

THE COMPARISON OF THE EFFECTIVENESS OF THE VARIOUS METHODS OF PAIN MANAGEMENT AFTER ABDOMINAL OPEN SURGERY

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СРАВНИТЕЛЬНАЯ ХАРАКТЕРИСТИКА РАЗЛИЧНЫХ МЕТОДОВ ОБЕЗБОЛИВАНИЯ ПОСЛЕ ОТКРЫТЫХ АБДОМИНАЛЬНЫХ ХИРУРГИЧЕСКИХ ВМЕШАТЕЛЬСТВ

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Цель работы: Целью исследования является сравнение эффективности различных методов послеоперационной анальгезии.

Дизайн, материалы, методы: В исследовании приняли участие 38 больных мужского пола после открытого хирургического вмешательства на абдоминальной части аорты, все они прошли стандартный предоперационный осмотр, наркоз и интенсивную терапию. Было проведено сравнение 3 групп. Первой группе проводилась эпидуральная анальгезия ропивокаином. Второй группе проводились билатеральные прямые послойно блокады ропивокаином. Третьей – введение лидокаина. Оценивались параметры системной гемодинамики, данные измерения размера зрачков, шкалы анальгезии, эмоционального и неврологического статуса (VAS, Wong-Baker, SF-36, MMSE, HADS), ноцицептивного индекса ANI-монитором. Нами были использованы непараметрические критерии, такие как U-тест Манна Уитни, тест Уилкоксона для статистического анализа с одной пробой.

Результаты. Инфузионная терапия прекращалась через 12 ч. во 2-й группе, в 1-й и 3-й группах – инфузия была нужна в объеме 6-12 мл / кг ($p < 0,01$). Современные исследования показывают, что все методы анальгезии эффективны и связаны со снижением оценки боли по VAS. В других группах выявлены преимущественно брадикардия и гипотензия. Два пациента с 1-й группы получили эпидуральные гематомы. Метод анальгезии не имел положительного влияния на продолжительность пребывания в отделении интенсивной терапии и пребывания в стационаре ($7,1 \pm 2,9$). Осложнения негативно повлияли на продолжительность пребывания в отделении интенсивной терапии и длительность пребывания в стационаре (23 ± 9 дней).

Выводы. Эпидуральная анальгезия является «золотым стандартом», но пациенты с сердечно-сосудистыми заболеваниями, которые принимают антиагрегантную и антикоагулянтную терапию, нуждаются в альтернативных методах анальгезии. Все методы обезболивания являются эффективными и связаны со снижением оценки боли по шкале VAS. В целом, мультимодальный подход может применяться в лечении послеоперационной боли (+ билатеральные прямые послойные блокады), поскольку он имеет незначительное количество побочных эффектов. Билатеральный прямой послой-

ный блок является простым методом. Субъективная оценка болевого синдрома не совпала с объективными критериями.

Ключевые слова: послеоперационная анальгезия, эпидуральная анальгезия, билатеральный прямой послыйный блок, лидокаин, лапаротомия.

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Objectives: The goal of the study is comparing the comparison of the effectiveness of various methods of postoperative analgesia.

Design, Materials, Methods: the study was included 38 male patients after open abdominal aortic surgery, all of them underwent the standard pre-procedure examination, anesthesia and intensive care (IC). There were 3 comparable groups. The first group included the epidural analgesia by ropivocain. The second group was bilateral rectus sheath blocks by ropivocain. The third one was the intravenous infusion of lidocaine. We evaluated the system of hemodynamic parameters, the data of pupillometry, several scales of analgesia, emotional and neurological status (VAS, Wong-Baker, SF-36, MMSE, HADS), nociceptional index by ANI-monitors. We used non-parametrical criteria such as Mann Whitney U-test, one-sample Wilcoxon test for the statistical analysis.

Results. Fluid therapy has been discontinued after 12h in the 2nd group, 1st and 3rd groups – fluid administration was needed of 6-12 ml/kg ($p<0,01$). Current study show that all method analgesia is effective and associated with decrease VAS pain scores. We found predominantly bradycardia and hypotension in other groups. Two patients from the 1st group got epidural hematomas. Method analgesia did not have a positive impact on length of intensive care unite and of hospital stay ($7,1\pm 2,9$). Complications had negative effect on length of intensive care unite and of hospital stay (23 ± 9 days).

