https://doi.org/10.31925/farmacia.2023.2.13 **ORIGINAL ARTICLE**

THE BENEFICIAL EFFECT OF DEXMEDETOMIDINE COMBINED WITH EPIDURAL-CONTROLLED ANALGESIA ON THE REDUCTION OF FEVER AND INFLAMMATION DURING LABOUR IN TERM-PREGNANT WOMEN

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Abstract

In this study, we investigated the impact of epidural-controlled analgesia and dexmedetomidine (Dex) epidural analgesia on fever and outcomes for the mother and infant in full-term pregnancies. A total of 605 first-term pregnant women were randomly divided into Group A (n = 300), Group B (n = 300), and Group C (n = 5). They were given 1 μg/mL fentanyl + 0.1% ropivacaine (Group A), 1:0.5 μg/mL Dex + 0.1% ropivacaine (Group B), and 2:1 μg/mL Dex + 0.1% ropivacaine (Group C). Before epidural labour analgesia (T0), 10 min after analgesia (T1), 30 min after analgesia (T2), immediately after foetal delivery (T3), 10 min after foetal delivery (T4), Two hours after foetal delivery (T5), and 24 h after foetal delivery (T6), the mean arterial pressure, heart rate, foetal heart rate, pain visual analogue scale (VAS) score, sedation score, lower limb motor block degree, maternal satisfaction, sedation drug used, and fever were recorded. The findings indicate that Group B exhibited a reduction in the quantity of sedative drugs administered and added, as well as a decrease in mean arterial pressure at T3. The VAS score at T3 and T4 decreased, while the maternal satisfaction score increased. Furthermore, the fever rate and serum levels of IL-6 and CRP decreased at T4, T5, and T6 in Group B compared to Group A. There were no significant differences in maternal heart rate, foetal heart rate, Ramsay score, or Bromage score between Group A and Group B.

Rezumat

În acest studiu, am investigat impactul analgeziei epidurale controlate și al analgeziei epidurale cu dexmedetomidină (Dex) asupra febrei și consecințele asupra mamei și nou-născutului. Un total de 605 femei însărcinate au fost împărțite aleator în Grupul A (n = 300), Grupul B (n = 300) și Grupul C (n = 5). Acestora li s-a administrat 1 μg/mL fentanil + 0,1% ropivacaină (Grupul A), 1:0,5 μg/mL Dex + 0,1% ropivacaină (Grupul B), și 2:1 μg/mL Dex + 0,1% ropivacaină (Grupul C). Înainte de analgezia epidurală în travaliu (T0), la 10 minute după analgezie (T1), la 30 de minute după analgezie (T2), imediat după nașterea fătului (T3), la 10 minute după nașterea fătului (T4), la două ore după nașterea fătului (T5) și la 24 de ore după nașterea fătului (T6), au fost măsurați parametrii clinici specifici la mamă și la nou-născut, raportat la medicamentul de sedare utilizat. Constatările indică faptul că Grupul B a prezentat o reducere a cantității de medicamente sedative administrate, precum și o scădere a presiunii arteriale medii la T3. Scorul VAS la T3 și T4 a scăzut, în timp ce scorul de satisfacție maternă a crescut. Mai mult, rata febrei și nivelurile serice ale IL-6 și CRP au scăzut la T4, T5 și T6 în Grupul B, în comparație cu Grupul A. Nu au existat diferențe semnificative în ceea ce privește frecvența cardiacă maternă, frecvența cardiacă fetală, scorul Ramsay sau scorul Bromage între Grupul A și Grupul B. În concluzie, analgezia epidurală controlată cu dexmedetomidină s-a dovedit sigură la mamă și nou-născut, iar efectele analgezic și antipiretic au fost evidente.

Keywords: term pregnancy, epidural controlled analgesia, dexmedetomidine, analgesia, fever

Introduction

Natural childbirth is a very important physiological process for women. Severe pain caused by uterine muscle contraction and foetal compression of soft tissue will increase the maternal stress response, and persistent pain will also prolong labour [1]. Prolonged, severe pain during labour can cause changes in the maternal mental state and may not be conducive to a smooth delivery. Junge *et al*. [2] confirmed that the increase in caesarean section probability is closely related to labour pain. Therefore, it is very important to find appropriate anaesthetic drugs for labour analgesia to ensure the smooth delivery of women and reduce the rate of caesarean sections caused by pain. Continuous epidural anaesthesia is the gold standard for labour analgesia. The use of epidural analgesics can effectively reduce pain during labour, reduce the incidence of postpartum adverse reactions and help promote postpartum recovery of puerperae [3]. Commonly used epidural analgesics include fentanyl and ropivacaine [4, 5]. However, fentanyl is prone to causing nausea and vomiting, respiratory depression, pruritus, drowsiness and other

adverse reactions in patients [6]. Ropivacaine is a class of long-term amide local anaesthetic drugs that can effectively achieve nerve block and analgesic effects, but an excessive dosage will affect maternal and infant health [7].

