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Effects of dexmedetomidine on Apgar score, NBNA score of newborns and maternal hemodynamic in cesarean section

LI Wulan, WANG Jun, XU Tao, ZHOU Nina, TANG Guoqiang

Department of Anesthesiology, Zigong First People's Hospital, Zigong, Sichuan 643000, China

Corresponding author: TANG Guoqiang, E-mail: mz65123@sina.com

Abstract: Objective To investigate the effects of dexmedetomidine on the safety of newborns, and maternal hemodynamic parameters and nerve block of cesarean section. **Methods** The clinical data of 117 cases of cesarean section delivery admitted to the Zigong First People's Hospital from July 2021 to October 2022 were retrospectively analyzed. The women were divided into two groups based on whether dexmedetomidine was given before anesthesia, 52 cases who were not given dexmedetomidine were divided into control group, and 65 cases who were given dexmedetomidine before anesthesia were divided into observation group. The two groups were compared with the newborn's Apgar score, the Neonatal Behavioral Neurological Assessment (NBNA), maternal hemodynamic indicators, sensory block, motor block, and maternal complications. **Results** There was no significant difference in the Apgar score and the NBNA score at 2 and 4 days between the two groups of newborns (P>0.05). Compared with 1 minute before drug infusion (T_1), the mean arterial pressure in both groups was significantly reduced at 5 minutes after drug infusion (T_2), 10 minutes before the end of surgery (T_3), and at the time of fetal delivery (T_4), and the mean arterial pressure of T_2 to T_4 in the observation group were higher than those of the control group. Heart rate of T_2 to T_4 in the observation group was significantly higher than that of T_1, but the heart rate of T_2 to T_4 in the observation group was lower than that of the control group (P<0.05) and there was no statistical difference in saturation of peripheral oxygen (SpO_2) between the two groups at all time points (P>0.05). The time of onset of sensory block and motion block of observation group were shorter than those of control group. The duration of sensory block and motion block of observation group were longer than those of control group (P<0.05). The total incidence of maternal complications in the observation group was lower than that in the control group (4.62% *vs* 17.31%, χ^2=5.056, P=0.025). **Conclusion** Dexmedetomidine before anesthesia can improve the stability of hemodynamics parameters, shorten the onset time of sensory and motor block, extend the duration of sensory and motor block, reduce the incidence of maternal complications, and has no significant impact on the neonatal Apgar score and NBNA score.

Keywords: Dexmedetomidine; Cesarean Section; Apgar score; Neonatal Behavioral Neurological Assessment; Hemodynamics
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Epidural anesthesia is the most commonly used anesthesia method for cesarean sections in China. This method has a precise analgesic effect, allowing the mother to remain awake during the delivery process, which effectively reduces the incidence of aspiration. Moreover, it has minimal suppression on the newborn [1-3]. Although epidural anesthesia provides pain relief for the parameters during labor, the process of cesarean section while awake may cause anxiety and fear in the parameters, particularly in primiparas, which can even interfere with the surgery and increase the risk [4]. To mitigate this risk, sedatives are often given before epidural anesthesia in cesarean sections to stabilize the parameters' mood and ensure cooperation during delivery. Dexmedetomidine, a novel α_2-adrenergic receptor agonist, has shown significant anti-anxiety effects and is commonly used for sedation in various surgical patients [5-6]. While there are studies on the effect of dexmedetomidine on stabilizing the mood of mothers undergoing cesarean section, there is limited analysis on its impact on the fetal Apgar score, neonatal behavior, and maternal hemodynamics. These parameters are often used to assess the prognosis of both the mother and the newborn. Therefore, it is necessary to analyze these effects further to explore the safety and efficacy of dexmedetomidine in cesarean sections.

1 Materials and Methods

1.1 General Data

A retrospective analysis was conducted on 117 women who underwent cesarean sections at Zigong First People's Hospital from July 2021 to October 2022.

Inclusion criteria: (1) American Society of Anesthesiologists (ASA) grade Ⅰ - Ⅱ [7]; (2) singleton pregnancy; (3) indications for cesarean section; (4) gestational age ≥ 37 weeks; (5) maternal age 18-35 years; (6) cesarean section performed by the same medical team.

Exclusion criteria: (1) contraindications for cesarean section; (2) allergies to the drugs used in the study; (3) multiple pregnancies; (4) presence of severe diseases such as malignancies; (5) changes in the

delivery plan during the course of labor.

