THE USE OF REGIONAL ANESTHESIA TECHNIQUES IN DIFFERENT SURGICAL PROCEDURES

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Anaesthesia with bupivacaine provides more stable hemodynamic parameters than with lidocaine. Interest in the use of regional anaesthesia methods in surgical and traumatological operations has always been quite high. The aim of the study was to investigate the effectiveness of regional methods in surgical operations on the lower abdomen and traumatological and vascular operations on the lower extremities. Materials and methods of research. The data of the study are based on the results of the Department of Anaesthesiology and Reanimatology of the RSCEMP AF in Andijan. The data of surgical treatment with modern local anaesthetics Bupivacaine and Ropivicaine in 198 adult patients in 2023-2024, operated in planned and emergency procedure for surgical, traumatological and vascular diseases were used in the study. The mean age of the patients was 40.5±14.0 years, the mean weight of the patients was 72.9±10.7 kg, and the mean height of the patients was 169.2±7.4 cm.

Results: Bupivacaine-based anaesthesia has shown to be the method with the least effect on haemodynamics. With proper calculation of anaesthetic dose, haemodynamic shifts were minimal. There was enough time to perform these surgical interventions under spinal anaesthesia with bupivacaine at a dose of 15 mg. From the complications of spinal anaesthesia we noted headaches in 4 patients, and getting into nerve roots in 2 patients. The positive moment of epidural anaesthesia was the possibility of prolonged anaesthesia and the possibility of effective analgesia in the postoperative period. From the complications of EA we noted partial block and mosaicism of anaesthesia in 3 cases in group 1. Conclusion: Epidural anaesthesia is preferable when it is necessary to prolong the time of anaesthesia and postoperative analgesia.

Keywords: regional anaesthesia, sympatho-adrenal system, hypothalamic-pituitary-adrenocortical system, bupivacaine, ropivicaine.

ПРИМЕНЕНИЕ РЕГИОНАЛЬНЫХ МЕТОДОВ АНЕСТЕЗИИ В РАЗНЫХ ХИРУРГИЧЕСКИХ ОПЕРАЦИЯХ

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Анестезия с использованием бупивакаина обеспечивает более стабильные показатели гемодинамики, чем при использовании лидокаина. Интерес к применению методов регионарной анестезии при хирургических и травматологических операциях всегда был достаточно высоким. **Цель исследования** - изучить эффективность регионарных методов при хирургических операциях на нижнем этаже брюшной полости и травматологических и сосудистых операциях на нижних конечностях. **Материалы и методы исследования.** Данные исследования основаны на результатах работы отделения анестезиологии и реаниматологии РНЦЭМП АФ г.Андижана. В исследовании использованы данные оперативного лечения с применением современных местных анестетиков Бупивакаина и Ропивикаин у 198 взрослых пациентов в 2023-2024 гг., оперированных в плановом и экстренном порядке по поводу хирургических, травматологических и сосудистых заболеваний. Средний возраст больных составил 40,5±14,0 лет, средний вес пациентов составил 72,9±10,7 кг, средний рост пациентов составил 169,2±7,4 см. **Результаты**: Анестезия на основе бупивакаина показала себя как метод с наименьшим влиянием на гемодинамику. При правильном расчете дозы анестетика гемодинамические сдвиги были минимальны. Времени для проведения данных оперативных вмешательств в условиях спинальной анестезии бупивакаином в дозе 15 мг хватало с избытком. Из осложнений спинальной анестезии отмечали головные боли у 4 пациентов, и попадание в нервные корешки у 2 пациентов. Положительным моментом эпидуральной анестезии была возможность пролонгированного проведения анестезии и возможность проводить эффективное обезболивание в послеоперационном периоде. Из осложнений ЭА отмечали частичный блок и мозаичность анестезии в 3 случаях в 1 группе. **Вывод:** Эпидуральная анестезия предпочтительна при необходимости пролонгировании времени анестезии и послеоперационного обезболивания.

