



Full Length Article

Impact of tramadol abuse on clinical outcome of lumbar discectomy patients'

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ARTICLE INFO

Keywords:

Tramadol abuse
Lumbar discectomy
Clinical outcome

ABSTRACT

Background data: Little data exists regarding the effect of chronic preoperative tramadol abuse on the clinical outcomes after surgery. Lumbar discectomy is a very common procedure that has a predictably high success rate for relief of radicular pain. In addition, the patient population presenting for this procedure has a high propensity for preoperative narcotic use.

Purpose: The study aims to identify an association between preoperative tramadol abuse and clinical outcome after lumbar discectomy.

Study design: A descriptive controlled, non-randomized, clinical study.

Patients and methods: Sixty patients underwent surgery for lumbar disc herniation. They were divided into two groups; control group and tramadol abuse group. Each group included 30 patients. They were operated between 2015 and 2016. Participants were evaluated pre-operatively and post-operatively every three months. Strict history taking regarding preoperative and postoperative pain medication utilization, operative time, hospital stay and complications were assessed. Pain was scored by a VAS for both lower limbs and back pain. The clinical outcomes were compared using the Prolo economic and functional rating scale.

Results: In Tramadol abuse group, 12 (40%) continued to use tramadol after surgery. Tramadol abuse group showed worse clinical outcome parameters including worse VAS for low back pain and lower limb pain, worse Prolo economic, functional rating scale. In addition, tramadol abuse group showed significantly higher complications rate in the early post-operative and during the follow up period.

Conclusion: Tramadol abuse before lumbar discectomy was found to be associated with continued tramadol abuse after surgery and worse functional outcomes following surgery. Surgeons may want to counsel their patients about the potential for inferior clinical outcomes if narcotics were used before surgery.

1. Introduction

Prescription opioid abuse is considered as a significant public health crisis (Shah et al., 2018), its use is steadily increasing; particularly for musculoskeletal complaints. Chronic back pain is considered one of the most common musculoskeletal conditions that often persist for years or decades. In this setting, the safety of long-term opioid use remain controversial (Deyo et al., 2009).

Most chronic back pain patients visit their surgeon having the expectation that the offered operation will relieve their pain and improve their functionality (Webster et al., 2007). Before seeking surgery, many patients were depended on narcotic pain medications to address their pain. However, the effect of chronic preoperative narcotic use/abuse on the outcome of a surgical procedure has not been thoroughly

investigated. Webster et al. have shown that the early use of high dose narcotics was an independent risk factor for prolonged disability, increased medical utilization, and continued narcotic use after a workman's compensation related lower back injury (Webster et al., 2007). They suggested that more intensive use of narcotics might be counterproductive to recovery from injury, but did not assess outcome after surgery (Webster et al., 2007).

Tramadol is the number one drug abused by a whopping 40.7% of Egyptian drug abusers. Patients being evaluated for lumbar radiculopathy may have a high prevalence of preoperative tramadol abuse to suppress their pain. Many of these patients have failed conservative management. Lumbar discectomy is highly efficacious, with many authors demonstrating greater than 90% success rate for relief of radicular pain and return of function (Carragee et al., 2003; Jinkins, 1999; Wang

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<https://doi.org/10.1016/j.neuro.2019.06.009>

Received 5 March 2019; Received in revised form 13 June 2019; Accepted 24 June 2019

Available online 18 July 2019

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et al., 2014).

Because of the high prevalence of preoperative tramadol abuse and the good relief of symptoms which lumbar discectomy is able to provide, this patient population qualifies as an appropriate cohort to investigate the effects of preoperative tramadol abuse. Thus, we thought to test the hypotheses that there was an association between preoperative tramadol abuse and clinical outcome after lumbar discectomy and that preoperative tramadol abuse may predispose patients to continue its use after surgery

2. Patients and methods

This study was designed as a prospective, case-control clinical study. It was conducted upon patient admitted to Neurosurgery department, Suez Canal University Hospital (Ismailia, Egypt), seeking for lumbar discectomy.

A total of sixty patients were included, they were categorized into two equal groups (thirty patients each): Control group & Tramadol abuse group.

Control group; Inclusion criteria were: patients aged 20 years old and above, suffer from predominant radicular (neuropathic) symptoms e.g. intolerable sciatica, severe neurological/motor loss, their preoperative magnetic resonance imaging confirming a disc herniation that is concordant with patient's neurological complaint, been unresponsive to conservative management for a minimum of 6 weeks and should qualify for surgery for a single-level or contiguous two-level disc herniation between L2-S1.

