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Nano-Carbon-Based Application of Parecoxib Sodium Combined with Hydromorphone in Preventing Anesthesia Hyperalgesia Caused by Remifentanil after Thyroidectomy

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ABSTRACT

Nano-carbon is often used as a tracer in thyroidectomy, to improve the accuracy of the operation. Remifentanil is the most commonly used anesthetic during thyroidectomy, but the use of remifentanil can sometimes cause patients with anesthesia hyperalgesia. Therefore, auxiliary anesthetics are often used in surgery to prevent remifentanil from causing anesthesia hyperalgesia. The purpose of this article is to explore the specific application effect of the fusion agent of hydromorphone and parecoxib sodium after thyroidectomy based on nano-carbon in the prevention of remifentanil-induced anesthesia hyperalgesia. Taking 60 patients who underwent thyroidectomy based on carbon nanotechnology in our hospital as the research object, the patients were divided into the parecoxib sodium group, hydromorphone control group and hydromorphone and parecoxib sodium fusion agent group. All patients were injected with remifentanil before surgery for general paralysis. Ten minutes before the end of the operation, the parecoxib sodium group was injected with quantitative parecoxib sodium, and the hydromorphone control group was injected with quantitative hydromorphone, hydromorphone and the parecoxib sodium fusion medicament group was injected with a quantitative combination of parecoxib sodium and hydromorphone. The patient's comfort, calmness, pain, adverse reactions and recovery time of consciousness were counted. The results of the study showed that the sedation score of the hydromorphone and parecoxib sodium fusion drug group was (15.8±1.5), the pain degree score was (1.9±0.5), lower than the other two groups, and the postoperative recovery time was (38±5.0))min, lower than the other two groups. It can be seen that the use of a fusion agent of hydromorphone and parecoxib sodium after thyroidectomy based on nano-carbon is effective in preventing and reducing remifentanil-induced anesthesia hyperalgesia.

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Introduction

Total thyroidectomy is currently a common surgical procedure in clinical practice, while chronic parathyroid and chronic hypothyroidism are common complications of total thyroidectomy, and its clinical incidence is relatively high (1). Patients with hypoparathyroidism may be accompanied by acute parathyroid skin stimulating hormone (PTH) blood calcium level significantly reduced, and may also be accompanied by acute hand-foot muscle twitching, numbness of the hands and feet and other abnormal symptoms of hypocalcemia, severe cases may even cause. The patient's breathing difficulties or even breathing suffocation is not only beneficial to the personal safety of patients with this disease. Thyroid nodule resection anesthesia is one of the more common anesthesia operations in clinical practice. The anesthesia operation methods can be divided into general cervical plexus block surgery anesthesia and neck general block anesthesia (2). Research results show that more and more patients with liver cancer have begun to correctly choose general local anesthesia during a new type of nano-carbon oxide-based thyroid nodule resection. Therefore, it is very important to choose a safe general anesthetic without side effects before surgery (3).

Remifentanil is said to be a very common acute opioid amine receptor agonist in the treatment of

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clinics, and it has a very powerful therapeutic effect on nerve analgesia. However, due to the relatively short duration of drug analgesia, once the patient chooses to stop the drug, the effect of the drug analgesic may disappear naturally, which may directly cause the postoperative patient to experience no pain or allergies (4). Precoitional sodium is a high concentration and selective amount of cyclopropane oxide diesters receptor inhibitor. It has a high-strength central analgesic inhibitory effect and can be widely used in the short-term inhibitory treatment of pain after surgery (4-5). In recent years, with the continuous advancement and development of anesthesia technology, hydromorphone has gradually begun to be widely used in the early clinical application of a compound injection of anesthetics for the early prevention of local hyperalgesia after surgery in patients with mild allergy. This article will be on parecoxib sodium. The application of a compound anesthetic combined with other hydromorphone as an early clinical effective drug for the prevention of postoperative hypoalgesia has been studied in depth (4-5).

