27.8%)	9 (23.1%)	

Categorical or ordered data are given as frequency (column percentage).
(C), chi-square test.

Table 4. Patient-specific Operative Information

			Marijuana Use		
		All Patients (N = 168)	Nonactive (N = 147)	Active (N = 21)	Comparison *P* Value
Laterality	Unilateral	60 (35.7%)	57 (38.8%)	3 (14.3%)	0.029 (C)*
	Bilateral	108 (64.3%)	90 (61.2%)	18 (85.7%)	
Contralateral prophylactic mastectomy	No	154 (91.7%)	136 (92.5%)	18 (85.7%)	0.291 (C)
	Yes	14 (8.3%)	11 (7.5%)	3 (14.3%)	
Case length (h)		10.4 ± 2.6 (10.5)	10.3 ± 2.6 (10.1)	10.8 ± 2.7 (10.5)	0.371 (T)
Length of hospital stay (d)		5.6 ± 1.3 (5.0)	5.5 ± 1.3 (5.0)	6.0 ± 1.4 (6.0)	0.110 (W)
Duration of breast drains (d)		13.7 ± 8.7 (11.0)	14.1 ± 9.1 (11.5)	11.4 ± 4.0 (10.0)	0.358 (W)
Duration of abdominal drains (d)		16.3 ± 7.6 (15.0)	16.4 ± 7.9 (15.0)	15.4 ± 5.4 (16.0)	0.633 (W)
Duration of follow-up (d)		343.9 ± 388.7 (205.0)	351.2 ± 401.5 (204.0)	293.0 ± 286.0 (219.0)	0.757 (W)

Numerical data are given as mean ± SD (median). Categorical or ordered data are given as frequency (column percentage).
(C), chi-square test; (T), two-sample *t* test; (W), Wilcoxon rank sum test.
*$P < 0.05$.

marijuana users ($P = 0.029$; Table 4). There was no significant difference in contralateral prophylactic mastectomy rate, case length, hospital stay, duration of breast and abdominal drains, and duration of follow-up.

Operative Complications

There were no significant differences in patient-specific or flap-specific operative complications between active and nonactive marijuana use groups (Tables 5 and 6). There was no incidence of cardiac events or pneumonia in either patient group. Furthermore, there were no significant differences observed in terms of abdominal or umbilical complications, postoperative medical events, breast complications, flap loss, or need for additional reconstruction. Overall, there were no significant differences in the frequency and total number of minor or major complications (Table 7).

Multivariable generalized linear modeling found that marijuana use was not a statistically significant predictor of major and/or minor complications post DIEP flap surgery. Linear modeling also found that (1) BMI ($P < 0.001$), case hours ($P = 0.001$), and preoperative radiation ($P = 0.009$) were statistically significant predictors of any major complications (Table 8); (2) bilateral reconstruction ($P < 0.001$) and BMI ($P < 0.001$) were

Table 5. Patient-specific Peri- and Postoperative Complications

			Marijuana Use	
		All Patients (N = 168)	Nonactive (N = 147)	Active (N = 21)
Takeback for abdominal/umbilical wound	Yes	6 (3.6%)	4 (66.7%)	2 (33.3%)
Abdominal fat necrosis	Yes	3 (1.8%)	3 (100%)	0 (0.0%)
Abdominal wound skin necrosis	Yes	4 (2.4%)	4 (100%)	0 (0.0%)
Abdominal wound dehiscence	Yes	9 (5.4%)	9 (100%)	0 (0.0%)
Abdominal hematoma/seroma	Hematoma	0 (0.0%)	0 (—%)	0 (—%)
	Seroma	1 (0.6%)	1 (100%)	0 (0.0%)
Umbilical necrosis	Yes	12 (7.1%)	11 (91.7%)	1 (8.3%)
Deep vein thrombosis/pulmonary embolism	Yes	1 (0.6%)	1 (100%)	0 (0.0%)

Categorical or ordered data is given as frequency (column percentage) for the All Patients column, and frequency (row percentage) for the Marijuana Use columns.

Table 6. Flap-specific Peri- and Postoperative Complications

			Marijuana Use	
		All Flaps (N = 276)	Nonactive (N = 237)	Active (N = 39)
Take back	Yes	29 (10.5%)	24 (82.8%)	5 (17.2%)
Takeback for flap incision and drainage	Yes	5 (1.8%)	4 (80.0%)	1 (20.0%)
Takeback for hematoma/seroma	Yes	7 (2.5%)	6 (85.7%)	1 (14.3%)
Superficial epidermolysis mastectomy skin necrosis	Yes	24 (8.7%)	19 (79.2%)	5 (20.8%)
Full thickness mastectomy skin flap necrosis	Yes	8 (2.9%)	7 (87.5%)	1 (12.5%)
Partial flap loss (25%)	Yes	1 (0.4%	1 (100%)	0 (0.0%)
Total flap loss	Yes	11 (4.0%)	9 (81.8%)	2 (18.2%)
Nipple loss (nipple-sparing mastectomy)	Yes	6 (2.3%)	4 (66.7%)	2 (33.3%
Wound infection needing debridement	Yes	17 (6.2%)	17 (100%)	0 (0.0%)
Breast hematoma/seroma	Hematoma	6 (2.2%)	5 (83.3%)	1 (16.7%)
	Seroma	4 (1.4%)	4 (100%)	0 (0.0%)
Fat necrosis of flap needing debridement	Yes	4 (1.4%)	4 (100%)	0 (0.0%)
Need for different reconstruction	Yes	9 (3.3%)	9 (100%)	0 (0.0%)