Conclusions. Epidural analgesia is «Gold standard», but patients with cardiovascular disease are used antiplatelet and anticoagulant therapy to needed of alternative methods analgesia. All method analgesia is effective and associated with decrease VAS pain scores. Overall, a multimodal analgesic (+Bilateral rectus sheath blocks) approach may be used when treating postoperative pain, as it has few side effects. Bilateral rectus sheath block is simple method. The subjective evaluation of pain syndrome did not match with the objective criteria.

Key words: postoperative analgesia, epidural analgesia, bilateral rectus sheath block, lidocain, laparotomy.

Background. Despite many methods and analgesics are used to treat postoperative pain after open abdominal surgery, this is the actual problem today. About 80% of postoperative pains has been poorly managed, persistent postoperative pain is common of different intensity on the first day after surgical procedures, about 11% of patients may experience severe postoperative pain [1]. 20-40% of patients mobility reported pain more than 4 by numeric rating scale [2]. Chronic pain will be able to develop if acute pain is inadequate management on the first day after surgery [3]. Severe pain is associated hypertension, heart rhythm disorders, sinus tachycardia it is dangerous for patients with ischemic heart disease [4]. Epidural analgesia remains for postoperative

pain «Gold Standard», it leads to reductions in pain scores and does have a positive effect on bowel function, the occurrence of ileus, but it associated risks for severe complications (neurological, potential hypotension) [5,6]. Opioid analgesia, intravenous infusion of lidocaine, bilateral rectus sheath blocks for the management of pain in patients are alternative to epidural analgesia. The mechanism by which intravenous lidocaine provides analgesia this prevents the neo-proliferation of active sodium channels and blocks their spontaneous firing, reduces activity of spinal cord neurones, decreases NMDA receptor-mediated post-synaptic depolarization [7]. Intravenous lidocaine after surgery improved postoperative pain scores, opioid requirements in the care unit were not reduced, did not have any effect on bowel function [8]. Bilateral rectus sheath blocks do have a positive effect on bowel function, the occurrence of ileus, a decrease in early and late opioid consumption, reduces the length of hospital stay and useful for enhanced recovery, pain scores were decreased at rest and with activity 24 h after surgery [9]. Opioid analgesia associated with increased mortality in 2,9 times and increase the length of hospital stay [10]. There is no consensus for postoperative analgesia and acute pain management. The aim of this study was to compare the efficiency of different methods of analgesia.

Materials, methods. The abstract on the current prospective study, this study was approved the local ethics committee, all patients signed a consent. The study was in-

Table 1

Baseline patient characteristics, M±σ

Parameter	EA, n=13	BRSB, n=14	IL, n=11
Age, years	60,9±11,6	61,4±11,9	58,9±12,7
<i>Surgical procedure:</i>			
ABF, n (%)	6 (46)	6 (43)	5 (45)
AAA, n (%)	7 (53)	8 (57)	6 (54)
<i>Comorbidity*:</i>			
IHD, n (%)	9 (69)	11 (78)	8 (72)
AF, n (%)	4 (30)	3 (21)	3 (27)
Stenosis of the ICA (≥50%), n (%)	9 (69)	10 (71)	8 (72)
Diabetes mellitus, n (%)	5 (38)	6 (43)	5 (45)
COPD, n (%)	10 (77)	11 (78)	7 (63)
CKD (RIFLE I-II), n (%)	4 (30)	4 (28)	3 (27)
β-blocks, n (%)	11 (84)	11 (78)	9 (82)
ACE Inhibitor, n (%)	8 (61)	8 (57)	6 (54)
Surgery duration (minute)	225±65	232±69	230±72
Cross clamping, minute	37±11	33±12	31±14
Infusion intraoperative, ml/kg	7,2±4,2	6,9±3,6	7,15±4,1

Note. p>0,05. List EA-epidural analgesia, BRSB – bilateral rectus sheath blocks, IL – infusion of lidocaine, ABF – aortobifemoral bypass, IHD – Ischemic heart disease, AF – atrial fibrillation, ICA – internal carotid artery, COPD – chronic obstructive pulmonary disease, AAA open surgery – abdominal aortic aneurysm open surgery, CKD – chronic kidney disease, RIFLE classification, ACE – angiotensin-converting-enzyme.