Ключевые слова: регионарной анестезия, симпато-адреналовой система, гипоталамогипофизарно-адренокортикальной система, бупивакаин, ропивикаин.

Epidural and spinal anaesthesia using the modern anaesthetic bupivacaine has shown to be effective and safe in operations on the lower abdomen and lower

extremities. Anaesthesia with bupivacaine provides more stable hemodynamic parameters than with lidocaine. Interest in the use of regional anaesthesia methods in surgical and traumatological operations has always been quite high. All methods of general and regional anaesthesia have their advantages and disadvantages. Methods of regional anaesthesia options, their advantages, disadvantages, complications and effects on the body are well described in the literature (1,2,3). Various authors give preference to epidural anaesthesia (EA), spinal anaesthesia (SA), combined spinal-epidural anaesthesia (CSEA) alone or in combination with general anaesthesia (GA) under artificial ventilation (AV) conditions (4,5,6). The advantages of regional anaesthesia methods in comparison with OA are complete blockade of pain impulsation from the anaesthesia zone, reduction of total peripheral resistance (TPR), and most importantly, the possibility of preserving consciousness and independent breathing, which avoids complications associated with OA and ventilator (7). Compared to EA, SA is characterised by clear identification of the subarachnoid space by the presence of liquor, a smaller amount of local anaesthetic, and rapid onset of effect. EA is characterised by its ability to be performed at any level, while SA is only performed in the lumbar region. Prolonged EA has become an important component of postoperative anaesthesia and intensive care. With the advent of the epidural catheterisation technique and the possibility of additional anaesthetic administration, EA has become more popular, due to the fact that SA is limited by the time of local anaesthetic action (8,9,11). This problem is solved by the combined use of SA and EA, first as a two-level technique, and then by the development of combined spinal-epidural anaesthesia (CSEA), 'needle through needle', with puncture at the same level. CSEA combines a rapid onset of effect, as with SA, and the possibility of prolonged maintenance of anaesthesia, as with EA (4,10).

Materials and methods of research. The data of the study are based on the results of the work of the Department of Anaesthesiology and Reanimatology of the RSCEMP AF in Andijan. Regional methods of anaesthesia have been introduced since 1985. Before 1999-2005 regional anaesthesia methods were rarely used. The main drug for EA was 2% lidocaine. With the appearance of new disposable kits of B.Braun company for EA and SA, and modern local anaesthetics Bupivacaine and Ropivicaine, there is a steady increase in the percentage of regional anaesthesia in the structure of planned and emergency anaesthesia. Over 1000 regional anaesthetics using new drugs have been performed in the last 3 years. This study used operative treatment data from 198 adult patients in 2023-2024 who underwent elective and emergency surgery for surgical, traumatological and vascular conditions. The mean age of patients was 40.5±14.0 years, mean

weight of patients was 72.9±10.7 kg, mean height of patients was 169.2±7.4 cm. The bulk of surgical interventions were performed routinely. The distribution of patients by types of operations is presented in Table 1.

Table 1 Distribution of patients by the structure of surgical interventions and types of anaesthesia

Name of operation	Epidural anaesthesia	Spinal anaesthesia	Scheduled	Emergency
Appendectomy	**28**	**20**	**-**	**48**
Herniotomy, inguromastoid hernia repair	**33**	**13**	**25**	**21**
Haemorrhoidectomy	**9**	**9**	**18**	**-**
Excision of rectal fistula, sphincteroplasty	**3**	**8**	**11**	**-**
Anal fissure excision	**-**	**5**	**5**	**-**
Transvesical adenomectomy	**11**	**2**	**13**	**-**
Transurethral resection of the prostate	**16**	**9**	**25**	**-**
Open femoral osteosynthesis	**9**	**-**	**9**	**-**
Radical phlebectomy	**6**	**17**	**23**	**-**
Total	**115**	**83**	**129**	**69**

