Analysis of stages of labor, stress indexes and coagulation function in dexmedetomidine combined with regular discontinuous epidural injection for labor analgesia
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ARTICLE INFO

Objective: To study the changes in stages of labor, stress indexes and coagulation function in dexmedetomidine combined with regular discontinuous epidural injection for labor analgesia.

Methods: A total of 128 cases of full-term primiparas receiving epidural labor analgesia in our hospital between May 2013 and December 2015 were randomly divided into the dexmedetomidine (Dex group) and control group, the analgesia method for Dex group was dexmedetomidine combined with regular discontinuous epidural injection, and the analgesia method for control group was regular discontinuous epidural injection. The analgesic effect, time of stages of labor as well as stress indexes and coagulation function indexes in serum were evaluated.

Results: The analgesic onset time and effective time of Dex group were significantly shorter than those of control group, the hold time was significantly longer than that of control group, latency time was not different from that of control group, and the time of the second stage of labor and the time of the third stage of labor were significantly shorter than those of control group; in the second and third stages of labor, blood glucose, blood cortisol, blood insulin, epinephrine and norepinephrine content of Dex group were significantly lower than those of control group; 24 h after childbirth, PT, APTT and TT of Dex group were significantly longer than those of control group, and FIB and D-D content were significantly lower than those of control group.

Conclusions: Compared with epidural labor analgesia, the dexmedetomidine combined with regular discontinuous epidural injection can improve the analgesic effect, promote the progress of labor and reduce stress reaction as well as postpartum hypercoagulable state, and it is a more ideal solution for labor analgesia.

1. Introduction

Labor pain is an important factor affecting the process of childbirth, and good labor analgesia can ensure the smooth progress of childbirth. The pain caused by childbirth often starts from the first stage of labor until the delivery of baby. During childbirth, the paroxysmal contractions of uterine muscle and fetal damage to birth canal tissue are the major causes of pain, and acute pain will affect uterine muscle contraction, thus unfavorable to the progress of labor[1-2]. Epidural labor analgesia is a clinical common way of labor analgesia, and increasing the analgesic dose can effectively relieve the pain in the process of childbirth[3]. However, excessive drug dose will influence uterine muscle contraction, thus not conducive to the progress of labor. Dexmedetomidine is a new sedative drug developed in recent years, it excites 2 receptor to exert sedative effect, its combination with epidural analgesia can enhance the analgesic effect without affecting the uterine muscle contraction, and it is an ideal drug for labor analgesia[4]. In the following study, the changes in stages of labor, stress indexes and coagulation function in dexmedetomidine combined with regular discontinuous epidural injection for labor analgesia were analyzed.
A total of 128 cases of full-term primiparas receiving epidural labor analgesia in our hospital between May 2013 and December 2015 were selected as the research subjects, they were all with singleton full-term pregnancy and voluntarily accepted epidural labor analgesia, and the puerperae with abnormal birth canal, cephalopelvic disproportion and contraindications of intraspinal block puncture were excluded. After signing informed consent, the included puerperae were randomly divided into the dexmedetomidine (Dex group) and control group, 64 cases in each group. Dex group received dexmedetomidine combined with regular discontinuous epidural injection for analgesia, they were (26.3±3.14) years old and the gestational age was (39.52±5.14) weeks; control group received regular discontinuous epidural injection for analgesia, they were (26.83±3.14) years old and the gestational age was (39.71±5.28) weeks. The two groups of puerperae were not significantly different in general information (P>0.05).

2.2 Analgesia methods

Two groups of puerperae received regular discontinuous epidural injection for analgesia according to the following methods: puerperae were put in lateral position, then epidural puncture in the waist 2-3 cm clearance was performed, the catheter was indwelled 4 cm to the head and fixed, then the puerperae were put in horizontal position and given 3 mL of 1.5% lidocaine as test dose to confirm that there were no total spinal block or local anesthetic poisoning symptoms, then epidural catheter was connected to epidural analgesia pump, the analgesics of 0.1% ropivacaine + 2.0 μg/mL fentanyl were prepared, initial dose was 8 mL, dose rate was 50 mL/h, additional 5 mL was added every 1 h at 50 mL/h, self-controlled additional dose was 4 mL each time at 50 mL/h, and the locking time was 15 min. Dex group received intravenous pumping of dexmedetomidine at 0.4 μg/kg/h based on regular discontinuous epidural injection for analgesia, which was stopped when the cervix was open to 10 cm.