According to whether dexmedetomidine was administered before anesthesia, the parameters were divided into two groups: 52 women in the control group (no dexmedetomidine) and 65 women in the observation group (dexmedetomidine administered before anesthesia).

In the control group, the age ranged from 24 to 35 (28.39 ± 4.71) years old, body mass index (BMI) ranged from 18.27 to 26.03 (22.14 ± 2.91) kg/m²; 43 cases were ASA grade I, 9 were grade II; 33 primiparas and 19 multiparas. In the observation group, the age ranged from 21 to 33 (27.69 ± 5.13) years old, BMI ranged from 18.12 to 26.29 (22.37 ± 2.88) kg/m²; 39 cases were ASA grade Ⅰ, 26 were grade Ⅱ; 41 primiparas and 24 multiparas. There was no statistically significant difference in the general data between the two groups (P>0.05). The study was approved by the hospital's ethics committee (202278). All patients signed informed consent forms.

1.2 Methods

Upon entering the operating room, intravenous access was established, and the parameters were placed in the supine position with routine monitoring of ECG, saturation of peripheral oxygen (SpO_2), heart rate, and blood pressure. The parameter was given continuous oxygen via a nasal cannula at a flow rate of 3 L/min.

Pre-anesthesia medication: The observation group received a loading dose of 0.4 μg/kg dexmedetomidine (Yancheng Pharmaceutical Co., Ltd., No. H20183219, 2 mL: 0.2 mg) via a 10-minute infusion, followed by continuous infusion at 0.3 μg/(kg·h). The control group received an equivalent volume of 0.9% saline instead. Five minutes after administration, both groups were placed in the left lateral position, and combined spinal-epidural anesthesia was performed at the third and fourth lumbar vertebrae interspace. Bupivacaine (Anhui Changjiang Pharmaceutical, Drug Registration No. H34020931, 5 mL: 37.5 mg) 15 mg was injected into the subarachnoid space, and the anesthesia level was controlled to reach fifth thoracic vertebra to fifth sacral vertebra. An epidural catheter was placed, and the patient was then repositioned to a supine position. Maternal blood pressure was monitored, and if the systolic blood pressure dropped by 30% from baseline, 0.1 mg of phenylephrine hydrochloride (Shanghai Hefeng Pharmaceutical, No. H31021175) was injected intravenously. If the heart rate dropped below 50 beats/min, atropine sulfate (Anhui Changjiang Pharmaceutical, No. H34021900, 1 mL: 0.5 mg) was administered. The doses of the drugs were adjusted according to the maternal condition.

1.3 Evaluation Indicators

The following parameters were compared between the two groups: neonatal Apgar scores, neonatal behavioral neurological assessment (NBNA) scores [8], maternal hemodynamic indicators, sensory and motor block levels, and the incidence of maternal complications.

Neonatal Apgar Score: The Apgar scores at 1 and 5 minutes after birth were recorded for each newborn. The Apgar score includes five components, including muscle tone and skin color. A lower score indicates more severe asphyxia, with scores of 8–10 being considered normal.

NBNA Score: NBNA scores were collected on the 2nd and 14th days after birth. The NBNA assesses neonatal behavioral abilities across 5 domains, totaling 40 points. A score above 37 in the first week is considered normal.

Maternal Hemodynamic Indicators: The mean arterial pressure (MAP), heart rate, and SpO_2 were compared at the following time points: 1 minute before drug infusion (T_1), 5 minutes after infusion (T_2), 10 minutes before the end of surgery (T_3), and at fetal delivery (T_4).

Sensory and Motor Block Levels: The sensory block level was evaluated every 2 minutes at 10 minutes before and after subarachnoid administration using an alcohol cotton swab cold stimulation test. The time to reach the sensory block at T10 was recorded as the onset time, and the duration until normal sensation was restored was recorded as the duration of sensory block. Motor block was assessed using the modified Bromage scale: 0 = no block, 1 = unable to flex hip, 2 = unable to flex knee, 3 = unable to bend ankle. The time to reach a Bromage score of 1 and the time to return to 0 were recorded as the onset and duration of motor block.

Incidence of Maternal Complications: The occurrence of complications such as nausea, vomiting, and chest tightness was recorded for both groups.

1.4 Statistical Methods

Data analysis was performed using SPSS 23.0 software. Categorical data were presented as n (%) and analyzed using the χ^2 test. Continuous data were expressed as $\bar{x} \pm s$. Paired t-tests were used for intra-group comparisons, and independent-sample t-tests and repeated-measures ANOVA were used for inter-group comparisons. P<0.05 was considered statistically significant.