Dexmedetomidine (Dex) is a highly selective α2 receptor agonist that can achieve sedation and reduce the stress response by acting on the locus coeruleus receptor in brain tissue. Currently, Dex has shown good pharmacological effects, such as sedation, analgesia and anti-anxiety and can also prolong the action time and enhance the intensity of local anaesthetic drugs. Without respiratory inhibition, Dex can play a protective role in important organs, such as the cardiovascular and cerebrovascular organs [8]. Chen *et al*. [9] confirmed that Dex could promote the intensity and frequency of uterine contractions and reduce the rate of placental transfer. Tauzin and Durrmeyer [10] showed that Dex could promote the speed of labour, reduce the incidence of uterine bleeding and foetal distress, and facilitate the smooth delivery of women. In clinical practice, Dex is mainly administered by intravenous injection, and there are relatively few studies on epidural medication.

In this study, the effects of epidural analgesia combined with Dex on fever and maternal and infant outcomes in full-term pregnant women were analysed, and the effects of different concentrations of Dex on analgesic effects and adverse reactions in puerperae were compared to provide a reference for reducing the perinatal fever rate and finding the optimal concentration of epidural Dex.

Materials and Methods

Patients

From February 2022 to August 2022, 605 pregnant women with a full-term pregnancy, their first delivery, and voluntary enrolment in the Changsha Hospital for Maternal & Child Health Care affiliated with Hunan Normal University, Hunan, China, were selected as the research subjects. According to the analgesic regimen, the patients were randomly divided into three groups: Group A (300 cases), Group B (300 cases), and Group C (5 cases). Since the results of the preliminary experiment showed that the high concentration of dexmedetomidine affected the patient's muscle strength and labour process, the subsequent formal experiment with Group C patients was not carried out. Inclusion criteria were: (1) parturient who had a full-term pregnancy and underwent analgesic delivery; (2) American Association of Anaesthesiologists (ASA) grades I or II; (3) maternal age greater than 18 years old; (4) no severe cardiovascular and cerebrovascular diseases; (5) good communication with the follow-ups; and (6) voluntarily participated in this study and signed the relevant informed consent form. Exclusion criteria: (1) patients with contraindications to intraspinal anaesthesia; (2) patients with mental disease or poor treatment compliance; (3) pregnant women with severe preeclampsia, heart disease, blood system disease, kidney disease, thrombotic disease, autoimmune system disease, severe liver disease and hyperthyroidism. This study was approved by the Medical Ethics Committee of Changsha Hospital for Maternal and Child Health Care, affiliated with Hunan Normal University, Changsha, Hunan, China, and the informed consent forms of all enrolled parturient were signed.

Analgesic methods

The upper extremity veins of all puerperae were incised, and their pulse oxygen saturation, electrocardiogram and blood pressure were monitored using a multifunctional parameter monitor. The foetal heart rate was also monitored. A 0.9% sodium chloride injection was used to dilute ropivacaine, specification: 10 mL/100 mg (Jiangsu Hengrui Medicine Co., Ltd., SFDA Approval Number H20060137; Jiangsu, China) to a 0.1% concentration for later use. Dex, specification: 2 mL/0.2 mg (Jiangsu Nhwa Pharmaceutical Co., Ltd.; SFDA Approval Number H20110085; Jiangsu, China) was diluted to 4 μg/mL by 0.9% sodium chloride injection for later use. Lidocaine, specification: 20 mL/0.4 mg (Shanghai Chaohui Pharmaceutical Co., Ltd., Shanghai, China, SFDA Approval number H31021071), was diluted to a 1% concentration for use. Fentanyl, specification: 2 mg (Jiangsu Nhwa Pharmaceutical Co., Ltd., SFDA Approval Number H20143315) was diluted to 1 μg/mL for use in 0.9% sodium chloride injection.

