



Perioperative Pain Management Performed by Interdisciplinary Health Team for a Patient with Opioid Addiction History: A Case Report

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ABSTRACT

Objective: Pain is the most significant problem for postoperative patients in clinical practice, and it greatly affects the physical and mental health of patients and the process of postoperative rehabilitation. Patients with opioid addiction history are not only more sensitive to pain but also may be more likely to become re-addicted, making postoperative acute pain management more challenging. **Methods:** This article introduces the perioperative multidisciplinary pain management of an American patient with opioid addiction history. Before the surgery, the pharmacist, anesthesiologist, surgeon, nurse, and physical therapist together established a perioperative pain management plan for this patient. This plan is based on multimodal analgesia, the WHO analgesic ladder, treatment with low-dose strong opioids, on-time administration, and non-pharmacological interventions. **Result:** The pain score (visual analog scale) during activity was 1-3 out of 10 points, and the resting pain was 0-2 out of 10 points. No signs of addiction were found. The patient could complete 100% of the planned exercises and achieved an active knee flexion angle of 90° at discharge. **Conclusion:** This is the first patient we ever met who had opioid addiction history, which required both high skills of pain management and culture competence from us. The main contribution of this paper is to combine our case with a literature review, thus providing a multidisciplinary acute and breakthrough pain control protocol for patients with opioid addiction history. Finally, based on the clinical experience and literature review, this study revealed the stereotypes and underuse of opioids among Chinese doctors and patients and clarified the importance of nursing cultural competence in light of economic and medical globalization.

Keywords: Case reports, Cultural competence, Interdisciplinary health team, Opioid addiction, Pain

INTRODUCTION

Why carry out this study?

Acute pain and breakthrough pain are the most significant problems for postoperative patients in clinical practice. If patients have opioid addiction history, pain control becomes even more challenging. However, few studies have reported on pain management in patients with opioid addiction history. Our study answers the question of how to achieve an optimal balance among pain control, rehabilitation, and avoiding re-addiction.

What can we learn?

It is safe and effective to administer low doses of morphine and Demerol for patients with opioid addiction history. The multidisciplinary collaboration of surgeons, anesthesiologists, pharmacists, rehabilitation therapists, and nursing staff can effectively control patients' pain while reducing opioid use. Nursing cultural competence is becoming a core nursing competence for Chinese nurses in light of economic and medical globalization.

Pain is recognized as the fifth vital sign. Almost everyone has suffered from pain in their life. A review showed that up to 84% of patients experienced pain during hospitalization, and up to 35% of them reported severe pain [1].

During anterior cruciate ligament reconstruction postoperative rehabilitation, the higher the pain score, the lower are the functional scores at various stages of rehabilitation [2]. Undoubtedly, pain management is the most significant and challenging problem in healthcare. Current pain control guidelines cover almost all ages and types of pain, such as perioperative pain, chronic pain, and cancer pain. Among these guidelines, the Chinese Orthopedic Perioperative Pain Guidelines and American Postoperative Pain Management Guidelines suggest that for patients after orthopedic surgery, a multimode analgesia plan combined with individualized drug administration and non-pharmacological interventions can minimize the dose of opioids while relieving pain and enhancing the recovery process [3]. We adopt this as the basis of the pain management protocol in our case study. However, the above guidelines are based on the general population. Patients with opioid addiction history may have a lower pain threshold value, might be tolerant to opioid drugs, and could have a higher risk of addiction [4]. Therefore, opioid prescriptions for such patients should be individualized. However, relevant guidelines or guidance for opioid drug doses for patients with an addiction history are lacking, and few relevant consensus and case reports have been published. As healthcare workers, it is our obligation and responsibility to relieve the pain of patients. Medical staff should not refuse to relieve the pain of patients or to use opioids because of patients' addiction, as this is unfair, immoral, and contrary to medical principles. We hope that through this case, we can provide some evidence-based practice for the management of postoperative acute pain and breakthrough pain in patients with opioid addiction history. Hopefully, more medical professionals will focus on the application of postoperative opioid medicine among a special population to achieve medical equality.

MATERIALS AND METHODOLOGIES

Study Design

This study was a case report following the CARE reporting format. It was approved by the Ethics Committee of our hospital (ethics number: (2021) (026)). This study was also supported by the Clinical Research Project Foundation of our hospital (fund number: LCYJ2020003). Written informed consent was obtained from the patient.