2. Results

2.1 Comparison of Neonatal Apgar Scores and NBNA Scores

There was no significant difference between the

two groups in Apgar scores at 1 and 5 minutes, and in NBNA scores on days 2 and 4 (P>0.05). See **Table 1**.

Tab.1 Comparison of neonatal A score and NBNA score ($\bar{x}\pm s$)

Group	Cases	Apgar socre		NBNA score	
		1 min	5 min	2 d	14 d
Control group	52	9.41±0.54	9.78±0.21	37.18±1.45	37.96±1.62
Observation group	65	9.53±0.33	9.82±0.11	37.52±1.63	38.03±1.77
t value		1.480	1.326	1.177	0.221
P value		0.142	0.187	0.242	0.413

2.2 Comparison of Hemodynamic Parameters

At T_2 to T_4, the MAP of both groups was lower than at T_1, and the MAP of the observation group was higher than that of the control group. At T_2 to T_4, the heart rate of both groups was higher than that at T1, and the heart rate of the observation group was lower than that of the control group (P<0.05). See **Table 2**.

Tab.2 Comparison of maternal hemodynamic indicators ($\bar{x}\pm s$)

Group	MAP (mmHg)			
	T_1	T_2	T_3	T4
Control group(n=52)	93.04±12.13	78.17±12.04[a]	85.08±11.85[a]	86.48±10.72[a]
Observation group(n=65)	93.89±11.97	91.03±11.26[ab]	89.39±10.47[ab]	88.03±9.81[ab]
F/P_{time} value	5.147/0.002			
F/P_{group} value	3.928/0.010			
$F/P_{interaction}$ value	4.331/0.006			

Group	Heart rate (bpm)			
	T1	T2	T3	T4
Control group(n=52)	82.19±10.04	87.63±9.25[a]	89.75±9.71[a]	87.06±10.04[a]
Observation group(n=65)	81.04±11.13	84.18±8.96[ab]	83.92±8.53[ab]	84.23±10.26[ab]
F/P_{time} value	5.729/0.001			
F/P_{group} value	4.032/0.009			
$F/P_{interaction}$ value	5.003/0.003			

Group	SpO_2 (%)			
	T1	T2	T3	T4
Control group(n=52)	97.18±1.31	96.28±1.43	97.13±1.38	96.85±1.62
Observation group(n=65)	97.95±1.46	96.02±1.53	97.81±1.33	97.19±1.49
F/P_{time} value	2.042/0.112			
F/P_{group} value	1.903/0.133			
$F/P_{interaction}$ value	2.027/0.114			

Note: Compared with T1, [a]P<0.05;Compared with Control group, [b]P<0.05.

2.3 Comparison of Sensory and Motor Block

The onset time for sensory and motor block in the observation group was shorter than that in the control group, while the duration of sensory and motor block was longer in the observation group (P<0.05). See **Table 3.**

Tab.3 Comparison of maternal sensory and motor block(min, $\bar{x}\pm s$)

Group	Cases	Sensory Block		Motor Block	
		onset time	duration	onset time	duration
Control group	52	5.19±1.83	80.16±15.27	4.53±1.36	84.29±12.03
Observation group	65	3.94±1.25	91.09±18.94	3.41±1.17	90.62±15.27
t value		4.378	3.375	4.786	2.443
P value		<0.001	0.001	<0.001	0.016

2.4 Comparison of Complication Rates

The overall complication rate in the observation group was lower than that in the control group (P<0.05). See **Table 4**.

Tab.4 Comparison of the occurrence of maternal complications between two groups (case)

Group	Cases	Nausea	Vomiting	Chest distress	Total [case(%)]
Control group	52	2	6	1	9(17.31)
Observation group	65	0	2	1	3(4.62)
χ^2 value					5.056
P value					0.025

3 Discussion

Parturients choose cesarean section due to gestational hypertension, gestational diabetes, and other physiological or social factors that may lead to adverse pregnancy outcomes. At the same time, parturients increasingly demand reduced pain during the cesarean procedure [10]. Therefore, improving the effectiveness of anesthesia while ensuring safety has become a hot topic in anesthesiology research. Given the particularities of obstetric anesthesia, both maternal and fetal considerations must be taken into account. Combined spinal-epidural anesthesia (CSEA) has become the most commonly used anesthesia regimen for cesarean section due to its rapid onset, high safety, and strong operability [11]. Although CSEA provides pain relief during surgery, the surgical procedure may still cause anxiety in parturients. Some researchers suggest that administering a certain amount of sedative medication before anesthesia can help stabilize the parturient's mood [12]. Dexmedetomidine is a highly selective α_2-adrenoceptor agonist, with high affinity and a short half-life, commonly used for sedation and hypnosis [13].

