Impact of propofol epidural anesthesia on immune function and inflammatory factors in patients undergoing gastric cancer surgery

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Abstract: Objective: To investigate the impact of propofol epidural anesthesia on indexes such as T lymphocytes, NK cells and inflammatory factors in patients undergoing gastric cancer surgery. Methods: Eighty patients undergoing laparoscopic radical gastrectomy were randomly divided into the control group and the observation group, with 40 cases in each group. The control group was given propofol intravenous anesthesia, while the observation group was given propofol epidural anesthesia. The anesthetic indexes, mean arterial pressure (MAP), bispectral index (BIS), level of serum inflammatory mediators, level of T lymphocytes, level of NK cells and safety analysis were observed during anesthesia. Results: The anesthesia onset time, complete block time, time to resume spontaneous breathing and orientation recovery time in the observation group were reduced, and there was a difference compared with the control group (P<0.05). MAP before anesthesia (T0), after tracheal intubation (T1), at 30 min during operation (T2), at 60 min during operation (T3) and at the end of the operation (T4) all had a relatively small overall fluctuation. MAP at T2 and T3 in the observation group was lower than that in the control group (P<0.05). BIS value at T2 and T3 in the observation group was lower than that in the control group (P<0.05). Compared with the control group, the expression of IL-6 and TNF-α in the observation group decreased after tracheal intubation (S1), 1 d after the operation (S2), 3 d after the operation (S3), 5 min after extubation (S4) (P<0.05), while there was no significant difference at other time points (P>0.05). For pairwise comparison within each group, IL-1β, IL-6 and TNF-α level at S1 and S2 were upregulated compared with those at S0, and IL-1β, IL-6 and TNF-α level at S3 and S4 were downregulated compared with those at S2 (P<0.05). CD3+ T cells levels at S1, S2, S3 showed a downward trend compared to S0 (P<0.05). Compared with the control group, CD4+ T cells levels at S4 increased (P<0.05). CD4+ T cells levels at S3 in the two groups both increased compared with those at S1 and S2, and CD4+ T cells levels at S4 in the two groups both increased compared with those at S1, S2 and S3 (P<0.05). Compared with the control group, CD8+ T cells levels at S3 and S4 in the observation group decreased. CD8+ T cells levels at S1, S2, S3 showed a downward trend compared to S0 (P<0.05), while those at S4 showed an upward trend compared to S1 (P<0.05). Compared with the control group, the CD4+/CD8+ at S4 in the observation group increased (P<0.05). Compared with the control group, NK cells levels at S1,S4 increased (P<0.05), and NK cells levels at S1, S2, S3 showed a downward trend compared to S0 (P<0.05). The incidence of adverse reactions in the observation group was lower than that in the control group (P<0.05). Conclusion: The anesthetic effect of propofol epidural anesthesia was better than that of intravenous anesthesia in patients undergoing gastric cancer surgery. The main performance was that the expression of inflammatory mediators such as IL-1β, IL-6, TNF-α decreased at different time points before and after anesthesia, the proportion of CD4+ T cells, CD4+/CD8+ and NK cells increased, and the adverse reactions were less, which makes propofol epidural anesthesia worthy of clinical promotion.

Keywords: Gastric cancer, propofol, immune function, inflammatory factors, epidural anesthesia, intravenous anesthesia

Introduction

Gastric cancer is a disease of the digestive system. The pathogenesis is that superficial gastritis and atrophic gastritis occur in the stomach, and then the lesions metastasize to the intestine and produce epithelial metaplasia, which finally becomes heterogeneous hyperplasia
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and induces cancer [1]. According to epidemiological surveys, gastric cancer is a global disease. In China, the incidence and mortality of gastric cancer continue to increase, with gender and age gaps. Men aged 40 to 60 are the high-risk population [2]. Surgical stress leads to the activation of the immune system, and the secretion of inflammatory cytokines can affect the body's recovery after the operation. Therefore, narcotic drugs and methods should be scientifically selected following the characteristics of the surgery and the patient's own immune function [3]. For patients with autoimmune suppression, narcotic drugs can aggravate the immunosuppressive reaction, resulting in a poor prognosis. Opioids can strongly inhibit cellular and humoral immune function, but local anesthesia can reduce the neuroimmune response and tumor recurrence [4].

