Received: 14 October 2022 / Accepted: 11 February 2023 / Published online: 28 February 2023

DOI 10.34689/SH.2023.25.1.013

UDC 616 – 089.168.1

TRANSVERSUS ABDOMINIS PLANE BLOCK AFTER LAPAROSCOPIC SURGERY AND LAPAROTOMY COMPARED WITH OPIOID ANALGESIA

Rinat Ashzhanov[1], Daulet Mamyrov[1], Marat Syzdykbayev[2], Yoshihiro Noso[3], Olga Tashtemirova[4], Assem Ashzhanova[4], Anton Sheinin[5]

[1] Pavlodar branch of the JSC «Semey Medical University», Department of Emergency Medicine, Pavlodar, the Republic of Kazakhstan;
[2] JSC «Semey Medical University», Department of Hospital Surgery, Anaesthesiology and Reanimatology, Semey, theRepublic of Kazakhstan;
[3] Hiroshima International University, Department of Health Services Management, Hiroshima, Japan;
[4] Pavlodar branch of the JSC «Semey Medical University», Department of Surgery, Pavlodar, the Republic of Kazakhstan;
[5] Tel-Aviv University, Sagol School of Neuroscience, Tel-Aviv, Israel.

Abstract

Actuality. Adequate postoperative analgesia is essential for successful recovery after laparoscopic surgery and laparotomy. Opioids are commonly used to treat severe postoperative pain, and their use is often associated with many dose-dependent side effects such as nausea, vomiting, constipation, ileus, and respiratory depression]. Thus, a reduction in the administration of opioids is highly desirable, and multimodal forms of postoperative anesthesia are preferred. For this reason, the blockade of the transverse plane of the abdomen has received much attention.

Aim of this study was to evaluate the effectiveness of TAP blockade after laparoscopic surgery and laparotomy and compare it with standard systemic anesthesia.

Materials and methods of research: We analyzed the results of pain relief in 120 patients who underwent laparoscopic surgery or laparotomy and were divided into two equal (n=60) groups. One group received bipolar TAP block in the early postoperative period (within the first 24 hours). In addition, patients in this group also received intravenous administration of ketonal. The second group received the standard systemic administration of the narcotic analgesic Promedol and Ketonal during the first day after the operation.

Statistical significance was determined using unpaired two-tailed Student's t-test. Statistical processing of the material was carried out using the software package Statistica v. 7.0.

Results: The assessment of pain in the first 24 hours after surgery using the visual analog scale (VAS) did not reveal significant differences between the groups, except for the assessment after 5 hours, where the difference between the groups was significant ($p < 0.05$). Patient satisfaction with anesthesia, assessed on the Likert scale, did not reveal significant differences between the groups. Similarly, assessments of surgeons' satisfaction with anesthesia did not reveal a significant difference between the groups. We did not find any statistical differences in heart rate, systolic and diastolic blood pressure between the two experimental groups. We also assessed the volume of systemic analgesics used in the first 24 hours after surgery. Ketonal was used in both groups at 400 mg ($p>0.5$). Promedol was used only in the group of narcotic analgesics 44.50 ± 7.4 mg ($p<0.001$).

Conclusion: Based on these results, we suggest that multimodal analgesia in the form of bipolar TAP blockade in combination with intravenous administration of ketonal provides adequate anesthesia in the postoperative period, comparable to standard systemic administration of opioids and ketonal.

Keywords: *transversus abdominis plain (TAP) block, postoperative analgesia, opioid analgesia, laparoscopy, laparotomy, bupivacaine, ketonal.*

Резюме

БЛОКАДА ПОПЕРЕЧНОЙ ПЛОСКОСТИ ЖИВОТА ПОСЛЕ ЛАПАРОСКОПИЧЕСКОЙ ОПЕРАЦИИ И ЛАПАРОТОМИИ В СРАВНЕНИИ С ОПИОИДНОЙ АНАЛЬГЕЗИЕЙ

Ринат Ашжанов[1], Даулет Мамыров[1], Марат Сыздыкбаев[2], Йосихиро Носо[3], Ольга Таштемирова[4], Асем Ашжанова[4], Антон Шейнин[5]

