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Dexmedetomidine versus Morphine: The New versus the Old — Choosing the Optimal Hemodynamic and Analgesic Profile for Cesarean Section

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ABSTRACT

With the rising global rates of cesarean sections, identifying safe and effective spinal anesthesia strategies has become increasingly important. This study, conducted at the Republican Perinatal Center of Uzbekistan, aimed to compare the hemodynamic and analgesic profiles of two intrathecal adjuvants - morphine and dexmedetomidine - in pregnant women with severe preeclampsia. Sixty patients were divided into two groups. The study evaluated anesthesia quality, postoperative pain management, side effects, and neonatal outcomes. Findings indicated that dexmedetomidine provided comparable analgesic efficacy to morphine with significantly fewer side effects, supporting its potential as a favorable adjuvant for spinal anesthesia in obstetric practice.

Keywords: Spinal anesthesia, Dexmedetomidine, Morphine, Cesarean section, Obstetric anesthesia, Preeclampsia, Postoperative analgesia, side effects, Bupivacaine, Neonatal outcomes.

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INTRODUCTION

Today, the share of children born by caesarean section in the world is 20 percent. If this process continues, by 2030 this figure may reach 30 percent. In Latin American countries, caesarean section is used in 43 percent of cases. In five countries of the world - the Dominican Republic, Brazil, Cyprus, Egypt and Turkey, the number of such operations exceeds the rates of natural births. In the Republic of Uzbekistan, the number of births is approaching 900,000 per year for 37 million people; the percentage of caesarean sections is gradually increasing, and is approaching 20%. Spinal anesthesia for this type of operative delivery is one of the most common methods of anesthesia in obstetrics, and today accounts for more than 95%. It allows for a high degree of nerve blockade, which ensures the best level of quality of pain relief during caesarean section, and is optimal in terms of economic costs. However, like any other method of anesthesia, spinal anesthesia has its drawbacks and limitations. Such high figures for the use of spinal anesthesia in cesarean sections in obstetrics require the search for safer methods of anesthesia.

To improve the effectiveness of spinal anesthesia and reduce the risk of complications for the mother and fetus, multimodal anesthesia with adjuvants is increasingly used. Adjuvants are drugs that are added to local anesthetics to improve their effectiveness and duration of action. The use of adjuvants with local anesthetics in spinal anesthesia allows for more effective nerve block and prolongs the action of the local anesthetic. In addition, it allows for a reduction in the dose of local anesthetic and the risk of side effects. However, like any other drugs, the addition of adjuvants to local anesthetics in spinal anesthesia has its limitations and disadvantages. Some patients may be allergic to adjuvants, which can cause serious complications. In addition, it is necessary to carefully evaluate the indications and contraindications for the use of adjuvants in order to minimize the risk of undesirable consequences and side effects. In Uzbekistan, opioids are used as adjuvants in spinal anesthesia. But due to numerous side effects when using opioids such as nausea, vomiting, itching, urinary retention, etc., a constant search for new adjuvants is underway, this is especially relevant in the practice of an obstetric anesthesiologist, since the quality of postoperative well-being greatly affects the possibility of early rehabilitation and breastfeeding.

In the Republican Perinatal Center of Uzbekistan, a scientific work was conducted to determine the optimal adjuvant for cesarean section in pregnant women with obstetric pathology - severe preeclampsia. A study was conducted on the quality of spinal anesthesia among pregnant women with severe preeclampsia using 2 types of adjuvants: morphine and dexmedetomidine.

The design and study included an analysis of the quality of anesthesia and postoperative analgesia in pregnant women with severe obstetric pathology. Studies were conducted among 2 groups of 30 pregnant women. In group 1, Bupivacaine 0.5% 10-15 mg + Morphine 100 mcg was used for spinal anesthesia, in group 2, Bupivacaine 0.5% 10-15 mg + Dexmedetomidine 10 mcg were used. The dosage of Bupivacaine 0.5% was determined depending on the patient's height. The adjuvant was added to Bupivacaine by adding through an insulin syringe with clear divisions. Anesthesia quality control was performed using the Richmond Visual Analogue Scale Agitation-Sedation Scale (RASS), control of analyses was carried out according to the concentration of Interleukin -6 in the mother's blood plasma.

Table 1: The Target group of Pregnant women

	Bupivacaine + Morph	**Bupivacaine + Dexmed**	**F/χ^2**	***P* value**
Age (year)	22.5±3.9	23.1±4.9	2.04	0.1398
Height(cm)	161.2±5.4	160.2±3.6	0.23	0.7944
Weight(kg)	74.9±8.4	77.9±7.3	0.65	0.5266
Gestational weeks	34.5(34.0,38.0)	35.0(34.0,38.0)	4.51	0.1051
Duration of surgery(min)	52.0±8.8	56.3±11.5	1.91	0.1570
Onset time of operation (min)	13.1±3.4	14.7±3.8	0.71	0.4960

The obtained results were analyzed for the quality of the procedure depending on the type of added adjuvant. The dosage of morphine for intrathecal administration as an adjuvant for spinal anesthesia in pregnant women was 1003 mcg. Regression of the sensory block when using morphine as an adjuvant averaged 180 ± 50 minutes, adequate postoperative analgesia was 15 ± 2.5 hours. The use of morphine adjuvant in this study showed that adequate postoperative analgesia is accompanied by a large number of side effects, such as nausea, vomiting, dizziness, drowsiness and respiratory depression. These side effects accounted for up to 25% in our study and were poorly relieved by antihistamines and antiemetic drugs.