Anesthesia is an indispensable part of the surgical treatment of gastric cancer. Intravenous anesthesia acts on nerves through the blood, which makes the patient lose consciousness and the body remain relaxed, ensuring the smooth progress of the operation [5, 6]. Epidural anesthesia is a common anesthesia method, which can block spinal cord nerve transmission, has less influence on hemodynamics and has a long anesthesia duration [7]. Propofol has the characteristics of a quick effect, quick recovery and high safety [8]. Propofol epidural anesthesia suppresses nerve excitation and reduces the vasoconstriction and myocardial excitation by interactive inhibition. Patients can wake up quickly after using propofol as narcotic drugs. Propofol is suitable for use in combination with other anesthetics [9]. Olesen et al. confirmed that propofol epidural anesthesia could accelerate the patients' recovery time after the operation and reduce the dosage of auxiliary anesthesia drugs, which is similar to the conclusion of Li et al. research [10, 11]. However, there is little literature about the impact of propofol epidural anesthesia on immune function and inflammatory factors in patients undergoing gastric cancer surgery. Therefore, the following research is carried out in this paper.

Materials and methods

General information

Eighty patients undergoing laparoscopic radical gastrectomy in our hospital from June 2017 to June 2019 were enrolled in this study, with a male to female ratio of 52:28 and ages ranging from 50 to 75 years old. The inclusion criteria were: patients’ condition was in accordance with the 2013 standardized diagnosis and treatment guidelines for gastric cancer [5]; all patients underwent laparoscopic radical gastrectomy; the subjects were diagnosed by gastroscopy; patients had no cognitive dysfunction and language disability; patients had normal coagulation function. The exclusion criteria were: patients with metabolic diseases; patients with immune system dysfunction or coagulation dysfunction; patients without contraindications for the operation; patients taking sedatives; patients with hypoglycemia; patients disobeying medical orders. The patients were randomly divided into the control group and the observation group, with 40 cases in each group. The control group was given propofol intravenous anesthesia, and the observation group was given propofol epidural anesthesia. All patients and their family members understood the content of this study and had signed the consent form. This study was in line with the ethical provisions of our hospital.

Methods

Thirty minutes before anesthesia, 0.3 mg of atropine (China Resources Double Crane Pharmaceutical Co., Ltd., China) was injected intramuscularly. The venous passage was opened after the MY002-B gas monitor detected the vital signs. A mixture of sodium lactate Ringer’s solution (Qingdao Jieshikang Biotechnology Co., Ltd., China) and 6% hydroxyethyl starch (Shanghai Huayasichuang Biotechnology, China) was injected during the operation, with a dose of 10-12 ml/kg/h. Once decreased blood pressure occurred during the operation, 2 mg of dopamine (Shanghai Hefeng Pharmaceutical Co., Ltd., China) was injected. The central venous pressure was measured, according to which the infusion flow rate was controlled. Patients were sent back to the ward after recovery of consciousness.

The anesthesia induction method of the control group. The upper limb vein was opened, and mask oxygen-inspiration for 3 min was conducted. Four minutes after anesthesia with fentanyl (Yichang Renfu Pharmaceutical Co., Ltd., China) (3 μg/kg), midazolam (Yichang Renfu Pharmaceutical Co., Ltd., China) (0.15 mg/kg), atracurium (GlaxoSmithKline Manu-
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Facturing S.p.A., Italy) (0.5 mg/kg) and isopr- ply chloride (Xi'an Libang Pharmaceutical Co., Ltd., China) (1.5 mg/kg), the intubation was performed. After the position of the endotra- cheal tube was determined, mechanical venti- lation was performed with an anesthesia machine. The oxygen flow was monitored. When the ratio of breath to time reached 1:2, and the partial pressure of carbon dioxide reached 30-35 mmHg, a mini-dose of propofol (3-5 mg/ kg/h) was infused to maintain anesthesia. The patient’s condition situation was observed, and fentanyl (2 μg/kg) was added if needed.