The results of this study suggested that the use of dexmedetomidine had no significant effect on the newborn but helped stabilize the maternal hemodynamic parameters, consistent with related studies. This may be due to dexmedetomidine's ability to inhibit adenylate cyclase, reduce intracellular cAMP levels, and suppress synaptic neurotransmitter release by inhibiting calcium ion influx and activating potassium channels, thereby reducing surgical stress, inhibiting sympathetic activity, and enhancing vagal nerve activity to stabilize hemodynamic parameters [14]. Another study has shown that the impact of dexmedetomidine on hemodynamic parameters is related to the dose and administration rate. Rapid bolus administration can cause transient hypertension and a decrease in heart rate, a reaction more common in younger populations. This may be due to rapid, high-dose dexmedetomidine activating α2-adrenoceptors on vascular smooth muscle, resulting in strong

vasoconstriction. In this study, we controlled the bolus dose of dexmedetomidine at 0.4 μg/kg and administered it slowly over 10 minutes to reduce the incidence of transient hypertension. Continuous administration led to a stable decrease in blood pressure and heart rate due to dexmedetomidine's central sympatholytic and vagotonic effects [15].

The addition of other drugs to local anesthetics to shorten the onset time and prolong the duration of the blockade has been a hot topic in clinical research. The comparison of sensory and motor blockade between the two groups in this study showed that the onset time was shorter and the duration was longer in the observation group, which is consistent with related studies [16]. This may be because dexmedetomidine binds to receptors on spinal dorsal horn neurons, inhibiting presynaptic neurotransmitter release, thus shortening the duration of the blockade. Additionally, dexmedetomidine promotes the depolarization of dorsal horn neurons, which works synergistically with the sodium channel-blocking effect of bupivacaine, shortening the onset time and prolonging the blockade duration, enhancing the drug's neural blockade effect [17].

Further comparison of complications between the two groups showed that the observation group had a lower overall complication rate, which may be related to dexmedetomidine's ability to inhibit sympathetic nerve conduction in the medulla oblongata. The vomiting center is located at the dorsolateral edge of the medulla, and dexmedetomidine can inhibit peripheral sympathetic activity, relaxing gastrointestinal smooth muscle and thus suppressing nausea and vomiting. Additionally, dexmedetomidine has a relaxing effect on bronchial smooth muscle and can counteract transient organ contractions caused by prostaglandins, thus reducing the incidence of chest tightness in parturients [18]. In terms of safety, there was no statistically significant difference in Apgar scores or neurological function between the two groups, suggesting that dexmedetomidine has a high level of safety and does not cause harm such as hypoxia.

In conclusion, the preoperative administration of dexmedetomidine can improve the stability of hemodynamic parameters in parturients undergoing cesarean section with spinal anesthesia, shorten the onset time of sensory and motor blockade, prolong the duration of blockade, reduce the incidence of complications, and have no significant effect on fetal Apgar scores or NBNA scores, demonstrating its high safety.

Conflicts of Interest: None

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·论　著·

右美托咪定对剖宫产新生儿 Apgar 评分和 NBNA 评分及产妇血流动力学的影响

李武兰，王君，许滔，周妮娜，唐国强
自贡市第一人民医院麻醉科，四川 自贡 643000

摘要：目的　探讨右美托咪定对剖宫产新生儿的安全性及产妇血流动力学和神经阻滞情况的影响。**方法**　回顾性分析 2021 年 7 月至 2022 年 10 月自贡市第一人民医院收治的剖宫产产妇 117 例的临床资料。根据麻醉前有无给予右美托咪定将产妇分为两组，未给予右美托咪定的 52 例为对照组，麻醉前给予右美托咪定的 65 例为观察组。比较两组新生儿 Apgar 评分、新生儿行为神经测定（NBNA）、产妇血流动力学指标、感觉和运动阻滞情况、产妇并发症发生情况。**结果**　两组新生儿 1、5 min Apgar 评分及 2、4 d NBNA 评分比较差异无统计学意义（$P>0.05$）。输注药物后 5 min（T_2）、手术结束前 10 min（T_3）、胎儿分娩时（T_4）两组产妇平均动脉压均显著低于输注药物前 1 min（T_1），但观察组 T_2～T_4 平均动脉压均大于对照组；T_2～T_4 两组产妇心率均明显高于 T_1，但观察组 T_2～T_4 心率均低于对照组（$P<0.05$），两组各时间点脉搏血氧饱和度差异无统计学意义（$P>0.05$）。观察组产妇感觉阻滞起效时间及运动阻滞起效时间均较对照组更短，观察组产妇感觉阻滞持续时间及运动阻滞持续时间均较对照组更长（$P<0.05$）。观察组产妇并发症总发生率低于对照组（4.62% *vs* 17.31%，$\chi^2=5.056$，$P=0.025$）。**结论**　麻醉前给予右美托咪定可有提高椎管内麻醉剖宫产产妇血流动力学参数稳定性，缩短感觉及运动阻滞起效时间，延长感觉及运动阻滞持续时间，减少产妇并发症发生，且对新生儿 Apgar 评分、NBNA 评分无显著影响，具有较高的安全性。

