

Clinical application of combined anesthesia in cesarean section

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Abstract: This study chose 60 cases of cesarean section for patients with epidural anesthesia (EA) combined spinal epidural anesthesia (CSEA) surgery for clinical application research. Compared with EA, the CSEA could work well in subarachnoid anesthesia and epidural anesthesia. Although it was with less dosage, it had a faster and better effect, good muscle relaxant condition. It not only improved the quality of the surgery, but also reduced the burden of the anesthesiologist.

Keywords: Combined anesthesia, cesarean section, application.

INTRODUCTION

Local anesthetic agent has made great improvements and achievements, which has little or no side effects and has better and appropriate effects, and it has been applied in various aspects (Bajwa *et al.* 2013, Bajwa *et al.* 2011). It has been widely given in caesarean delivery cases (Banihashem *et al.* 2015). Recently, there were more and more pregnant women for caesarean delivery. It needs to apply a better method of anesthesia in cesarean section to reduce the possibility to injure the baby. The severe pain during maternal surgery had become an important subject in the research field of obstetrics and gynecology. More and more cesarean section were with CSEA surgery, which the mainly was lumbar hemp and epidural combined anesthesia accompanied with the lumbar hemp and epidural anesthesia. It had the advantage of work faster, better effect, less side effect of maternal after cesarean operation. This study had took the compare study for cesarean section of pregnant women of simply EA and CSEA operation to observe the anesthesia effect.

MATERIAL AND METHOD

Basic material

An ethical certificate showing approval of the study has to be included and mention in the paper prior to its publication.

Also mention whether the study was single blind or double blind!

This study had selected 60 cases of patients in Maternal and Child Health Hospital of Zhengzhou City, Zhengzhou City, Henan Province, China aged 23 to 35, with height from 145cm to 167cm, weight from 52kg to 75kg, ASAI-II and at least 38 weeks of pregnancy. All surgery were performed from December 2013 to March 2014. Inclusion and exclusion criteria were as described previously (Banihashem *et al.* 2015). For the research involving human subjects, approval was obtained from

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the institutional review board of our hospital. Informed consent was provided according to the Declaration of Helsinki (Banihashem *et al.* 2015). The study was single blind. The 60 cases of patients were randomly divided into two groups, each group with 30 cases. One group was subjected to EA surgery, the other group were under CSEA operation. All the patients had done the preoperative detection, the selected objects were with normal cardiopulmonary function, without pregnancy complications and forbidden operation for intra-spinal canal anesthesia. In EA group and CSEA group, the maternal age, physical characteristics, operation time had no significant difference ($P>0.05$).

Anesthesia method

After entering the operating room, patients need to be injected the compound sodium lactate injection, and give conventional nasal catheter oxygen. All patients in the two groups were taken the left side lying position. In CSEA group, in the intermittent of lumber vertebrae, the L₁₋₂, this study had used the NO.18th epidural puncture syringe perform the targeted implementation. Then fixed the epidural catheter around 3cm to 4cm in the head side, and then used the sterilized stickers (in the catheter puncture bag) to fix the catheter; and in the intermittent of lumber vertebrae, the L₃ and L₄ used the AN-S10.7X90 to lumbar puncture in subarachnoid, once the cerebrospinal fluid flowed out, and then applied the 10% of glucose 1ml and 2ml of Bupivacaine 0.75% mixture injection. The controlled dosage was 1.5-2ml (7.5-10mg of bupivaccine). Then the subject was in a supine position, and adjusted the position to a anesthesia plane as T₇.

In the cesarean section, according to the actual situation, the 1.73% of lidocaine carbonate 3-5ml per time could be added into the epidural catheter. In the EA group, between the puncture clearance of L₁ and L₂, or L₃ and L₄, the normal operation of puncture had applied. Then used the NO.18 syringe for epidural puncture, after the epidural puncture, then placed the epidural epidural catheter (3-5cm) in the head side. The chosen test dosage was 1.73% lidocaine of 3-5ml, based on the planar block situation,

Table 1: Anesthesia effect comparison of EA group and CSEA group (n%)

Group	N	I level	II level	III level	IV level
CSEA Group	30	26 (86.7)*	4 (13.3)	0 (0)	0(0)
EA Group	30	4 (13.3)	20 (66.7)	6 (20)*	0(0)

Note: *: P<0.05, had significant difference.