Upon dilation of the uterine orifice to a range of 2 - 3 cm, proficient anaesthesiologists selected to perform epidural catheterization at the L2 to L3 vertebral level. The catheter was then inserted to a depth of 4 cm, followed by the injection of 3 mL of 1% lidocaine through the epidural catheter. After it was determined that the puerpera had no adverse reactions, an analgesic solution was administered through the epidural catheter with a loading dose of 10 mL. The puerperae in Group A were given a loading dose of 1 μg/mL fentanyl combined with 0.1% ropivacaine. Puerperae in Group B were given a dose of 1:0.5 μg/mL Dex combined with 0.1% ropivacaine. Group C was given a dose of 2:1 μg/mL Dex combined with 0.1% ropivacaine. Pulse administration was performed with a standard volume of 100 mL and a background flow rate of 2 mL/h with a pulse dose of 6 mL every hour using a posterior epidural catheter linked to an analgesic pump. The supplemental dose of patient-controlled epidural analgesia (PCEA) in the three groups was set at 6 mL.

Observation indicators

Before epidural labour analgesia (T0), 10 minutes after labour analgesia (T1), 30 minutes after labour analgesia (T2), immediately after foetal delivery (T3), 10 minutes after foetal delivery (T4), 2 hours after

foetal delivery (T5), and 24 hours after foetal delivery (T6), the blood pressure, heart rate, body temperature and visual analogue scale (VAS) were recorded. The Ramsay score at T1, T3 and T6 and the foetal heart rate at T0, T1, T2 and T3 were evaluated. The foetal position, the time of the first stage of labour, the time of the second stage of labour, the time of the third stage of labour, the duration of labour analgesia, fever, the number of analgesic drugs used, the number of analgesic drugs added, the mode of delivery, the nature of the amniotic fluid, the whereabouts of the new-born, and the score of maternal satisfaction were recorded.

The VAS scale (1) [11] was used to score maternal pain. A score of 0 indicates no pain, a score of 1 to 3 indicates mild pain, a score of 4 to 6 indicates moderate pain, a score of 7 to 9 indicates severe pain, and a score of 10 indicates unbearable pain.

The Ramsay scale (2) [12] was used to score the sedation degree of puerperae. It is considered that 1 is fidgety and unable to be quiet, 2 is cooperative and quiet, 3 is lethargic, but able to comply with commands, 4 is asleep, but able to be awakened, 5 is asleep but unresponsive, and 6 is lethargic and unable to be awakened. A Ramsay score of less than 4 indicates satisfactory sedation, and a score of 5 - 6 indicates excessive sedation.

The modified Bromage scale (3) [13] was used to evaluate the degree of lower limb motor block in puerperae. It is considered that 0 means that the parturient hip and knee joints can flex freely and move without hindrance, 1 means that the parturient can only flex the hip and knee joints, 2 means that the parturient can only flex the knee joint, 3 means that the parturient can only flex the ankle joint, and 4 means that the parturient hip and knee joints and ankle joint cannot move. The higher the score on the modified Bromage scale, the more severe the lower extremity motor block.

The evaluation criteria for maternal satisfaction were as follows: the maternal satisfaction score ranges from 0 to 100, and the higher the score, the higher the maternal satisfaction (4). When the score is lower than 60, it is considered that the puerperae are not satisfied with the treatment they are receiving. The score is good in the range of 60 - 79, and it is considered that the parturient is satisfied with the doctor's treatment methods and other aspects. A score higher than 80 is considered excellent, indicating that the woman is satisfied with all aspects of the doctor's treatment.

Maternal venous peripheral blood was collected, and serum was isolated to detect IL-6 and CRP levels with an enzyme-linked immunosorbent assay kit (Abcam, Cambridge, MA, USA) according to the manufacturer's instructions (5). Both tests had a sensitivity below 2 pg/mL.

Statistical analysis

SPSS 19.0 (IBM Corp., Armonk, NY) was used for statistical processing. Measurement data were expressed as mean ± standard deviation (± sd) and were compared between two groups or multiple groups using an independent sample t-test or a univariate ANOVA. Enumeration data were expressed as frequency (%), and the chi-square test or F test was used for comparisons between two groups or between multiple groups. When $p < 0.05$, the difference between groups was considered statistically significant.

Results and Discussion

Comparison of puerperae general information

The differences in general data among the three groups were compared, and the results are shown in Table I. There were no considerable differences in height, weight, peripheral blood white blood cell count, duration of the first stage of labour, duration of the second stage of labour, duration of the third stage of labour, duration of labour analgesia, fever, mode of delivery, nature of the amniotic fluid, or orientation of new-borns among Groups A, B, and C ($p > 0.05$).