The anesthesia induction method of the observa- tion group. Patients took a right decubitus position. The epidural puncture was performed between T8 and T9, with a depth of 4 cm, and 1.5% lidocaine (Xi'an Disai Biopharmaceutical Co., Ltd., China) was injected. Tracheal intuba- tion was performed as the control group. A mini-dose of propofol (3-5 mg/kg/h) was infused to maintain anesthesia. Fentanyl (Yi- chang Renfu Pharmaceutical Co., Ltd., China) (2 μg/kg) was added if needed. After the operation, the tracheal catheter and epidural cathe- ter were pulled out.

Outcome measures

Primary outcome measures: (1) Comparison of the anesthesia effect. The anesthesia onset time, complete block time, time to resume spontaneous breathing and orientation recovery time of the two groups were recorded.

(2) Comparison of the mean arterial pressure (MAP) and bispectral index (BIS). MAP level and BIS scores of the two groups were recorded before anesthesia (TO), after tracheal intuba- tion (T1), at 30 min during operation (T2), at 60 min during operation (T3) and at the end of the operation (T4). After disinfecting the patient’s forehead and connecting the BIS motor, BIS was detected by the BIS detector (model: BIS EEG-VISTA, Shanghai Jumu Medical Equipment Co., Ltd., China), and the value was recorded when it became stable.

(3) Analysis of IL-1β, IL-6 and TNF-α level in serum. Two milliliters of venous blood from the elbow were collected from the two groups before anesthesia (S0), after tracheal intuba- tion (S1), 1 d after the operation (S2), 3 d after the operation (S3) and 5 min after extubation (S4). The blood samples were centrifuged by a high-speed centrifuge (model: Avanti JXN-30/26, Beckman Coulter, USA) with a condition of 4000 r for 10 min. The levels of IL-6, IL-1β and TNF-α were detected by ELISA.

(4) Comparison of the levels of T lymphocytes and NK cells. Two milliliters of peripheral blood from the elbow of the two groups were collect- ed before anesthesia (S0), after tracheal intuba- tion (S1), 1 d after the operation (S2), 3 d after the operation (S3) and 5 min after extu- bation (S4). The blood samples were anticoagulated and put into sterile EP tubes, and one volume of PBS was added to dilute the blood. The lymphocyte concentration was adjusted to 2×10^6 in DMEM medium (Youkang Hengye Biotechnology (Beijing) Co., Ltd., China). After standing for 30 min, anti-CD3+, CD4+, CD8+, CD4/CD8+ antibodies (Abcam, China) and anti-killer cells (NK cells) antibodies (Shanghai Jingkang Bioengineering Co., Ltd., China) were added, and the samples were left to stand for 20 min. The samples were then centrifuged, washed twice with PBS buffer and analyzed by flow cytometry (Navios, Beckman Coulter, USA).

Secondary outcome measures: Adverse reac- tions after anesthesia. The occurrence of shiv- ering, nausea, vomiting and other adverse reactions were monitored after the operation, and the incidence was calculated.

Statistical analysis

All data were analyzed by SPSS 23.0 software. The enumeration data were expressed as (n (%)) and analyzed by the χ^2 test. The measure- ment data were expressed as mean ± standard deviation (X ± sd). Comparison between multi- ple time points was conducted by the repeated measurement ANOVA. Comparison between the two groups was conducted by independent- samples t-test. P<0.05 was considered signifi- cantly different.

Results

Comparison of general information between the two groups

Gender, average age, average weight, pathological type (signet ring cell carcinoma and mucinous adenocarcinoma), degree of differen-
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Comparison of the anesthesia effect between the two groups

Compared with the control group, the anesthesia onset time, complete block time, time to resume spontaneous breathing and orientation recovery time of the observation group were significantly shorter (P<0.05). See Table 2.

