Journal of Pain & Relief
ISSN: 2167-0846

Kloub, J Pain Relief 2015, 4:6
DOI: 10.4172/2167-0846.1000217

Research Article Open Access

Effect of Oxycodone in Post-operative Pain Management

Ghassan Kloub*

Department of Anesthesia, Al Garhoud Private Hospital, UAE

Abstract

Aims: To study the efficacy of oxycodone for short-term pain management in post-operative patients in a real-world setting.

Methods: A 15-item survey was given to 263 post-operative patients undergoing ENT, general, local sedation, obstetrics/gynecology, ophthalmic, orthopedic, plastic and urological surgery at the department of anesthesiology, Al Garhoud Private Hospital, Dubai, UAE. Each patient answered all 15 questions. Bivariate analysis was used to determine the correlation between pain score and age, gender, and operation type. Multivariate analysis was used to assess the effect of age, gender and type of operation on pain scoring. Distribution of oxycodone adverse effects was also determined.

Results: All 263 patients (males 91 [34.6%]; female 172 [65.4%]) completed the survey. About half (139 [52.9%]) the population belonged to Gulf countries. Surgical procedures included ENT (13), general (65), local sedation (21), obstetrics/gynecology (24), ophthalmic (38), orthopedic (29), plastic (69) urological (4). A total of 220 (83.7%) patients had no pain and 20 (7.6%) patients reported a pain score of ≥5. Statistical analysis showed no effect of correlation with gender and weak negative correlation with age. Obstetrics/gynecology and orthopedic surgeries were positively associated with a higher pain score. All patients (263 [100%]) were pain free with no adverse effects.

Conclusions: Oxycodone was effective in relieving short-term pain after most surgeries and was found to be well tolerated irrespective of type of surgery.

Keywords: Oxycodone; Efficacy; Pain; Short-term; Post-operative; Survey; UAE

Introduction

Despite the availability of effective pharmacologic treatments, most surgical patients experience acute, often severe postoperative pain, and some experience postoperative pain that continues for weeks, months, or even years after surgery—well beyond the normal healing period.

Chronic or 'persistent' post-surgical pain is defined as pain of at least 2 months duration which has developed after a surgical procedure, where other causes such as disease recurrence or a preexisting pain syndrome have been excluded [1,2].

Acute post-operative pain is a manifestation of inflammation due to tissue injury. The management of postoperative pain and inflammation is a critical component of patient care and is important for cost-effective use of healthcare resources. Good postoperative pain management helps to achieve a satisfied patient who is in hospital or at home and unable to carry out normal activities for a minimal amount of time.

Opioids are established treatment for moderate/severe chronic malignant pain, as recommended by the World Health Organization (WHO) [3]; furthermore, they are the mainstay of treatment for chronic non-malignant pain [4].

The analgesic effect of opioids is due to agonistic action on central nervous system (CNS) and peripheral tissues, causing reduced pain perception and reaction to pain, and increased pain tolerance. Oxycodone is significantly selective for the μ-opioid receptor compared with δ- and κ-opioid receptors [5]. Oxycodone binds to 7-transmembrane G protein-coupled receptor via μ-opioid receptors, ion channels and second messengers transduce the signal into inhibition of the ascending transmission of nociceptive information from periphery to spinal cord. At the same time, opioids also activate descending pathways which modulate pain signals [6].

The threshold of pain in individuals differs based on gender. Studies show that women report pain more frequently, have greater pain sensitivity and a lower threshold for pain than men. Women respond better to opioids, in particular κ-receptor-binding opioids [7-9].

In addition to these desirable analgesic effects, binding to receptors in the CNS may cause adverse events such as drowsiness and respiratory depression, and binding to receptors elsewhere in the body (primarily the gastrointestinal tract) commonly causes nausea, vomiting, and constipation [10,11]. Long-term treatment with opioids may result in development of tolerance to analgesia, physical dependence and addiction [12,13].

Oxycodone is one of the most widely used opioids for pain management [1,14,15]. Oxycodone is available as oxycodone hydrochloride controlled release tablets (5, 10, 20, 40 and 80 mg), immediate release capsules (5 mg), and in ampoules containing 10 mg/1 ml and 20 mg/1 ml for parenteral (subcutaneous and intravenous) administration.

Results from several studies have shown that oxycodone is highly effective and well tolerated in different types of surgical procedures and patient groups [16-24]. However, observational studies that reflect the true clinical effectiveness of oxycodone in routine clinical practice are limited. Though oxycodone has a role in the chronic pain management, the present study was undertaken to assess the efficacy of parenteral oxycodone in short-term pain management in post-operative patients in a real-world setting.