In order to explore the specific application effect of the fusion agent of hydromorphone and parecoxib sodium after thyroidectomy based on nano-carbon in the prevention of remifentanil-induced anesthesia hyperalgesia, this article consulted a lot of related information. Among them, Ishii introduced the current research status of nano-carbon-based thyroidectomy in China, analyzed some problems in nano-carbon-based thyroidectomy, proposed related solutions, and pointed out that nano-carbon is used as a tracer in resection; it plays an important role in surgery (6). Singh *et al* took 89 patients undergoing thyroidectomy under general anesthesia with remifentanil as experimental subjects, and conducted an analysis and research on the anesthesia effect of remifentanil, and found that 15 remifentanil has great potential to induce anesthesia hyperalgesia, among 89 patients, 13 had anesthesia hyperalgesia (7). Jiang *et al* introduced the relevant principles of the anesthetic effect of remifentanil in the article, pointed out that the analgesic effect of remifentanil disappeared too quickly when used for surgical anesthesia, and easily caused anesthesia hyperalgesia, and analyzed the related technology to overcome this problem (8). Xiao *et al* have proved through relevant studies that taking relevant measures to prevent remifentanil from causing anesthesia hyperalgesia is very important for patients undergoing thyroidectomy, and introduced several drugs to prevent hyperalgesia, including parecoxib sodium and hydromorphone ketone (9). Zhang *et al* found that the use of a compound anesthetic of parecoxib sodium and hydromorphone for thyroidectomy can reduce the pain of the patient so that the patient can get stability after the operation, and it can shorten the time for the patient to recover consciousness, the feasibility of the fusion agent of hydromorphone and parecoxib sodium to prevent remifentanil from causing anesthesia hyperalgesia (10).

The purpose of this article is to study the specific application effect of parecoxib sodium combined with hydromorphone after thyroidectomy based on nano-carbon in the prevention of remifentanil-induced anesthesia hyperalgesia, and to further explore its mechanism of action, in summary. Some improvements and innovations made in this article on the basis of empirical results include the following two points. First of all, in this study, the compound drug of parecoxib sodium and hydromorphone was used as a clinical drug to prevent hyperalgesia, and it took the first step in the clinical application of compound anesthetics. Secondly, use the universal PST8.0 software to perform quantitative statistical comprehensive analysis on the statistical data results of the various indicators of the pain degree and adverse reactions of patients after thyroidectomy included in the experimental study, and take the total mean difference (XDO) as the amount of exercise effect is a comprehensive test of whether it is included in the experimental research results.

Materials and methods

General Information and Exclusion Criteria

In this experiment, 60 patients who underwent thyroidectomy using carbon nanotechnology in our hospital were the subjects of the study. According to the physical condition of each patient, they are divided into 3 different types, the hydrogen morphinone sodium group and parecoxib sodium group, and the parecoxib sodium complex ketone hydromorphone group. There are 20 cases in each group. All men 15 cases of 5 female patients, average

age (47.9±3.5) were divided into 12 male patients, 8 females, with an average age (49.5±3.2).

Inclusion criteria: clear clinical diagnosis and perfect preoperative examination reviewed and approved by the ethics committee. Choose OASAI Grade II patients who undergo thyroidectomy based on nano-carbon. Those who meet the indications for surgery without contraindications, and have signed an informed consent form for surgery and anesthesia with normal mental and cognitive status.