Categorical or ordered data are given as frequency (column percentage) for the All Patients column, and frequency (row percentage) for the Marijuana Use columns.

Table 7. Flap-specific Major and Minor Complications

			Marijuana Use	
		All Flaps (N = 276)	Nonactive (N = 237)	Active (N = 39)
Major complications	Yes	40 (14.5%)	34 (85.0%)	6 (15.0%)
No. major complications		0.3 ± 0.8	0.3 ± 0.8	0.4 ± 0.9
Minor complications	Yes	64 (23.2%)	57 (89.1%)	7 (10.9%)
No. minor complications		0.4 ± 0.8	0.4 ± 0.8	0.3 ± 0.6
Major or minor complications	Yes	91 (33.0%)	79 (86.8%)	12 (13.2%)
No. minor and major complications		0.7 ± 1.1	0.7 ± 1.2	0.6 ± 1.1

Numerical data are given as mean ± SD. Categorical or ordered data are given as frequency (column percentage) for the All Patients column, and frequency (row percentage) for the Marijuana Use columns.

statistically significant predictors of any minor complications (Table 9); and (3) bilateral reconstruction ($P = 0.002$), BMI ($P < 0.001$), active smoking ($P = 0.008$), and case hours ($P < 0.001$) were statistically significant predictors of any major or minor complications (Table 10). Of note, marijuana use is trending toward significance as a predictor of minor complications in DIEP breast reconstruction ($P = 0.072$).

Table 8. Breast-specific Prediction of the Presence of Any Major Complications Using Multivariable Generalized Linear Modeling

	P
Marijuana use	0.872
Bilateral	0.358
BMI	<0.001*
Active smoker	0.136
Case hours	0.001*
Preoperative radiation	0.009*
Neoadjuvant chemotherapy	0.634

* Statistically significant, $P < 0.05$.

DISCUSSION

Given the increasing prevalence of marijuana use and the growing clinical use of DIEP autologous tissue

Table 9. Breast-specific Prediction of the Presence of Any Minor Complications Using Multivariable Generalized Linear Modeling

	P
Marijuana use	0.072
Bilateral	<0.001*
BMI	<0.001*
Active smoker	0.207
Case hours	0.626
Preoperative radiation	0.316
Neoadjuvant chemotherapy	0.170

* Statistically significant, $P < 0.05$.

Table 10. Breast-specific Prediction of the Presence of Any Major or Minor Complications Using Multivariable Generalized Linear Modeling

	P
Marijuana use	0.525
Bilateral	0.002*
BMI	<0.001*
Active smoker	0.008*
Case hours	<0.001*
Preoperative radiation	0.065
Neoadjuvant chemotherapy	0.349

* Statistically significant, $P < 0.05$.

reconstruction post mastectomy, it is important for clinicians to be aware of the risks of marijuana use and to consider counseling patients on its potential impact on surgical outcomes. In this study, we explored the association between patient-reported marijuana use and surgical outcomes in patients undergoing immediate or delayed abdominal free flap reconstruction. Our results demonstrate that there were no significant differences in major and minor complications between active and nonactive marijuana user groups. This suggests that marijuana use may not have an impact on surgical outcomes in breast free flap reconstruction. To our knowledge, this is the first study investigating the association between marijuana use and surgical outcomes in patients undergoing abdominal free flap reconstruction. Although limited, the available literature suggests that marijuana use may have negative effects on wound healing and cardiovascular outcomes, which could potentially impact surgical outcomes.[12–14,20] However, multiple studies assessing the impact of marijuana use on lumbar spinal fusion found that there was no significant difference in surgical complications, operating room takeback, or revision surgery between user and nonuser groups.[21,22] This discordance in the literature points to the need for additional research on the impact of marijuana on surgical healing in the postoperative period, particularly for flap reconstruction.

