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Comparison of clinical efficacy between epidural anesthesia and lumbar combined with epidural anesthesia during caesarean section.

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Abstract

Objective: To compare the clinical efficacy between epidural anesthesia and lumbar combined with epidural anesthesia applied during caesarean section.

Methods: A total of 120 pregnant women undergoing caesarean section in the Second Affiliated Hospital and Yuying Children's Hospital of Wenzhou Medical University between Jan 2014 and Jan 2016 were recruited in this clinical trial. All participants were randomly divided into the control and observation groups (n=60). In the control group, epidural anesthesia was administered during caesarean section and lumbar combined with epidural anesthesia was implemented in the observation group. The quality of anesthesia, onset time of anesthesia, time of motor blockage recovery time and anesthesia-induced adverse reactions were statistically compared between two groups.

Results: In the observation group, the excellent rate of anesthesia was calculated as 98.33%, significantly higher compared with 85.00% in the control group (χ^2=6.521, P<0.05). In the observation group, the onset time of anesthesia (t=26.212, P=0.001) and time of motor blockage recovery were significantly shorter compared with those in the control group (t=12.582, P<0.001). The incidence rate of adverse reactions induced by anesthesia was 8.33% in the observation group, significantly lower compared with 21.67% in the control group (χ^2=4.125, P=0.003).

Conclusion: Compared with the epidural anesthesia, lumbar combined with epidural anesthesia significantly enhances the quality of anesthesia, accelerates the onset of anesthesia, shortens the time of motor blockage recovery and yields less anesthesia-induced adverse reactions when applied during caesarean section.

Keywords: Caesarean section, Epidural anesthesia, Lumbar combined with epidural anesthesia, Clinical efficacy.

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Introduction

Along with the steady progression of medical technology, the use of caesarean section has been widely applied. During the whole process of caesarean section, anesthesia is a critical step which affects the safety [1-3]. Effective anesthesia can enhance the delivery quality of pregnant women and reduce the risk of adverse reaction induced by anesthesia. There are multiple surgical indications for general anesthesia during caesarean section in spite of the decrease of neonatal depression, maternal expectation for regional techniques [4]. Although no obvious superiority for one anesthetic technique over the remaining techniques, the advantages and limitations of each technique should be acknowledged by the anesthetists. At present, combined use of subarachnoid space block anesthesia or lumbar anesthesia and epidural anesthesia has been widely applied in clinical settings. In this study, clinical efficacy and safety between the epidural anesthesia and lumbar combined with epidural anesthesia when applied in caesarean section were statistically compared.

Materials and Methods

Baseline data

In total, 120 pregnant women undergoing caesarean section in our hospital between Jan 2014 and Jan 2016 were recruited in this clinical trial. All participants were randomly divided into the control and observation groups (n=60). In the control group, the pregnant women were aged from 20-38 y, 25.6 ± 1.8 y on average. In the observation group, the enrolled pregnant women were aged between 20-37 y with a mean age of 25.4 ± 1.6 y. Written informed consents were obtained from all participants. The study procedures were approved by the ethics committee of the Second Affiliated Hospital and Yuying Children's Hospital of Wenzhou Medical University.

Methods

Prior to caesarean section, all enrolled pregnant women were examined for the vital signs, clinical symptoms, heart rate and routine blood test. They were administered with atropine and

ephedrine for corresponding anesthesia. In the control group, epidural puncture was conducted at the L2-3 vertebra, an epidural catheter of 3-4 cm in diameter was inserted and a portion of 5 ml of 2% lignocaine was administered. At 5 min, another portion of 5-10 ml of 2% lignocaine was re-injected *via* the epidural route if no anesthesia-induced adverse events were observed. Meantime, narcotic analgetics were simultaneously administered. In the observation group, vital signs were initially monitored and the intravenous route was established. Epidural puncture was implemented at the L2-3 vertebra and then 25G lumbar puncture needle was inserted along with the epidural puncture pinhole entering into the subarachnoid space. At the presence of cerebrospinal fluid, a portion of 1.3-1.5 ml of 0.5% bupivacaine was gradually administered into the subarachnoid space for lumbar anesthesia. After the implementation of lumbar anesthesia, the lumbar puncture needle was rapidly removed and a catheter of 3-4 cm in diameter was inserted for epidural anesthesia according to the procedures described in the control group. Before and after the caesarean section, all vital signs, adverse reactions and clinical symptoms were closely monitored and effectively addressed by corresponding interventions.