Exclusion criteria: patients allergic to narcotic drugs. Those who use this product for injection or those who do not contain other active allergy prodrug components of parecoxib sodium or any active drug components in excipients or those who use the product or have a 60-year-old male elderly patient with a history of obvious drug allergy. Patients with dysregulation of the thyroid gland in the late stage. Patients with organic pyloric stenosis or with paralytic colorectal obstruction. There is a history of severe allergies to drugs, especially acute skin allergic reactions, such as acute skin membrane ophthalmitis syndrome, toxic skin epidermal cell necrolysis, erythema multiforme, etc., or you know you have a certain morphine people who may be hypersensitive to ketone allergy drugs. Activity can cause ulcers in the digestive tract or cause acute gastrointestinal bleeding. Acute bronchial myocardial spasm, acute obstructive rhinitis, nasal polyps, vasculitis and necrogenous edema, aesthetic urticaria, and venous edema may also occur after taking aspirin or non-proliferative anti-inflammatory drugs (including acetyl cox-2 inhibitors). Asthma patients with other body allergic reactions. Pregnant patients who are in the 1/3 week after the first pregnancy or are breastfeeding. In severe cases, liver function is significantly damaged (serum albumin<15g/l or PUG score>10).

Instruments and Reagents Used in this Experiment

The main reagents used in the experiment are as follows: nano-carbon preparation, parecoxib sodium injection, hydromorphone injection, remifentanil anesthetic, dolostone injection, cresol soap solution (1200ml), phosphoric acid sodium hydrogen (400ml), anhydrous potassium dihydrogen phosphate (AR), n-butanol (600ml laboratory inventory), flurbiprofen acetyl, surgical disinfectant, hydroxyethyl starch, pre-stained protein 20mg (purchased from the NET company), paraformaldehyde 20ml, ammonium bicarbonate 40ml, PMSG (purchased from Yunnan Anuran Chemical Co., Ltd.). RIPA lysis solution 70ml, PLG biological tissue solvent (Shanghai Chemical Reagent Factory).

Main equipment: DRG anesthetics, PHL anesthesia monitoring instrument. TMAO monitor, ventilator, glue cutting instrument and automatic anxiolysis instrument purchased from PFG. PCA postoperative analgesia pump, electronic measuring instrument. BIO-652 plate washer produced for the company. VSP scoring scale, TCR syringe pump, heartbeat monitor, blood pressure monitor, surgical equipment, high-light searchlight. Other auxiliary instruments and equipment used in this experiment are shown in Table 1.

Table 1. Other auxiliary equipment and reagents

Group	Usage amount	Source
Ventilator	1	General Electric Company
Microscope	1	General Electric Company
Injection pump	1	Shanghai Analytical Instruments
Mizoram	500ml	Caused by Jiangsu Feng Hua
Hydrochloric acid	150ml	Gaohu Chemical Enterprise
Sulfuric acid	300mg	Japan Sanwa Kimono
Sodium chloride	750ml	American SGH
Electrophoresis tank	1	Haupia Biological Instrument Group

Anesthesia During Thyroid Surgery

Before entering the operating room, daily hypoxic monitoring of patients with thyroid disease includes life cycle signs, pulse hypoxic blood saturation (SPO2), heart rate (HR), blood pressure (BP), and electrocardiogram (ECG). The introduction of anesthetics includes cresol 1 mg/kg, hydromorphone 0.08 mg/kg, benzoin 0.4ug/kg, parecoxib sodium 0.45 mg/kg, and propofol 4-8 MGk. HH is injected with a pump. The thyroidectomy was over, and 2pg.kg of cuisine was used. Partial pressure 20 minutes before the end of the operation. During the operation, all thyroid patients used a volume-controlled mechanical ventilation mode, and adjusted breathing parameters to maintain the expiratory CO2 pressure PETCO235-45mhg. BIS is kept between thyroidectomy. MAP and HR are within ±30% of the basic value range. Hydromorphone group: 10 g phenol and 20 mg baler hybrid sodium were injected intravenously 30 minutes before the end of the operation. Hydromorphone