Comparison of MAP and BIS between the two groups

Compared with the control group, the MAP levels of the observation group at T2 and T3 decreased (P<0.05), and there were significant differences between T1 and T0, T2 and T1, T3 and T2, T4 and T3 within each group (P<0.05). Compared with the control group, the BIS values of the observation group at T2 and T3 were lower (P<0.05), and there were significant differences between T1, T2, T3, T4 and T0 within each group (P<0.05). See Table 3 and Figure 1.

Comparison of the levels of IL-1β, IL-6, TNF-α in serum between the two groups

Compared with the control group, the expression of IL-1β at S1, S2, S3 and S4 in the observation group was significantly decreased, and the expression of IL-6 and TNF-α at S1, S2, S3 and S4 was downregulated (all P<0.05), and there was no difference at other time points (P>0.05). For comparison within each group, IL-1β, IL-6, TNF-α at S1 and S2 were upregulated compared with S0, and IL-1β, IL-6, TNF-α at S3 and S4 were downregulated compared with S2 (P<0.05). See Table 4 and Figure 2.

Comparison of the levels of T lymphocytes and NK cells in serum between the two groups

In the level of CD3+ T cells, there was no difference at S0~S4 between the two groups (P>0.05). For comparison within each group,
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the levels at S1~S3 showed a downward trend compared to S0 (P<0.05), and there was no difference between S4 and S0 (P>0.05). In the level of CD4+ T cells, there was no difference at S0~S3 between the two groups (P>0.05). Compared with the control group, the levels at S1~S4 increased in the observation group (P<0.05). For comparison within each group, the levels at S1~S3 showed a downward trend compared to S0 (P<0.05), and the levels at S4 showed an upward trend compared to S1 (P<0.05). In the CD4+/CD8+ ratio, there was no difference at S0~S3 between the two groups (P>0.05). Compared with the control group, the ratio at S4 increased in the observation group (P<0.05). For the level of NK cells, there was no difference at S0 between the two groups (P>0.05). Compared with the control group, the levels at S1~S4 increased in the observation group (P<0.05). For comparison within each group, the levels at S1~S3 showed a downward trend compared to S0 (P<0.05), and there was a difference between the levels at S4 and S0 (P<0.05). See Tables 5, 6 and Figure 3.

Safety analysis of the two groups of patients

The incidence of shivering, respiratory depression and other events in the observation group was 11 cases (27.50%), which was lower than that of the control group (40.00%). There was a significant difference between the two groups (P<0.05). See Table 7.

Discussion

Blood pressure changes in patients with gastric cancer during surgery. The increase of blood pressure in patients using intravenous general anesthesia is related to the blood flow limitation in the distal abdominal aorta. The rise of blood pressure in patients with gastric cancer can be accelerated 5 minutes after the start of surgery [11]. MAP refers to the body’s average arterial pressure. After epidural anesthesia, the

Table 3. Comparison of MAP and BIS during anesthesia (X ± sd)

<table>
<thead>
<tr>
<th>Time</th>
<th>MAP (mmHg)</th>
<th>BIS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Observation group</td>
<td>Control group</td>
</tr>
<tr>
<td>T0</td>
<td>90.50±8.90</td>
<td>89.60±9.11</td>
</tr>
<tr>
<td>T1</td>
<td>80.51±7.20^{a}</td>
<td>78.64±8.42^{a}</td>
</tr>
<tr>
<td>T2</td>
<td>80.10±8.81^{a,b}</td>
<td>83.20±9.21^{a,b}</td>
</tr>
<tr>
<td>T3</td>
<td>84.24±9.23^{a,b,c}</td>
<td>88.60±9.40^{a,b,c}</td>
</tr>
<tr>
<td>T4</td>
<td>81.22±7.70^{a,b,c,d}</td>
<td>81.00±8.10^{a,b,c,d}</td>
</tr>
<tr>
<td>P</td>
<td>&lt;0.001</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

Note: Compared with the control group, *P<0.05, **P<0.01. For comparison within each group: compared with T0, *P<0.05; compared with T1, *P<0.05; compared with T2, *P<0.05; compared with T3, *P<0.05. MAP: mean arterial pressure; BIS: bispectral index.