Table I

Comparison of general information among the three groups

Item	Group A (n = 300)	Group B (n = 300)	Group C (n = 5)	p
Height (cm)	158.46 ± 5.77	159.14 ± 5.24	158.40 ± 2.19	0.749
Weight (kg)	66.48 ± 8.91	68.55 ± 8.04	62.72 ± 4.15	0.101
White blood cell count ($\times 10^9$/L)	9.41 ± 2.41	9.36 ± 2.15	9.58 ± 1.90	0.819
Duration of the first stage of labour (min)	440.35 ± 160.30	473.96 ± 177.26	476.00 ± 98.64	0.620
Duration of the second stage of labour (min)	59.21 ± 27.75	60.67 ± 30.38	67.20 ± 23.85	0.522
Duration of the third stage of labour (min)	7.15 ± 5.57	5.96 ± 3.07	7.00 ± 2.12	0.531
Duration of labour analgesia (min)	252.67 ± 127.62	241.59 ± 116.97	213.80 ± 53.17	0.452
Fever (n)				0.769
Yes	18	19	1	
No	282	281	4	
Delivery way (n)				0.843
Flat	276	279	1	
Caesarean section	20	19	2	
Obstetric forceps	4	2	0	

Item	Group A (n = 300)	Group B (n = 300)	Group C (n = 5)	p
Amniotic fluid properties				0.431
Clear	270	265	5	
Grade I	18	17	0	
Grade II	6	13	0	
Grade III	6	5	0	
New-born whereabouts				0.436
Mother-infant sharing room	265	271	3	
Neonatal intensive care unit	35	29	2	

Comparison of analgesic drug use in perinatal parturients

The differences in the number of analgesic drugs used and the times analgesic drugs were added among the three groups were recorded and compared (Figure 1). Compared with Group A, the amount of analgesic drugs used and the times of analgesic drugs added in Groups B and C were drastically reduced ($p < 0.05$). Compared with Group B, the use of analgesic drugs in Group C was drastically reduced ($p < 0.05$). However, there was no considerable difference in the supplemental times of analgesic drugs between Group B and Group C ($p > 0.05$).

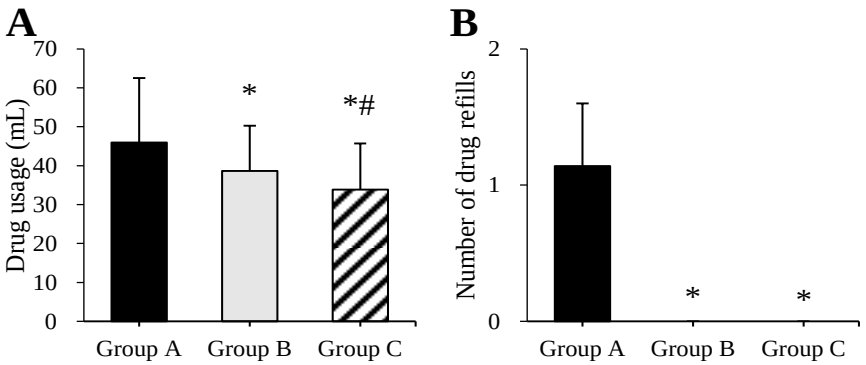

Figure 1.

Comparison of analgesic drug usage and supplemental times among the three groups. A: amount of analgesic drugs used; B: supplemental doses of analgesic drugs

* Compared with Group A, $p < 0.05$; # compared with Group B, $p < 0.05$

Comparison of changes in vital signs in perinatal women

Perinatal mean arterial pressure, heart rate and blood oxygen saturation (SpO_2) levels were recorded and compared among the three groups. In Figure 2, maternal mean arterial pressure fluctuated to different degrees in Groups A, B, and C at different time points. The mean arterial pressure in Groups A and B decreased slowly and tended to be stable. After comparison, there was no considerable difference in mean arterial pressure at T0, T1, T2, T3, T4, T5, and T6 between Group A and Group B ($p > 0.05$). There was no considerable difference in mean arterial pressure at T0, T1, T2, T3, T4, T5 and T6 between Group B and Group C ($p > 0.05$). There was no considerable difference in mean arterial pressure between Group A and Group C at any time except T3 ($p > 0.05$).