Multivariable linear modeling revealed that active smoking was a significant predictor of any major or minor complications ($P = 0.008$). The well-documented impact of nicotine on surgical wound healing, particularly in relation to free flap surgery, supports this finding.[23] Although our study does not indicate that marijuana use has an impact on flap outcomes, the regression analysis suggests that marijuana use approaches significance ($P = 0.072$) as a predictor of minor complications. This highlights the need for higher statistical power in future investigations. It is important to note that four of 21 (19%) active marijuana users were also concomitant active nicotine users. Although there is an overlap of active nicotine and marijuana users in our patient population, they are both independently accounted for in the regression analysis, indicating that our outcomes were specific to active marijuana users. To truly isolate the impact of marijuana use on surgical outcomes, it would be necessary to perform a randomized control trial. However, conducting such a trial poses challenges and ethical concerns regarding marijuana use. Alternatively, animal studies may offer a more plausible and effective approach. Further studies using a prospective evaluation of clinical outcomes and marijuana use within a larger cohort of patients may help solidify our understanding of the impact of marijuana use on DIEP flap reconstruction.

Our study additionally found that there was a significantly higher number of bilateral reconstructions in active marijuana users ($P = 0.028$, 88.2% versus 61.1%). This observation may be attributed to the greater likelihood of anxiety among marijuana users, which is likely contributing to an increase in contralateral prophylactic mastectomy (CPM) in that population. Previous studies have shown that CPM is more preferred and used by patients with a negative affect toward their diagnosis.[24,25] Furthermore, studies have found that patients undergoing CPM are strongly motivated to do so by concerns about cancer reoccurrence and the desire to minimize postsurgery treatment and radiation visits.[24,25] Our study found that patients who were active marijuana users did in fact have significantly higher rates of anxiety/depression ($P = 0.003$). In total, 76.5% of active marijuana users had a prior medical history of anxiety/depression, compared with 38.2% of nonactive marijuana users. This finding is supported by established literature, which shows that both chronic and weekly use of cannabis has a positive association with depression.[26,27] Another study showed that both regular and nonregular cannabis users reported higher rates of generalized anxiety disorder compared with those who did not use cannabis.[28] These findings support that marijuana use may ultimately contribute to the development or exacerbation of patient anxiety and depression and contribute to preference for CPM.

The multivariate regression analysis indicates that, although marijuana use may not have a significant effect on complications in this autologous patient population, there are significant associations between operative complications and factors such as BMI, case hours, bilateral reconstruction, preoperative radiation, and, aforementioned, active smoking. These factors are likely related to pre- and intraoperative optimization factors that have been previously established in the literature, such as achieving a healthy BMI before surgery, minimizing the duration of the procedure, and limiting the area of operation, thus reducing trauma to the patient.[29–31] Previous studies have explored the association between preoperative radiation and breast reconstruction outcomes with varying results,

predominantly concluding that preoperative radiation has no significant impact on autologous breast reconstruction success.[29,32,33] However, a study conducted by Fracol et al. found that patients with previous radiation therapy had significantly higher occurrences of intraoperative vascular complications and postoperative wound infections.[34] These findings emphasize the importance of optimizing pre- and intraoperative factors in all complex procedures, including DIEP flap reconstruction, to minimize complications and improve patient outcomes.

Our study has limitations that should be taken into consideration when interpreting the results. Firstly, the study relied on patients to self-report their marijuana use. Therefore, the data may be subject to recall and social desirability bias, resulting in underreported marijuana use and inaccurate collected data. Secondly, the study was conducted at a single institution. The patient population, surgical techniques, and postoperative care may differ across institutions, which could limit the generalizability of the study. Thirdly, the sample size of marijuana users may limit the power of the study to detect significant associations between active marijuana use and surgical complications. Although our study's sample size is reasonable for a single-institution study, further evaluation with a larger patient base may be necessary to confirm our findings. Finally, the study classified patients as active marijuana users without considering the context of marijuana use (therapeutic versus recreational) and frequency, form, and amount of marijuana used, which may have an impact on the likelihood and severity of adverse outcomes. Despite these limitations, our study provides valuable insights into the potential impact of marijuana use on surgical outcomes in patients undergoing DIEP flap reconstruction.

CONCLUSIONS

In conclusion, our study suggests that active marijuana use may not impact surgical outcomes in free flap breast reconstruction. Although patients should still be advised to disclose marijuana use during the preoperative evaluation, advising marijuana abstinence preoperatively may not alter surgery-specific patient outcomes for flap reconstruction, specifically DIEP breast reconstruction. Nonetheless, given the inconclusive nature of the study results, we suggest that patients abstain from nicotine use for 6 weeks and marijuana use for a minimum of 12 weeks, in the pre- and perioperative period. Although this will protect against previously known serious adverse effects from nicotine and marijuana use, it also aids in mitigating potential unidentified complications that could have negative implications on surgical outcomes and postoperative recovery. Similarly, further research is needed to confirm our findings and to investigate the mechanisms by which marijuana use may affect surgical outcomes and complications, particularly in relation to DIEP flap breast reconstruction.

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DISCLOSURES

Dr. Atisha is an MTF Biologics Consultant. All other authors have no financial interest to declare in relation to the content of this article.

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