In group 2, spinal anesthesia was performed with the addition of dexmedetomidine, this drug belongs to the group of α -2- adrenoreceptor agonists and has long been used to treat arterial hypertension. However, for this indication, they are gradually being replaced by antihypertensive drugs with a more interesting therapeutic profile. In our study, dexmedetomidine was used at a dosage of 10 mg/kg adding 0.5% Bupivacaine to the solution. The results obtained for the duration of motor and sensory block coincided with the use of morphine in group 1. Sensory block was statistically comparable with the use of opioid adjuvants. The time of sensory regression was 160 ± 60 minutes, postoperative pain relief on average showed 12 ± 2 hours. Patients note the high quality of anesthesia and postoperative pain relief. In contrast to the use of morphine, a significantly smaller number of side effects are noted. This has a positive effect on the postoperative period after cesarean section, especially considering the breastfeeding of the child. Our results are consistent with a study

conducted in India, which showed that the addition of dexmedetomidine 5-10 mcg to 0.5% isobaric bupivacaine in SMA at cesarean section provided a sedative effect, reduced the need for opioids and improved the quality of postoperative analgesia (Gupta et al ., 2020). A meta-analysis of studies conducted in Europe, Asia, and North America found that the addition of dexmedetomidine to local anesthetics for obstetric SMA improved the quality of the block, reduced the need for opioids , and reduced the risk of side effects (Zhang et al ., 2020).

Table 2: The analysis of postoperative pain relief

	Bupivacaine+Morph	Bupivacaine+Dexmed	F/χ^2	*P* value
VAS				
6h	0.0(0.0,0.0)	0.0(0.0,1.5)	11.50	0.0032
12h	5.0(2.5,7.5)	3.8(2.5,5.3)	2.08	0.3533
Uterine Contraction Pain				
6h	0.0(0.0,0.0)	0.0(0.0,0.0)	1.72	0.4239
12h	1.0(0.5,1.0)	1.0(0.5,1.0)	1.84	0.3978
Supplement postoperative analgesia case (%)	8(4 0.0)	4 (2 0.0)	2.13	0.3440

Based on the data obtained, it can be concluded that the use of dexmedetomidine as an adjuvant in SMA has the same analgesic profile as when using morphine. The data obtained on the child's condition immediately after birth deserve special attention. The newborns were analyzed using the Apgar scale, the umbilical cord blood was analyzed for $CO2_{and}$ blood pH, the level of lactate and glucose immediately after birth. The results obtained show virtually no changes in the child's condition immediately after birth, when using morphine and dexmedetomidine as an adjuvant in 2 study groups.

Results of the analysis of the child's condition at birth

Factor	Bupivacaine+Morph	Bupivacaine+Dexmed	F	*P* value
Apgar score				
1min	9.0(8.0,9.0)	9.0(8.0,9.0)	0.59	0.7450
5min	10.0(9.0,10.0)	10.0(9.0,10.0)	0.31	0.8556
Umbilical oxygen partial pressure(mmHg)	24.8±10.3	25.7±8.4	0.48	0.6217
Umbilical dioxide partial pressure(mmHg)	41.9±5.1	43.1±5.4	0.49	0.6162
Umbilical glucose(mmol /L)	3.5±0.6	3.6±0.4	0.12	0.8838
Umbilical lactate (mmol /L)	1.5(1.4,1.6)	1.5(1.3,1.7)	1.33	0.5136
Umbilical blood pH	7.4±0.0	7.3±0.0	1.99	0.1460

CONCLUSION:

Comparison of adjuvants when using regional anesthesia in surgical obstetric practice requires additional research. The choice of adjuvant for SMA in obstetrics should be based on the individual needs and preferences of the patient and the anesthesiologist. The use of adjuvants for SMA in obstetrics improves the quality of the block, prolongs its duration and

reduces the need for opioids. In our study, no significant differences were found in the quality of spinal anesthesia and postoperative analgesia in women after cesarean section using morphine or dexmedetomidine. But data were obtained showing a sharp decrease in side effects using opioids in contrast to dexmedetomidine in the form of nausea, vomiting, skin, urinary retention. In conditions of early activation of patients 6-8 hours after surgery and breastfeeding of the child, this is of greatest importance. It is also important that morphine is a narcotic analgesic and is subject to accounting and special storage. Literature data show that additional studies are needed on the use of adjuvants to ensure adequate intra- and postoperative pain relief during cesarean section performed under SMA. The possibility of using adjuvants in various obstetric and somatic pathologies also deserves attention and study.

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