Table 2: Anesthesia time comparison of EA group and CSEA group (x ± s) (Right format)

Group	N	Working time(min)
CSEA group	30	5.3 ± 1.6*
EA group	30	11.3 ± 3.1

Note*: P<0.05 significant differences.

then medical workers decided whether it was need to add other medicine. If there was no adverse reaction, an extra dose of 8-10ml, and lied on supine position T₇. After operation, both group were adopted epidural analgesia, and then be injected 20u of oxytocin after the completion of delivery.

Observation Project

During the surgery, the two groups of subjects were been tested the pulse oxygen saturation, blood pressure, respiratory frequency, amplitude and continuous ECG detection. Experiment object observation project mainly involved whether any nausea, vomiting, hypotension, chill or headaches. In addition, the project also included the Apgar scoring (1 minute and 5 minutes) of new born infant, the level of anesthesia effect and the postoperative pain scoring (applied VAS, 0-10 points, the higher of the score, the more obvious pain for the patients).

Effect of decision criteria

The anesthesia effect could be divided into four levels: level was with perfect anesthesia effect, no pains, muscle relaxant, relatively stable state of cardiopulmonary function and blood flow mechanics; level was with general anesthesia effect, few deficiencies, with mild pain, imperfect of muscle relaxant effect, with hemodynamic fluctuations, internal organs had pains, needed to anesthesia again; level was the imperfect of anesthesia, obvious pain, poor muscle relaxant, needed to take medicine, surgery was complete reluctantly; level surgery needed the assist of other anesthesia method to complete.

STATISTICAL ANALYSIS

Using SPSS15.0 analysis, t test was used to compare between groups, using analysis of variance and SNK-q inspection in the group. It had statistically significant different (P <0.05).

RESULTS

Two groups of anesthesia information

These two groups of neonatal Apgar score were kept in normal range. 24 hours after the surgery, there was no significant differences for VSA score. In the two groups, there was no significant difference for the adverse reactions, such as omitting, nausea, itchy skin.

The patients in CSEA group were much more than the patients in EA group. EA group patients were mainly concentrated in level 0, for 66.7%. While, in CSEA group, the patients was mainly in level I, counting for 86.7%. Detailed information see table 1.

We also measured the sensory and motor block characteristics in mothers after the application of spinal anesthesia. There was no significant differences between these. There was little or no maternal side effects and neonatal outcomes following spinal anesthesia were good.

The time of anesthesia effect comparison of EA group and CSEA group

There could be less time of anesthesia medicine to work for CSEA group CSEA group than EA group. P<0.05, had significant difference, shown in table 2.

Caesarean operation should not only focus on the maternal physiological changes during and after the surgery, but also need to minimize the adverse impacts on the fetus.

Surgery was the focal point and the physiological changes after the surgery, but also minimized adverse impact on the fetus, and made the procedure of maternal and fetus in the security state. Therefore, it required anesthesia to be a promising effect, could work efficiently, and could keep a good state of muscle relaxant, clear anesthesia effect. The experimental results of CSEA group showed that it could play an advantage of subarachnoid anesthesia and epidural anesthesia. Anesthesia dosage was less, while,

the effect was better, the muscle relaxant met the requirements, and not to be restricted by the operation time during the operation. It could not only improve the quality of the operation, but also relatively ease the burden of anesthesiologist.

DISCUSSION

The present investigation explored the clinical application of combined anesthesia in cesarean section. Although anesthesia has been widely used in caesarean delivery (Banihashem *et al.*, 2015), we show in our manuscript that our method has less dosage, a faster and better effect, and good muscle relaxant condition. It not only improved the quality of the surgery, but also reduced the burden of the anesthesiologist.