[1] Павлодарский филиал НАО «Медицинский университет Семей», Кафедра скорой медицинской помощи, г. Павлодар, Республика Казахстан;
[2] НАО «Медицинский университет Семей», Кафедра госпитальной хирургии, анестезиологии и реаниматологии, г. Семей, Республика Казахстан;
[3] Международный университет Хиросимы, Кафедра управления службами здравоохранения, Хиросима, Япония;

[4] НАО «Медицинский университет Семей», Кафедра хирургии Павлодарского филиала, г. Павлодар, Республика Казахстан;
[5] Тель-Авивский университет, Школа Нейронаук им.Саголь, г.Тель-Авив, Израиль.

Резюме

Актуальность. Адекватная послеоперационная анальгезия необходима для успешного восстановления после лапароскопической операции и лапаротомии. Опиоидные препараты обычно используются для лечения сильной послеоперационной боли, их использование часто связано со многими дозозависимыми побочными эффектами, такими как тошнота, рвота, запор, кишечная непроходимость и угнетение дыхания. Таким образом, крайне желательно сокращение введения опиоидов и предпочтительны мультимодальные формы послеоперационной анестезии. По этой причине блокада поперечной плоскости живота привлекла большое внимание

Цель: оценить эффективность ТАР-блокады после лапароскопической операции и лапаротомии и сравнить ее со стандартной системной анестезией.

Материалы и методы исследования: Нами был проведен анализ результатов обезболивания 120 пациентов, подвергшихся лапароскопической операции или лапаротомии, были разделены на две равные (n=60) группы. Одна группа получила биполярную ТАР-блокаду в раннем послеоперационном периоде (в течение первых 24 часов). Кроме того, больные этой группы также получали внутривенное введение кетонала. Вторая группа получала стандартное системное введение наркотического анальгетика промедола и кетонала в течение первых суток после операции.

Статистическую значимость определяли с помощью непарного двустороннего критерия Стьюдента. Статистическую обработку материала проводили с использованием программных средств пакетов Statistica v. 7.0.

Результаты: Оценка боли в первые 24 ч после операции по визуальной аналоговой шкале (ВАШ) не выявила достоверных различий между группами, за исключением оценки через 5 ч, где разница между группами была достоверной ($p<0,05$). Удовлетворенность пациентов анестезией, оцененная по шкале Лайкерта, не выявила достоверных различий между группами. Точно так же оценка удовлетворенности хирургов анестезией не выявила существенной разницы между группами. Мы не обнаружили каких-либо статистических различий в частоте сердечных сокращений, систолическом и диастолическом артериальном давлении между двумя экспериментальными группами. Мы, также оценили объем системных анальгетиков, использованных в первые 24 часа после операции. Кетонал применяли в обеих группах по 400 мг ($p>0,5$). Промедол использовали только в группе наркотических анальгетиков 44,50 ± 7,4 мг ($p<0,001$).

Заключение: На основании приведенных результатов мы предполагаем, что мультимодальная анальгезия в виде биполярной ТАР-блокады в сочетании с внутривенным введением кетонала обеспечивает адекватную анестезию в послеоперационном периоде, сравнимую со стандартным системным введением опиоидов и кетонала.

Ключевые слова: *блокада поперечной мышцы живота, послеоперационное обезболивание, опиоидное обезболивание, лапароскопия, лапаротомия, бупивакаин, кетонал.*

Түйіндеме

ОПИОИДТІ АНАЛГЕЗИЯМЕН САЛЫСТЫРҒАНДА ЛАПАРОСКОПИЯЛЫҚ ОПЕРАЦИЯДАН ЖӘНЕ ЛАПАРОТОМИЯДАН КЕЙІН ІШТІҢ КӨЛДЕНЕҢ ЖАЗЫҚТЫҒЫНЫҢ БЛОКАДАСЫ

