Effect of preemptive analgesia of dexmedetomidine in combined with sufentanil on the stress reaction after anesthesia

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ARTICLE INFO

Article history:
Received 5 Mar 2016
Received in revised form 25 Mar 2016
Accepted 15 Mar 2016
Available online 28 Mar 2016

Keywords:
Dexmedetomidine
Sufentanil
Preemptive analgesia
Anesthesia
Stress reaction

ABSTRACT

Objective: To explore the effect of preemptive analgesia of dexmedetomidine in combined with sufentanil on the stress reaction after anesthesia. Methods: A total of 120 patients who were admitted in our hospital from May, 2014 to August, 2015 for laparoscopic surgery were included in the study and randomized into the observation group and the control group with 60 cases in each group. The patients in the observation group were given dexmedetomidine in combined with sufentanil for preoperative analgesia before anesthesia, while the patients in the control group were given sufentanil. The changes of immunological stress indicators and stress hormone indicators before and after operation, and the occurrence of adverse reactions in the two groups were compared. Results: The comparison of DTER, FEIR, CD3+, and CD4+ before operation between the two groups was not statistically significant. DTER, CD3+, and CD4+ levels after operation in the observation group were significantly elevated when compared with the control group, while FEIR level was significantly lower than that in the control group. The comparison of three stress hormone indicators before operation between the two groups was not statistically significant. ACTH, Cor, and ALD levels after operation in the observation group were significantly lower than those in the control group. The occurrence rate of adverse reactions in the observation group was significantly lower than that in the control group. Conclusions: Preemptive analgesia of dexmedetomidine in combined with sufentanil for patients underwent laparoscopic surgery has a small effect on the stress reaction, with a low recurrence rate of adverse reactions; therefore, it can be served as a first choice for preemptive analgesia of laparoscopic surgery.

1. Introduction

Sufentanil is a common analgesic drug in the clinic, belonging to the strong opioids, with advantages of rapid excellency and metabolism, stable anesthetic effect, favorable controllability, and short continuous infusion half-life period[1–3]. However, it has disadvantages of rapid disappearing of analgesic effect after drug withdrawal and strengthened postoperative aching feeling; therefore, the analgesic effect can be elevated by reinforcing the pain controlling, in which dexmedetomidine is mostly applied to be combined with[4]. The study is aimed to explore the effect of preemptive analgesia of dexmedetomidine in combined with sufentanil on the stress reaction after anesthesia.

2. Materials and methods

2.1. General materials

A total of 120 patients who were admitted in our hospital from May, 2014 to August, 2015 for laparoscopic surgery were included in the study, among which 59 were male, and 61 were female; aged from 35 to 72 years old, with an average age of (45.12±12.30) years old; average height of (168.79±10.20) cm; average weight of (62.49±5.41) kg; and average BMI of (21.05±2.05) kg/m². Inclusion criteria[5]: (1) those who had signed the informed consent; (2)
those who had normal cardio-pulmonary function and hepatorenal function; (3) those who had no hematological system diseases; (4) those who had not taken analgesic drugs for a long time. Exclusion criteria: (1) those who were unwilling to cooperate with; (2) those who were allergic to NSAIDs.

2.2. Methods

The patients were randomized into the observation group and the control group with 60 cases in each group. The patients in the two groups were fasting 10-12 h before operation, and given intramuscular injection of 0.5 mg atropine and 0.1 g phenobarbital sodium 0.5 h before operation. After entering the operation room, the intravenous channel was established, and the anesthesia/EEG consciousness detection system was connected after the indicators were stabilized. The sedation state was observed and recorded. Meanwhile, ECG monitor was connected, and a continuous oxygen inhalation was given. Before anesthesia induction, drugs with corresponding dosages and categories were given according to the weight.

The patients in the observation group were given intravenous injection of 10 mL dexametomidine (1 μg/kg) + 10 mL sufentanil (0.1 μg/kg) within 10 min, with a speed of 0.3 μg/(kg·h) until the end of operation.

The patients in the control group were given 10 mL sufentanil (0.1 μg/kg) within 10 min, with a speed of 0.3 μg/(kg·h) until the end of operation. The changes of immunological stress indicators and stress hormone indicators before and after operation were recorded. The analgesic effect 1 h and 24 h after operation was evaluated. The occurrence of adverse reactions after operation in the two groups was observed and compared.

2.3. Observation indicators

The levels of DTER, FEIR, CD3+, and CD4+ in the two groups were observed. VAS was used to evaluate the postoperative pain. The stress hormone indicators contained ACTH, Cor, and ALD.

2.4. Statistical analysis

SPSS 18.0 software was used for the statistical analysis. Data were expressed as mean±SD, and t test was used for the comparison. Chi-square test was used for the comparison of the enumeration data. P<0.05 was regarded as statistically significant.