2.3 Analgesic effect evaluation methods

NRS was used to evaluate the levels of pain of two groups, the time from drug administration to NRS score reducing to 2 was analgesic onset time and the time from drug administration to the puerperae’s first pressing on the analgesia pump was analgesic hold time. At the same time, the latency time of labor, the time of second stage of labor and the time of third stage of labor were evaluated during childbirth.

2.4 Serum sample collection and index detection methods

5 mL of peripheral blood was collected in the second and third stages of labor and then centrifuged to get serum, chemiluminescence kits were used to determine blood glucose, blood cortisol and blood insulin content, and enzyme-linked immunosorbent assay kits were used to determine the content of epinephrine and norepinephrine. 24 h after childbirth, full-automatic blood coagulation analyzer was used to detect prothrombin time (PT), activated partial thromboplastin time (APTT) and thrombin time (TT) as well as fibrinogen (FIB) and D-dimer (D-D) content.

2.5 Statistical methods

SPSS 20.0 software was used to input and analyze data, measurement data analysis between two groups was by t test and P<0.05 indicated statistical significance in differences.

3. Results

3.1 Analgesic effect and duration of labor of two groups

Analysis of analgesic onset time, effective time and hold time between two groups was as follows: the analgesic onset time and effective time of Dex group were significantly shorter than those of control group, and the hold time was significantly longer than that of control group; analysis of duration of labor was as follows: latency time of Dex group was not different from that of control group, and the time of the second stage of labor and the time of the third stage of labor were significantly shorter than those of control group. Differences in analgesic onset time, effective time, hold time, the time of the second stage of labor and the time of the third stage of labor were statistically significant between two groups (P<0.05).

3.2 Stress reaction indexes during labor

Analysis of blood glucose, blood cortisol and blood insulin content in the second and the third stages of labor between two groups was shown in Table 2: blood glucose, blood cortisol and blood insulin content in the second and third stages of labor of Dex group were significantly lower than those of control group; Analysis of epinephrine and norepinephrine content in serum in the second and the third stage of labor was shown in Table 3: epinephrine and norepinephrine content in serum in the second and third stages of labor of Dex group were significantly lower than those of control.

Table 1.
Duration of analgesia and labor of two groups.

<table>
<thead>
<tr>
<th>Groups</th>
<th>n</th>
<th>Duration of analgesia (min)</th>
<th>Duration of labor (min)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Effective time</td>
<td>Onset time</td>
</tr>
<tr>
<td>Dex</td>
<td>64</td>
<td>2.25±0.32</td>
<td>2.85±0.41</td>
</tr>
<tr>
<td>Control</td>
<td>64</td>
<td>3.19±0.45</td>
<td>4.03±0.58</td>
</tr>
<tr>
<td>t</td>
<td></td>
<td>7.381</td>
<td>8.319</td>
</tr>
<tr>
<td>P</td>
<td></td>
<td>&lt;0.05</td>
<td>&lt;0.05</td>
</tr>
</tbody>
</table>
group. Differences in blood glucose, blood cortisol and blood insulin content were statistically significant between two groups in the second and the third stages of labor (P<0.05).

3.3 Coagulation function indexes after childbirth

24 h after childbirth, analysis of coagulation function indexes PT, APTT and TT as well as FIB and D-D between two groups was as follows: PT, APTT and TT of Dex group were significantly longer than those of control group, and FIB and D-D content were significantly lower than those of control group (P<0.05). Differences in PT, APTT, TT, FIB and D-D were statistically significant between two groups 24 h after childbirth (P<0.05).