group: Quantitative hydromorphone was injected 10 minutes before the end of the operation. The combination of parecoxib sodium and hydroxylamine: through the combination of parecoxib sodium and hydroxylamine, hydrogen was injected 30 minutes before the end of the operation. In order to connect the patient with the facial anesthesia machine, the patient after the endotracheal intubation and the facial patient after the operation maintain continuous anesthesia, and the recovery rate is about 15g/kg. In order to maintain continuous anesthesia, fentanyl was administered to the postoperative patients 3 times continuously, and parecoxib sodium was continuously used for the postoperative patients at a dose of 3 mg/kg. In order to ensure the postoperative patients, there are the patient was still relaxed and nervous, and continued to provide bromine discontinuous hydromorphone injections to the god library. On this basis, a 0.5 mg/kg hydromorphone solution was injected into the patient's vein after the operation. The control group was determined every 10 minutes before the end of the operation, and the control group was stopped 10 minutes before the end of the operation.

Pain Threshold Detection and Scoring Standards and Statistical Methods

Record the start time of facial surgery for all surgical patients and the time after the patients wake up. Immediately after extubating in our hospital, 30, 60, and 90 minutes after the operation, each patient's pain was scored with a 10 ram sedation pain depth simulation score, bus comfort simulation score 10 and 20vas pain depth visual image simulation depth score. The calculation method of the Ramsay sedation and stability test score is as follows: 1 point for restlessness and irritability. Quiet is very suitable for 2 points. Lethargy, following others' instructions, is 3 points. Sleep awakening state, being able to be awakened by others is 4 points. The slow response when calling sounds is 5 points. Deep sleep, calling sound but not waking up is 6 points, 2-4 points for sedative sleep satisfaction, 5 or 6 points for sedative hypersomnia. Vas pain simulation visual experience simulation patient score: 0 is the patient's painless, 10 is the patient's unbearable pain. 0-3 is classified as mild pain, 4-6 is classified as moderate pain, and >6 is classified as severe pain.

The SPt2.0 statistical analysis software system is used to analyze the measurement data. The measurement data is generally expressed by the annual average number of standard deviations or the average median (less than the interquartile millimeter spacing) formula, and the counting data generally uses the rate fraction. Age, weight, anesthesia treatment time, operation recovery time, first head analgesia time, pump head compression operation time, head recovery operation time, and head laryngeal mask wound removal operation time were the average t of two different independent test samples. The mean postoperative mechanical pain threshold, postoperative sanitaria, recoil sodium group and the total use of non-dihydromorphine, plasma pge2 concentration, il-1p and IL-6 concentration and other related data were compared between the two groups.

The s and t methods of independent two samples were used to test between the groups, and the data within the group were tested by repeated measurement analysis of variance. Related surgical complications such as intraoperative hypotension, bradycardia, postoperative nausea or vomiting, and postoperative chills, can be tested by quantitative chi-square exact test or fisher's exact test probability method indicates the statistical significance of the limited coefficient of difference. Synthetic nanomaterials can be considered as a novel effective carrier (11-12). It can be concluded that this study showed the nano-carbon-based application of parecoxib sodium combined with hydromorphone in preventing anesthesia hyperalgesia caused by remifentanil after t. thyroidectomy.

Results and discussion

Analysis of Test Results and Scoring Results of Various Indexes in Patients after Thyroidectomy

The results of the study showed that the three groups of patients in the parecoxib sodium control group, hydromorphone control group, and hydromorphone and parecoxib sodium fusion drug group after thyroidectomy based on nano-carbon (MAP) were in the same condition at the time of extubating. After extubating, the snack rate at each time was compared, and the difference was statistically significant ($P<0.05$). Comparison of parecoxib sodium control group and hydromorphone and parecoxib sodium fusion medicament group ($P<0.01$), comparison of hydromorphone control

