Analgesic effect of propofol combined with fentanyl or dezocine on polypectomy under colonoscope as well as the neurohumoral changes

Dong-Wu Xie

Anesthesiology Department, Mianyang Central Hospital of Sichuan Province, Mianyang City, Sichuan Province, 621000, China

ARTICLE INFO

Objective: To analyze the analgesic effect of propofol combined with fentanyl or dezocine on polypectomy under colonoscope as well as the neurohumoral changes. Methods: A total of 116 patients who received polypectomy under colonoscope in our hospital between February 2013 and February 2016 were selected as the research subjects and randomly divided into observation group and control group, and after polypectomy under colonoscope, control group received fentanyl analgesia and observation group received dezocine analgesia. The levels of indole neurotransmitters, pain-related indexes, inflammatory factors and stress hormones in serum were compared between two groups of patients 6 h after operation. Results: Six hours after operation, 5-HTP, 5-HIAA, 5-HT, SP, PGE2, NGF, NPY, IL-1β, IL-6, IL-8, TNF-α, PCT, HSP70, Cor, DA, ALD, NE and ACTH content in serum of observation group were significantly lower than those of control group. Conclusions: Propofol combined with dezocine can more effectively inhibit the postoperative pain in patients with polypectomy under colonoscope, and also stabilize neurohumoral balance.

1. Introduction

Single and small intestinal polyps can be directly removed under colonoscope, it is minimally invasive, quick and so on, but such patients are with significant postoperative pain, and targeted analgesic drugs need to be added during operation in order to optimize the patients’ postoperative subjective feeling and reduce related complications[1,2]. Both fentanyl and dezocine are the clinical common analgesic drugs, fentanyl acts on central μ and δ receptors, dezocine acts on cerebral cortex κ receptors, the overall mechanism, overall strength, action duration and so on are not the same, and therefore, their postoperative analgesic effect on surgical patients is significantly different[3,4]. In the study, the analgesic effect of fentanyl and dezocine on patients with polypectomy under colonoscope was mainly compared, and the related results were reported as follows.

2. Materials and methods

2.1. General information

A total of 116 patients who received polypectomy under colonoscope in our hospital between February 2013 and February 2016 were selected, and the inclusion criteria were: (1) with polyps observed under colonoscope; (2) with normal coagulation function; (3) did not take aspirin, warfarin and other anticoagulation drugs for 1 month before operation; (4) signed informed consent. Exclusion criteria were: (1) associated with severe liver and kidney dysfunction; (2) with history of intestinal malignant tumor; (3) with obesity or long-term use of sedative and analgesic drugs; (4) with the history of anesthesia 1 month before operation. Random number table was used to divide the included patients into observation group and control group (n=58). Control group included 30 male cases and 28 female cases, they were 34-70 years old and (45.72±7.19) years old in average, and the body weight was 48-72 kg; observation
group included 31 male cases and 27 female cases, they were 32-71 years old and (44.68±7.82) years old in average, and the body weight was 47-71 kg. The two groups of patients showed no statistically significant difference in the distribution of gender, age, body weight and other baseline information (P>0.05) and they were comparable.

2.2. Anesthesia and analgesia methods

Patients were fasting for solids for 6-8 h and fasting for liquids for 4 h before operation, and were without routine preoperative medication. After patients entered the OR, peripheral vein was opened to inject the compound lactated Ringer's solution, and nasal catheter was used for oxygen uptake (oxygen flow rate was 5-8 L/min). Observation group received dezocine analgesia, specifically as follows: intravenous injection of dezocine 0.1 mg/kg, slow intravenous injection of propofol (2 mg/kg) after 10 min, starting surgery after patients' eyelash reflex disappeared and injection of additional propofol 1mg/kg every 10-15 min during operation. Control group received fentanyl analgesia, specifically as follows: intravenous injection of fentanyl 1 μg/kg, followed by same usage and dosage of propofol as those of observation group.