Exclusion criteria ruled out patients with history of previous back surgery, general diseases that preclude surgical management, morbid obesity, those with spondylolithesis or any form of degenerative segmental instability, history of preoperative intake of tramadol.

Tramadol abuse group; includes patients with the previously mentioned inclusion criteria in addition of having one or more of the eleven abuse criteria of DSM 5 criteria for substance use disorders within a 12-month period. The criteria are related to tramadol hazardous use, social and interpersonal problem related to its use, legal problems, withdrawal symptoms, tolerance, use of larger amounts of tramadol, repeated attempts to quit use and physical and psychological problems related to use (Deborah et al., 2013).

At time of scheduling surgery, researcher filled out a pre-designed checklist from all participants after obtaining their informed consent, it includes: age, smoking history, weight, length and detailed history of preoperative pain medication usage. Data for comorbidities and potential confounding variables, like other medical or psychiatric problems, chronic pain syndromes, or litigation was collected.

All patients were operated using midline posterior skin incision and sub-periosteal retraction of the paraspinal muscles to expose the affected segment. A small laminotomy with rarely medial facetectomy was performed if the medial facet was clearly impinging on the nerve root. Exploration is then started to look for annular defect or any free fragments. If the annulus is intact, an oblique 45° incision was made with a number-15 blade and the slit was explored. The disc space was not curetted or debrided deep to the annulus except to remove loose fragments.

In both groups of patients; amount of blood loss, duration of surgery, duration of hospital stay were recorded. Intraoperative, early and late postoperative complications were also assessed and documented. Strict history was taking regarding postoperative pain medication utilization.

Patients were followed at: 2 weeks, 3, 6, 9 and 12 months after surgery. During follow up visit the following data were collected: location of pain; intensity of leg and back pain according to the Visual Analogue Scale (VAS); neurological symptoms; pain medication, complications, recurrence of symptoms and subsequent spinal surgery. Assessment of the patient's clinical outcome was evaluated using the Prolo economic and functional rating scale (Prolo et al., 1986).

Table 1

Demographic data of study groups.

	Control group (n = 30)	Tramadol abuse group (n = 30)	Total	P value
Sex				
Male	18(60%)	24(80%)	42(70%)	0.09
Female	12 (40%)	6 (20%)	18(30%)	
Age(years); mean ± SD	32.3 ± 3.7	34.2 ± 2.4	33.8 ± 2.6	0.07
Age group, yr				
Age 20– < 30	8 (26.7)	6 (20%)	14(23.3%)	0.9
Age 30– < 40	11(36.7)	12 (40%)	23(38.4%)	
Age 40– < 50	7 (23.3)	8 (26.7%)	15 (25%)	
Age > 50	4(13.3)	4(13.3%)	8 (13.3%)	
Positive smoking history	7 (23.3 %)	20 (66.6 %)	27 (45 %)	0.00*
Secondary gain issue	5 (16.7 %)	8 (26.6 %)	13 (21.6 %)	0.3
Body mass index (BMI); mean ± SD	27.9 ± 2.7	26.7 ± 4.3	27.4 ± 3.9	0.2

Obesity is defined as BMI that is higher than 30 of the body mass index.

* Statistically significant.

The study was conducted according to Declaration of Helsinki, and after obtaining approval from institutional research ethics committee. Confidentiality of data of all participants was preserved.

2.1. Statistical analysis

SPSS (Statistical Package for Social Science) software version 21 was used. Qualitative data were represented as frequencies and percentages and Chi-square test was used to identify significant relations of these data between the groups. Quantitative data were represented as means and standard deviation; *t*-test was used for comparing the two groups & Mann–Whitney *U* test is used for data that are not normally distributed. Statistically significant was considered at ($p < 0.05$).

3. Results

A total of sixty patients (thirty in each group) were included in this study. The demographic data of the two study groups are presented in (Table 1), shows that the two groups of patients were fairly homogeneous and comparable in gender, age, body mass index and the presence of secondary gain issue, not homogenous regarding history of smoking. Male gender is predominant in tramadol abuse group 24 (80%) in comparison to 18 (60%) in control group, but this difference is not significant. The mean age in the control group was 32.3 ± 3.7 years in comparison to 34.2 ± 2.4 years in the tramadol abuse group. Smoking was significantly higher in tramadol abuse group 20 (66.6%) in comparison to 7 (23.3%) in control group. Secondary gain issue was present in 8 (26.6%) of the tramadol abuse group in comparison to 5 (16.7%) in control group. The mean body mass index was nearly equal in both groups, in the control group was 27.9 ± 2.7 and 26.7 ± 4.3 in the tramadol abuse group.