Ринат Әшжанов[1], Дәулет Мамыров[1], Марат Сыздықбаев[2], Йошихиро Носо[3], Ольга Таштемирова[4], Әсем Әшжанова[4], Антон Шейнин[5]

[1] «Семей медицина университет» КеАҚ Павлодар филиалы, Жедел медициналық көмек кафедрасы, Павлодар қ., Қазақстан Республикасы;
2 «Семей медицина университет» КеАҚ, Госпитальдық хирургия, анестезиология және реаниматология кафедрасы, Семей қ., Қазақстан Республикасы;
[3] Хиросима халықаралық университеті, Денсаулық сақтау қызметтерін басқару кафедрасы, Хиросима қ., Япония;
[4] «Семей медицина университет» КеАҚ Павлодар филиалы, хирургия кафедрасы, Павлодар қ., Қазақстан Республикасы;
[5] Тель-Авив университеті, Сагол Нейрология мектебі, Тель-Авив қ., Израиль.

Өзектілігі. Адекватты анальгезия лапароскопиялық операция мен лапаротомиядан кейінгі кезеңде тиімді қалпына келу үшін өте маңызды. Опиоидтер әдетте ауыр операциядан кейінгі ауырсынуды емдеу үшін қолданылады және оларды қолдану жиі жүрек айнуы, құсу, іш қату, ішек өтімсіздігі және тыныс алу депрессиясы сияқты дозаға тәуелді көптеген жанама әсерлермен байланысты. Осылайша, опиоидтарды енгізуді азайту және операциядан кейінгі анестезияның мультимодальды формаларын қолдану өте маңызды. Осы себепті іштің көлденең жазықтығының блокадасына көп көңіл бөлінеді.

Бұл зерттеудің мақсаты лапароскопиялық хирургия мен лапаротомиядан кейін ТАП- блокадасының тиімділігін бағалау және оны стандартты жүйелік анестезиямен салыстыру болып табылады.

Зерттеу материалдары мен әдістері: Біз лапароскопиялық хирургия немесе лапаротомия жасалған және екі тең (n=60) топқа бөлінген 120 науқаста ауырсынуды басу нәтижелерін талдадық. Бір топ операциядан кейінгі ерте

кезеңде (алғашқы 24 сағат ішінде) биполярлы ТАП блокадасын алды. Сонымен қатар, осы топтағы емделушілерге кетонал көктамыр ішіне енгізілді. Екінші топ операциядан кейінгі алғашқы тәулікте есірткілік анальгетик Промедол мен Кетоналдың стандартты жүйелі қабылдауын алды.

Статистикалық маңыздылық жұпталмаған екі жақты Стьюдент критериі арқылы анықталды. Материалды статистикалық өңдеу Statistica v 7.0.бағдарламалық пакетінің көмегімен жүзеге асырылды.

Нәтижелер: Операциядан кейінгі алғашқы 24 сағатта ауырсынуды визуалды аналогтық шкала (VAS) арқылы бағалау топтар арасындағы айырмашылық айтарлықтай болған, 5 сағаттан кейінгі бағалауды қоспағанда (p<0,05). айтарлықтай айырмашылықты анықтаған, Лайкерт шкаласы бойынша бағаланған пациенттердің анестезияға қанағаттануы топтар арасында айтарлықтай айырмашылықтарды анықтаған жоқ. Сол сияқты, хирургтардың анестезияға қанағаттануын бағалау топтар арасында айтарлықтай айырмашылықты анықтаған жоқ. Біз екі эксперименталды топ арасында жүрек соғу жиілігінде, систолалық және диастолалыққан қысымында статистикалық айырмашылықтарды таппадық. Біз сондай-ақ операциядан кейінгі алғашқы 24 сағатта қолданылатын жүйелі анальгетиктердің көлемін бағаладық. Кетонал екі топта да 400 мг (p>0,5) қолданылды. Промедол есірткілік анальгетиктер тобында ғана қолданылған 44,50 ± 7,4 мг (p<0,001)

Қорытынды: Осы нәтижелерге сүйене отырып, кетоналды көктамыр ішіне енгізумен біріктірілген биполярлы ТАР блокадасы түріндегі мультимодальды анальгезия, опиоидтар мен кетоналды стандартты жүйелі енгізумен салыстыруға болатын, операциядан кейінгі кезеңде адекватты анестезияны қамтамасыз етеді деп болжаймыз.