In emergency trauma patients, only OA (general anaesthesia) was used, because the state of traumatic shock did not allow regional anaesthesia. In conditions of traumatic shock, EA and SA can cause circulatory decompensation and a state of uncontrolled hypotension. In emergency surgical patients with pinched inguinal hernia, acute appendicitis, proctological diseases in the absence of peritonitis, EA or SA was performed. All patients underwent a standard preoperative examination including general blood and urine analysis, biochemical blood analysis, coagulogram, electrocardiogram, chest X-ray, consultations of allied specialists. The allergological anamnesis was determined. The degree of anaesthetic risk was assessed using the American Anaesthesiologists Association (ASA) scale. The average risk degree was 1.5±0.8 points, indicating that relatively healthy people with non-serious comorbidities were included in the study. Patients were divided into 3 groups according to anaesthesia technique: 1. Lidocaine based epidural anaesthesia (n=35); 2. Bupivacaine based epidural anaesthesia (n=70); 3.

Bupivacaine based spinal anaesthesia (n=73). For EA we used the kits of 'W.Braun' (Germany) and Balton (Poland). Puncture of the epidural space was performed under local anaesthesia with 0.25% novocaine at the level of L1 -L2 , L2 -L3 using an 18G needle in the patient lying on the side. Catheterisation of the epidural space was performed, directing the catheter upwards or downwards depending on the type of surgical intervention. Then a test dose of lidocaine 80 mg (MERRYMED FARM, Uzbekistan) or bupivocaine 15 mg (Grindex, Latvia) was administered. The patient was observed for 5 minutes. If there were no signs of spinal block, a basic dose of bupivacaine 75-100 mg combined with fentanyl 0.1 mg or lidocaine 240-400 mg was administered. If spinal block developed, surgery was started and anaesthesia was administered as CA. The catheter was removed at the end of the operation and used for additional injection of half of the spinal dose of anaesthetic. Anaesthesia was started after registration of initial indicators of central hemodynamics and preliminary infusion of NaCI 0.9% solution or colloidal solutions at the rate of 10-15 ml/kg. In case of arterial pressure decrease due to vasoplegic effect of EA, mesaton in dilution was administered intravenously bolus against the background of continued infusion load. Subsequent doses of bupivacaine, half of the initial one, were administered epidurally after 120-180 min. Additional doses of lidocaine were administered every 40-50 min, also at half the initial dose. Humidified air-oxygen mixture was insufflated throughout the operation. If drug sedation was necessary, in some patients, to eliminate the effect of 'presence at surgery', brusepam was administered intravenously at a dose of 0.05-0.1 mg/kg-1 every 30-60 min. The epidural catheter was left for postoperative anaesthesia and removed on the next day after surgery. Special needles of the company 'V.Braun', Germany, were used for SA. In all patients, puncture of the subarachnoid space was performed under local anaesthesia of the skin and subcutaneous tissue with 0.25% novocaine along the midline of the spinal column. The spinal canal was punctured at the level of L3 -L4 . Spinal anaesthesia was performed with bupivacaine solution in a dose of 15-20 mg. A single injection of bupivacaine was sufficient for 2-3 hours of effective anaesthesia. Lidocaine was not used for CA due to its short duration of action. The study was conducted at the following stages of surgery and anaesthesia: - Initial data; - Start of surgery; - Main (traumatic) stage of surgery; - End of surgery. Hemodynamic parameters were recorded: systolic blood pressure (SBP), diastolic blood pressure (DBP), heart rate (HR), infusion volume, and the need for analgesics in the postoperative period. Statistical processing was performed using Microsoft Excel programme. Reliability of differences was determined by Student's t-criterion. The difference was considered reliable at $p<0,05$.