Patient Information

Mr. X is 32 years old, born in the United States, and working in China. His BMI is 22.4 kg/cm². His social and family support is good. Mr. X denied having a chronic disease. He had shoulder surgery 10 years ago and then became addicted to opioids after using oral opioid analgesics for more than one month. He was admitted to our hospital with symptoms of knee swelling, pain, walking instability, and limited knee flexion and extension after getting injured when playing basketball. At admission, his vital signs were as follows: body temperature, 36.6°C; pulse, 77 beats/min; respiration, 20 beats/min; blood pressure, 121/74 mmHg; and pain score (visual analog scale), 2/10 points. The physical examination revealed the following: front drawer test (+), Lachman test (+), axial shift test (+), McMurray test (+), and lateral joint space tenderness (+). The blood test results, electrocardiogram, and chest radiograph were normal. Magnetic resonance imaging showed the rupture of the anterior cruciate ligament of the right knee and a level III meniscus injury.

Perioperative Pain Management

Considering the surgical trauma of ACL reconstruction and the addiction history, we predicted that the patient would suffer uncontrolled severe pain after the surgery. Therefore, our nurses suggested performing an interdisciplinary consultation for pain management of this patient. The surgeons, pharmacist, anesthesiologist, nurses, and physical therapist together discussed how to achieve an optimal balance to keep good pain control, maintain no-pain rehabilitation, and avoid re-addiction. Finally, we established the following perioperative pain control protocol.

Preoperative pain prevention based on interdisciplinary education: The surgeon introduced the surgical process, major risks, and rehabilitation timeline to the patient. The nurses conducted preoperative education; informed the patient about the degree of postoperative pain and pain management regimen after the operation; and introduced the operating room environment, body parts that may be exposed during the operation, and surgical position. The anesthesiologist informed the patient the day before the operation about the risks of anesthesia, a medication that would be used, and the general process of anesthesia.

Intraoperative pain prevention based on multimodal analgesia: Anesthesia was induced using 200 mg of propofol, 45 µg of sufentanil, 50 mg of atracurium, and 0.5 mg of atropine, followed by tracheal intubation under direct vision.

To maintain the anesthesia effect, during the surgery, inhalation of 2% sevoflurane and intravenous infusion of 0.1 µg/kg/min of remifentanyl was administered. Half an hour before the end of the surgery, 50 mg of flurbiprofen and 5 mg of dezocine were administered intravenously. After surgery, a single dose of femoral nerve block was given (10 ml of 0.2% ropivacaine +10 ml of 2% lidocaine). Finally, the surgeon administered 10 ml of ropivacaine for local anesthetic wound infiltration to achieve better pain relief.

Postoperative pain management timeline: In this case, post-operative pain could be classified into two categories: background pain and breakthrough pain. Satisfactory background pain management is the foundation for fine breakthrough pain control. However, the emphasis on pain management is different. To provide clearer pain management for these two types of pain, we provided two timelines: post-operative background pain and post-operative breakthrough pain management timelines (Table 1).

Table 1 Background pain management timeline

Timeline	Intervention		Background pain score
	Pharmacological treatment	Non-pharmacological treatment	
May 11 (Operation day)	Flurbiprofen Axetil 100 mg (IVgtt) Bid	Distracting	2-4 out of 10
		Leg elevation as tolerated	
		Ice therapy: 20 min TID	
May-12	Flurbiprofen Axetil 100 mg (IVgtt) Bid	Distracting	1-3 out of 10
		Leg elevation as tolerated	
		Ice therapy: 20 min TID	
		TENS: 20 min Bid	
		Traditional Chinese medication infiltration: 20 min Bid	
		Intermittent pneumatic compression therapy: 40 min Bid	
Manual lymph drainage: 30 min Qd			
May-13	Flurbiprofen Axetil 100 mg (IVgtt)	The same as above	1-2 out of 10
May 14-16	Flurbiprofen Axetil 100 mg (IVgtt) Bid	The same as above	1-2 out of 10
May 17 (Discharge day)	Take-home medicine:	Leg elevation as tolerated	0-1 out of 10
	Oral medicine: Imrecoxib 0.1 g Bid (for 1 week)	Ice therapy: 20 min TID	
	Topical patch: Flurbiprofen Axetil Bid	Compression stocking: wearing as tolerated	

BTP: Breakthrough Pain, BP: Background Pain, IV: Intravenous Drip, IM: Intramuscular Injection, Qd: Once a day, Bid: two times a day (usually administered at 9 AM and 3 PM), TID: Three times a Day (usually administered at 9 AM, 12 AM, and 3 PM), s.t.: administer immediately, PRN: administer as necessary, TENS: Transcutaneous Electrical Nerve Stimulation.

The interventions for breakthrough pain were based on background pain management. Therefore, only opioid administration is listed in Table 2.

