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Effect of Sufentanil Combined with Propofol on Hemodynamic Level and Postoperative Recovery of Patients Undergoing Hysteroscopic Surgery

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Abstract

Objective: To investigate and analyze the effects of Sufentanil and propofol on the hemodynamic level and postoperative recovery of patients undergoing hysteroscopic surgery. **Method:** Eighty patients undergoing elective hysteroscopic surgery at our hospital between January 2021 and November 2022 were selected as the research subjects. They were randomly divided into two groups using a random number table method, with 40 cases in each group. Fentanyl combined with propofol was used as anesthesia for hysteroscopic surgery in the control group, while Sufentanil combined with propofol was used as anesthesia in the study group. The hemodynamic levels, propofol dosage, postoperative recovery, early postoperative pain, and occurrence of adverse reactions were evaluated and compared at different stages of the operation. **Results:** The heart rate and mean arterial pressure in the study group were lower than those in the control group at the beginning and end of the operation, and the difference was statistically significant ($P < 0.05$). Comparison of postoperative recovery and early postoperative pain: the dosage of propofol in the study group was less than the control group, the postoperative recovery time was shorter than the control group, and the early postoperative pain score was lower than the control group, the difference was statistically significant ($P < 0.05$). The incidence of respiratory depression, nausea, vomiting, delirium, abnormal blood pressure and other adverse reactions in the study group was lower than that in the control group, with statistical significance ($P < 0.05$). **Conclusions:** The combination of sufentanil and propofol has minimal impact on the hemodynamic stability of patients undergoing hysteroscopic surgery. Additionally, it results in shorter postoperative recovery time and higher application safety.

Keywords

Sufentanil, Propofol, Hysteroscopic surgery, Hemodynamic level, Postoperative recovery

Endoscopy technology is one of the most rapidly developed minimally invasive technologies in recent years, among which hysteroscopy is a common type. As a visual and minimally invasive technology, hysteroscopy has advantages such as no muscle relaxation requirements, little trauma, short postoperative rehabilitation period [1, 2], and has become the preferred method in the diagnosis and treatment of some female diseases. During hysteroscopic surgery, hysteroscopy can provide real-time and clear field support for the operator, and the operation can effectively avoid the incision on the body surface. However, during the operation, a series of operations such as uterine pulling and dilation [3, 4] are involved, resulting in a relatively severe pain response. Meanwhile, uterine contraction during

hysteroscopic surgery will further aggravate the pain response [5]. In hysteroscopic surgery, if sufficient depth of anesthesia and analgesic intensity is not obtained, the surgical process will be directly affected, the difficulty of surgical operation will be increased, and the risk of adverse events such as uterine perforation and abnormal injury of uterine appendages will be increased [6, 7], affecting the quality and safety of surgery. Propofol is a commonly used drug in hysteroscopic anesthesia. It has the characteristics of quick onset, short half-life, etc., and patients can recover quickly after stopping administration after surgery. Sufentanil is an opioid analgesic with a high affinity for opioid receptors, which can play an ideal analgesic effect while extending the analgesic time [8, 9]. In recent years, Sufentanil combined with propofol anesthesia has been applied in some cases of hysteroscopic surgery in our hospital, and relatively ideal results have been obtained. In this study, combined with some case data, this anesthesia mode was compared with the previous anesthesia of propofol combined with fentanyl, the application effects of different anesthesia schemes were analyzed, and the influence of anesthesia mode on the hemodynamic level and postoperative recovery of patients was evaluated, to provide some ideas for the follow-up hysteroscopic anesthesia work, which is reported as follows.

1. Data and methods

1.1 General Information

80 patients treated with elective hysteroscopic surgery in our hospital from January 2021 to November 2022 were selected as research objects, all female cases, and divided into two groups by random number table method, with 40 cases in each group, aged 24~61 (43.19±8.94) years old. The age of the control group was 26 to 60 (44.02±9.12) years old, and there was no statistical difference in the general data between the two groups ($P > 0.05$). Inclusion criteria: (1) Selected cases of hysteroscopic surgery; (2) Consistent with sufentanil, propofol and other drug indications adopted in this study; (3) Complete matching data; (4) Normal mental and psychological status, normal cognitive function and communication ability; (5) no history of stroke, myocardial infarction and other serious cardiovascular and cerebrovascular diseases. Exclusion criteria: (1) confirmed malignant diseases, such as liver cancer, lung cancer, etc.; (2) Inadequate cooperation in perioperative treatment, examination, nursing and other work; (3) Patients with diseases of the blood system and immune system, such as coagulation dysfunction, moderate to severe anemia, etc.; (4) motor dysfunction; (5) patients with infectious diseases; (6) Those with a history of drug or alcohol abuse or dependence.