***Түйінді сөздер**: іштің көлденең бұлшықетінің блокадасы, операциядан кейінгі анальгезия, опиоидты анальгезия, лапароскопия, лапаротомия, бупивакаин, кетонал.*

Bibliographic citation:

Ashzhanov R., Mamyrov D., Syzdykbayev M., Noso Yo., Tashtemirova O., Ashzhanova A., Sheinin A. Transversus abdominis plane block after laparoscopic surgery and laparotomy compared with opioid analgesia // *Nauka i Zdravookhranenie* [Science & Healthcare]. 2023, (Vol.25) 1, pp. 100-105. *doi 10.34689/SH.2023.25.1.013*

Ашжанов Р., Мамыров Д., Сыздыкбаев М., Носо Йо., Таштемирова О., Ашжанова А., Шейнин А. Блокада поперечной плоскости живота после лапароскопической операции и лапаротомии в сравнении с опиоидной анальгезией // Наука и Здравоохранение. 2023. 1(Т.25). С. 100-105. *doi 10.34689/SH.2023.25.1.013*

Ашжанов Р., Мамыров Д., Сыздыкбаев М., Носо Йо., Таштемирова О., Ашжанова А., Шейнин А. Опиоидті аналгезиямен салыстырғанда лапароскопиялық операциядан және лапаротомиядан кейін іштің көлденең жазықтығының блокадасы // Ғылым және Денсаулық сақтау. 2023. 1(Т.25). С. 100-105. *doi 10.34689/SH.2023.25.1.013*

Introduction

The number of laparoscopic surgical procedures has been significantly increased during the last years [1]. Laparoscopic techniques have many significant advantages, including reduced lower complication rates, reduced post-operative pain and shorted hospitalization [7]. Therefore, the laparoscopic surgery became common in abdominal and gynecologic surgeries.

The adequate postoperative analgesia is essential for the successful recovery after the laparoscopic surgery and laparotomy. While systemic opioid drugs are commonly used to manage the severe post-operative pain, their use if often associated with many dose-dependent adverse effects, such as nausea, vomiting, constipation, ileus and respiratory depression [18]. Thus, the decrease in opioid administration is highly desirable and the multimodal forms of post-operative anaesthesia are preferable. For this reason, the transversus abdominis plane (TAP) block introduced by Rafi in 2001has received a lot of attention[20]. The TAP block is a form of loco-regional anaesthesia in which anaestheticis introduced into a space between internal oblique and transversus abdominis muscles in order to "bathe" a thoracolumbar nerve originating from the T6 to L1 rootsthatarepassing in this space [3, 13, 14]. The resulting "neural field" block affects the innervation of the abdominal skin, muscles and parietal peritoneum [20]. The TAP block could be performed either by a blind "double pop" technique, based on the anatomical landmarks [3, 11, 12, 17, 20] or guided by the ultrasound navigation [8, 10, 14].The ultrasound guidance is preferred since it allows more accurate injection of the anaestheticthan the blind technique [10].

In this study, we attempted to assess the effectiveness of the bipolar TAP block during the post-operative period and compare it to the standard systemicanaesthesia. We hypothesized that the ultrasound-guided TAP block in the early post-operative period effectively reduces the pain intensity without additional administration of systemic opioid drugs.

Materials and methods

Experimental groups.