On average, patients had preoperative symptoms duration for 1.5 years (range 0.2–2.9). Patients in the control group had mean preoperative symptoms duration for 1.3 ± 0.9 years in comparison to 1.6 ± 0.8 years in patients in tramadol abuse group.

The primary indication for surgery in the whole series was Lumbar disc prolapse. 80% of the patients were treated with one-level surgery and 20% were treated with two-level surgery. Fig. 1 shows distribution of the operative level by the level of the construct within the two study groups. About 46.6% of surgeries were done at L4-5 level.

The intra and postoperative findings in the two groups were comparable in regard to intraoperative blood loss; operative time and duration of hospital stay (days). The tramadol abuse group showed significantly increased hospital stay time in comparison to the control

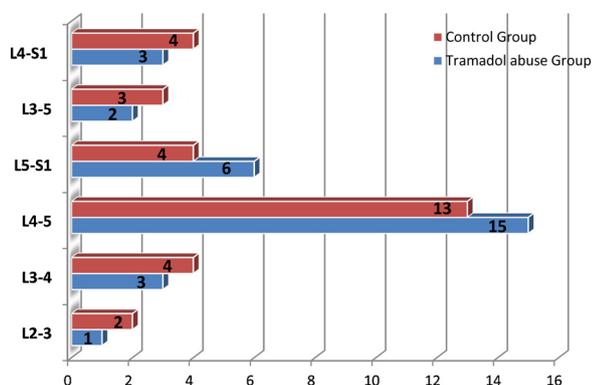


Fig. 1. Distribution of the study groups according to the level of discectomy.

Table 2
Intra and post-operative data of both study groups.

		Control group (n = 30)	Tramadol abuse group (n = 30)	P value
Blood loss during surgery (ml)	mean ± SD	150 ± 60	160 ± 80	0.6
	Range	(100–260)	(120–300)	
Surgical Time (min)	mean ± SD	75 ± 20	80 ± 30	0.5
	Range	(50–95)	(60–100)	
Duration of hospital stay (days)	mean ± SD	1.7 ± 2.8	4.1 ± 1.5	0.0001*
	Range	(1–11)	(2–14)	

* Statistically significant.

group (Table 2).

Perioperative drug use among study groups are presented in (Table 3), shows that in control group, 18 (60%) were taking non-narcotic pain medications on regular basis before surgery. At 2 weeks after surgery, 6 (20%) patients required nonnarcotic pain medication and 1(3.3%) patient required tramadol oral tablet. By 3 months, only 2 (6.7%) patients were still taking nonnarcotic pain medication and only one patient was still taking tramadol tablet. The nonnarcotic pain medications include non-steroidal anti-inflammatory medications, muscle relaxants, and neuroleptics. Regarding tramadol abuse group; 12 (40%) were able to discontinue the use of tramadol within 2 weeks of surgery. An additional 6 (20%) were able to stop taking tramadol within 3 months after surgery. Thus a total of 18 (60%) patients who had been on chronic tramadol abuse were off all narcotics 3 months after surgery. However, 12 (40%) patients were chronically taking tramadol up to 1 year follow up after lumbar discectomy. The difference in post-operative tramadol consumption between the two study groups is statistically insignificant.

Regarding Clinical Outcomes; many parameters were used to assess and compare these outcomes of the two study groups. The 100 Visual Analogue Scale for back pain showed statistically significant

Table 3
Peri-operative drug use among study groups.

	Control group (n = 30)	Tramadol abuse group (n = 30)	P value
Preoperative:			
Non-narcotic analgesics	18 (60%)	–	NA
Tramadol	–	30 (100%)	NA
Post-operative:			
Non-narcotic analgesics (> 3 months)	2 (6.7%)	5 (16.7%)	0.2
Tramadol (> 3 months)	1 (3.3%)	12 (40%)	0.000*

NA: not applicable.

* Statistically significant.

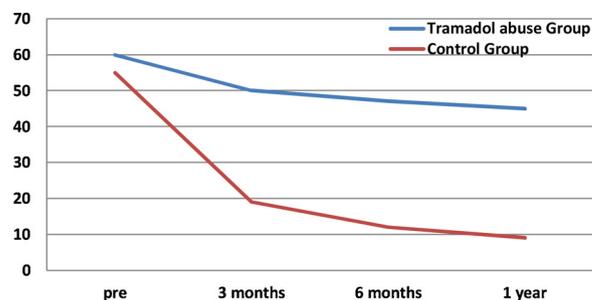


Fig. 2. Visual Analogue Scale (VAS) of low back pain in both study groups over one year duration, (statistically significant).