Figure 1. Comparison of MAP and BIS during anesthesia. A: Comparison of MAP; B: Comparison of BIS. Compared with the control group, *P<0.05, **P<0.01. For comparison within each group: compared with T0, *P<0.05; compared with T1, *P<0.05; compared with T2, *P<0.05; compared with T3, *P<0.05. T0, before anesthesia; T1, after tracheal intubation; T2, at 30 min during operation; T3, at 60 min during operation; T4, at the end of operation. MAP: mean arterial pressure; BIS: bispectral index.
sympathetic nerve block leads to a decrease of myocardial blood volume and blood pressure [12]. This study confirmed that propofol epidural anesthesia can stabilize the level of MAP in patients. The mechanism may be related to reduced cardiac stress and decreased blood pressure caused by epidural block. BIS is an important index to evaluate the cerebral cortex’s function by using the digital processing results of EEG. BIS can directly and accurately reflect the depth of anesthesia in patients undergoing gastric cancer surgery, which helps

Table 4. Analysis of levels of IL-1β, IL-6, TNF-α in serum (± sd)

<table>
<thead>
<tr>
<th>Time</th>
<th>IL-1β (pg/mL)</th>
<th>IL-6 (pg/mL)</th>
<th>TNF-α (pg/mL)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Observation group</td>
<td>Control group</td>
<td>Observation group</td>
</tr>
<tr>
<td>S0</td>
<td>10.66±5.68</td>
<td>10.25±6.18</td>
<td>45.50±10.23</td>
</tr>
<tr>
<td>S1</td>
<td>17.21±5.14</td>
<td>21.05±8.14</td>
<td>118.60±20.15</td>
</tr>
<tr>
<td>S2</td>
<td>16.20±5.56</td>
<td>19.32±6.02</td>
<td>65.23±11.20</td>
</tr>
<tr>
<td>S3</td>
<td>11.23±3.35</td>
<td>14.36±4.25</td>
<td>35.20±8.02</td>
</tr>
<tr>
<td>S4</td>
<td>10.70±3.15</td>
<td>13.20±3.80</td>
<td>21.35±6.16</td>
</tr>
</tbody>
</table>

Note: Before anesthesia (S0), after tracheal intubation (S1), 1 d after operation (S2), 3 d after operation (S3), 5 min after extubation (S4). Compared with the control group, *P<0.05, **P<0.01, ***P<0.001. For comparison within each group: compared with S0, ΔP<0.05; compared with S1, #P<0.05; compared with S2, aP<0.05; compared with S3, bP<0.05.

Table 5. Comparison of levels of CD3+ and CD4+ T cells in serum (± sd)

<table>
<thead>
<tr>
<th>Time</th>
<th>CD3+</th>
<th>CD4+</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Observation group</td>
<td>Control group</td>
</tr>
<tr>
<td>S0</td>
<td>61.05±5.44</td>
<td>60.85±5.67</td>
</tr>
<tr>
<td>S1</td>
<td>48.15±5.40</td>
<td>47.69±5.51</td>
</tr>
<tr>
<td>S2</td>
<td>50.11±5.23</td>
<td>49.62±7.63</td>
</tr>
<tr>
<td>S3</td>
<td>52.63±3.61</td>
<td>51.39±6.35</td>
</tr>
<tr>
<td>S4</td>
<td>60.10±3.81</td>
<td>60.48±4.02</td>
</tr>
</tbody>
</table>

Note: Before anesthesia (S0), after tracheal intubation (S1), 1 d after operation (S2), 3 d after operation (S3), 5 min after extubation (S4). Compared with the control group, *P<0.05. For comparison within each group: compared with S0, ΔP<0.05; compared with S1, #P<0.05; compared with S2, aP<0.05; compared with S3, bP<0.05.
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Table 6. Comparison of levels of CD8+ T cells, CD4+/CD8+ and NK cells in serum (X ± sd)