关键词：右美托咪定；剖宫产；Apgar 评分；新生儿行为神经测定；血流动力学
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LI Wulan, WANG Jun, XU Tao, ZHOU Nina, TANG Guoqiang
Department of Anesthesiology, Zigong First People's Hospital, Zigong, Sichuan 643000, China
Corresponding author: TANG Guoqiang, E-mail: mz65123@sina.com

Abstract: Objective　To investigate the effects of dexmedetomidine on the safety of newborns, and maternal hemodynamic parameters and nerve block of cesarean section. **Methods**　The clinical data of 117 cases of cesarean section delivery admitted to the Zigong First People's Hospital from July 2021 to October 2022 were retrospectively analyzed. The women were divided into two groups based on whether dexmedetomidine was given before anesthesia, 52 cases who were not given dexmedetomidine were divided into control group, and 65 cases who were given dexmedetomidine before anesthesia were divided into observation group. The two groups were compared with the newborn's Apgar score, the Neonatal Behavioral Neurological Assessment (NBNA), maternal hemodynamic indicators, sensory block, motor block, and maternal complications. **Results**　There was no significant difference in the Apgar score and the NBNA score at 2 and 4 days between the two groups of newborns ($P>0.05$). Compared with 1 minute before drug infusion (T_1), the mean arterial pressure in both groups was significantly reduced at 5 minutes after drug infusion

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通信作者：唐国强，E-mail：mz65123@sina.com
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(T_2), 10 minutes before the end of surgery (T_3), and at the time of fetal delivery (T_4), and the mean arterial pressure of T_2 to T_4 in the observation group were higher than those of the control group. Heart rate of T_2 to T_4 in the observation group was significantly higher than that of T_1, but the heart rate of T_2 to T_4 in the observation group was lower than that of the control group ($P<0.05$), and there was no statistical difference in saturation of peripheral oxygen (SpO_2) between the two groups at all time points ($P>0.05$). The time of onset of sensory block and motion block of observation group were shorter than those of control group. The duration of sensory block and motion block of observation group were longer than those of control group ($P<0.05$). The total incidence of maternal complications in the observation group was lower than that in the control group (4.62% *vs* 17.31%, $\chi^2=5.056$, $P=0.025$). **Conclusion** Dexmedetomidine before anesthesia can improve the stability of hemodynamics parameters, shorten the onset time of sensory and motor block, extend the duration of sensory and motor block, reduce the incidence of maternal complications, and has no significant impact on the neonatal Apgar score and NBNA score.

Keywords: Dexmedetomidine; Cesarean Section; Apgar score; Neonatal Behavioral Neurological Assessment; Hemodynamics

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椎管内麻醉为目前国内剖宫产过程使用最多的麻醉方式,因该麻醉方式镇痛效果确切,产妇可在分娩过程保持清醒而有效降低误吸的发生率,同时该麻醉方式对新生儿抑制较少[1-3]。虽然椎管内麻醉分娩过程产妇因麻醉而无痛感,但在清醒状态下进行剖宫术难免造成产妇紧张、恐惧,初产妇紧张尤为严重,甚至影响手术的顺利进行而增加手术风险[4]。因此临床上为降低风险,在剖宫术椎管内麻醉前多给予镇静药物以稳定产妇情绪,并保证其在清醒状态下配合进行分娩。右美托咪定为新型 α_2 肾上腺素受体激动剂的一种,研究显示其抗焦虑效果显著,常用于多种手术患者的镇静[5-6]。目前对右美托咪定稳定剖宫产妇情绪方面已有相关研究,但关于该药物对胎儿 Apgar 评分、神经行为及产妇血流动力学方面的影响分析较少,上述参数常用于分析产妇及新生儿的预后,因此有必要就此进行分析,以进一步探究该药物用于剖宫产的效果及安全性。