### Table 1
Comparison of the immunological stress indicators before and after operation between the two groups.

| Groups    | n  | Before operation |  | After operation |  |
|-----------|----|------------------|  |                |  |
| Observation | 60 | DTER             |  | FEIR           |  |
|           |    | 34.98±2.56       |  | 33.27±2.97     |  |
| Control   | 60 | After operation  |  |                |  |
|           |    | 32.25±2.37*      |  | 38.79±3.21*    |  |
|           |    | 35.05±2.79       |  | 43.50±3.27     |  |

### Table 2
Comparison of ACTH, Cor, and ALD levels before and after operation between the two groups.

| Groups    | n  | Before operation |  | After operation |  |
|-----------|----|------------------|  |                |  |
| Observation | 60 | ACTH (ng/L)      |  | 8.17±0.97      |  |
|           |    | 195.26±26.23     |  | 98.12±5.49    |  |
| Control   | 60 | After operation  |  |                |  |
|           |    | 26.45±1.72       |  | 239.78±25.18  |  |
|           |    | 184.25±25.41     |  | 89.78±7.01   |  |

3. Results

3.1. Comparison of the immunological stress indicators before and after operation between the two groups

The comparison of DTER, FEIR, CD3+, and CD4+ before operation between the two groups was not statistically significant (P>0.05). DTER, CD3+, and CD4+ levels after operation in the observation group were significantly elevated when compared with the control group, while FEIR level was significantly lower than that in the control group (P<0.05) (Table 1).

3.2. Comparison of ACTH, Cor, and ALD levels before and after operation between the two groups

The comparison of ACTH, Cor, and ALD levels before operation between the two groups was not statistically significant (P>0.05). ACTH, Cor, and ALD levels after operation in the observation group were significantly lower than those in the control group (P<0.05) (Table 2).

### Table 2
Comparison of ACTH, Cor, and ALD levels before and after operation between the two groups.

| Groups    | n  | Before operation |  | After operation |  |
|-----------|----|------------------|  |                |  |
| Observation | 60 | ACTH (ng/L)      |  | 8.76±1.02      |  |
|           |    | 184.25±25.41     |  | 89.78±7.01    |  |
| Control   | 60 | After operation  |  |                |  |
|           |    | 19.02±1.24       |  | 201.5±21.48   |  |
|           |    | 26.45±1.72       |  | 239.78±25.18  |  |
|           |    | 184.25±25.41     |  | 89.78±7.01   |  |

3.3. Comparison of the postoperative pain degree between the two groups

VAS pain scores 1 h and 24 h after operation in the observation group were (1.98±0.87) and (0.35±0.12), respectively, while in the control group were (2.03±1.02) and (1.23±0.56), respectively. The comparison of pain degree 1h after operation between the two groups was not statistically significant (P>0.05). The pain degree 24 h after operation in the observation group was significantly lower than that in the control group (P<0.05).

3.4. Adverse reactions

In the observation group, after operation, 1 had nausea, 2 had respiratory depression, with an occurrence rate of adverse reactions of 3.34%; while in the control group, after operation, 2 had nausea, 3 had vomiting, 2 had respiratory depression, and 3 had chills, with an occurrence rate of adverse reactions of 16.66%. The occurrence rate of postoperative adverse reactions in the observation group was significantly lower than that in the control group (P<0.05).
4. Discussion

Some researches demonstrate that[10-12] the postoperative pain can not only cause discomfort, but also prominent stress manifestations; therefore, some experts propose that[13] monitoring of the stress degree can estimate the feasibility of interference means to a certain degree. Among the numerous stress indicators, immunological stress and stress hormone are highly sensitive to the stress change; therefore, controlling their expression degrees can reflect the postoperative analgesic effect from the other side. Sufentanil is highly approved to be analgesic in the clinic, but the clinical practice results show that[14,15] the analgesic effect will disappear after the drug withdrawal, resulting in a strengthened postoperative pain; therefore, it is essential to combine with other drugs to reach a sufficient analgesic effect, in which dexmedetomidine is usually adopted, but the safety of their combination requires a further confirmation. In the study, the analgesic effect of the above two drugs for the laparoscopic surgery patients and their effect on the stress reaction after anesthesia are studied.

The results in the study showed that FEIR, CD3+, and CD4+ levels after operation in the observation group were significantly elevated when compared with before operation, but DTER level was reduced; FEIR level after operation in the treatment group was significantly elevated when compared with before operation, but DTER, CD3+, and CD4+ levels were reduced; DTER, CD3+, and CD4+ levels after operation in the observation group were significantly higher than those in the control group, but FEIR level was reduced; indicating that dexmedetomidine can control the stress reaction to a certain degree. The results in the study showed that ACTH level in the observation was elevated from (8.17±0.97) ng/L to (26.45±1.72) ng/L, Cor and ALD levels were also elevated; ACTH, Cor, and ALD levels after operation in the control group were also elevated when compared with before operation, but the elevated degree was lower than that in the observation group. The results in the study showed that VAS score 24 h after operation in the control group was reduced to (1.23±0.56), but VAS score 24 h after operation in the observation group was only (0.35±0.12), showing that the analgesic effect of dexmedetomidine has a favorable controlling effect on the stress reaction after anesthesia. In order to study the safety of drugs, the adverse reactions in the two groups are compared. After drug administration, nausea, respiratory depression, vomiting, and chills can occur. The occurrence rate of adverse reactions in the control group (16.66%) was significantly higher than that in the observation group (3.34%), showing that dexmedetomidine can reduce the occurrence rate of adverse reactions, which is consistent with the results reported by Qi et al.[15]

In conclusion, preemptive analgesia of dexmedetomidine in combined with sufentanil for patients underwent laparoscopic surgery can effectively control the stress reaction after anesthesia, significantly alleviate the pain, and reduce the occurrence rate of postoperative adverse reactions.

References