Methods

After approval from the Ethics Committee, a prospective study was undertaken at the department of anesthesiology at the Al Garhoud

***Corresponding author:** Kloub G, Head of the Anesthesia Department / Consultant Anesthesia, Al Garhoud Private Hospital, PO Box: 36868 Dubai, UAE, Tel: 00971 4 454 5000; Fax: 00971 4 454 5197; E-mail: info@alhilalms.ae

Received July 30, 2015; **Accepted** November 03, 2015; **Published** November 05, 2015

Citation: Kloub G (2015) Effect of Oxycodone in Post-operative Pain Management. J Pain Relief 4: 217. doi:10.4172/21670846.1000217

Private Hospital, Dubai, UAE. Males and female outpatients aged ≥18 years who had a major surgery (ear nose and throat [ENT], general, local sedation, obstetrics/gynecology, ophthalmic, orthopedic, plastic and urological surgery) with a documented history of moderate/severe non-malignant pain that required continual parenteral opioid therapy (oxycodone equivalent of ≥20 mg/day and ≤80 mg/day), answered a 15-item electronic survey regarding post-surgical pain management. Intensity of pain was self-assessed by the patients using a 0-10 numeric pain scale depicted in Figure 1.

Data collection

Patient demographics were collected using the online questionnaire. Pain was assessed via the 0 to 10 numeric pain rating scale. Safety was assessed via the reporting of adverse and serious adverse events.

Statistical analyses

The Pearson chi-square (χ^2) test was used for categorical variables and the Student's χ-test was used to compare means between two groups. Spearman correlation was used to test the relation between continuous variables and Kruskal-Wallis non-parametric test was used to compare means between more than 2 groups. A P-value <0.05 was considered statistically significant.

Results

Demographics

A total of 263 patients (males 91 [34.6%]; female 172 [65.4%]) completed the survey. All patients 263 (100%) reported moderate/severe chronic nonmalignant pain requiring continuous opioid therapy with parenteral oxycodone. Mean age of the patients in this study was 38.72 ± 14.08 years. About half (121 [46%]) the population belonged to Gulf countries. The most common procedures included plastic (69 [26.2%]) and general (65 [24.7%]) surgery (Table 1). Total of 4 patients underwent urological surgery, the details of which are summarised in Table 2.

Efficacy

A total of 220 (83.7%) patients had no pain and 20 (7.6%) patients reported a pain score of ≥5 (Table 3).

Pain score and gender

Mean pain score in men was 0.74 ± 2.00 and 0.80 ± 1.96 in women, with no significant difference (p=0.26). The pain score was transformed into 2 categories (patients reporting pain score up to 4 to 10 compared to patients reporting pain score from 5 to 10). There was no statistically significant difference between pain experienced by male and female patients in this case (Table 4).

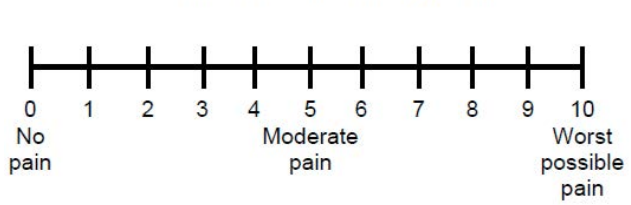

Figure 1: Numeric pain rating scale.

Patients' Characteristics	No. of patients (N)	Percentage
Gender		
Male	91	34.6
Female	172	65.4
Age, Mean (SD)	38.72 (14.08)	
Operation category		
ENT Surgery	13	4.9
General Surgery	65	24.7
Local Sedation	21	8.0
Obstetrics/Gynaecologic Surgery	24	9.1
Ophthalmic Surgery	38	14.4
Orthopaedic Surgery	29	11.0
Plastic Surgery	69	26.2
Urological Surgery	4	1.5
Nationality		
Gulf	139	52.9
Non-Gulf	55	20.9
Europe	16	6.1
Africa	27	10.3
Others	26	9.9

Table 1: Demographic characteristics.

Type of urological surgery	No. of patients (N)	Percentage
Any urological surgery	4	100
Uretoroscopy + double-j stent	1	25
Uretroscope laser+ lithotripsy	1	25
Testicular biopsy	1	25
Urethroscopy + cystoscopy	1	25

Table 2: Type of urological surgery.

