International Journal of Psychosocial Rehabilitation, Vol. 24, Issue 08, 2020
ISSN: 1475-7192

Experience in the Use, Evaluation of the Effectiveness and Safety of Regional Anesthesia Techniques

[1]Khalilov Firuz Valievich, [2]Sevagina Valentina, [3]Goncharova Tatyana Yuiryevna, [4]Kaibov Akim Kamilovich

Abstract--*Providing pain relief and eliminating the painful sensation of pain are of paramount importance in medicine and anesthesiology. Currently, the undeniable advantages those regional methods of anesthesia have allowed using this method of anesthesia more often in medical practice.With the introduction in clinical practice of means of delivering drugs directly to the place of their action, the use of epidural RSA, the development of combined spinal-epidural anesthesia, as well as the synthesis of new low-toxic local anesthetics, regional methods of anesthesia have taken a significant place in the overall structure of anesthesia. That determines the relevance of this article.*

Key words--*anesthesia, regional blockade, regional anesthesia techniques, local anesthetics, complications of regional anesthesia*

I. INTRODUCTION

Choosing the most appropriate method of anesthesia for a particular patient is a difficult problem, often associated with the complexity, often-unpredictable duration, high trauma of surgery, the stress of the body's compensatory forces in the intra-and post-operative periods, and the negative impact on the vital organs and systems of almost all anesthetics used for anesthesia.

If General anesthesia is currently considered to be almost completely examined, and its individual types differ from each other only by different drugs and methods of their administration, then regional methods (spinal and epidural) anesthesia differ in techniques, methods of conducting and many other nuances. The main advantages of such methods of anesthesia are highly effective protection of the body from surgical trauma and stress, good muscle relaxation, reduction of blood loss, and minor impact on the blood clotting system, the possibility of prolonging anesthesia and providing full postoperative anesthesia, early activation of the patient. As a result, it is reducing the number of complications [5, p. 66].

Each regional blockage is a unique combination of anatomical localization and the corresponding anesthetic: features of the needle location as a means of delivering the correctly selected pharmacological drug. Local anesthetics (etheric, amide anesthetics and their groups) are the pharmacological cornerstones of regional anesthesia. Being near the axon, they cause a temporary and complete blockage of the neural transmission. This can lead to a complete interruption of the transmission of the nerve impulse, allowing you to eliminate all types

[1]*National Research Mordovia State University; MRSU*
[2]*First Pavlov State Medical University of St. Petersburg.*
[3]*First Pavlov State Medical University of St. Petersburg.*
[4]*Peoples' Friendship University of Russia, Email ID: Neo_hero.95@mail.ru*

DOI: 10.37200/IJPR/V24I8/PR280058
Received: 19 Jan 2020 | Revised: 06 Feb 2020 | Accepted: 12 Mar 2020

of sensitivity in the area innervated by this blocked nerve fiber. Alternatively, you can use a local anesthetic in a low concentration and apply it spinal, causing selective blockage of pain without significantly affecting motor function [9, p. 25].

In the last decade, the significant development of regional methods of anesthesia is associated with the introduction of a wide clinical practice of means of delivering drugs directly to the place of their action (disposable sets for anesthesia, spinal needles with pencil-point sharpening, the use of epidural RSA, the development and improvement of the method of combined spinal-epidural anesthesia, as well as the synthesis of new highly effective and low-toxic local anesthetics (ropivacaine, levobupivacaine) [17]. In addition, the improvement of the quality of anesthesia and analgesia is largely determined by the use of adjuvants (opiates, alpha-2 agonists of adrenergic receptors, benzodiazepines, etc.) [6, p. 3].

A certain contribution to the development of regional blockades was made by the widespread use of ultrasound technologies [2], since the visualization of "blind" procedures significantly increases the effectiveness and safety of anesthesia.

Currently, regional anesthesia is considered not only as a method of anesthesia during surgery and analgesia of the postoperative period, but also as a factor that has a powerful influence on the outcome of surgical treatment. In recent years, combined spinal epidural anesthesia (CSEA), which is used in thoracic [8], abdominal surgery [5], vascular operations, obstetrics and gynecology [1], and in high-risk patients [4], has become increasingly popular. There is a steady increase in the frequency of regional blockades in pediatric practice [2; 3].

Let's turn to the examination of clinical and anatomical materials, scientific experience in the use of regional anesthesia in practice.