1　资料与方法

1.1　一般资料　选择 2021 年 7 月至 2022 年 10 月自贡市第一人民医院收治的剖宫产产妇 117 例的临床资料进行回顾性分析。纳入标准:(1) 美国麻醉师协会[7](American Society of Anesthesiologists, ASA)分级Ⅰ~Ⅱ级;(2) 单胎妊娠;(3) 有剖宫产指征;(4) 孕周在 37 周以上;(5) 产妇年龄在 18~35 岁;(6) 由同一组医护人员行剖宫术。排除标准:(1) 剖宫产禁忌证者;(2) 对治疗药物过敏者;(3) 多胎产妇;(4) 合并恶性肿瘤等严重疾病者;(5) 中途改变分娩方案者。根据麻醉前有无给予右美托咪定将产妇分为两组,未给予右美托咪定的 52 例为对照组,麻醉前给予右美托咪定的 65 例为观察组。对照组年龄 24~35(28.39±4.71)岁;身体质量指数(body mass index, BMI)18.27~26.03(22.14±2.91)kg/m^2;ASA 分级Ⅰ级 43 例,Ⅱ级 9 例;初产妇 33 例,经产妇 19 例。观察组年龄 21~33(27.69±5.13)岁;BMI 18.12~26.29(22.37±2.88)kg/m^2;ASA 分级Ⅰ级 39 例,Ⅱ级 26 例;初产妇 41 例,经产妇 24 例。两组一般资料差异无统计学意义($P>0.05$)。本研究经医院伦理委员会审批通过(202278)。所有患者均签署知情同意书。

1.2　方法　产妇入室后打开静脉通路,取仰卧位,对心电图、血氧饱和度(saturation of peripheral oxygen, SpO_2)、心率、血压等进行常规监测,以鼻导管持续吸氧,流量控制在 3 L/min。诱导前给药:观察组给予盐酸右美托咪定注射液(扬子江药业,国药准字 H20183219,规格 2 mL:0.2 mg)以 0.4 μg/kg 的负荷剂量 10 min 泵注完毕,以 0.3 μg/(kg·h)持续泵注。对照组以等量 0.9%氯化钠注射液替代。给药 5 min 后两组产妇改为左侧卧位,在第三腰椎第四腰椎间隙行腰硬联合麻醉,给予盐酸布比卡因注射液(安徽长江药业,国药准字 H34020931,规格 5 mL:37.5 mg)15 mg 蛛网膜下腔注射,麻醉平面控制第五胸椎~第五骶椎,留置硬膜外导管,改为平卧位。观察产妇血压,收缩压低于基础值 30%时立即给予盐酸去氧肾上腺素(上海禾丰制药,国药准字 H31021175,规格 1 mL:10 mg)静脉注射,当出现心率 50 次/min 以下时,立即给予硫酸阿托品注射液(安徽长江药业,国药准字 H34021900,规格 1 mL:0.5 mg),给药剂量均视产妇情况而定。

1.3　评价指标　比较两组新生儿 Apgar 评分、新生

儿行为神经测定[8]（Neonatal Behavioral Neurological Assessment, NBNA）以及产妇的血流动力学指标、感觉和运动阻滞情况、并发症发生情况。（1）新生儿 Apgar 评分：收集两组新生儿出生后 1、5 min Apgar 评分，该评分包括肌张力、皮肤颜色等 5 项内容，得分越低新生儿窒息越严重，8～10 分为正常。（2）NBNA 评分：收集两组新生儿出生后第 2、14 天时 NBNA 评分结果，该评分包括行为能力等 5 项内容，共 40 分，1 周内 37 分以上为正常。（3）产妇血流动力学指标：比较两组产妇输注药物前 1 min（T_1）、输注开始后 5 min（T_2）、手术结束前 10 min（T_3）及胎儿分娩时（T_4）的平均动脉压（mean arterial pressure, MAP）、心率及 SpO_2。（4）感觉、运动阻滞情况：在蛛网膜下腔前后 10 min，每隔 2 min 对感觉阻滞平面及运动阻滞程度进行测评。感觉阻滞平面以腋中线酒精棉签冷刺激法，冷刺激无感觉时认为阻滞到达该平面，记录给药至感觉阻滞达到第十胸椎时间为感觉阻滞起效时间，感觉阻滞首次达第十胸椎至该平面恢复正常感觉时间为持续时间。运动阻滞情况采用改良 Bromage 评分[9]进行测评，标准如下：无阻滞为 0 分，不能屈髋为 1 分，不能屈膝为 2 分，不能弯踝为 3 分，记录蛛网膜下腔给药至 Bromage 评分 1 分时间为起效时间，Bromage ≥1 分下降至 0 分时间为持续时间。（5）产妇并发症发生情况：记录两组产妇恶心、呕吐、胸闷等并发症发生情况。