<table>
<thead>
<tr>
<th>Time</th>
<th>CD8+ Observation group</th>
<th>CD8+ Control group</th>
<th>CD4+/CD8+ Observation group</th>
<th>CD4+/CD8+ Control group</th>
<th>NK cells Observation group</th>
<th>NK cells Control group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>24.80±2.02</td>
<td>25.10±1.95</td>
<td>1.52±0.35</td>
<td>1.57±0.30</td>
<td>20.14±5.68</td>
<td>19.41±6.60</td>
</tr>
<tr>
<td>S1</td>
<td>20.66±1.58</td>
<td>20.93±1.44</td>
<td>1.36±0.28</td>
<td>1.44±0.30</td>
<td>17.02±6.55</td>
<td>13.02±6.14</td>
</tr>
<tr>
<td>S2</td>
<td>21.50±0.98</td>
<td>21.06±0.87</td>
<td>1.47±0.21</td>
<td>1.43±0.35</td>
<td>16.11±6.20</td>
<td>12.70±5.51</td>
</tr>
<tr>
<td>S3</td>
<td>22.51±0.56</td>
<td>23.17±0.61</td>
<td>1.52±0.22</td>
<td>1.49±0.31</td>
<td>18.20±6.11</td>
<td>15.71±6.22</td>
</tr>
<tr>
<td>S4</td>
<td>24.17±1.25</td>
<td>25.10±1.60</td>
<td>1.65±0.28</td>
<td>1.48±0.31</td>
<td>19.77±6.50</td>
<td>17.25±5.10</td>
</tr>
<tr>
<td>F</td>
<td>&lt;0.001</td>
<td>&lt;0.001</td>
<td>5.880</td>
<td>1.241</td>
<td>3.100</td>
<td>10.090</td>
</tr>
<tr>
<td>P</td>
<td>&lt;0.001</td>
<td>&lt;0.001</td>
<td>0.295</td>
<td>0.017</td>
<td>&lt;0.001</td>
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</table>

Note: Before anesthesia (S0), after tracheal intubation (S1), 1 d after operation (S2), 3 d after operation (S3), 5 min after extubation (S4). Compared with the control group, *P<0.05, **P<0.01, ***P<0.001. For comparison within each group: compared with S0, ΔP<0.05; compared with S1, #P<0.05.

Figure 3. Comparison of levels T lymphocytes and NK cells in serum between the two groups. A: Comparison of CD3+ T cells; B: Comparison of CD4+ T cells; C: Comparison of CD8+ T cells; D: Comparison of CD4+/CD8+; E: Comparison of NK cells. Compared with the control group, *P<0.05, **P<0.01, ***P<0.001. For comparison within each group: compared with S0, ΔP<0.05; compared with S1, #P<0.05; compared with S2, ΔP<0.05; compared with S3, ΔP<0.05; S0, before anesthesia; S1, after tracheal intubation; S2, 1 d after operation; S3, 3 d after operation; S4, 5 min after extubation.

control the dosage of narcotic drugs and accelerate postoperative recovery of patients [13]. Propofol can reduce the BIS scores and has a certain degree of sedative effect [14]. Xia Z et al. confirmed that propofol epidural anesthesia can promote patients to quickly enter the anesthesia state, which showed a concentration-dependent effect, and it had a good anesthetic effect similar to intravenous anesthesia [15]. Epidural anesthesia can effectively control the depth of anesthesia, promote the rapid onset of propofol anesthesia and, at the same time, stabilize blood pressure [16]. In this study, after epidural anesthesia with propofol, the BIS at T2 and T3 in the observation group was lower than that in the control group, indicating that propofol epidural anesthesia has a fast sedative speed.

The expression of IL-1β and IL-6 was upregulated after surgical trauma. A stress reaction occurs in postoperative gastric cancer patients,
which can accelerate the expression of serum IL-1β and IL-6. TNF-α is an inflammatory mediator that can regulate immune function. The expression of TNF-α is upregulated in perioperative period, resulting in the secretion of a variety of inflammatory mediators to infiltrate gastric tissues and induce injury. Propofol has an effect of inhibiting the release of inflammatory mediators, reducing inflammatory cells and mediating the chemotaxis of granulocytes [17]. Epidural anesthesia can effectively reduce the stress response of patients with gastric cancer during perioperative period and reduce the expression of serum TNF-α in postoperative patients [18]. Yan et al. found that the expression of IL-1β and IL-6 was downregulated after epidural anesthesia with propofol, which was related to the upregulation of NK cellular activity [19]. In this study, the expression of serum inflammatory mediators in the observation group was lower than that in the control group, indicating that propofol epidural anesthesia can reduce the reaction of serum inflammatory mediators and accelerate recovery.