In Figure 3, at different time points, the heart rates of parturients in Groups B and C did not fluctuate much, while those of parturients in Group A increased abnormally at T3. After comparison, there was no considerable difference in heart rate at T0, T1, T2, T3, T4, T5, and T6 among Groups A, B, and C ($p > 0.05$).

The differences in SpO_2 levels among the three groups are compared in Figure 4. The levels of SpO_2 in Groups A, B, and C were 98.45 ± 2.41%, 98.38 ± 1.83%, and 98.60 ± 0.55%, respectively, and there was no considerable difference among the three groups ($p > 0.05$).

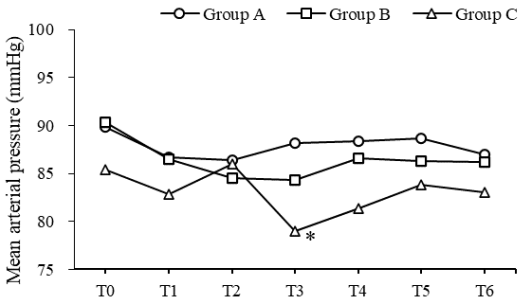

Figure 2.

Comparison of perinatal mean arterial pressure changes among the three groups.

* Compared with Group A, $p < 0.05$

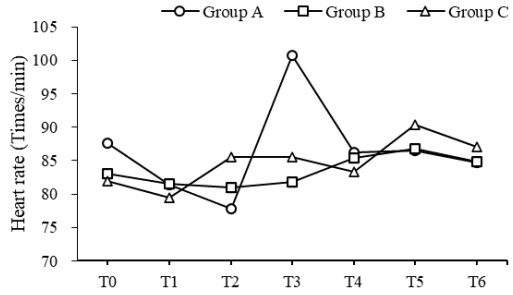

Figure 3.
Comparison of perinatal heart rate changes among the three groups

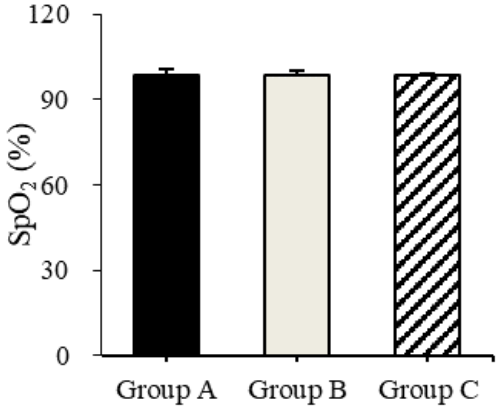

Figure 4.
Comparison of perinatal SpO_2 levels among the three groups

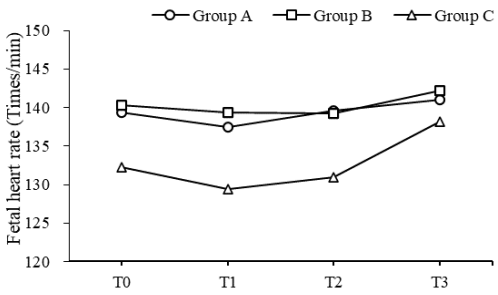

Figure 5.
Comparison of perinatal foetal heart rate among the three groups

Comparison of perinatal maternal-foetal heart rate changes

The changes in foetal heart rate among the three groups during the perinatal period were compared, and the results are shown in Figure 5. The foetal heart rate of Groups A and B did not fluctuate drastically at T0, T1, T2 and T3, while the foetal heart rate of Group C showed a slightly increasing trend. After comparison, there was no considerable difference in foetal heart rate at T0, T1, T2, and T3 between Group A, Group B, and Group C ($p > 0.05$).

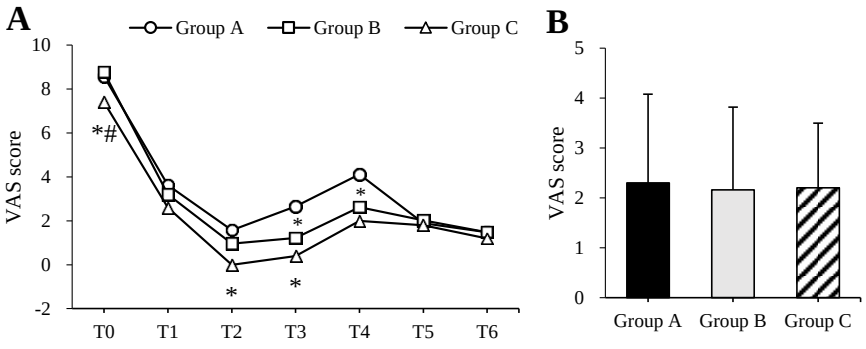

Figure 6.
Comparison of VAS scores of perinatal pain among the three groups. A: changes in the VAS score of perinatal pain; B: comparison of postoperative pain VAS scores
* Compared with Group A, $p < 0.05$; #compared with Group B, $p < 0.05$