1.4　统计学方法　采用 SPSS 23.0 软件进行数据分析。计数资料以例（%）表示，行 χ^2 检验；计量资料以 $\bar{x}\pm s$ 表示，组内比较行配对 t 检验，组间比较行独立样本 t 检验，重复测量资料行方差分析。$P<0.05$ 为差异有统计学意义。

2　结　果

2.1　两组新生儿 Apgar 评分及 NBNA 评分比较　两组新生儿 1、5 min Apgar 评分及 2、4 d NBNA 评分比较差异无统计学意义（$P>0.05$）。见表 1。

2.2　两组产妇血流动力学指标比较　T_2～T_4 时点两组产妇 MAP 低于 T_1，且观察组 MAP 高于对照组；T_2～T_4 时点两组产妇心率高于 T_1，且观察组心率低于对照组（$P<0.05$）。两组各时间点 SpO_2 差异无统计学意义（$P>0.05$）。见表 2。

2.3　两组产妇感觉、运动阻滞情况比较　观察组产妇感觉阻滞和运动阻滞的起效时间短于对照组（$P<0.05$），感觉阻滞和运动阻滞的持续时间长于对照组（$P<0.05$）。见表 3。

2.4　两组产妇并发症发生情况比较　观察组产妇并发症总发生率低于对照组，差异有统计学意义（$P<0.05$）。见表 4。

表 1　两组新生儿 Apgar 评分及 NBNA 评分比较　（$\bar{x}\pm s$）
Tab. 1　Comparison of neonatal A scores and NBNA scores between two groups　（$\bar{x}\pm s$）

组别	例数	Apgar 评分		NBNA 评分	
		1 min	5 min	2 d	14 d
对照组	52	9.41±0.54	9.78±0.21	37.18±1.45	37.96±1.62
观察组	65	9.53±0.33	9.82±0.11	37.52±1.63	38.03±1.77
t 值		1.480	1.326	1.177	0.221
P 值		0.142	0.187	0.242	0.413

表 2　两组产妇血流动力学指标比较　（$\bar{x}\pm s$）
Tab. 2　Comparison of maternal hemodynamic indicators between two groups　（$\bar{x}\pm s$）

组别	MAP（mmHg）			
	T_1	T_2	T_3	T_4
对照组（n=52）	93.04±12.13	78.17±12.04[a]	85.08±11.85[a]	86.48±10.72[a]
观察组（n=65）	93.89±11.97	91.03±11.26[ab]	89.39±10.47[ab]	88.03±9.81[ab]
$F_{时间}/P_{时间}$ 值	5.147/0.002			
$F_{组间}/P_{组间}$ 值	3.928/0.010			
$F_{交互}/P_{交互}$ 值	4.331/0.006			
组别	心率（次/min）			
	T_1	T_2	T_3	T_4
对照组（n=52）	82.19±10.04	87.63±9.25[a]	89.75±9.71[a]	87.06±10.04[a]
观察组（n=65）	81.04±11.13	84.18±8.96[ab]	83.92±8.53[ab]	84.23±10.26[ab]
$F_{时间}/P_{时间}$ 值	5.729/0.001			
$F_{组间}/P_{组间}$ 值	4.032/0.009			
$F_{交互}/P_{交互}$ 值	5.003/0.003			
组别	SpO_2（%）			
	T_1	T_2	T_3	T_4
对照组（n=52）	97.18±1.31	96.28±1.43	97.13±1.38	96.85±1.62
观察组（n=65）	97.95±1.46	96.02±1.53	97.81±1.33	97.19±1.49
$F_{时间}/P_{时间}$ 值	2.042/0.112			
$F_{组间}/P_{组间}$ 值	1.903/0.133			
$F_{交互}/P_{交互}$ 值	2.027/0.114			

注：与 T_1 比较，[a]$P<0.05$；与对照组比较，[b]$P<0.05$。

表 3　两组产妇感觉、运动阻滞情况比较　（min, $\bar{x}\pm s$）
Tab. 3　Comparison of maternal sensory and motor block between two groups　（min, $\bar{x}\pm s$）