1.2 Methods

Before hysteroscopic surgery, all the examinations were completed in the two groups. The surgeon and anesthesiologist made joint preoperative ward rounds to evaluate the overall situation of the patients and formulate the surgical plan and anesthesia plan. The fasting and drinking time before surgery were controlled at about 8h and 6h respectively.30 minutes before surgery, the patient was transferred from the ward to the operating room, venous channels were established, and the vital signs monitor was connected for monitoring of heart rate, blood pressure, oxygen saturation, etc. The oxygen delivery mode is selected by a breathing mask, and the oxygen flow rate is 5L per minute.

(1) Control group: Patients in this group were anesthetised by propofol combined with fentanyl for hysteroscopic surgery. The induced dose of anesthesia was 1μg/kg fentanyl and 2mg/kg propofol. The patients' consciousness status and absence of eyelash reflex were observed, and the operation was carried out after successful anesthesia. During the operation, propofol intravenous infusion was given to maintain anesthesia at a dose of 1-2mg /kg per hour. If the patient's heart rate was below 50 beats per minute or the mean arterial pressure was less than 60mmHg, ephedrine and other adrenal agonists should be given as appropriate. When oxygen saturation is less than 92% or apnea occurs and lasts for more than 15s, the patient's jaw should be lightly supported and pressure ventilation with breathing mask should be given as appropriate.

(2) Study group: Sufentanil combined with propofol was used as anesthesia in this group, and the anesthetic induction dose was 0.15μg/kg of Sufentanil and 2mg/kg of propofol. Surgery was performed after eyelash reflex and consciousness disappeared. The maintenance anesthetic dose of propofol was 0.5-1mg /kg per hour. The vital signs of patients were monitored intraoperatively and the treatment of abnormal conditions was the same as that of the control group.

1.3 Observation indicators

(1) Evaluation of hemodynamic level at different stages during surgery: Hemodynamic indexes of each patient were recorded at three stages, including heart rate and mean arterial pressure, before anesthesia, immediately after surgery and after surgery.

(2) Statistics of propofol dosage, postoperative recovery and early postoperative pain: The intraoperative dose of propofol was counted in the two groups, and the postoperative recovery time of each patient was recorded. A visual analog scale (VAS) was used to evaluate subjective pain response at 2h after surgery, with the score ranging from 0 to 10. The lower the score, the milder the pain response was.

(3) Statistics on the occurrence of adverse reactions: The incidence of anesthesia-related adverse reactions during hysteroscopic surgery in the two groups was analyzed, including respiratory depression, nausea and vomiting, delirium, abnormal blood pressure, etc.

1.4 Statistical methods

SPSS23.0 statistical software was used for processing, measurement data were expressed as ($\overline{x} \pm s$), a comparison was performed by t-test, count data were expressed as percentage, a comparison was performed by χ^2 test, $P < 0.05$ was considered statistically significant.

2. Results

(1) Comparison of hemodynamic levels in different stages of surgery between the two groups: At the beginning of surgery and after surgery, heart rate and mean arterial pressure in the study group were lower than those in the control group, with statistical significance ($P < 0.05$), as shown in Table 1.

Table 1. Comparison of hemodynamics in different stages of operation between the two groups ($\overline{x} \pm s$)

Group	Preanesthesia		Immediate operation		After the operation	
	Heart rate (times/minute)	Mean arterial pressure(mmHg)	Heart rate (times/minute)	Mean arterial pressure(mmHg)	Heart rate (times/minute)	Mean arterial pressure(mmHg)
research team/40	78.95±5.68	65.29±4.29	79.85±4.03	65.04±3.94	80.11±3.94	65.98±3.85
control group/40	77.74±6.14	64.54±4.34	84.32±4.30	71.20±4.31	84.30±3.28	69.40±4.01
t	0.915	0.850	4.797	4.529	5.169	3.288
P	0.363	0.398	< 0.001	< 0.001	< 0.001	0.002

(2) Comparison of propofol dosage, postoperative recovery and early postoperative pain between the two groups: the dosage of propofol in the study group was less than that in the control group, the postoperative recovery time was shorter than that in the control group, and the early postoperative pain score was lower than that in the control group, with statistical significance ($P < 0.05$), as shown in Table 2.