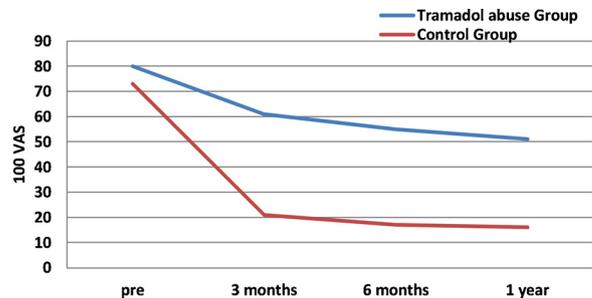


Fig. 3. Visual Analogue Scale (VAS) of low back pain in both study groups over one year duration, (statistically significant).

improvement in the low back pain in control group all over the follow up period (Fig. 2). Also the 100 Visual Analogue Scale for lower limb pain showed statistically significant improvement in tramadol abuse group all over the follow up period (Fig. 3).

When the outcome was evaluated by more practical means, such as the Prolo economic and functional scale, the control group showed statistically significant improvement in the clinical outcomes (Fig. 4).

Complications in both groups are summarized in Table 4 and can be divided into:

- Intraoperative complications: Three dural tears were recorded in whole series; 2(6.7%) patients in the control group and 1(3.3%) patient in the tramadol abuse group.
- Early postoperative complications: There is marked increased in early postoperative complications in tramadol abuse groups. Radicular pain and dyesthesia was recorded in 8(26.7%) patients in comparison to 2(6.7%) patients only in the control group; the same also with regard to infection. There are 5(16.7%) cases of superficial wound infection in tramadol abuse group in comparison to 2(6.7%) cases in control group. Occurrence of radicular pain and dyesthesia postoperatively between the two study groups is statistically

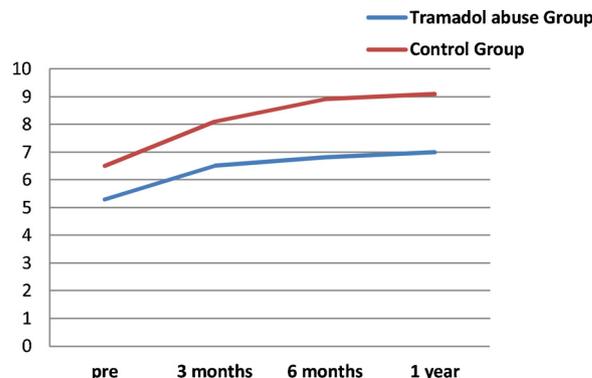


Fig. 4. Clinical outcome (according to Prolo economic and functional scale) over one year duration, (statistically significant).

Table 4
Comparison between the two study groups according to the recorded complications.

Complication ^a	Control group (n = 30)	Tramadol abuse group (n = 30)	Total (n = 60)	P value
Intraoperative complications				
Dural tear	2(6.7%)	1(3.3%)	3(5%)	0.5
Early post-operative complications				
<i>Neurological complications</i>				
Radicular pain and dyesthesia	2(6.7%)	8 (26.7%)	10 (16.7)	0.03**
Increased Motor weakness	1(3.3%)	3(10%)	4(6.7%)	0.3
<i>Wound Infection</i>				
Superficial wound infection	2(6.7%)	5 (16.7%)	7(11.7%)	0.07
Deep wound infection	0 (0%)	2(6.7%)	2(3.3%)	
Late post-operative complications				
Recurrence	4 (13.3%)	5(16.7%)	9(15%)	0.7
Reoperation	2(6.7%)	3 (10%)	5(8.3%)	0.6

* More than one complication are allowed.

** Statistically significant.

significant.

- Late postoperative complications: Recurrent lumbar disc prolapse occurred in 5(16.7%) patients of the tramadol abuse group in comparison to 4(13.3%) patients in the control group. 3(10%) patients underwent reoperative interventions in tramadol abuse group in comparison to 2(6.7%) patients in the control group.