group and hydromorphone and parecoxib sodium fusion medicament group heart rate test results (P<0.05), the mean arterial pressure (MAP) of the three groups of patients was higher at the time of extubating and 10 minutes after the extubating than before the operation. The fusion drug group of hydromorphone and parecoxib sodium was the most obvious. The parecoxib sodium fusion agent group recovered to the preoperative level 20 minutes after extubating, while the parecoxib sodium control group and hydromorphone control group had a downward trend, but were still higher than the preoperative level. The comparison between the parecoxib sodium control group and the hydromorphone and parecoxib sodium fusion medicament group P<0.01, and the comparison between the hydromorphone control group and the hydromorphone and parecoxib sodium fusion medicament group p<0.05. The heart rate HR of the three groups of patients was higher at the time of extubating and 10 minutes after extubating than before the operation, and the fusion drug group of hydromorphone and parecoxib sodium was the most obvious. The results of the study show that the fusion agent of hydromorphone and parecoxib sodium can effectively reduce the heart rate and arterial blood pressure of patients after nanocarbon-based thyroidectomy. The relevant data are shown in Table 2.

Table 2. Parecoxib sodium combined with hydromorphone reduces heart rate and arterial blood pressure in patients

Group	Heart rate	Arterial blood pressure	Breath rate
Parecoxib sodium group	64.5±3.2 (min)	98.2±5.3	34.8±3.3 (min)
Hydromorphone group	68.2±4.1 (min)	87.5±4.8	41.7±2.5 (min)
Composite group	70.5±2.2 (min)	103.4±5.9	36.8±3.7 (min)

The results of the study showed that there were significant differences in the sedation scores of patients in the parecoxib sodium group, hydromorphone group and parecoxib sodium combined with the hydromorphone group after thyroidectomy based on nano-carbon. The sedation score of patients in the parecoxib sodium group was (8.3±1.2) at 30 min after extubating, (9.5±1.4) at 60 min after extubating, and (11.7±2.1) at 2h after extubating. The sedation score of patients in the hydromorphone group was (7.7±0.8) at 30 min after extubating, (9.1±1.2) at 60 min after extubating, and (12.3±2.4) at 2h after extubating. The sedation score of patients in the parecoxib sodium combined with hydromorphone group was (13.2±3.3) at 30 min after extubating, (15.7±3.4) at 60 min after extubating, and (18.8±3.4) at 2h after extubating. The parecoxib sodium combined with the hydromorphone group had a significantly higher sedation score than the other two groups. The results of the study show that parecoxib sodium combined with hydromorphone can improve the patient's calm score after nanocarbon-based thyroidectomy. The relevant data are shown in Figure 1.

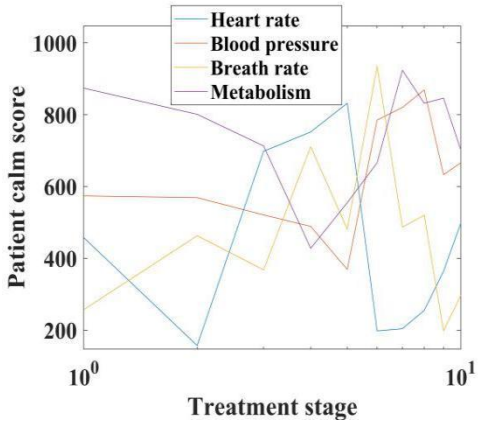

Figure 1. The effect of parecoxib sodium combined with hydromorphone on sedation after nano-carbon-based thyroidectomy

It can be seen from Figure 1 that parecoxib sodium combined with hydromorphone can improve the patient's tranquility score after nano-carbon-based thyroidectomy. The parecoxib sodium combined with the hydromorphone group has a sedation score two hours after extubating (18.8±1.5), higher than the other two groups.