II. MATERIALS AND METHODS

The data on the use of regional anesthesia of the brachial plexus with interplotinal access for arthroscopic operations on the shoulder joint, obtained by a group of authors of the national medical research center of traumatology and orthopedics and the Federal State Medical Academy of the Russian Federation in honor of N.N. Priorov of Administrative Department of President [7], were used as the material for the work.

The examination included 60 patients who underwent planned arthroscopic surgery on the shoulder joint. Patients were randomly assigned to regional anesthesia, either once or for an extended period. On the eve of surgery and 30 minutes before the patient's arrival in the operating room premedication was performed with benzodiazepine-type Diazepam (Relanium). After the patient was admitted to the operating room, the peripheral vein was catheterized, and a 500 ml infusion of a crystalloid solution was performed.

Standard patient monitoring included: indirect measurement of blood pressure, heart rate (HR), electro-cardiography (ECG), respiratory rate, blood oxygen saturation (SpO2). As a preemptive analgesia, patients of all groups received intravenous infusion of Paracetamol (Perfalgan) 1 gr in combination with intravenous administration of Ketorolac (Ketorol) 30 mg before the introduction of anesthesia. Regional anesthesia of the brachial plexus was performed using ultrasound navigation in all patients. A linear ultrasonic sensor with a frequency of 12 MHz was used. After treatment of the skin with an antiseptic solution, in the position of the patient on the back with the head turned in the opposite direction from the place of blockade, the main vessels

DOI: 10.37200/IJPR/V24I8/PR280058
Received: 19 Jan 2020 | Revised: 06 Feb 2020 | Accepted: 12 Mar 2020

were determined on the neck, which are represented as a pulsating internal carotid artery and a compressible internal jugular vein.

After that, the sensor is shifted lateral to the moment of detection of the anterior and middle scalene muscles. Then a 50 mm insulated needle for conductive anesthesia (Stimplex, Bbraun, Germany) was applied to the trunks of the brachial plexus C6-C7 using in-plane technology (the needle is located in the field of the ultrasonic beam). Before the introduction of a local anesthetic, a mandatory aspiration test was performed . Then, 10 ml of 0.5% ropivacaine solution (Naropin, AstraZeneca AB, Sweden) was administered to patients of both groups.

In group I patients, after performing the blockage, the needle was removed and an aseptic sticker was applied . Group I I patients were placed on a catheter f or prolonged analgesia after the block age. After visual ultrasound control of the correct position of the catheter, the latter was fixed on the skin with a band-aid. For prolonged anesthesia, an elastomeric pump (Vogt Medical, Germany) was used with different rates of local anesthetic administration (2-10 ml/hour).

All operations were performed under combined endotracheal anesthesia: introductory anesthesia-Diprivan (Propofol) in a dosage of 1.5-2.5 mg / kg, narcotic analgesic fentanyl in a dosage of 0.2-0.4 mg, non-depolarizing muscle relaxant cisatracuria bezilat (Nimbex) in a dosage of 0.15 mg/kg.after induction, orotracheal intubation of the trachea was performed. Artificial lung ventilation was performed by an anaesthetic device LEON Heinen+Lowenstein GmbH (Germany). Anesthesia was maintained with the inhalation anesthetic sevofluran (Sevoran, Abbott Laboratories, UK) along a semi-closed circuit at low flow.

After the end of the operation, systemic anesthesia was administered to patients of all groups by prescribing paracetamol (perfalgan) 1 g 2 times a day in combination with ketorol (Ketorol) 30 mg 3 times a day. Group II patients were anesthetized by constant infusion of 0.2% ropivacaine solution through an established catheter. If the combination of non-opioid analgesics was ineffective (first line), pain relief was supplemented with the appointment of opioid analgesics. A 2% solution of Trimeperidine (Promedol) was used as a narcotic analgesic.

Statistical processing of the results by the authors was carried out using the program Statistica-6 (StatSoft Inc., USA). The measure of the Central trend was the arithmetic mean M, the dispersion measure was the mean square deviation σ, and the standard error was m. The Student's test was used to determine the validity. The confidence level was recognized when an error was $p < 0.05$.

III. RESULTS

The effectiveness of regional anesthesia of the brachial plexus with inter- lumbar access in arthroscopic operations on the shoulder joint was evaluated by S. V. Krylov and co-authors according to the measurement of the pain threshold at rest and during movement, the number of prescribed narcotic analgesics, side effects from opioid analgesics and regional anesthesia [7].

