



# Application of Interventional Analgesics in Patients Undergoing Bariatric Surgery

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**Abstract:** In order to analyze and compare the effects of interventional analgesics use on pain level after having surgery in patients with obesity which were undergoing bariatric surgery, 309 cases of obese patients from April 2018 to September 2019 were adopted in the study. The patients were divided into two groups according to the presence or absence of interventional use of analgesics. Numerical Rating Scale (NRS) score sheet was applied to dynamically evaluate and assess the patients' pain level, and the patients' first time of getting out of bed, the first time of postoperative flatulence and the whole length of hospital stay were collected and compared. Data showed that the interventional use of analgesics can ease the obese patients' pain level in which  $NRS \leq 2$  in average after surgery ( $P < 0.01$ ), accelerate the first time of getting out of bed which is  $6.40 \pm 2.40$  hour after surgery in average ( $P < 0.05$ ), bring forward the first time of flatulence postoperatively which is  $11.83 \pm 1.60$  hour after surgery in average ( $P < 0.05$ ) and shorten the length of hospital stay which is  $6.95 \pm 1.01$  hour in average ( $P < 0.05$ ). In conclusion, interventional use of analgesics is beneficial to the enhanced recovery of patients undergoing bariatric surgery and shorten the overall length of hospital

**Keywords:** Postoperative, Bariatric Surgery, Interventional Use of Analgesics, ERAS

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## 1. Introduction

Obesity and related metabolic diseases have become a global health problem. Obesity and metabolic disease are chronic diseases with multiple causes, which are important risk factors for many diseases, such as cardiovascular and cerebrovascular diseases, osteoarthritis, tumor, psychological diseases, etc [1, 2]. The incidence of obesity and type 2 diabetes is increasing year by year in the World. In 2016, the World Health Organization (WHO) estimated that there were about 650 million obese patients worldwide [3]. In recent years, minimally invasive metabolic surgery for weight loss has developed rapidly in the treatment of obesity and diabetes, laparoscopic Roux-en-Y gastric bypass (LRYGB) and laparoscopic sleeve gastrectomy (LSG) are the most common types of surgeries, resulting in sustained weight loss, as well as pronounced effects on obesity-related comorbidities and less complications [4]. As the fifth vital sign beyond body

temperature, pulse, respiration and blood pressure, pain is increasingly valued [5]. Pain can activate the stress response system of the body, release inflammatory mediators, and cause a series of postoperative pathophysiological changes of patients, leading to postoperative pain-related complications [6]. Pain after abdominal surgery mainly includes visceral pain and somatic pain. The duration of visceral pain was shorter, mostly 6 ~ 12h. Somatic pain generally lasts 2 to 3 days after surgery [7]. The tolerance of obese patients to pain is often lower than that of non-obese patients. Postoperative pain is more likely to cause a complex physiological and psychological reaction in obese patients, resulting in the delay of early ambulation and the insufficient respiratory volume, which directly affects the postoperative rehabilitation process. Therefore, pain management is of great significance to the postoperative bariatric surgery nursing [8]. Rapid rehabilitation nursing is a nursing method that adopts a series of perioperative optimization measures proved effective by

evidence-based medicine to reduce surgical stress and accelerate postoperative recovery, which has been widely used in surgical clinic in recent years [9], postoperative pain management is one of the important contents of ERAS (enhanced recovery after surgery) nursing care, and pain is the most common symptom of patients after surgery. According to statistics, 75% of patients undergoing surgery have obvious postoperative pain [10]. Therefore, in this study, analgesics were interventional applied to accelerate postoperative recovery of patients undergoing bariatric surgery and turned out to be effective. The summary report is as follows.

## 2. Data and Method

### 2.1. Research Objects

Patients who underwent bariatric surgery from April 2018 to September 2019 were selected as the study subjects, and retrospective analysis and case control were conducted. Postoperative patients without interventional use of analgesics from April 2018 to December 2018 were selected as the control group and those who underwent the interventional use of analgesics from January to September 2019 were chosen as the intervention group. A total of 309 cases were included, with 154 cases in the control group and 155 cases in the intervention group. The inclusion criteria were as follows: (1) patients who met the surgical indication criteria of the Chinese guidelines for the surgical treatment of obesity and type 2 diabetes (2014) before surgery, that is, patients with body mass index (BMI)  $\geq 27.5 \text{ kg/m}^2$  and associated with obesity-related metabolic diseases; (2) patients who received LRYGB and LSG in our hospital; (3) patients without digital cognition or hearing impairment. Exclusion criteria: (1) patients with severe mental and cognitive impairment and unable to cooperate with treatment; (2) patients allergic to analgesics. (3) patients with excessive alcohol dependence.