Table 2

Hemodynamic parameters, vassopressors support and intravenous administration at the stages of the study, M [10%,90%]

	waking				6 h				12 h				24 h						
	EA n=13	BRSB n=14	IL n=11	EA n=13	BRSB n=14	IL n=11	EA n=13	BRSB n=14	IL n=11	EA n=13	BRSB n=14	IL n=11	EA n=13	BRSB n=14	IL n=11	EA n=13	BRSB n=14	IL n=11	
BP	112 [94-123]	111,5 [92,5-125,5]	115 [98-125]	115 [94-125]	117 [104,5-130]	115 [98-125]	110 [95-123]	120 [110-130]	120 [115-135]	112 [94-125]	121 [114-136]	120 [115-135]	112 [94-125]	121 [114-136]	125 [120-137]				
HR	69 [60-80]	69 [62-79]	64 [49-70]	69 [61-77]	69,9 [62-79]	62 [49-70]	69 [60-80]	69 [62-79]	60 [50-65]	65 [59-70]	69 [65-78]	60 [50-65]	65 [59-70]	69 [65-78]	60 [50-65]				
CVP	3 [1-4]	5 [4-7]	5 [4-6]	3 [1-5]	5 [4-6]	5 [4-6]	3 [3-5]	6 [4,5-7]	5 [4-7]	3 [2-4]	5 [4-6]	5 [4-7]	3 [2-4]	5 [4-6]	4 [3-6]				
Infusion	12 [8-17]	7 [4-10]	7 [3-10]	6 [2-10]	4 [2-5]	5 [2-6]	5 [2-6]	0*	4 [2-5]	9 [5-10]	0*	4 [2-5]	9 [5-10]	0*	5 [2-7]				
Norepi- nephrine	0,07 [0,04-0,1]	0*	0,075 [0,05-0,1]	0,07 [0,04-0,1]	0*	0,08 [0,05-0,1]	0,07 [0,06-0,1]	0*	0,035 [0,01-0,06]	0,04 [0,03-0,04]	0*	0,035 [0,01-0,06]	0,04 [0,03-0,04]	0*	0,03 [0,03-0,03]				

Note. * p<0,05 compare between groups. BP – blood pressure, HR – heart rate, CVP – central venous pressure.

cluded 38 male patients after open abdominal aortic surgery. Inclusion criteria: Patients with atherosclerotic disease, after arterial endovascular revascularization (more than 30 days before surgery). Exclusion criteria: age <25 years; dual antiplatelet therapy; patients with history of any degree of heart block, heart failure, seizure disorder, impaired liver and renal function, patient refusal of treatment, allergy to anesthetic agent, decompensated diabetes, emergency open abdominal aortic surgery. All patients were receive our standardized protocols: pre-operative assessment, anesthesia, intensive care after surgery. Basic analgesics are used to treat postoperative pain after open abdominal surgery: paracetamol 3 gr/day i.v. (every 8 h) + tramadol 100 mg i.m. in needed. All patients was randomized in blind fashion: 1st group is epidural analgesia – ropivacaine 0,2% 4-12 ml/h (n=13), 2nd is bilateral rectus sheath blocks – ropivacaine 0,2% 3 mg/day every 4 hours (n=14), 3rd intravenous infusion of lidocaine 1mg/kg with 0,5-2 mg/kg/h after that (n=11). Groups are equal in clinical characteristics ($p>0,05$) (Tab.1). Hemodynamic parameters (heart rate, blood pressure), scores (the visual analogue scale, Wong-Baker, SF-36, MMSE, HADS) were evaluated. ANI-monitoring was used in 22 cases (n=7 in 1st и 3rd groups, и n=8 in 2nd). Non-parametric statistics were used for statistical analysis (Mann-Whitney-Wilcoxon test). Results are presented in mediana.

Results. Tracheal extubation was performed of all patients after surgery immediately without complications. Hemodynamic parameters did not have statistical significance, but 2nd group did not require vassopressors (tab.2). Fluid therapy has been discontinued after 12h in the 2nd group, 1st and 3rd groups – fluid administration was needed of 6-12 ml/kg ($p<0,01$).

Current study show that all method analgesia is effective and associated with decrease VAS pain scores. (tab.3).

ANI (27 ± 10) was in the 3rd group at the first 6 h and this increased tramadol consumption 28,6% (fig.1). Hemodynamic responses to evoked pain were behind nociception and this is demonstrated ANI monitoring (Figure 1).