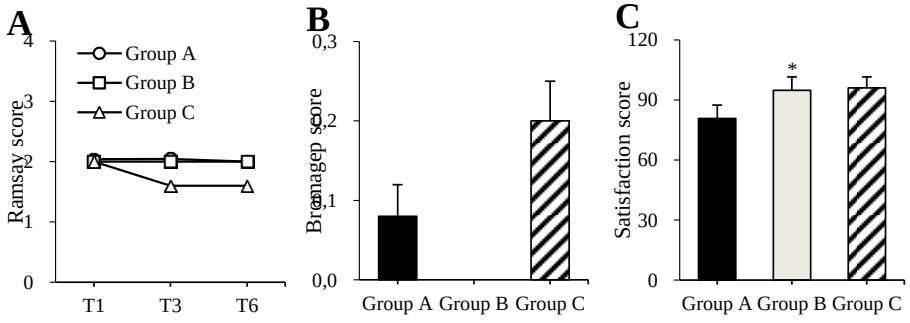

Figure 7.
Comparison of Ramsay and Bromage scores among the three groups. A: sedation Ramsay scale score; B: Bromage score of lower extremity motor block disorder; C: satisfaction score
*Compared with Group A, $p < 0.05$

Comparison of pain, sedation, lower limb motor block degree and satisfaction in perinatal parturients

The VAS scores of perinatal pain were compared among the three groups, and the results are shown in Figure 6. The VAS scores at T0, T1, T2, T3, T4, T5 and T6 during the perinatal period in Groups A, B, and C showed an overall decreasing trend, while the VAS scores at T4 increased slightly. There was no considerable difference in VAS scores at T0, T1, T2, T5 and T6 between Group A and Group B ($p > 0.05$). Compared with Group A, the VAS scores of T3 and T4 in Group B were significantly lower ($p < 0.05$). Compared with Group A, the VAS scores at T0, T2 and T3 in Group C were significantly lower ($p < 0.05$). Compared with Group B, the VAS score at T0 in Group C was significantly lower ($p < 0.05$).

The Ramsay score of sedation and the Bromage score of lower limb motor block were compared among the three groups. In Figure 7A, there was no considerable change in Ramsay's scores of sedation at T1, T3 and T6 in groups A, B and C, and there was no considerable difference in Ramsay's scores of sedation among groups after comparison ($p > 0.05$). In Figure 7B, the Bromage scores of the lower limb motor block in Group A, Group B, and Group C were 0.08 ± 0.04, 0.00 ± 0.00, and 0.20 ± 0.05, respectively. After comparison, there was no considerable difference in the Bromage score of the lower limb motor block among the groups ($p > 0.05$). In Figure 7C, the satisfaction scores of parturients in Groups A, B and C were 80.67 ± 6.71, 94.81 ± 6.64, and 96.00 ± 5.48, respectively. Compared with Group A, the maternal satisfaction score of Group B was significantly increased ($p < 0.05$). Because the sample size of parturient women in Group C was too small, there was no comparison.

Comparison of perinatal parturient fever rates

The differences in perinatal fever rates among the three groups were compared, and the results are shown in Figure 8. The fever rates at T0, T1, T2, T3, T4, T5 and T6 in Group A were 0.00%, 0.00%, 0.00%, 0.00%, 3.33%, 5.67% and 8.00%, respectively. The fever rates of Group B at each time point were 0.00%, 0.00%, 0.00%, 0.00%, 0.67%, 1.00% and 1.33%, respectively. Compared with Group A, the fever rate at T4, T5, and T6 was significantly lower in Group B ($p < 0.05$). Because the sample size of parturient women in Group C was too small, there was no comparison.