组别	例数	感觉阻滞		运动阻滞	
		起效时间	持续时间	起效时间	持续时间
对照组	52	5.19±1.83	80.16±15.27	4.53±1.36	84.29±12.03
观察组	65	3.94±1.25	91.09±18.94	3.41±1.17	90.62±15.27
t 值		4.378	3.375	4.786	2.443
P 值		<0.001	0.001	<0.001	0.016

表 4　两组产妇并发症发生情况比较　（例）
Tab. 4　Comparison of the occurrence of maternal complications between two groups　（case）

组别	例数	恶心	呕吐	胸闷	合计[例（%）]
对照组	52	2	6	1	9（17.31）
观察组	65	0	2	1	3（4.62）
χ^2 值					5.056
P 值					0.025

3 讨　论

产妇因妊娠期高血压疾病、妊娠糖尿病及其他可能引起不良妊娠结局的生理因素或社会因素而选择剖宫术进行分娩，如今产妇对于减轻剖宫术中疼痛的要求也日益增加[10]。因此，在确保麻醉安全的前提下，提高麻醉效果是目前麻醉研究的热点问题。因产科的特殊性，麻醉过程中应同时考虑到母体及胎儿双方，腰硬联合麻醉有麻醉速度快、安全性高、可操作性强等优势而成为目前最常用的剖宫术麻醉方案[11]。腰硬联合麻醉下剖宫术虽在麻醉药物作用下无痛感，但手术操作仍可致产妇焦躁不安。有研究者提出，麻醉前给予产妇一定量的镇静剂有助于稳定产妇情绪[12]。右美托咪定为具高选择性的 α_2 肾上腺受体激动剂，其亲和力高，半衰期短，常用作镇静催眠[13]。

本研究结果提示右美托咪定的使用对新生儿无显著影响，但有助于稳定孕妇的血流动力学参数。这可能是由于右美托咪定可抑制腺苷酸环化酶，降低细胞内环一磷酸苷水平，并通过抑制钙离子内流，激活钾离子通道等途径而使突触前后被抑制而达到降低手术刺激、抑制交感、提高迷走神经活性作用，进而可稳定血流动力学指标[14]。另有研究发现，右美托咪定对血流动力学指标的影响与给药剂量及速度有关，当快速给予负荷剂量时可引起短暂性高血压而降低心率，此反应在年轻人群中尤为常见，该研究认为可能与快速、高剂量右美托咪定可激活血管平滑肌的 α_2 肾上腺素能受体而产生强烈的血管收缩作用有关，因此本研究在右美托咪定给药时将负荷剂量控制在 0.4 μg/kg，再以 10 min 缓慢注射以降低短暂性高血压的发生率，在持续给药时因右美托咪定的中枢抗交感、增强迷走神经活性作用而使血压及心率稳定下降[15]。

在局部麻醉药物中添加其他药物以缩短局麻起效时间，延长维持时间一直为临床研究的热点。本研究结果显示，观察组产妇感觉阻滞起效时间及运动阻滞起效时间均更短、持续时间均更长，与相关研究结果相一致[16]。可能与右美托咪定可与脊髓背角神经元受体结合而抑制其突触前神经递质的释放而缩短抑制时间有关；同时该药还有促进角神经元的去极化作用，该作用可与盐酸布比卡因的阻断 Na^+ 内流作用互为协同作用而缩短其起效时间并延长阻滞时间的作用，增强该药物的神经阻滞效果[17]。本研究对两组产妇并发症比较显示，观察组产妇并发症总发生率更低，可能与右美托咪定可抑制延髓交感神经外向传导有关，呕吐中枢位于延髓背外侧缘，右美托咪定可抑制外周交感活性而舒缓胃肠道平滑肌活动达到抑制恶心、呕吐的作用；同时右美托咪定对于支气管平滑肌同样具有舒张作用，还可对抗前列腺素引起的短暂器官收缩而引起的胸闷，因而可降低产妇胸闷的发生率[18]。安全性方面，两组 Apgar 评分与 NBNA 评分差异无统计学意义，提示右美托咪定具有较高的安全性，不会造成缺氧等危害。

综上所述，麻醉前给予右美托咪定可有效提高椎管内麻醉剖宫产产妇血流动力学参数稳定性，缩短感觉及运动阻滞起效时间，延长感觉及运动阻滞持续时间，降低产妇并发症发生率，且对新生儿 Apgar 评分、NBNA 评分无显著影响，具有较高的安全性。

利益冲突　无

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