Table 2 Breakthrough pain management timeline

Timeline	Breakthrough pain assessment	Medicine	Reassessment after medicine
May 11 (Operation day)	10:00 PM	10:10 PM	10:30 PM
	6-8 out of 10	Pethidine 50 mg plus promethazine hydrochloride 50 mg (IM) ST	3 out of 10

May-12	3:00 AM	3:05 AM	3:30 AM
	6 out of 10	tramadol hydrochloride 100 mg (IM) ST	4 out of 10
	8:00 AM	8:15 AM	8:30 AM
	8 out of 10	morphine 10 mg (IM) PRN	VAS: 1 out of 10
May-13	No breakthrough pain	10:00 PM	No breakthrough pain
		morphine 10 mg (IM) PRN	

RESULTS

During hospitalization, the background pain was around 0-4 out of 10, and the breakthrough pain was controlled satisfactorily. The activity pain (1-3 out of 10), which is significant for exercises, was tolerable. The compliance with the rehabilitation exercise was 100%. The patient could follow all rehabilitation protocols (patellar mobilization, ankle pumps: 20 × 5 sets, quadriceps contraction: 20 × 5 sets, hamstring exercise: 20 × 5 sets) and walk with the knee brace with two crutches. The positive knee flexion was assisted by our physical therapist daily. Upon discharge (6 days after surgery), active knee flexion of 90° was achieved, and the patient showed no symptoms of addiction, deep vein thrombosis, postoperative infection, and other complications. One month after the surgery, the patient scored the background pain at around 0-1 out of 10 and could achieve 100° knee flexion. The patient was very satisfied with the medical experience in China.

DISCUSSION

Study Limitation

Although the multidisciplinary approach of postoperative acute pain management applied, in this case, was successful, its limitations should not be ignored. First, in terms of the level of evidence, this is a case study. It can provide some valuable experience for pain management in patients with addiction history; however, more evidence is needed in the future. Second, the perioperative pain management of ACL requires the multidisciplinary cooperation of surgeons, anesthesiologists, pharmaceutical experts, nurses, and a physical therapist. It requires medical skills as well as language competence. Some healthcare institutions might not be eligible to provide these services. Third, the administration method and type of analgesic were not in keeping with the guidelines. For example, the guidelines recommended that oral administration is a priority, and COX-2 inhibitors should be considered if there are no contraindications [3]. Future studies can hopefully avoid these limitations and provide more evidence about pain management in patients with an addiction history.

Inspiration and Discussion with Literature Review

Evidence of pain management in patients with opioid addiction: Pain management in patients with opioid addiction has been a clinical challenge for centuries. It is extremely difficult to achieve an optimal balance between satisfactory pain control, early exercise, and avoiding re-addiction. Recent guidelines have strongly recommended multi-pattern pain control, ladder pain management, and combined non-pharmacological intervention and psychological intervention; these were the basic principles in the pain management protocol for our patients [3]. For populations with an opioid addiction history, some experts have stated that this history should not be an excuse for refusing to prescribe opioids, and opioids should be considered for patients who are experiencing severe pain [4]. However, once the decision is made to provide opioids to patients with previous addictions, several points should be considered carefully [4]. First, strong opioids should not be considered until other drugs such as Non-steroidal Anti-inflammatory Drugs (NSAIDs), COX-2 inhibitors, and weak opioids fail to relieve pain. Second, the side effects and toxicity of long-term use should be considered. Third, the possibility of iatrogenic addiction should be considered. Our patient is a young male with no previous chronic disease and no contraindication to morphine or Demerol. According to the advice of our clinical pharmacist, a prophylactic dose of morphine (10 mg) was prescribed 2-3 days after surgery. Therefore, this patient has little risk of iatrogenic addiction. In addition, according to Weaver, drug addiction seemed closely related to the under-control of pain; conversely, prophylactic pain control is less likely to induce addiction [5]. Some studies have noted that non-pharmacological treatments can also play an important role in pain management. A meta-analysis of randomized controlled trials showed that psychosocial approaches significantly decreased postoperative

pain score (Hedges' $g=0.31$ (95% confidence interval=0.14, 0.48)) as well as preoperative and postoperative anxiety ($g=0.26$ (0.11, 0.42) and $g=0.4$ (0.21, 0.59), respectively). Moreover, patient education and relaxation techniques achieved consistent positive effects on pain relief, anxiety reduction, and recovery enhancement [6]. Another review showed that Transcutaneous Electrical Nerve Stimulation (TENS), Neuromuscular Electrical Stimulation (NMES), ice therapy, and compression can contribute to pain relief and enhance the rehabilitation process [7]. The novel manual lymph drainage technique has been proved to increase the pain threshold value and thereby decrease the pain score [8]. The above evidence suggested that the role of nonpharmacological interventions should be fully considered in patients with opioid addiction.