When assessing the level of rest pain in the study groups, significant differences were found in patients of groups I and II (table . 1).

DOI: 10.37200/IJPR/V24I8/PR280058
Received: 19 Jan 2020 | Revised: 06 Feb 2020 | Accepted: 12 Mar 2020

Table 1 Dynamics of the level of pain at rest

Group of patients	**Postoperative period**	**6 hours**	**12 hours**	**24 hours**	**48 hours**
I(n=30)	0,8±0,3	1,1±0,6	3,3±0,5	3,7±0,4	3,5±0,5
II(n=30)	0,7±0,2	0,9±0,3	1,2±0,3*	1,1±0,3*	1,1±0,4*

** - p < 0.05 compared to group I indicators at this time stage*

Examination of indicators of pain level during movement allows us to note significantly higher indicators in patients of group I, in comparison with patients of group II (table .2).

Table 2 Dynamics of pain level during movement

Group of patients	**Postoperative period**	**6 hours**	**12 hours**	**24 hours**	**48 hours**
I(n=30)	0,9±0,2	1,2±0,7	4,2±0,9	3,9±0,5	4±0,7
II(n=30)	0,7±0,2	1,1±0,5	1,5±0,5*	1,3±0,5*	1,3±0,5*

** - p < 0.05 compared to group I indicators at this time stage*

Low indicators of the level of pain at rest and when moving in patients with prolonged conductor analgesia indicate that there are no indications for the appointment of narcotic analgesics. However, despite the minimally invasive arthroscopy, patients in the postoperative period experience a pain syndrome that requires the appointment of opioid analgesics in the postoperative period. This fact allows us to conclude that the use of extended conductor analgesia can be used as the main analgesic component in patients after arthroscopic operations on the shoulder joint [15].

Undoubtedly, opioid analgesics have the maximum analgesic effect , but their use may be accompanied by the development of undesirable side effects [14]. The dosage and frequency of opioid analgesics in the postoperative period is shown in table 3.

Table 3 Number of prescribed narcotic analgesic in the postoperative period

Medication	**Group**	
	I (n=30)	**II(n=30)**
Trimeneridine 2%, mg / kg	0,7±0.2	-
The multiplicity of purposes, times	2,7±0,7	-

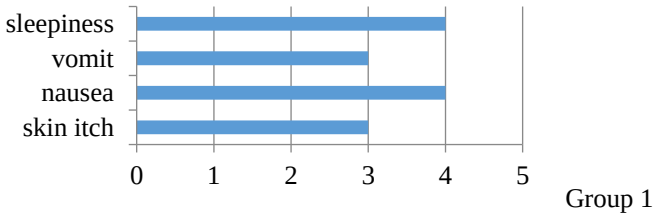
As it can be seen from the data in table 3, group I patients required a greater total amount of the prescribed narcotic analgesic in the postoperative period, while group II patients did not require any drug analgesic during

DOI: 10.37200/IJPR/V24I8/PR280058
Received: 19 Jan 2020 | Revised: 06 Feb 2020 | Accepted: 12 Mar 2020

all time intervals of the examination. As for the multiplicity of opioid analgesics, patients in group I were required to prescribe a narcotic analgesic 2.7±0.7 times in order to relieve pain.

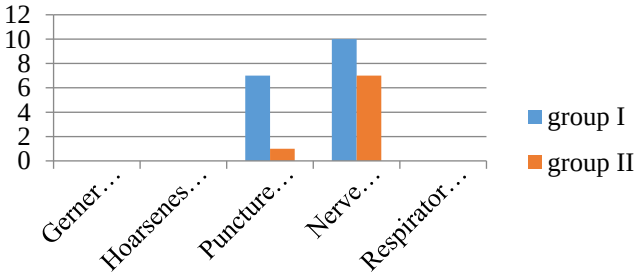
From the presented data, it can be concluded that the use of extended conductor analgesia in the postoperative period allows implementing the principle of "no-opioid" analgesia.

It should be mentioned that increasing the amount of narcotic analgesic prescribed increases the risk of complications. Complications from opioid analgesics were observed only in group I patients (Pic. 1).