2.3. Observation indexes

Six hours after operation, 3 mL of peripheral venous blood was collected from two groups of patients, let stand at room temperature and then centrifuged at high speed to get supernatant and cryopreserve it in -80℃ refrigerator for test. For test, the serum specimens were taken out, enzyme-linked immunosorbent assay kit was used to detect the relevant indexes, and the specific detection indexes were as follows: (1) indole neurotransmitters: 5-hydroxytryptophane (5-HTP), 5-hydroxy indoleacetic acid (5 HIAA) and 5-hydroxytryptamine (5-HT); (2) pain-related indexes: substance P (SP), prostaglandin E2 (PGE2), nerve growth factor (NGF) and neuropeptide Y (NPY); (3) inflammatory factors: interleukin-1 β , IL-6, IL-8, TNF-α, PCT and HSP70 content in serum of observation group were significantly lower than those of control group (P<0.05), shown in Table 3.

3. Results

3.1. Indole neurotransmitters

5-HTP, 5-HIAA and 5-HT content in serum of observation group were significantly lower than those of control group (P<0.05), shown in Table 1.

<table>
<thead>
<tr>
<th>Groups</th>
<th>Case No.</th>
<th>5-HTP</th>
<th>5-HIAA</th>
<th>5-HT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observation group</td>
<td>58</td>
<td>60.32±7.18</td>
<td>85.37±9.12</td>
<td>1329.76±150.88</td>
</tr>
<tr>
<td>Control group</td>
<td>58</td>
<td>84.45±9.11</td>
<td>97.04±10.93</td>
<td>1761.35±201.64</td>
</tr>
<tr>
<td>t</td>
<td></td>
<td>7.215</td>
<td>8.094</td>
<td>13.284</td>
</tr>
<tr>
<td>P</td>
<td></td>
<td>&lt;0.05</td>
<td>&lt;0.05</td>
<td>&lt;0.05</td>
</tr>
</tbody>
</table>

3.2. Pain-related indexes

SP, PGE2, NGF and NPY content in serum of observation group were significantly lower than those of control group (P<0.05), shown in Table 2.

3.3. Inflammatory factors

IL-1 β, IL-6, IL-8, TNF-α, PCT and HSP70 content in serum of observation group were significantly lower than those of control group (P<0.05), shown in Table 3.

3.4. Stress hormones

Cor, DA, ALD, NE and ACTH content in serum of observation group were significantly lower than those of control group (P<0.05), shown in Table 4.

4. Discussion

Patients with polypectomy under colonoscope are with severe postoperative pain, which can directly affect the effect of the operation and even result in postoperative colonic wound bleeding[5]. Fentanyl is the opioid with the most clinical application, it can excite central μ and δ receptors at the same time, and it can not only alleviate pain, but can also lead to slowed respiratory rate and bradycardia. Latest study has shown that although fentanyl has significant analgesic effect, its peak can only be maintained for 30-60 min, more than 30% of the patients can still feel intense pain after surgery, and therefore, it arouses suspicion from many scholars whether fentanyl is suitable for postoperative long-term analgesia[6]. Dezocine belongs to opioid receptor agonist-antagonist, it exerts analgesic effect through exciting the cerebral cortex κ receptors, it is with slow onset and long effective time of action, and meanwhile, it antagonizes μ receptor in order to reduce the occurrence of
Comparison of stress hormone content in serum between two groups after treatment.

Table 4

<table>
<thead>
<tr>
<th>Groups</th>
<th>Case No.</th>
<th>Cor (mg/L)</th>
<th>DA (ng/L)</th>
<th>ALD (ng/L)</th>
<th>NE (ng/L)</th>
<th>ACTH (ng/mL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observation</td>
<td>58</td>
<td>15.48±3.6</td>
<td>127.4±25.3</td>
<td>20.73±2.8</td>
<td>231.2±28.6</td>
<td>9.34±0.3</td>
</tr>
<tr>
<td>Control</td>
<td>58</td>
<td>27.15±3.04</td>
<td>171.4±20.5</td>
<td>27.18±2.4</td>
<td>289.6±34.2</td>
<td>14.1±1.6</td>
</tr>
<tr>
<td>t</td>
<td></td>
<td>&lt;0.05</td>
<td>&lt;0.05</td>
<td>&lt;0.05</td>
<td>&lt;0.05</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>P</td>
<td></td>
<td>&lt;0.05</td>
<td>&lt;0.05</td>
<td>&lt;0.05</td>
<td>&lt;0.05</td>
<td>&lt;0.05</td>
</tr>
</tbody>
</table>