During the combined spinal epidural anesthesia, the cause of the failure might be associated with the following factors: (1) The patient's position, the injection point and direction improperly during puncturing made the epidural space puncture failure; (2) although the puncture needle was in the epidural space, the deflection of the direction made lumbar puncture syringe was difficult to penetrate the spinal dual mater; or physiological saline was mistaken for cerebrospinal fluid, as physiological saline was injected in the epidural space, that led to poor judgment; (3) Lumbar puncture syringe was not fixed well, may had be out of subarachnoid or penetrated through subarachnoid and reach the opposite epidural space; (4) During the drug injection, lumbar puncture needle and syringe cohesion was not fixed tightly, lost too much anesthetics; (5) It was difficult to set catheter in the epidural space, and the anesthesia plane was too low or unilateral blockade; The main reason for epidural block of combined spinal epidural anesthesia was the failure of catheter setting and catheter penetrated into vascular (Ye *et al.*, 2008).

After many years of clinical practice: after the epidural puncture success, and before the process of lumbar puncturing surgery, did not fill the epidural space, in case of the misjudgment. After the lumbar hemp anesthesia being successfully finalized, it need to inject a small amount of physiological saline in order to facilitate the placement of epidural catheter and reduce the probability of catheter went into blood vessels (Cheng and Xiao, 2008).

Hypotension was the main complications of combined spinal epidural anesthesia. The main reason for low blood pressure were: (1) sympathetic preganglionic fibers were blocked, parasympathetic nerve were relatively excited, and decreased the systemic resistance, anesthesia plane vasodilation, reduced the blood volume back to heart; (2) dehydration or low blood volume; (3) much anesthesia dosage and faster injection speed made the spinal

anesthesia block the plane; (4) The vague nerve tension was too high (Yin and Gao, 2007).

Process of dealing with low blood pressure included the following several aspects: (1) before the spinal anesthesia, it needed to give a certain amount of liquid crystal and treatment of expansion and the liquid crystal and colloid ratio was 1:1; (2) For maternal and patients with above level of ASA grading. The dosage shall be relatively smaller and drug injection speed also shall not too fast, as possible as to control the block plane not too exorbitant; (3) The application of vasoactive drugs; (4) kept his maternal right hip to the left side of the inclined a 20 to 30 degree, in case the uterus oppression caused changes of inferior vena, in case the uterus oppression caused change of inferior vena cava blood reduce.

Combined spinal epidural anesthesia was the surgery widely used in cesarean section. When maternal blood pressure dropped, it needed to be handled well and in time, in case the fetus distress and fetal intrauterine and vomiting aspiration (Carpenter, 1996; Okogbo *et al.*, 2011; Ingelmo and Somaini, 2010).

Nausea, vomiting were the common symptoms of combined spinal epidural anesthesia. It was usually happen in patients with low blood pressure, feed, maternal and inadequate anesthesia plane upper bound, pull abdominal viscera responders. Measures: for those with non-emergency were strict preoperative diet; For emergency patients with full stomach, preoperative coarser stomach tube, and gave drugs inhibit gastric acid, in case the aspiration problems caused by vomiting, and cause Mendel syndrome (Macfarlane *et al.*, 2009).

Combined spinal epidural anesthesia caused headache was much less than that of lumbar anesthesia, and the neurological complications were rare, mainly were women. Headaches may be related to repeated puncture, woke-up early, insufficient blood volume and spiritual factors. There were 3 cases developed the postoperative neurological symptoms after the surgery, the symptoms was that patients had obviously different feelings of unilateral lower limbs during the combined spinal epidural anesthesia (Zhao and Tang, 2006). Although it had cerebrospinal fluid overflow, drug injection caused patients suffering pain, and it was difficult to inject medicine. Among them, 3 cases of patients had immediately stopped drug injection (Rosemberg and Heinonen, 1984). The postoperative characterized by unilateral lower limbs local numbness, one week later, the symptoms disappeared after the treatment; Still, another one case had obvious symptoms after discharged, then turned to nerve internal medicine treatment, and recovered after two months of treatment. In order to avoid damage of the spinal cord, stinging clearance shall not be higher than the L₂ and L₃.