4. Discussion

Labor analgesia is the hotspot of current obstetric anesthesia research and attention. Good labor analgesia can ensure the smooth progress of childbirth. Epidural analgesia is the most common clinical way of labor analgesia, regular discontinuous epidural injection of analgesics can effectively relieve labor pain, sustain the puerperae’s force of labor and reduce the delivery rate by apparatus, the greater the drug dose, the better the analgesic effect, but excessive doses of analgesics can affect the uterine muscle contraction and is not conducive to the progress of labor[9]. Epidural labor analgesia should take both analgesic effect and uterine muscle contractility into account, too undersize dose is not enough for effective analgesia, and excessive dose will influence uterine muscle contraction. In recent years, some scholars have tried the combined use of intravenous drip of analgesic and sedative drugs at the same time of epidural analgesia to enhance the effect of epidural analgesia, and also tried to avoid the influence of combined drug use on uterine contractions[6,7]. Dexmedetomidine is a kind of selective α2 adrenergic receptor agonist, its combination with brainstem α2 receptor can generate sedative effect, and its combination with the spinal cord α2 receptor can inhibit the neurotransmitter release and produce analgesic effect[8]. The application of dexmedetomidine during labor can help exert analgesic effect without affecting the uterine muscle contraction[9].

In order to define the analgesic effect of dexmedetomidine combined with regular discontinuous epidural injection, analgesic onset time, effective time and hold time were analyzed at first in the study, and the results showed that the analgesic onset time and effective time of Dex group were significantly shorter than those of control group (P<0.05). Differences in PT, APTT, TT, FIB and D-D were statistically significant between two groups 24 h after childbirth (P<0.05).
could ensure normal uterine contraction intensity, thus advantageous to the progress of labor. In the study, comparison of the duration of labor between the two groups showed that the time of the second stage of labor and the time of the third stage of labor of Dex group were significantly shorter than those of control group. This means that dexmedetomidine combined with regular discontinuous epidural injection can improve the analgesic effect, promote the progress of labor and shorten the time of the second and third stages of labor.

Severe perception of pain in childbirth is strong stressor for the body, and will activate the maternal stress response and affect the systemic hemodynamic characteristics, causing postpartum hypercoagulable state. Adrenal gland is an endocrine organ with important change in the process of stress reaction, and the activation of hypothalamus-pituitary-adrenal cortex and sympathetic nerve-adrenal medulla can enhance the body's nonspecific defense reaction. The cortisol secreted by adrenal cortex can enhance the function of defending noxious stimulation, and can also cause elevated blood glucose levels and increased compensatory insulin secretion\[10,11]\; epinephrine and norepinephrine secreted by adrenal medulla can shrink blood vessels and cause postpartum hypercoagulable state\[12,13]\.

In the study, analysis of stress reaction indexes in labor between the two groups showed that the blood glucose, blood cortisol, blood insulin, epinephrine and norepinephrine content in the second and third stages of labor of Dex group were significantly lower than those of control group. This means that the dexmedetomidine combined with regular discontinuous epidural injection can reduce the degree of stress reaction in labor. Stress reaction activation during childbirth will last until after the childbirth, which results in blood coagulation function change and is manifested as the shortened coagulation time and elevated content of blood coagulation products FIB and D-D\[14,15]\.

In the study, the analysis of blood coagulation function indexes between the two groups after childbirth showed that the PT, APTT and TT of Dex group 24 h after childbirth were significantly longer than those of control group, and the FIB and D-D content were significantly lower than those of control group. This means that dexmedetomidine combined with regular discontinuous epidural injection can relieve hypercoagulable state after childbirth.

To sum up, compared with epidural labor analgesia, the dexmedetomidine combined with regular discontinuous epidural injection can improve the analgesic effect, promote the progress of labor and reduce stress reaction as well as postpartum hypercoagulable state, and it is a more ideal solution for labor analgesia. In the study, the intravenous pumping rate of dexmedetomidine is 0.4 μg/kg/h, and it requires further research to judge whether the dose was the optimal dose and its effect on the fetus.

References