### 2.2. Research Methods

- 1) Dynamic evaluation The pain level of patients was evaluated by Numerical Rating Scale (NRS) digital score (0~10, 0: no pain, 10: labor pain). Patients were evaluated when they returned to the ward after surgery. Different evaluation frequencies were carried out until the third day after surgery according to the pain score: QH for score  $\geq 7$ , Q4H for 3~6; QD for 1~3.
- 2) Medication plan of the control group Analgesia was

given as needed, corresponding treatment was given as patients complained of pain. When pain score  $\geq 4$ , tramadol hydrochloride 100mg for intramuscular injection was used as prescribed by the health care provider. When pain score  $\geq 7$ , pethidine hydrochloride 100mg for intramuscular injection was applied as prescribed.

- 3) interventional measures of the intervention group: combined use of multi-mode analgesia: 1) relevant pain education and psychological nursing were conducted during preoperative preparation, and the family members were instructed to give psychological support to the patient. 2) routine prophylactic use of normal saline 100ml and flurbiprofen axetil 100mg for intravenous transfusion on 3 consecutive days postoperatively. 3) distraction and music therapy were applied when pain score  $\leq 3$ ; tramadol 100mg intramuscular injection was used as prescribed by the doctor when pain score  $\geq 4$ . Pethidine 100mg intramuscular injection when pain score  $\geq 7$  points. After the pain was relieved, instruct the patient to early ambulate.

### 2.3. Evaluation Index

After intervention, comparing pain levels of two groups of patients with NRS score sheet and evaluating the effect of the measures after implementation. If not achieving the desired effect, reasons were analysed; new nursing interventions were formulated and recorded; first ambulance, flatulence and hospital-stay length were compared.

### 2.4. Statistical Methods

SPSS20.0 software was used for statistical analysis. The measurement data were expressed as ( $\bar{x} \pm s$ ) by t-test, and the counting data were tested by  $\chi^2$  test.  $P < 0.05$  indicates that the difference is statistically significant.

## 3. Result

### 3.1. General Information

The general data of the two groups (age, sex, height, weight, BMI and procedure method) showed no statistically significant difference after statistical analysis ( $P > .05$ ), indicating comparability. See table 1 and table 2.

Table 1. Comparison of general data between the two groups ( $\bar{x} \pm s$ ).

General data	Intervention group (n=155)	Control group (n=154)	P level
Age (year)	30.8 $\pm$ 10.7	30.6 $\pm$ 9.9	0.223
Gender (Male/Female)	66/89	63/91	0.818
Height (cm)	167.6 $\pm$ 8.8	166.9 $\pm$ 8.7	0.987
Weight (kg)	110.2 $\pm$ 26.5	111.9 $\pm$ 29.0	0.280
BMI (Kg/m <sup>2</sup> )	38.3 $\pm$ 7.1	38.7 $\pm$ 10.0	0.058

BMI: Body Mass Index

$P < 0.05$  indicates that the difference is statistically significant

**Table 2.** Comparison of procedure methods between the two groups ( $x\pm s$ ).

procedure method	Intervention group (n=155)	Control group (n=154)	P level
LRYGB	38	48	0.206
LSG	117	106	0.051

LRYGB: Laparoscopic Roux-en-Y gastric bypass; LSG: laparoscopic sleeve gastrectomy

P < 0.05 indicates that the difference is statistically significant

### 3.2. Pain Level Between Control Group and Intervention Group

The pain level was scored on the day of operation and 1d, 2d and 3d after operation. The results showed that the pain level of the patients who used analgesics preventatively was significantly lower than that of the control group (P<0.01), as shown in table 3.