Pic. 1 Complications from prescription of narcotic analgesics in the postoperative period

The use of ultrasound, atraumatic needles, and guide anesthesia kits allowed to minimize the percentage of complications during regional anesthesia (Pic. 2).



Pic. 2 Complications of regional anesthesia

As can be seen from the data in figure 2, the development of complications from regional anesthesia is higher in the first group of patients. One of the most serious complications of regional anesthesia of the brachial plexus with intercostal access is a blockage of the diaphragmatic nerve, and one patient did not develop respiratory disorders, since it is known that the use of ultrasound support and a decrease in the volume and concentration of local anesthetic are methods of preventing the development of this complication [13]

IV. DISCUSSION

The results of the presented clinical and anatomical materials on the use of regional anesthesia in practice indicate the advantages of using extended conduction anesthesia compared to a single blockade. The use of extended conduction anesthesia reduces the number of narcotic analgesics prescribed in the postoperative period after arthroscopic surgery on the shoulder joint. This, in turn, reduces the frequency of side effects from the use of regional anesthesia.

DOI: 10.37200/IJPR/V24I8/PR280058
Received: 19 Jan 2020 | Revised: 06 Feb 2020 | Accepted: 12 Mar 2020

V. CONCLUSION

The tested clinical experience allows us to note that epidural analgesia significantly reduces the frequency of postoperative myocardial infarctions, significantly reduced the frequency of shunt thrombosis, and repeated operations. The incidence of deep vein thrombosis in patients operated on the lower extremities under spinal and epidural anesthesia is 21% lower compared to those who underwent similar interventions under general anesthesia. In addition, it is noted that thromboembolic complications developed against the background of EA do not have a fatal character [10].

It was found that the use of regional anesthesia allowed for a 50% reduction in mortality in hip operations and 25-50% lower than in General anesthesia in hip operations. The authors, who have experience of about 8,000 total hip replacement operations under epidural anesthesia, showed that the mortality rate for these operations was 0.1%, and the incidence of deep vein thrombosis in the lower extremities was 2-3% compared to 10% when using General anesthesia [16].

The frequency of neurological complications in General does not exceed 0.3–0.5%, and such a complication as post-functional syndrome occurs in 4-5% of cases [11]. Infectious complications are now also extremely rare. Thus, the frequency of epidural abscesses was estimatedas 1: 60 000, and meningitis-1:40 000). It is noteworthy that the evaluation of more than 50,000 anesthetics did not reveal any infectious complications at all [5].

When using long-term epidural analgesia, according to foreign sources, pulmonary complications developed after abdominal operations in 10.4%, without epidural analgesia-16.7%, after thoracic surgery - in 14.6% and 31.1%, respectively [12].

In order to avoid complications, and primarily neurological, it is advisable to enter a mandatory indication in the annotation about the possibility of using this drug for neuraxial blockages, as well as a list of stabilizers that are part of the solution.

It should be noted that the use of disposable tools, modern local anesthetics, and compliance with the rules of asepsis and antiseptics reduces the number of complications to a minimum.

So, summing up the presented scientific experience and medical practice in the field of regional anesthesia, it should be noted that the ease of implementation by a specialist, availability and versatility give every reason to recommend it as an effective method of anesthesia in the intra - and postoperative period, both in its "pure" form, and as a component of anesthetic support.

REFERENCES

1. Bautin A. E. Regional anesthesia in pregnant women with concomitant diseases of the cardiovascular system / A. E. Bautin, Yu. N. Belskikh, V. V. Moskalenko, etc. / / Translational medicine. - 2019. - No. 6. - Pp. 29-39.
2. Zabolotsky D. V. Prolonged local anesthesia in children with orthopedic pathology. Abstract. dis .of professor of med. sciences'. SPb., 2015. - 40 s.
3. Zabolotsky D. V. Child and regional anesthesia-Why? Where? and How? / D. V. Zabolotsky, V. A. Koryachkin / / Regional anesthesia and treatment of acute pain. - 2016. - No. 10(4). - Pp. 243-253.
4. Koryachkin V. A., Zabolotsky D. V., Kuzmin V. V., and others. Anesthesiological support for fractures of the proximal femur among the elderly patients (clinical recommendations). Regional anesthesia and treatment of acute pain. - 2017. - No. 11(2). - Pp. 133-142.