Moreover, there were no any complications in the 2nd group. However, we found predominantly bradycardia and hypotension in other groups. Two patients from the 1st group got epidural hematomas. First case, the patient required dialysis for acute kidney injury and myoglobinemia. The epidural hematoma was diagnosed with magnetic resonance imaging. The patient was urgently taken up for surgical evacuation of the hematoma. Second case, epidural catheter was removed difficult. The epidural hematoma was not diagnosed with magnetic resonance imaging. The patient did not have neurological symptoms and treatment was not needed. Method analgesia did not have a positive im-

Table 3

The degree and tolerance of the pain in groups (Visual-analogue scale, points)

	1st day			2nd day		
	EA n=13	BRSB n=14	IL n=11	EA n=13	BRSB n=14	IL n=11
Degree of pain	0 [0-1]	1 [0-3]	2 [0-3]	1 [0-3]	1 [0-2]	1,9 [1-3]
Tolerance of pain	0 [0-1]	0 [0-3]	2 [0-4]	1 [0-1]	0 [0-1]	1,8 [0-3]

Note. $p>0,05$.

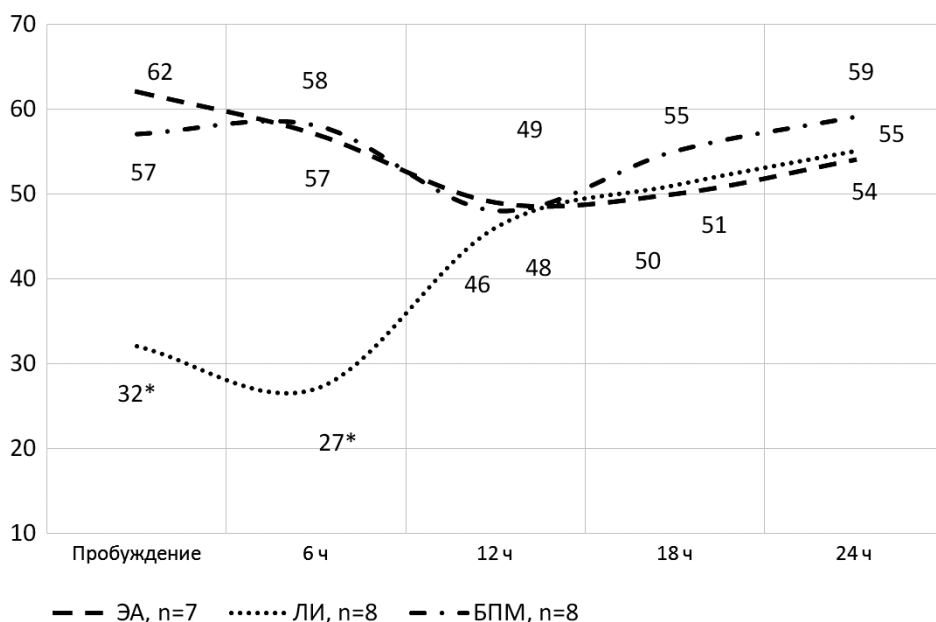


Figure 1. * – $p < 0,05$. Groups nociception index (units) in post-procedure day 1 (ANI-monitoring – Analgesia Nociception Index, MetroDoloris®, France)

pact on length of intensive care unite and of hospital stay ($7,1 \pm 2,9$). Complications had negative effect on length of intensive care unite and of hospital stay (23 ± 9 days).

Discussion. Many patients with cardiovascular disease use antiplatelet and anticoagulant therapy, this is increased of epidural hematoma risk. About 25% patients could not yield neurological improvement [11,12]. Excess fluid administration is dangerously for patients with cardiovascular disease, an fluid strategy may reduce postoperative complications [13]. Epidural analgesia was not associated with improved recovery [14]. On our opinion, the method has limitations of patients with cardiovascular disease. The last abstract did not have answer to question: does lidocain improve postoperative pain, reduce the risk of ileus, postoperative nausea and opioid consumption? [8] In our study, IL analgesia was associated with higher VAS pain scores than other methods. The adverse effects were associated to bradycardia and hypotension(4%). The subjective evaluation of pain syndrome did not match with the objective criteria[15].

Conclusions. Epidural analgesia is «Gold standard», but patients with cardiovascular disease are used antiplatelet and anticoagulant therapy to needed of alternative methods analgesia. All method analgesia is effective and associated with decrease VAS pain scores. Overall, a multimodal analgesic (+Bilateral rectus sheath blocks) approach may be used when treating postoperative pain, as it has few side effects. Bilateral rectus sheath block is simple method. The subjective evaluation of pain syndrome did not match with the objective criteria. This may be associated to different of reasons and psychoemotional stress. At this time, there is clinical trial and initial results will be confirmed of immuno-biochemical analyses.

The study limitations: monocenter study, small sample size, same anesthetic team.

Competing interests: The authors declare no competing interests

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