Status of medical opioid use in China: Chinese people's deep-rooted prejudice against opioids, clinical supervision, and other factors lead to the potential underuse of opioids. Opioids play an irreplaceable role in pain management, and their consumption is considered an important indicator to measure the level of pain control in a country [9]. Data analysis by the Drug Economy Development Information Network indicated that the consumption amount of five types of opioids in China increased from 69.62 s-DDD in 2014 to 78.64 s-DDD in 2016. Although the drug consumption of opioids in China showed an increasing tendency, it remained lower than the global average of 200 s-DDD [10]. These findings could be explained as follows. First, healthcare staff and patients are afraid of addiction and subsequent adverse reactions, leading to the underuse of opioids in clinical practice [11]. Their fear might be induced by policies, Chinese history, traditional culture, publicity, and education. Second, there is a gap in the judgment of postoperative pain degree between medical staff and patients. Most medical staff tends to believe that patients exaggerate their pain. Third, China's regulation of opioids is very strict. The procedures for the administration of opioids are extremely complicated. For example, a qualified surgeon must issue a medical order and a "red prescription." Moreover, all opioids are locked in the counter and are monitored by two Registered Nurses (RNs). Whenever opioids need to be used, two RNs have to open the password-protected cabinet, sign off on their use, and then use them at the bedside. Compared with European countries and the US, there is almost no opioid abuse in China [11]. Instead, opioids are insufficiently administered, indicating that pain management in clinical practice can be greatly improved.

Cultural competence of modern Chinese nurses: In light of medical and economic globalization, healthcare workers, especially nurses, must be able to provide culturally competent care [12]. In this case, Mr. X left his country and family and lived alone in China while suffering from disease and pain. Studies have shown that hospitalized patients, especially those who come from a different culture, can become agitated or stressed [12]. Therefore, understanding Mr. X's cultural background, belief, and values are critical for delivering proper care to him. For example, unlike most Chinese patients, Mr. X would like to receive analgesics. From the perspective of most Chinese medical staff, this might indicate addiction because this phenomenon is rare in Chinese people, and asking for analgesics might be one of the symptoms of addiction. However, he comes from the cultural background of America where pain bearing is not recommended. We were inspired by this case. Only when we meet people from such different cultures can we become aware of the significance of cultural competence. This principle is also applicable to Chinese patients of different ethnicities. Based on the above statement, Chinese nurses need to be aware of and cultivate cultural competence in clinical practice. This will enable them to achieve quality healthcare delivery, better patient satisfaction, and optimal patient outcomes.

Patient's Perspective

Mr. X said the price-quality ratio of Chinese medical services is very high. He compared our rehabilitation protocol with the American's. They are almost the same; thereby he had more confidence in our medical services. In beginning, his parents were worried about him when he decided to have surgery in China. Honestly, most American people have no confidence in the Chinese healthcare system. Through this experience, Mr. X wants to share his own story and tells people to change their stereotype of the Chinese healthcare system. All in all, he was very satisfied and will recommend our hospital to his friend.

CONCLUSION

According to our practice and literature review, a small amount of morphine and Demerol before the onset of pain can achieve excellent pain control. Strong opioid analgesics should not be avoided by patients with a history of addiction. Additionally, we highly recommended non-pharmacological interventions combined with medical treatment for reducing opioid use while relieving pain. As medical workers in China, it is necessary to realize that

cultural competence is becoming an increasingly important nursing competence. We hope that relevant organizations or experts will establish guidelines on the use of opioids in certain populations so that all patients can be free of pain and enjoy medical equality.

DECLARATIONS

Conflicts of Interest

The authors declared no potential conflicts of interest concerning the research, authorship, and/or publication of this article.

Disclosures

All authors (Wenjuan Sun, Yuxiang Ren, Shuang Wang, Canfeng LI, Li Yang, Zhihui Lang, and Tao Luo) declared no personal, financial, commercial, or academic conflicts of interest.

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All authors contributed to the study's conception and design. Wenjuan Sun contributed to the methodology and wrote this manuscript, Yuxiang Ren helped with collecting the information and informed consent of the patient. Li Yang and Shuang Wang helped with collecting the information with Yuxiang Ren. Canfeng LI was the surgeon and was responsible for making sure all information of this patient is true. , Zhihui Lang and Tao Luo were both helping with revising the manuscript. All authors read and approved the final manuscript. Other contributors, Xintao Zhang and Hongwei Liu should be acknowledged for their dedication to surgery and the rehabilitation process.

Compliance with Ethics Guidelines

The study was authorized by Peking University Shenzhen Hospital Ethical Committee. Informed consent for participating in the study was obtained from a patient.

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