respiratory depression. The effect characteristics of dezocine make it become the popular new analgesic drug at present, but there is less comparative study at present about the analgesic effect of fentanyl and dezocine, fentanyl and dezocine were applied respectively in patients with colon polyp excision in the study, and the differences in analgesic effect and homeostasis of two groups of patients were mainly observed.

Pain is a kind of central feeling, a variety of neurotransmitters are involved in the production and expansion of pain, and indole neurotransmitter is a commonly studied type at present[7]. 5-HTP, 5-HIAA and 5-HT all belong to indole neurotransmitters, and 5-HT is 5-HTP and 5-HIAA degradation product. It has been found in pain rat models that 5-HT content in serum of model group significantly increases and is consistent with the degree of pain. Once the release of 5-HT increases, it can generate 5-HTP under the action of 5-HTP enzyme, thereby causing the generation of 5-HIAA[8]. It was found in the study that serum 5-HTP, 5-HIAA and 5-HT content of observation group were lower 6h after operation, indicating that under the action of dezocine, the generation and release of indole neurotransmitters in the body are suppressed, and the direct effect is to reduce patients’ perception of pain after operation. In addition to the neurotransmitters, there are many recognized pain-related factors in the body fluids, including the SP, PGE2, NGF, NPY, etc.[9]. SP is the neuropeptide widely existing in the nerve fibers, and when the body is stimulated, it is massively released and involved in pain transmission. PGE2 is an inflammatory pain mediator that can promote nerve ending sensitivity and increase patients’ subjective perception of pain[10,11]. NGF can promote neural axon ending budding, and its level is positively correlated with pain intensity in patients. NPY is abundantly expressed in damaged nerves, and research has confirmed that anti-NPY treatment can effectively ease the neuropathic pain. In the study, the levels of the above four pain-related factors were detected, and it was found that the serum SP, PGE2, NGF and NPY content of observation group were lower 6h after operation, indicating that compared with fentanyl, dezocine can more effectively control the pain stimulating factors at a low level within a long time after surgery.

Inflammation is an important factor that increases the postoperative perception of pain in patients, and the release of a large number of inflammatory cytokines can directly lead to accelerated pain transmission and pain cascade reaction[12,13]. In the study, serum levels of IL-6, IL-8, TNF-α, IL-1β, PCT, HSP70 and other pro-inflammatory factors of two groups were tested 6h after operation, and it was found that the levels of above inflammatory factors of observation group were lower, indicating that at the same time of powerfully controlling patients’ perception of pain, dezocine can effectively reduce the release of inflammatory mediators and avoid the vicious circle between inflammation and pain. Pain can directly lead to the increased postoperative stress state in patients, and the protein decomposition rate in the body is greater than the synthesis rate, which directly affects the postoperative rehabilitation speed and effect. Cor, DA, ALD, NE and ACTH are all typical stress hormones, it has been found in a variety of acute infectious diseases that the levels of the above indexes increase, and studies have shown that high levels of stress hormones is one of the independent risk factor for poor prognosis[14-16]. In the study, serum Cor, DA, ALD, NE and ACTH levels of observation group were lower 6h after operation, indicating that the inhibitory effect of dezocine analgesia on the stress state can last until 6h after operation, and its strong analgesic effect, long duration and other characteristics make it more suitable for clinical application.
for postoperative analgesia in patients with polypectomy under colonoscope.

To sum up, it is concluded as follows: propofol combined with dezocine can more effectively inhibit the postoperative pain in patients with polypectomy under colonoscope and also stabilize neurohumoral balance, and it’s worth popularization and application in clinical practice in the future.

References