Table 2. Comparison of propofol dosage, postoperative recovery and early postoperative pain between the two groups ($\overline{x} \pm s$)

group	Propofol dosage(mg)	Postoperative recovery time(min)	Postoperative 2hVAS score(score)
research team/40	41.21±19.48	8.81±1.39	2.48±0.85
control group/40	67.40±21.15	11.94±2.04	3.77±0.71
t	5.761	8.019	7.367
P	< 0.001	< 0.001	< 0.001

(3) Comparison of the occurrence of adverse reactions between the two groups: The incidence of respiratory depression, nausea and vomiting, delirium, abnormal blood pressure and other adverse reactions in the study group was lower than that in the control group, with statistical significance ($P < 0.05$), as shown in Table 3.

Table 3. Comparison of the occurrence of adverse reactions between the two groups(case %)

group	Respiratory depression	Nausea and vomiting	delirium	Abnormal blood pressure	Total incidence
research team/40	1(2.50)	0(0.00)	0(0.00)	0(0.00)	1(2.50)
control group/40	2(5.00)	2(5.00)	1(2.50)	1(2.50)	6(15.00)
χ^2					3.914
P					0.048

3. Discussion

Hysteroscopic surgery is one of the most commonly used surgical procedures in obstetrics and gynecology. It has the advantages of no incision on the body surface, high safety and quick postoperative recovery, and meets the needs of surgical patients for aesthetics and rapid recovery. A series of operations, such as uterine pulling and dilation, are involved in this surgery, which can cause great stimulation to the body. Female cervix is rich in sensory nerves, which will respond to surgical stimulation to varying degrees, inducing pain perception, leading to intraoperative body movement [10], and affecting the smooth operation. Therefore, in hysteroscopic surgery, surgical anesthesia has high requirements. Firstly, the depth of anesthesia and analgesic effect should be ensured, and secondly, the rapid postoperative recovery of patients should be ensured to control the introduction of intraoperative injurious stimuli, so as to ensure the overall comfort and safety of patients in surgery [11, 12]. Propofol intravenous anesthesia is relatively commonly used in hysteroscopic surgery, and its analgesic effect is relatively weak. Therefore, it is generally necessary to ensure the analgesic effect by combining with other analgesic drugs [13], so as to meet the anesthesia requirements in hysteroscopic surgery by combining drugs.

Good analgesic and sedative effect, stable intraoperative vital signs, and stable hemodynamic level are important requirements for anesthesia [14]. At the beginning and end of surgery, the heart rate and average arterial pressure of patients in the study group were lower than those in the control group, indicating that Sufentanil combined with propofol anesthesia can stabilize the intraoperative hemodynamic level of patients. Sufentanil, as an opioid analgesic drug, mainly acts on μopioid receptors. Compared with the traditional opioid analgesic drug fentanyl, Sufentanil has higher opioid receptor affinity, improved analgesic effect and significantly prolonged analgesic effective time [15]. At present, many clinical studies [16, 17] have confirmed that Sufentanil has advantages such as rapid effect and ideal analgesic effect, which can quickly reach blood-brain balance after intravenous infusion during surgery and exert analgesic effect. The propofol dosage of the study group was lower than that of the control group, the postoperative recovery time was shorter, the early postoperative pain score was lower than that of the control group, and the incidence of adverse reactions was lower than that of the control group. The combination of Sufentanil and propofol could control the dosage of anesthetic drugs, promote early postoperative recovery, and had higher safety. The postoperative recovery time of patients undergoing hysteroscopic surgery is mainly affected by the dose of anesthetic, and excessive use of anesthetic dose will prolong the postoperative recovery time. Sufentanil, as a piperidine derivative, has a high binding rate with plasma proteins, which can play a long-term analgesic effect and stabilize hemodynamic level by inhibiting the release of catecholamine [18]. The dosage of propofol in the study group was less than that in the control group. By controlling the dosage of propofol, the inhibition of motor center and cardiovascular center could be reduced, so as to regulate hemodynamic fluctuations.

4. Conclusion

In conclusion, Sufentanil combined with propofol in patients undergoing hysteroscopic surgery can stabilize the hemodynamic level and shorten the postoperative recovery time, and the efficacy and safety of analgesia are relatively prominent.

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