**Table 3.** Comparison of pain severity scores on the pain rating scale between the two groups ( $x\pm s$  points).

Group	Cases	Day of operation	1 day Postoperative	2 day Postoperative	3 day Postoperative
Control group	154	4.51±0.50	3.73±0.67	2.01±0.30	1.25±0.42
Intervention group	155	2.34±0.52	1.88±0.74	1.15±0.21	0.22±0.47
P level		<0.01	<0.01	<0.01	<0.01

P < 0.05 indicates that the difference is statistically significant

**Table 4.** Comparison of first ambulance, flatulence and hospital-stay length between the two groups ( $x\pm s$ ).

Group	Cases	First ambulance (h)	Flatulence (h)	Hospital-stay length (d)
Control group	154	12.50±7.9	15.40±5.25	7.65±1.22
Intervention group	155	6.40±2.40	11.83±1.60	6.95±1.01
P level		0.023	0.047	0.034

P<0.05 was significantly difference

## 4. Discussion

### 4.1. Current Status of Analgesia in Bariatric Surgery

Bariatric surgery is considered to be an effective method to treat morbid obesity [11]. Compared with traditional open surgery, minimally invasive laparoscopic surgery can significantly reduce the surgical trauma of patients, so endoscopic bariatric surgery is increasingly widely used in clinical practice. Postoperative pain not only makes patients feel unpleasant, but also affects their sleeping, resulting in a series of postoperative complications and prolonged hospital stay [12]. Pain can also activate the sympathy-adrenal medulla response, leading to increased secretion of catecholamines and a series of pathophysiological reactions [13]. With the deepening of people's understanding of enhanced recovery, the concept of prophylactic analgesia is gradually accepted by health care providers. Different from the concept of advanced pain management, in which analgesia measures should be given before cutting skin to reduce the inflammatory response caused by surgery and raise the pain threshold [14]. Prophylactic analgesia is to prevent the formation of pain-sensitive states by using multi-mode analgesia in the perioperative period [6]. However, there are few studies on prophylactic analgesia in bariatric surgery. In this study, the analgesic effect of flurbiprofen axetil injection was significantly better than the control group after three

The first postoperative ambulance, flatulence and hospital-stay length of the two groups of patients were compared. The patients who used analgesics preventatively had significantly earlier first out-of-bed activity and exhaust time than the control group, and the total hospitalization days were significantly less than the control group (P<0.05), as shown in table 4.

consecutive days of intravenous infusion after bariatric surgery. (note: flurbiprofen is a non-selective non-steroidal anti-inflammatory (NSAIDs), mainly by inhibiting cox-2 enzyme to reduce the synthesis of prostaglandins, thus playing an anti-inflammatory and analgesic role. Secondly, flurbiprofen ester lipid globules can accumulate in the surgical wound site in a targeted manner, thus exerting analgesic effect). Whether there are other better analgesic methods or whether flurbiprofen injection can be combined with other analgesics to enhance the analgesic effect is worth further exploration.

### 4.2. The Influence of ERAS on the Bariatric Surgery

Enhanced Recovery After Surgery (ERAS) is a new concept of the treatment and rehabilitation model in 21st century, and postoperative pain relief is one of the main content of ERAS. Compared with traditional methods, rapid rehabilitation program has a protective effect on organ function: early ambulation can better maintain postoperative muscle function; Early postoperative enteral nutrition can better preserve lean meat mass, reduce postoperative damage to lung function, recover gastrointestinal peristalsis and enhance cardiovascular function [15]. Preventional and combinational use of multi-mode analgesia to achieve the best analgesia effect is essential to achieve the goal of ERAS. In this study, by observing the patients' first ambulance, flatulence and hospital-stay length, it was found that the first

ambulance, flatulence and hospital-stay length in the intervention group were shorter than those in the control group, which may be directly related to the good analgesic effect of preventative analgesia. After surgery, patients were afraid to get out of bed due to pain, which was increased the incidence of venous thrombosis in lower extremities. Less postoperative activity is not conducive to the recovery of gastrointestinal peristalsis, and increase the occurrence of adhesion intestinal obstruction. In this study, postoperative pain was significantly reduced, and patients are keep in painless or slightly painful state after surgery, which was shortened the postoperative ambulance time, the recovery time of gastrointestinal function, and the hospital-stay length, thus accelerating the rehabilitation process of patients. It is believe that the progress of basic and clinical studies, the concept of ERAS will be further implemented in the field of bariatric surgery and more patients with obesity and metabolic diseases will benefit from it [15].

In conclusion, pain management under the ERAS model can effectively alleviate the pain level of patients after bariatric surgery and accelerate the recovery process, which has the value of research and promotion, but the management scheme still needs to be constantly studied and improved. In addition, due to the different procedure methods, the pain level differs. Clinically, the pain level of LRYGB patients is usually lighter than that of LSG. This paper did not further analyze the causes and demonstrate, which is the deficiency of this study.

## Ethics Approval and Consent to Participate

Not applicable.

## Consent for Publication

Not applicable.

## Competing Interests

The authors declare that they have no competing interests.

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