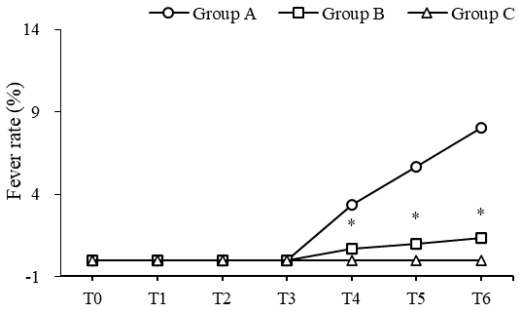

Figure 8.

Comparison of perinatal fever rates among the three groups

*Compared with Group A, $p < 0.05$

Comparison of serum levels of IL-6 and CRP in perinatal parturients

Perinatal serum levels of IL-6 and CRP were recorded and compared among the three groups. In Figure 9, the serum levels of IL-6 and CRP in Groups A, B and C were significantly different at different time points. Compared with Group A, the serum levels of IL-6 and CRP at T4, T5, and T6 were significantly increased in Group B ($p < 0.05$). The sample size of women in Group C was too small to be comparable.

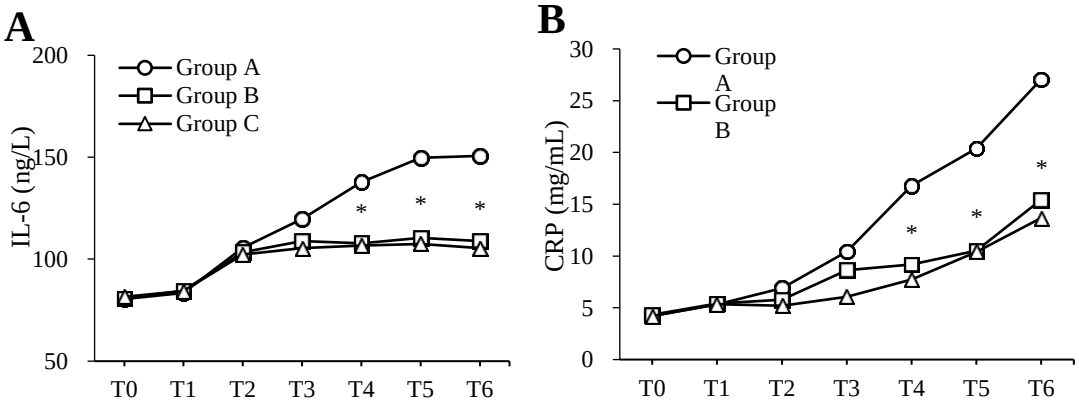

Figure 9.

Comparison of perinatal serum IL-6 and CRP levels among the three groups. A: Perinatal serum IL-6 levels; B: Perinatal changes in serum CRP levels.

*Compared with Group A, $p < 0.05$

In the process of labour, due to the strong contraction of the uterus and the compression of the foetus on the cervix, paroxysmal suprapubic pain will be caused, which is most obvious in the first stage of labour [14]. Labour pain is an appropriate response of the body to stress, but excessive pain will lead to fear, tension, anxiety, and other negative psychology in parturient women and then cause the acceleration of the respiratory rate and heart rate, which easily leads to respiratory alkalosis and even the incidence of complications such as foetal hypoxia in utero [15]. Effective labour analgesia can ensure the smooth delivery of women and the safety of new-borns. Ropivacaine is the most commonly used drug for epidural labour analgesia in clinical practice and has the advantages of a low placental transfer rate, a small foetal impact, and a good anaesthetic analgesia effect [16,17]. However, large doses of ropivacaine can affect maternal and infant health, and small doses of ropivacaine have poor analgesic effects [18]. Dex is a highly selective α2 receptor agonist with central anti-sympathetic ability, which can reduce stress response and anxiety and increase the analgesic and diuretic effects. Some studies have confirmed that Dex, when used for labour analgesia, will not cause respiratory depression in the puerperae, can play a protective role on important organs, and has a low influence on the puerperae's labour [19, 20]. This study aimed to analyse the effects of patient-controlled epidural analgesia combined with different doses of Dex on analgesia, sedation, degree of lower limb motor block, fever, mean arterial pressure, heart rate and foetal heart rate in full-term pregnant women. The results showed that compared with fentanyl combined with ropivacaine for patient-controlled epidural analgesia, the number of analgesic drugs used and the number of additional analgesic drugs were drastically reduced in women with 1:0.5 μg/mL Dex combined with ropivacaine for patient-controlled epidural analgesia, and the number of analgesic drugs used and the number of additional analgesic drugs were lower in women with 2:1 μg/mL Dex assisted with patient-controlled epidural analgesia. Dex has a central anti-sympathetic effect, which can reduce the use of anaesthetic drugs and prolong the analgesic time of drugs, which is similar to the results of this study [21].