Pain score	Frequency	Percent
0	220	83.7
2	9	3.4
3	5	1.9
4	9	3.4
5	2	.8
6	12	4.6
8	3	1.1
9	1	.4
10	2	.8

Table 3: Pain score distribution.

Gender	Pain Score Class		P value
	0 to 4	5 to 10	
Male, N (%)	85 (35.0%)	6 (30.0%)	0.65
Female, N (%)	158 (65.0%)	14 (70.0%)	

Table 4: Pain and gender.

Pain score and age

A significant difference i.e., a negative but weak correlation between age and pain score. Spearman correlation coefficient=-0, 14 (P=0.022). With increased age, pain score seemed to decrease.

Pain score and operation type

Obstetrics/gynaecology and orthopaedic surgeries showed a higher pain score among the various operation types (Table 5).

Multivariate analysis

Multiple linear regressions were used to assess the effect of age,

Operation Type	Pain score, Mean ± SD	P-value
ENT surgery	0	0.018
General surgery	0.95 ± 2.42	
Local sedation	0.19 ± 0.87	
Obstetric/GYN surgery	1.46 ± 2.34	
Ophthalmic surgery	0.18 ± 0.86	
Plastic surgery	0.77 ± 17	
Urological surgery	0	
Orthopaedic surgery	1.48 ± 0.7	

Table 5: Pain and operation type.

	Unstandardized coefficient B	95% CI	Standardized coefficient beta	P value
Obstetrics/Gynaecology surgery	0.91	0.07; 1.75	0.13	0.035
Orthopaedic surgery	0.75	-0.027; 1.53	0.12	0.058
Age	-0.015	-0.032; 0.003	-103	0.098

Table 6: Multivariate analysis.

gender and type of operation on pain scoring. Results showed that Obstetrics/Gynaecology operations and orthopaedic surgeries are positively associated with higher pain score. The effect of age was retained in the final model but failed to reach a significant level (Table 6).

Safety

All 263 (100%) patients were free of pain. No complaints were recorded. In all cases, vital signs were stable.

Discussion

Chronic post-surgical pain is an under recognized and prevalent healthcare problem associated with significant morbidity and potential economic costs. Risk factors include the type of surgery, particularly where there is likelihood of significant nerve or tissue damage, preoperative pain, moderate-to-severe acute postoperative pain, neurotoxic radio or chemotherapy and psycho-social factors.

Oxycodone has been used in the past, mainly for cancer and chronic pain and usually as tablets. This is the first study in the Middle East region to assess parenteral oxycodone for short-term post-operative pain management. It also identified the correlation between pain and gender, age, and type of surgery.

There is evidence in the literature that the pain threshold is lower in women and their response to painful stimuli differs from males [7-9]. However, in a study by Couceiro et al. in 190 patients, differences in the incidence of pain between males and females or related to any age group were not observed [25]. This finding is in agreement with the present study which showed no correlation between post-surgical pain and gender. However, Chung et al. have identified a higher frequency in younger and male patients [26].

Obstetrics/gynecology and orthopedic surgeries were positively associated with a higher pain score. This is in line with the epidemiological data which states that, the most well established risk factor for CPSP is, the type of surgery [1]. In the study by Couceiro et al. prevalence of postoperative pain was elevated, with a significant correlation with the type of surgery [25]. When postoperative pain was associated with the type of surgery, the incidence was higher in patients undergoing general surgery (inguinal an umbilical herniorrhaphies, conventional and laparoscopic cholecystectomies, and exploratory laparoscopies). Those results differ from other authors who reported a higher prevalence of pain in patients who underwent orthopedic procedures [27].

This study included a wide range of surgical procedures and thus one cannot exclude possible factors related to each surgery, such as site and size of the incision, and intracavitary or superficial, that might have interfered with the results. Also, it is impossible to group procedures, since pain severity is different according to the type of surgery performed by the same surgical subspecialty.

The prevalence of post-surgical pain in literature varies considerably. In the study by Couceiro et al. the prevalence of pain in the first 24 postoperative hours was 46%, considering all degrees [25]. The present study showed that 20 (7.6%) patients reported post-surgical pain. None of the patients in the study reported side effects and all patients were pain free.

Overall, oxycodone has shown to be as potent as morphine with the advantage of lower rates of side effects

Conclusion

Oxycodone was effective in relieving short-term pain after most surgeries and was found to be well tolerated irrespective of type of surgery.

Acknowledgements

This was investigator-sponsored study. The author also thanks ClinArt MENA for assisting in the preparation of the manuscript.

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