DOI: 10.37200/IJPR/V24I8/PR280058
Received: 19 Jan 2020 | Revised: 06 Feb 2020 | Accepted: 12 Mar 2020

5. Koryachkin V. A., Zabolotsky D. V., Regional methods of anesthesia in surgical anesthesia. Medicine: theory and practice. - 2018. - No. 4. - Pp. 65-69
6. Koryachkin V. A. Regional anesthesia and adjuvants how long to wait? // Regional anesthesia and treatment of acute pain. - 2017. - No. 1. - Pp. 3-4.
7. Krylov S. V. Choice of the method of using regional anesthesia of the brachial plexus with interplastic access in arthroscopic operations on the shoulder joint / S. V. Krylov, I. N. Pasechnik, M. V. Kapyrina, etc. / / Ural medical journal. - 2019. - No. 7 (175). - Pp. 138-144.
8. Orlov M. M. Combined anesthesia for lung resection / M. M. Orlov, E. V. Nedashkovsky, A. E. Rakhov, etc. / / Bulletin of anesthesiology and resuscitation. - 2018. - 15(1). - From 32-39.
9. Rafmell D. P. Regional anaesthesia: The Essentials in anesthesiology. - Moscow: Medpressinform, 2015. - 272 p.
10. Chebanov K. O. Experience in applying various methods of combined spinal-epidural anesthesia during reconstructive operations on the arteries of the lower extremities / K. O. Chebanov, E. N. Kligunenko, S. P. Novikov / / Medicine of emergency conditions. - 2018. - No. 6 (93). - Pp. 99-102
11. Horlocker T.T. Infectious complications of regional anesthesia / Horlocker T.T, Wedel DJ // Best Pract Res ClinAnaesthesiol. - 2018. - No. 22(3). - P. 451-75.
12. H Kehlet Multimodal strategies to improve surgical outcome / H. Kehlet, DW. Wilmore / / Am J Surg. - 2016-No. 183(6) - P. 630-41.
13. Lee J. H. Ropivacaine for ultrasoundguidedinterscalene block: 5 mL provides similar analgesia but less phrenic nerve paralysis than 10 mL / J. H. Lee, S. H. Cho, S. H. Kim [et al.] //Can J Anesth. - 2011. - no. 58. - P. 1001-1006.
14. Levin P. The opioid epidemic: impact on orthopedic surgery / P. Levin, H. R. Mir // J Am AcadOrthop Surg. 2015. - no. 23. - P. 36-37.
15. E. A. Salviz Continuous interscalene block in patients having outpatient rotator cuff repair surgery: a prospective randomized trial / E. A. Salviz, D. Xu, A. Frulla [et al.] // Anesth. Analg. - 2013. - No. 117 (6). - P. 1485-1492.
16. Sharrock N.E. Hypotensive epidural anaesthesia for total hip arthroplasty / N.E. Sharrock, E. A. Salvati / / ActaOrthop. Scand. - 1996. - No. 67 (1.1). - P. 91-107.
17. Brown B. Regional anesthesia B. [Electronic resource]. - Access mode-URL: https://www.mediteczt.ru/docs/regionarnaia_anesteziia.pdf (accessed 03.03.2020).
18. Bansal, S.K., Saxena, V., Kandpal, S.D., Gray, W.K., Walker, R.W., Goel, D.The prevalence of hypertension and hypertension risk factors in a rural Indian community: A prospective door-to-door study(2012)Journal of Cardiovascular Disease Research, 3 (2), pp. 117-123.
19. DOI: 10.4103/0975-3583.95365
20. Sohrabi, Y., Rahimi, S., Nafez, A.H., Mirzaei, N., Bagheri, A., Ghadiri, S.K., Rezaei, S., Charganeh, S.S.Chemical coagulation efficiency in removal of water turbidity(2018) International Journal of Pharmaceutical Research, 10 (3), pp. 188-194.
21. Kalaivani Selvaraj, Girija Sivakumar, Vishnu Priya Veeraraghavan, Vijaya S Dandannavar, Geetha Royapuram Veeraraghavan, Gayathri Rengasamy. "Asparagus Racemosus - A Review." Systematic Reviews in Pharmacy 10.1 (2019), 87-89. Print. doi:10.5530/srp.2019.1.14

DOI: 10.37200/IJPR/V24I8/PR280058
Received: 19 Jan 2020 | Revised: 06 Feb 2020 | Accepted: 12 Mar 2020