Compared to fentanyl combined with ropivacaine for epidural patient-controlled analgesia, there was no considerable difference in mean arterial pressure, heart rate, or foetal heart rate in women treated with 1:0.5 μg/mL Dex combined with ropivacaine for epidural patient-controlled analgesia. The normal foetal heart rate ranges from 110 to 160 beats per minute [22, 23]. The foetal heart rate of puerperae with different analgesia modes was within the normal range, while the foetal heart rate of puerperae with a large dose of Dex assisted by controlled epidural analgesia was reduced. Such errors may be because the foetus was asleep or because the sample size was too small because only five parturients were included in the analysis. Second, the differences in VAS scores of perinatal maternal pain were evaluated. The results showed that the VAS scores of parturients assisted with 2:1 μg/mL Dex patient-controlled epidural analgesia at 30 min after delivery and immediately after the delivery of the foetus were drastically lower than those of those treated with fentanyl combined with ropivacaine for patient-controlled epidural analgesia. Dex can promote the release of choline-like substances from peripheral nerve cells, thereby enhancing the body's pain threshold [24]. Therefore, Dex administered on the basis of ropivacaine for patient-controlled epidural analgesia can drastically reduce the degree of pain during childbirth, which is similar to the results of Li *et al*. [25].

Excessive exertion during labour and other factors will lead to an elevated temperature stress response [26]. In addition to fever caused by the stress response, cold, intrauterine infection and other factors can also lead to fever during labour [27]. The fever rate and serum levels of the inflammatory factors IL-6 and CRP in parturient women under different analgesic modes were compared. The results showed that, compared with fentanyl combined with ropivacaine for patient-controlled epidural analgesia, the postpartum fever rate and serum levels of IL-6 and CRP were significantly decreased in the women with dexmedetomidine combined with ropivacaine for patient-controlled epidural analgesia. Usually, postpartum stress fever will gradually improve, and the right amount of water is needed to prevent dehydration. Fever caused by cold needs to be treated by physical cooling during delivery. IL-6 can improve the sensitivity of the peripheral and central nervous systems, thereby causing hyperalgesia [28]. CRP, a non-specific marker of inflammation, increases sharply when infection or tissue injury occurs [29]. The serum levels of IL-6 and CRP in puerperae with dexmedetomidine combined with ropivacaine for patient-controlled epidural analgesia were significantly decreased, indicating that dexmedetomidine is beneficial to inhibit the maternal stress response, reduce the release of inflammatory mediators, and facilitate a smooth delivery. For fever caused by intrauterine infection, attention should be given to local health during delivery to avoid aggravation of the infection, and timely anti-infection treatment is required after delivery [30]. Fever is a strong stress state; mothers not only need to pay attention to a light diet at the same time but also need to avoid excessive anxiety and tension. When puerperae exhibit high-risk factors, such as premature rupture of membranes, they should pay attention to the cleanliness of the vulva and avoid uterine infection. This study also found that, compared with fentanyl combined with ropivacaine for epidural patient-controlled analgesia, the rate of forceps use

in women with Dex combined with ropivacaine for epidural patient-controlled analgesia during labour was 0.0%, but there was no considerable difference. These results indicate that Dex combined with ropivacaine can reduce the prolongation of labour caused by labour pain and the intrauterine mortality caused by foetal hypoxia to a certain extent.

Conclusions

Dex combined with ropivacaine for patient-controlled epidural analgesia in term pregnant women can reduce the pain in the process of foetal delivery and reduce the number of analgesic drugs used, which is conducive to the smooth delivery of the foetus and ensures the health of the mother and child. Dexmedetomidine combined with ropivacaine for patient-controlled epidural analgesia can effectively reduce the levels of serum inflammatory factors and fever rate in term pregnant women after delivery. However, a high concentration of dexmedetomidine can affect maternal muscle strength and labour process. Therefore, the effects of different doses of dexmedetomidine on maternal fever rate and stress inflammatory response were explored. However, this study did not analyse the effect of different analgesic modes on the health status of new-borns. In the future, more sample sizes should be included to supplement this part of the content. In conclusion, this study provides a reference for the application of Dex combined with ropivacaine in patient-controlled epidural analgesia during pregnancy.

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Conflict of interest

The authors declare no conflict of interest.

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