Observation parameters

Before and after anesthesia, clinical parameters including onset time of anesthesia, time of motor blockage recovery and anesthesia-induced adverse reactions were observed and the incidence rate of these parameters was statistically compared between the control and observation groups.

Evaluation criteria

Evaluation criteria of anesthesia quality: Excellent anesthesia quality was defined as the pregnant women presented with no discomfort or traction reactions [5]. The surgery was successfully completed. Moderate anesthesia quality as the pregnant women had slight discomfort, which could be treated by medication use. The surgery could be accomplished. Poor anesthesia quality referred to the pregnant women with evident pain and discomfort accompanied with severe traction pain. The caesarean section could be performed under general anesthesia.

Statistical analysis

SPSS17.0 software package was utilized for statistical analysis in this study. Measurement data were analyzed by independent sample t-test and enumeration data were statistically compared by χ^2 test. $P<0.05$ was considered as a statistical significance.

Results

Comparison of anesthesia quality between two groups

In the observation group, the excellent rate of anesthesia quality was calculated as 98.33%, which was significantly higher compared with 85.00% in the control group ($\chi^2=6.521$, $P<0.05$). The percentage of high-quality anesthesia in the observation group was 70.0%, significantly higher compared with 51.7% in the control group, whereas the poor-quality anesthesia in the control group was significantly higher than that in the observation group ($\chi^2=6.589$, $P<0.05$), as illustrated in Table 1.

Comparison of onset time of anesthesia and time of motor blockage recovery between two groups

In the observation group, the onset time of anesthesia was recorded as 3.6 ± 0.5 min, significantly shorter compared with 9.8 ± 1.2 min in the control group (t=26.212, P=0.001). The time of motor blockage recovery in the observation group was 120.5 ± 10.2 min, significantly shorter compared with 159.3 ± 20.5 min in the control group (t=12.582, P<0.001), as revealed in Table 2.

Table 1. *Comparison of anesthesia quality between the observation and control groups (n/%).*

Group (n)	High-quality anesthesia	Moderate-quality anesthesia	Poor-quality anesthesia	Excellent rate
Observation group (n=60)	42 (70.0%)	17 (28.3%)	1 (1.7%)	0.983
Control group (n=60)	31 (51.7%)	21 (35.0%)	9 (15.0%)	0.851
χ^2	4.23	0.615	6.589	6.521
P value	0.031	0.435	0.007	0.006

Table 2. *Comparison of onset time of anesthesia and time of motor blockage recovery between the observation and control groups ((x ± s), min).*

Group (n)	Onset time	Motor blockage recovery time
Observation group (n=60)	3.6 ± 0.5	120.5 ± 10.2
Control group (n=60)	9.8 ± 1.2	159.3 ± 20.5
t	26.212	12.582
P value	0.001	0.001

Comparison of anesthesia-induced adverse reactions between two groups

In this study, the overall incidence of anesthesia-induced adverse reactions in the observation group was calculated as

8.33%, significantly lower compared with 21.67% in the control group (χ^2=4.125, P=0.003). In the observation group, 3 patients had nausea and vomiting, 2 presented with bradyarrhythmia, and 7 suffered from nausea and vomiting, 4 had bradyarrhythmia and 2 presented with hypotension in the control group, as illustrated in Table 3.