Patients with gastric cancer have low immune function and disorders of inflammatory mediators. Surgical trauma will increase the body’s excessive stress, reduce the patient’s immune function, and accelerate the reaction of inflammatory mediators [20]. T lymphocytes mainly include CD3+, CD4+, CD8+ T cells. CD3+ T cells are all mature T cells in the peripheral system. CD4+ T cells activate B cells, and B cells can regulate the body’s anti-injury effect in many ways [21]. When an immune response occurs, CD8+ T cells will play a toxic role in target cells, promote the increase of immunosuppressive factors, weaken the level of immune response and have an effect of blocking CD4+ T cells. The CD4+/CD8+ ratio directly reflects the body’s ability to regulate the immune response. When the immune balance is destroyed, the ratio of CD4+/CD8+ decreases. NK cells are cells in the immune system that have the effect of destroying pathogens and have anti-tumor effects [22]. In the serum of patients with gastric cancer, the number of B cells and NK cells decreases, and the body’s immune system is damaged [23]. Compared with general anesthesia, epidural anesthesia can effectively reduce the perioperative immune suppression and reduce the body stress response. Meanwhile, deep anesthesia has less impact on patients’ immune function, and the stress response is lighter [24]. Epidural anesthesia can block the noxious stimulation input during operation, while intravenous anesthesia can only inhibit the signal input from the hypothalamus to the cerebral cortex, reducing patients’ immune function [25]. Yuan et al. confirmed that intravenous anesthesia could decrease the number of NK cells, which was conducive to the spread of cancer cells after surgery, while epidural anesthesia could effectively upregulate the activity of NK cells [26]. In this study, the levels of T lymphocytes and NK cells in the observation group were higher than those in the control group, indicating that propofol epidural anesthesia can reduce the damage of anesthetic drugs on immune function. The adverse reactions of the two groups were analyzed. Patients in the observation group, who were given propofol epidural anesthesia, maintained a better sedative effect, and the occurrence of shivering was reduced.

Due to the limited time, the sample size in this study is small, and the experimental results are unitary. In the later stage, our research group will strengthen the cooperation with other related research units, increase the sample size, refine the experimental content, and provide a reference for the clinical perioperative anesthesia effect of gastric cancer.

In conclusion, the anesthetic effect of propofol epidural anesthesia is better than that of intravenous anesthesia in patients undergoing gastric cancer surgery, which is mainly manifested by the decreased expression of inflammatory mediators IL-1β, IL-6 and TNF-α, the increased proportion of CD4+ T cells and NK cells, and a high ratio of CD4+/CD8+ at different time points before and after anesthesia. Propofol epidural anesthesia has high safety and is worthy of clinical promotion.

<table>
<thead>
<tr>
<th>Group</th>
<th>n</th>
<th>Chills</th>
<th>Respiratory depression</th>
<th>Feeling sick and vomit</th>
<th>Incidence rate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observation group</td>
<td>40</td>
<td>4 (10.00)</td>
<td>1 (2.50)</td>
<td>6 (15.00)</td>
<td>11 (27.50)</td>
</tr>
<tr>
<td>Control group</td>
<td>40</td>
<td>6 (15.00)</td>
<td>3 (7.50)</td>
<td>7 (17.50)</td>
<td>16 (40.00)</td>
</tr>
<tr>
<td>χ²</td>
<td>0.571</td>
<td>4.512</td>
<td></td>
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<tr>
<td>P</td>
<td>0.752</td>
<td>0.030</td>
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</tbody>
</table>
Propofol epidural anesthesia improves immune function in the perioperative period

Disclosure of conflict of interest
None.

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References


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