4. Discussion

Tramadol is one of the centrally acting analgesics with a weak opioid action. It possesses catecholamine and serotonin reuptake property. It acts on serotonergic and noradrenergic nociception, while its metabolite *O*-desmethyltramadol acts on the μ -opioid receptor (Liu and Liu, 2013; Proglor, 2010). An increasingly alarming phenomenon of Tramadol abuse has been heavily demonstrated in the Egyptian community recently. The alleged usages of tramadol contributed greatly to its popularity and massive use -especially among youth- as a remedy for premature ejaculation, for extended orgasm and to increase sexual pleasure as Promoted in many online drug stores and opioid analgesic in the world and is registered and marketed in more than 100 countries, many of the current forms of violence, rape and Increased traffic accidents are closely related to the recently introduced forms of drug abuse, among which tramadol is now becoming the most popular one (Fawzy, 2019; Salem et al., 2008).

Tramadol is extensively used to relief mild to moderate pain. It is used worldwide for relief of chronic pain; especially pain of osteoarthritis (Rahimi et al., 2014).

There is inherent concern when prescribing narcotics; those patients who are chronically dependent on narcotic pain medication may have worse clinical outcomes following surgical procedures aimed at relieving the source of their pain. This concern may lead to the belief that chronic narcotic use is a relative contraindication to surgery. However, there is little formal clinical evidence to support this concern. In this analysis of consecutive patients presenting for lumbar discectomy, we have been able to convincingly prove the hypotheses that chronic abuse of narcotic pain medication before surgery was associated with continued postoperative narcotic use and significantly worse clinical outcomes.

Current study found that 40% of the patients who were on tramadol abuse before lumbar discectomy were still taking tramadol for their pain after surgery, in contrast to those undergoing the same surgical procedures while taking other narcotics before their surgical procedure, where only 3% of patients required narcotic pain medications greater than 3 months after the procedure.

Clinical outcome after lumbar discectomy was also greatly affected by preoperative tramadol abuse. In addition to increased complications of surgical intervention in the form of increased rate of wound infection and increased sensory complications.

In a study of injury related back pain, Webster et al demonstrated that the early use of high dose narcotics was independently associated with worse long-term outcomes, including prolonged disability, increased medical utilization including surgery, and continued narcotic usage (Webster et al., 2007). Given this negative association they suggested that more intensive use of narcotics might be counterproductive to recovery. Although they did not directly assess the outcome of surgical intervention, their findings are in general agreement with the findings presented here for lumbar disc surgery.

Similar results have been reported in the orthopedic literature. Lawrence et al. retrospectively reviewed 47 patients undergoing cervical spinal fusion who were on opioid medications for greater than six months prior to surgery and compared them to a similar group of 44 patients who had not used these medications (Lawrence et al., 2008). At a mean follow-up of 31 months (range, 24–64 months), 16 patients (34%) from the narcotic group were still on some form of opioid medication to control their pain compared to three patients (7%) in the non-narcotic group. Additionally, the narcotic group had fewer patients who reported good or excellent results after surgery and had a significantly higher number of patients who reported a worse result after surgery ($p < 0.001$). Franklin et al. retrospectively reviewed the use of narcotics prior to total knee arthroplasty on 6364 patients and found that at a mean follow-up of 12 months, patients who had been using narcotics prior to surgery were more likely to still be on some form of narcotic for knee pain and be dissatisfied with their surgery (Franklin et al., 2010).

Chronic narcotic use leads to addiction. In these patients, relief of the pain generator with surgical intervention then does not relieve them of their addiction to narcotics. This addiction must be overcome separately after surgery. It has been proposed that the sedating effects and altered sensorium associated with tramadol abuse may lead some patients not to return to work or productive lifestyles.1 Tramadol abuse may also be a marker for many psychosocial factors that have been shown to contribute to poor clinical outcomes (Buer and Linton, 2002; Carragee et al., 2005; IJzelenberg and Burdorf, 2005).

Thus in light of the findings presented here, one could make the argument that tramadol abuse patients who need surgical intervention should undergoes formal detoxification in an appropriate professional setting. However, further study will be necessary to determine if the effect of chronic preoperative drug abuse can be reversed through such measures. It is our recommendation that efforts be made to taper patients from using opioid-derived medications as much as possible prior to undergoing surgical interventions, which may decrease the incidence of opioid-induced hyperalgesia, decrease hospital stay, and increase the likelihood of a successful recovery.

5. Conclusion

Tramadol abuse before lumbar discectomy was found to be associated with continued tramadol abuse after surgery and worse functional outcomes following surgery. Surgeons may want to counsel their patients about the potential for inferior clinical outcomes if narcotics are used before surgery.

Funding

Authors declared that they got no financial support, no financial interest concerning the present article.

Declaration of Competing Interest

Authors declared that there is no conflict of interest, respecting the present research and authorship.

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