The results of the study showed that there were significant differences in pain scores among the three groups of parecoxib sodium group, hydromorphone group and parecoxib sodium combined with the hydromorphone group after thyroidectomy based on nano-carbon. The pain degree score of patients in the parecoxib sodium group was (5.2±0.2) at 30 minutes after extubating, (5.5±0.4) at 60 minutes after extubating, and (4.7±0.7) in patients with thyroidectomy at 2H after extubating. In the hydromorphone group, the pain score was (4.8±0.8) at 30 min after extubating, (3.9±1.0) at 60 min after

extubating, and (4.4±0.5) in patients with thyroidectomy at 2H after extubating. The pain degree score of patients in the parecoxib sodium combined with hydromorphone group was (3.2±0.3) at 30 min after extubating, and the pain degree at 60 min after extubating was (2.8±0.4), and the pain degree of patients with thyroidectomy at 2H extubating was (1.9±0.3). The pain degree score of parecoxib sodium combined with the hydromorphone group was significantly lower than the other two groups after thyroidectomy. The results of the study show that parecoxib sodium combined with hydromorphone can reduce the pain score of patients undergoing thyroidectomy after nanocarbon-based thyroidectomy. The relevant data are shown in Figure 2.

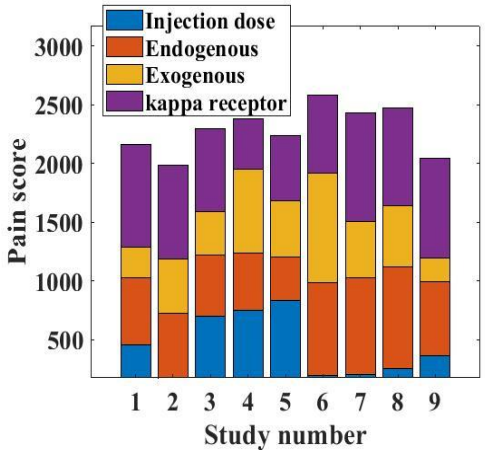

Figure 2. The effect of parecoxib sodium combined with hydromorphone on the degree of pain after nano-carbon-based thyroidectomy

It can be seen from Figure 2 that parecoxib sodium combined with hydromorphone can reduce the pain score of patients undergoing thyroidectomy after nanocarbon-based thyroidectomy. Two hours after the parecoxib sodium combined with the hydromorphone group was extubated. The pain degree score was (1.9±0.5), which was lower than the other two groups.

Discussion on the Prevention of Remifentanil-Induced Hyperalgesia Caused by Parecoxib Sodium and Hydromorphone

The experimental results in this article show that parecoxib sodium and hydromorphone are commonly used drugs for preventing and treating remifentanil hyperalgesia in nano-carbon-based thyroidectomy. Fentanyl is a specific μ receptor agonist. It has the main characteristics of fast onset, strong analgesic and inhibitory effects, and long sedation and maintenance time. It has less interference and inhibition on cardiovascular and respiratory. It also has a good sedative inhibitory effect and screaming in terms of sedation and maintaining the hemodynamic stability of the patient's cardiac circulatory system. The results of the study showed that compared with parecoxib sodium and complex hydromorphone, the sedative and analgesic effects of the fusion agent of hydromorphone and parecoxib sodium were relatively better than those of other groups, and it also had sedation and maintenance. The sedative inhibitory effect of stable hemodynamics in the circulatory system of patients with heart disease does not affect the postoperative recovery and extubating time of the other two groups of patients. The results of the study show that the fusion agent of hydromorphone and parecoxib sodium can reduce the recovery time of patients undergoing thyroidectomy after nanocarbon-based thyroidectomy. The specific data are shown in Figure 3.

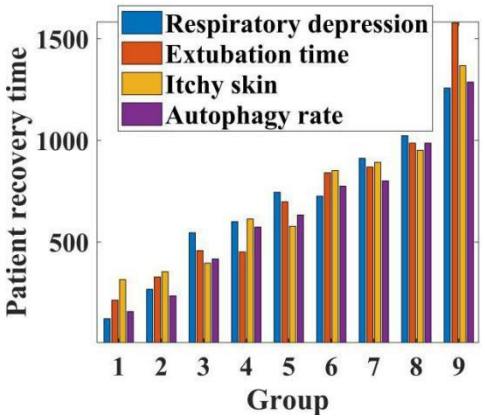

Figure 3. The effect of parecoxib sodium combined with hydromorphone on the recovery time of patients undergoing thyroidectomy

It can be seen from Figure 3 that parecoxib sodium combined with hydromorphone can reduce the recovery time of patients undergoing thyroidectomy after nanocarbon-based thyroidectomy. The average recovery time of patients in the parecoxib sodium group is 34.8 minutes. The average recovery time of patients in the hydromorphone group was 37.5 minutes, and the recovery time of patients with parecoxib sodium and hydromorphone was 24.2 minutes.