The design of the study is a randomized clinical trial. The period of the study is from 2018 to 2020 in the regional hospital of the city of Pavlodar. The study included 120 patients, both male and female, who were subjected to the laparoscopic surgery or laparotomy. The age of the patients varied from 18 to 75, the ASA physical status of all patients was either I or II. All surgeries were conducted under the general endotracheal anaesthesia. Depending on the method of the post-surgical analgesia, all patients were divided onto 2 equal groups: 1) the group inwhich the TAP blockwas performed in early post-operative period (during the first 24 hrs). In addition, the patients of this group also received the intravenous administration of the non-steroidal anti-inflammatory drug (NSAID)ketonal, total volume of 8 ml, 4 times/24 hrs. This group will be referred as "TAP" through the article. 2) the group in which the systemic administration of both narcotic analgesic (NA) promedolandketonal were used. Both promedol and ketonal

were administered intravenously 4 times/24 hrs. This group will be referred as "NA" through the article.

TAP block.

The patient was placed into the supine position. After the skin disinfection and local infiltration with 2% lidocaine, the ultrasound probe is placed in a transverse plane to the lateral abdominal wall in the midaxillary line, between the lower costal margin and iliac crest. The external oblique, internal oblique and transversus abdominis muscles were identified first. Then, the echogenic needle was introduced directly under the probe to the depth of 50-100 mm and deeper, until it reaches a space between the internal oblique and transversus abdominis muscle. The 2 ml of saline was injected slowly in order to confirm the correctness of the needle position. Then, 15 ml of local anaesthetic solution (0.5% bupivacaine HCl, or 75 mg) was injected incrementally into each side of the abdomen.

Pain assessment

The evaluation of the pain intensity was performed every hour, after 24 hrs, according to numerical visual analog scale (VAS) of pain intensity, in rest and during the movement. In addition, the following criteria were also monitored: pulse, systolic and diastolic arterial pressure, the amount of narcotic analgesic promedol used.

Statistical analysis

All data presented in the article as mean ± SEM; the statistical significance was determined by the unpaired two-tailed Student's *t*-test. All statistical tests of significance were performed using Igor Pro software (Wavemetrics, OR) and custom-written procedures. The level of significance was set to $P < 0.05$.

Results. In our study, the average age of the patients and the gender distribution of both experimental groups were similar.

The mean age in the TAB group was 45.30 ± 9.9, in the narcotic analgesics group 45.28 ± 8.1 (p> 0.5). By gender difference, respectively, in the groups - men were 53.33% and 55.0% (p> 0.5), women - 46.67% and 45.0% (p> 0.5).

The type of surgery is summarized in Table 1. Overall, 16.66% (10 patients) of each experimental group undergone the laparoscopic surgery, while the majority of the patients (83.33%, or 50 patients) undergone the laparotomy.

Table 1.

Type of surgery.

Typeofsurgery	Group with TAP anesthesia and ketonal (numberofpatients	Opioid Pain Group (numberofpatients)	p
Laparotomy			
Cholecystectomy. Sanitation and drainage of the abdominal cavity.	18	17	>0,5
Removal of a colon tumor. Stoma placement. Sanitation and drainage of the abdominal cavity.	6	6	>0,5
Imposition of gastrointestinal and inter-intestinal anastomoses	5	6	>0,5
Marsupialization of the cyst in the head of the pancreas	5	6	>0,5
Resection of 2/3 of the stomach	5	4	>0,5
Ulcerclosure	2	2	>0,5
Appendectomy. Sanitation and drainage of the abdominal cavity	7	7	>0,5
Herniarepair. Hernioplasty	2	2	>0,5
Laparoscopic cholecystectomy	10	10	>0,5
Total	60	60	

Assessment of the pain during the first 24 hrs after the surgery according to the visual analog scale (VAS) revealed no significant difference between the groups, except for the assessment after 5 hrs where the difference between the groups was significant ($p < 0.05$) (Fig. 1).

The patient satisfaction with the anaesthesia assessed according to Likert scale did not reveal any significant difference between the groups (Table 2).

Similarly, the assessment of the satisfaction of the surgeons with the anaesthesia did not reveal any significant difference between the groups (Table 3).