Results and their discussion. The results of the work are reflected in Table 2. Initial hemodynamic parameters in the groups did not differ significantly and were at the upper limit of the norm. At the second stage, after the beginning of EA or SA action, there was a significant decrease in SBP, MAP and HR, which is associated with the pharmacological effect of EA and SA. The decrease occurred within physiologically acceptable values. At the traumatic stage, SystAD increased significantly in groups 1 and 2, and this trend continued at stage 4. By the end of the operation, SystAD and MAP significantly increased compared to stages 2 and 3, but remained below baseline. HR in group 2 at stages 2 and 3 were similar, with a slight increase at stage 4. At stages 3 and 4, HR was similar in group 1. In group 3, HR gradually increased in stages 2, 3, and 4. In the overall trend, the haemodynamic changes were homogeneous and consistent with the clinic of EA and SA. In the comparison between groups, it should be noted that in SA, the decrease in SystAD and HR was less pronounced than in EA in groups 1 and 2. This is due to the lower dose of anaesthetic in SA, and the absence of a general effect on the body. The most pronounced bradycardia was observed in the group using lidocaine for EA. In case of severe bradycardia, it was necessary to administer atropine 0.1% 0.5 ml each. In rare cases, when bradycardia and hypotension were combined, adrenaline 0.1% 0.1 - 0.2 ml in dilution was administered. When analysing hemodynamics in all groups, it should be noted that both EA and SA proved to be effective and safe methods of anaesthesia. In order to prevent vascular collapse before the test dose administration, a preliminary infusion of NaCl 0.9% in the volume of at least 800 ml was performed, followed by infusion of at least 1600 ml of fluids during the operation under hemodynamic control. It should be noted that volumetric correction of hemodynamics did not always allow to stabilise SystAD, which is associated with sympathetic blockade and resorptive effect of local anaesthetics. SA based on bupivacaine proved to be the method with the least influence on haemodynamics. With correct calculation of the anaesthetic dose, haemodynamic shifts were minimal. However, CA has one significant disadvantage associated with the limited time of anaesthetic action. There was enough time to perform these surgical interventions under spinal anaesthesia with bupivacaine in a dose of 15 mg. Among the complications of SA we noted headaches in 4 patients, and penetration into nerve roots in 2 patients. The positive aspect of EA was the possibility of prolonged anaesthesia and the possibility to perform effective analgesia in the postoperative period. Partial block and mosaicism of anaesthesia in 3 cases in group 1 were noted as complications of EA. When bupivacaine was used, anaesthesia was always effective.

Table 2 Dynamics of the main indicators at the stages of the study

Indicator	Groups	1 stage	2 stage	3 stage	4 stage
Systolic blood pressure (mmHg)	1 group	135±19	84±14*	91±14* **	100+15* ** ***
	2 group	138±20	86+13*×	94±14* **	101±12* ** ***
	3 group	139±18	99±11 ×× ×××	93±22*	107±15* ** *** ×× ×××
Diastolic blood pressure (mm.Hg)	1 group	77±10	45±8*	44±8*	49±8* ***
	2 group	75±15	45±6*	51±7* ** ×	53±6* **
	3 group	75±8	45±8*	44±5* ××	53±6* ** *** ×××
Heart rate (beats/min)	1 group	84±14	63±8*	75±9* **	75±9* **
	2 group	86±14	71±9* ×	70±12*	79±8* ** *** ×
	group	85±12	67±10* ××	75±9* **	79±9* ** *** ××

* - p<0.05 in comparison with stage 1
** - p<0.05 in comparison with stage 2
*** - p<0.05 compared to stage 3
× - p<0.05-significance of differences between group 1 and 2
×× - p<0.05 significance of differences between group 2 and 3
××× - p<0.05 significance of differences between group 1 and 3

The majority of patients were transferred from the operating theatre immediately to specialised departments. There are many works devoted to the comparative evaluation of regional anaesthesia in different types of surgical interventions (11, 12, 13, 14). This paper presents our experience in a multidisciplinary hospital, where various types of surgical interventions are performed. The widespread introduction of EA and SA into daily anaesthesia practice allows to reduce the load on the intensive care unit and the waking room, to provide comfortable conditions for the surgeon and the patient.

Conclusions: Epidural anaesthesia based on bupivacaine provides effective and safe anaesthesia for lower abdominal and lower extremity surgeries. Spinal anaesthesia based on bupivacaine provides more stable haemodynamics than epidural anaesthesia. Epidural anaesthesia is preferable when prolongation of anaesthesia time and postoperative pain relief are required.

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