There were several limitations of the study. First of all, the present investigation included only limited number of subjects, which should be further addressed by employing more research subjects. Secondly, follow-up should be conducted for longer time and the data should be provided to further investigate the effects of anesthesia on delivery. Thirdly, the side effects of the present method should be observed for longer time with more patience.

CONCLUSION

After the experimental comparison study between CSEA group and EA group, and the anesthesia time for CSEA group was obvious shorter than in EA group. While facing the short operation time, emergency surgery, fetal distress, and so on. This knowledge could assist deliver the fetus. Subarachnoid block in CSEA group could fully work, and after the finalization of surgery, and could sterilize the wound, it could reduce the stress and pain of maternal, and reduce the fetus intrauterine distress in time. According to the experimental observation, the ideal dosage of local anesthetic dosage was 7mg to 10mg. CSEA operation had rapid and stable anesthesia effect, and had a good state of muscle relaxant. For a cesarean section incision, the tear, separation of the rectus operation could make muscle fibers, blood vessels, and nerve preservation, small wound, unfavorable infection, and reduce the trauma and pain of patients.

REFERENCES

Bajwa SJ and Jindal R (2013). Epilepsy and nonepilepsy surgery: Recent advancements in anesthesia management. *J. Anesth Essays Res.*, **7**(1): 10-7.
Bajwa SS and Bajwa SK (2011). Anesthesia and Intensive care implications for pituitary surgery: Recent trends and advancements [J]. *Indian J. Endocrinol. Metab.*, **3**: S224-S232.

Banihashem N, Hasannasab B, Esmaceli A and Hasannasab B (2015). Addition of Intrathecal Magnesium Sulfate to Bupivacaine for Spinal Anesthesia in Cesarean Section. *J. Anesth. Pain Med.*, **5**(3): e22798.
Carpenter RL (1996). Future epidural or subarachnoid analgesics: local anesthetics. *J. Reg. Anesth.*, **21**(6 Suppl): 75-80.
Cheng G and Xiao W (2008). Clinical observation of combined spinal and epidural anesthesia for caesarean section. *Chengqing. Medical*, **17**(7): 123.
Ingelmo PM and Somaini M (2010). Optimal epidural volume expansion during combined spinal-epidural anesthesia: One question, one answer. *J. Minerva Anesthesiologica*, **76**(5): 312-313.
Macfarlane AJ, Pryn A and Litchfield KN (2009). Randomised controlled trail of combined spinal epidural vs. Spinal anaesthesia for elective caesarean section: vasopressor requirements and cardiovascular changes. *Eur. J. Anaesthesiol.*, **26**(1): 47-51.
Okogbo FO, Ezechi OC and Loto OM (2011). Uterine leiomyomata in south western nigeria: A cnilical study of presentations and management outcome. *J. Afr. Health Sci.*, **11**(2): 271-278.
Rosemberg PH and Heinonen E (1984). Differential sensitivity of A and C fibers to long-acting amide local anaesthesia. *J. Br. J. Anaesth.*, **55**: 164-170.
Ye ZY, Liu DH and Zhang KQ *et al* (2008). Prevention on supine hypotension syndrome under combined spinal and epidural anesthesia for caesarean section. *Guangdong Medical*, **11**(2): 232.
Yin J and Gao W (2007). Nursing on supine hypotension syndrome under combined spinal and epidural anesthesia for caesarean section. *Chinese Journal of Practical Nursing*, **31**(7): 77.
Zhao WJ and Tang WY (2006). Lumbar hemp-epidural block or simple lumbar hemp cesarean delivery on maternal circulation function and the influence of the newborn. *J. Clinical Medical*, **8**(8): 2-54.