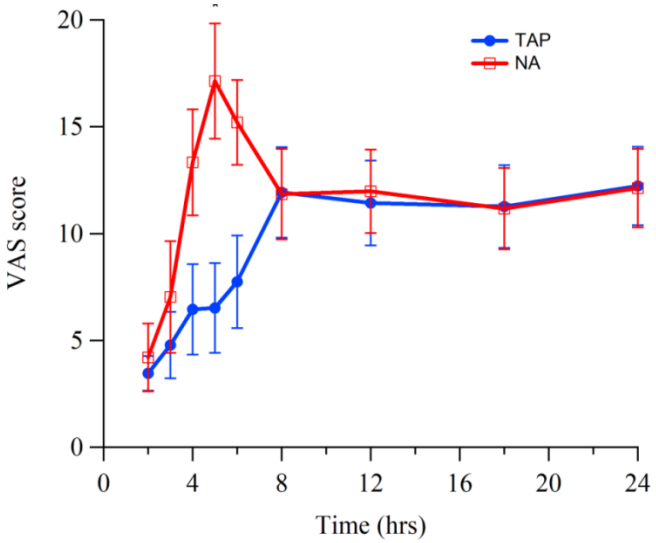

Figure 1. Assessment of the pain during the first 24 hrs after the surgery according to the visual analog scale (VAS).

Table 2.

Satisfaction of the patients with the anaesthesia.

Satisfaction of patients with the anaesthesia	Groups		
	Group with TAP anesthesia and ketonal (%)	Opioid Pain Group (%)	p
Extremely satisfied	10 (16.67)	11 (18.33)	>0.5
Very satisfied	48 (80.0)	47 (78.33)	>0.5
Satisfied	2 (3.33)	2 (3.33)	>0,5
Dis satisfied	-	-	>0.5
Verydis satisfied	-	-	>0.5
Total	60 (100%)	60 (100%)	

The heart rate and the arterial pressure were also monitored during the first 24 hrs after the surgery. Again, we did not find any statistical differences in heart rate, systolic and diastolic arterial pressure between the two experimental groups.

We also assessed the volume of systemic analgesics used in the first 24 hrs after the surgery. Ketonal was used in both groups at 400 mg (p> 0.5). Promedol was used only in the narcotic analgesic group 44.50 ± 7.4 mg (p<0.001)

Table 3.

Satisfaction of the surgeons with the anaesthesia.

Satisfaction of surgeons with the anaesthesia	Groups		
	Group with TAP anesthesia and ketonal (%)	Opioid Pain Group (%)	p
Extremely satisfied	9 (15.00)	10 (16.67)	>0.5
Very satisfied	44 (73.33)	43 (71.67)	>0.5
Satisfied	7 (11.67)	7 (11.67)	>0.5
Total	60 (100%)	60 (100%)	

Discussion

In the present study that included patients who had undergone the laparoscopic surgery or laparotomy, we found that there were no significant differences in patient self-reported pain scores amongst those who received TAP blocks in combination with the intravenous administration of ketonaland the group in which the opioids were administered systemically in the early post-operative period. The assessment of the satisfaction of patients and the surgeonswith the anaesthesia also did not reveal any significant difference between the two experimental groups. In addition, no significant differences in hemodynamic characteristics (heart rate, systolic and diastolic arterial pressure) and the post-operative oxygen saturation levels were observed between the patients who received the TAP blocks and systemic administration of narcotic analgesics. Moreover, the time of transition of the patient to the ambulatory care was not significantly different between the two experimental groups. Taken together, these findings suggest that the TAP block performed in immediate post-operative period could be as effective for managing the pain after the laparoscopic surgeries as the standard administration of opioids.