Part of the method of removing anesthesia based on nano-carbon thyroid surgery is general anesthesia and part of the brain nerve tissue transmission anesthesia. If the patient chooses general intravenous anesthesia, then under the action of the re-anesthetic agent, the excitatory response caused by the abnormal discharge of brain neurons can be inhibited and extreme pain can be eliminated (13). Feel the impact of the brain nerves and keep the patient's airway smooth and unobstructed after thyroidectomy. At the same time, if the fusion of hydromorphone and parecoxib sodium is selected during thyroidectomy, the patient's body twitching can be reduced (14). To improve operational safety, the fusion drug of hydromorphone and parecoxib sodium is a neurological anesthetic that is worthy of clinical application. In this study, fentanyl and propofol were used to give intravenous anesthesia to patients undergoing thyroidectomy before reoperation. It has the advantages of fast induction of anesthesia, high operability, and fewer adverse reactions than a series of other anesthetics (15). Fentanyl staying in the human body for a long time can easily cause postoperative anesthesia hyperalgesia (16), which is mainly manifested as loss of anesthesia effect and aggravated pain (17). Parecoxib sodium combined with hydromorphone is often needed to relieve pain before the end of the operation (18). The results of the study showed that the use of hydromorphone and parecoxib sodium fusion agent to prevent remifentanil from causing anesthesia hyperalgesia can reduce adverse reactions such as cough, vomiting, and dizziness. The relevant data are shown in Figure 4.

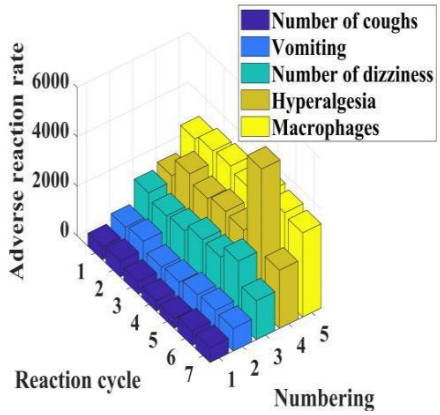

Figure 4. The effect of parecoxib sodium combined with hydromorphone on the prevention of remifentanil-induced anesthesia hyperalgesia on adverse reaction rate

It can be seen from Figure 4 that the use of parecoxib sodium combined with hydromorphone to prevent remifentanil from causing anesthesia hyperalgesia can reduce adverse reactions such as cough, vomiting, and dizziness, and reduce the incidence of adverse reactions by 32.6%.

Conclusions

Remifentanil is the most commonly used anesthetic in thyroidectomy, but the use of remifentanil can sometimes cause anesthesia hyperalgesia in patients, resulting in reduced or lost analgesic effects, so auxiliary anesthetics are often used in surgery. Prevent remifentanil from causing anesthesia hyperalgesia. Studies have found that parecoxib sodium combined with hydromorphone can effectively reduce the heart rate and arterial blood pressure of patients after nanocarbon-based thyroidectomy, improve postoperative calmness, reduce pain in patients undergoing thyroidectomy, and reduce patients undergoing thyroidectomy. Wake-up time can also reduce adverse reactions such as coughing, vomiting and dizziness. The summary of the full text shows that the use of parecoxib sodium combined with hydromorphone after nano-carbon-based thyroidectomy is effective in preventing and reducing remifentanil-induced anesthesia hyperalgesia.

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Interest conflict

The authors declare that they have no conflict of interest.

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