Table 3. *Comparison of the incidence of adverse reactions between the control and observation groups (n/%).*

Group (n)	Nausea and vomiting	Bradyarrhythmia	Hypotension	Overall incidence
Observation group (n=60)	3 (5.0%)	2 (3.3%)	0 (0)	0.083
Control group (n=60)	7 (11.7%)	4 (6.7%)	2 (3.3%)	21.7
χ^2	1.785	0.785	2.021	4.125
P value	0.147	0.412	0.125	0.003

Discussion

During the procedures of caesarean section, preoperative and intraoperative anesthesia is a key step [6]. The quality of anesthesia affects the success and completion of caesarean section. Multiple factors include anesthesia approach, anesthesia dose and anesthesia duration, which play a vital role in the anesthesia quality.

Currently, anesthesia methods commonly include epidural anesthesia, lumbar anesthesia and general anesthesia [7]. Along with the advancement of anesthesia technique, epidural-lumbar anesthesia has been more and more widely applied in clinical settings. However, the clinical efficacy and safety between lumbar combined with epidural anesthesia and epidural anesthesia alone remain to be elucidated [8].

To resolve this issue, in this clinical trial, lumbar combined with epidural anesthesia approach was successfully delivered during the procedures of caesarean section. Comparative analysis demonstrated that the excellent rate of preoperative anesthesia in the pregnant women receiving lumbar combined with epidural anesthesia was significantly higher compared with that in their counterparts undergoing epidural anesthesia alone. In addition, the onset time of anesthesia and time of motor blockage recovery, closely related to the quality and effectiveness of anesthesia, in the lumbar combined with epidural anesthesia group was considerably shorter compared with that in the epidural anesthesia group. Moreover, the incidence of adverse reactions induced by anesthesia, such as headache, vomiting and nausea, in pregnant women undergoing lumbar combined with epidural anesthesia was significantly lower compared with that in their counterparts receiving epidural anesthesia alone. Similar findings have been validated by previous studies in which the excellent rate of anesthesia *via* lumbar combined with epidural anesthesia is significantly higher, the onset time of anesthesia is considerably shorter and the incidence of adverse events induced by anesthesia is significantly lower compared with that through epidural anesthesia [8,9].

Epidural anesthesia is initiated at the lateral side of the vertebral canal, which imposes significant influence upon blockage nerve root [10]. The anesthesia response is performed *via* the arachnoid and neurilemma [11]. Thus, the onset of anesthesia is slow and the risk of nerve blockage is high. However, the approach of lumbar combined with epidural anesthesia is implemented from the subarachnoid space and thus the onset of nerve blockage is rapidly initiated, which yields relatively favourable analgesia effect and rapid onset of anesthesia. These advantages of lumbar combined with epidural anesthesia approach allow for shorter onset time of anesthesia and less pain to the pregnant women. In this clinical trial, more pregnant women receiving lumbar combined with epidural anesthesia were satisfied with the anesthesia quality compared with their counterparts, suggesting that the combined application of lumbar-epidural anesthesia can notably enhance the clinical effect of anesthesia during caesarean section. A majority of young pregnant women tend to resist the caesarean section because of the surgical trauma. Therefore, how to reduce the risk of surgical injury and trauma is of clinical significance in determining the success of surgery. Compared with epidural anesthesia, lumbar combined with epidural anesthesia yields less adverse reactions and exert less effect upon the heart rate, blood pressure and alternative parameters of the pregnant women undergoing caesarean section. Shorter induction time and onset time of anesthesia allow for muscle relaxation of pregnant women, and then the caesarean section can be immediately implemented. Reducing the delivery time of pregnant women can further decrease the risk of foetal distress and other adverse events. Lumbar combined with epidural anesthesia yields less surgical trauma, reduces the risk of surgical infection and minimizes the traction injury towards the nerve and vital organs of the pregnant women. Moreover, the dose used during lumbar combined with epidural anesthesia is lower, whereas the blockage area is larger, which collectively reduce the risk of toxic effect induced by anesthesia drugs.

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