In our study, the only significant difference in pain assessment between the two experimental groups was at 5 hrs after the surgery (Fig. 1). The duration of action of the plain bupivacaine has been reported to vary in the range from 2 to 10 hrs, with the peak effect noted around 30-45 min [2]. Thus, the short duration of the TAP blocks appears to be a limitation of this method of anaesthesia. Continuousinfusionof the anaestheticthrough the indwelling catheters could potentially help to overcome this limitation [6, 19]; however, the use of the catheters may increase the risk of infections and peritonitis. Alternatively, the use of long-acting liposomal anaesthetics could seem promising for the prolongation of postsurgical analgesia [2]. Recently, it has been shown that the duration of the TAP blockade could be prolonged up to 72 hrs with the use of a liposomal bupivacaine LB [15]. One serious concern related to both continuous infusion of the anaesthetic and the long-acting liposomal anaesthetics should be noted. The plasma concentrations of the anaesthetics have been reported to reach the toxic levels after bipolar TAP blocks when 30-40 ml of anaesthetic solution are administered [5, 11, 12, 17]. Theoretically, there is a possibility that some of the TAP block effects could be attributed to the absorption of the anaesthetic. Thus, the research of the pharmacokinetic parameters of TAP blockade appears to be the important condition for the routine use of TAP blocksin the near future.

TAP blocks are generally considered safe procedures [9, 22], especially when performed under the ultrasound guidance. The use of ultrasound allows visualization of the walls of the plane in which the anaesthetic solution is injected, as well as the injecting needle and the spread of local anaesthetic. As a result, the anaesthetic solution is injected with a greater precision, in comparison to the "blind" technique. Theoretically, the precision of the needle insertion and the visual control over the entire procedure may limit the excessive "spillage" of the anaesthetic thereby reducing the risk of local anaesthetictoxicity. The lack of differences in terms of post-operative side effects between the two experimental groups of the present studyprobably indicates that the local absorption of the anaesthetic during the TAP block does not contribute to the common side effects of the general anaesthesia.

We demonstrated that in combination with the intravenous administration of ketonal, the TAP block performed immediately after the surgery resulted in an effective anaesthesia and allowed us to avoid an administration of opioids. Theseresults are in agreement with some other studies in which TAP block reduced the amount of used narcotic analgesics [4, 12, 16]. However, some studies report no difference in opioid consumption between the TAP and standard systemic analgesia following the laparoscopic colorectal surgery [21]. In that study, the authors hypothesized that because of minimal pain experienced by the patients, the TAP blockade could be less effective in laparoscopic colectomy than in other forms of abdominal surgery [21].

Our study has some limitations. First, the design of the study was retrospective, and performed in a single center. However, the one of the potential strengths of the present study is the relatively large number of patients included. Secondly, the study assessment was limited to 24 hrswhile some other studies report the assessment during the 36 hrs after the surgery (ref). In our study, we limited the assessmentto 24 hrsbecause the majority of the patients usually no longer require the administration of systemic opioids 24 hrs after the surgery. Finally, the types of surgeries included into the study were different, with the

non-equal number of laparoscopic interventions and laparotomy.

Conclusions

We suggest that the use of multimodal analgesia in the form of bipolar TAP block in conjunction with intravenous administration of ketonal provides an adequate anaesthesia in the post-operative period, comparable to the standard systemic administration of opioids and ketonal. The proposed approach utilizes the synergy of actions of the local anaestheticbupivacaine and systemically administered ketonal. In addition, the proposed method of TAP blockade reduces the use of narcotic analgesics and contributes to the earliest possible activation of patients and their fast recovery after the laparoscopic surgery and laparatomy.

References:

1. *Alkatout I., Mechler U., Mettler L., Pape J., Maass N., Biebl M., et al.* The Development of Laparoscopy-A Historical Overview // Front Surg. 2021;8:799442.

2. *Beiranvand S., Moradkhani M.R.* Bupivacaine Versus Liposomal Bupivacaine For Pain Control // Drug Res (Stuttg). 2018;68(7):365-9.

3. *Carney J., McDonnell J.G., Ochana A., Bhinder R., Laffey J.G.* The transversus abdominis plane block provides effective postoperative analgesia in patients undergoing total abdominal hysterectomy // Anesth Analg. 2008;107(6):2056-60.

4. *El-Dawlatly A.A., Turkistani A., Kettner S.C., Machata A.M., Delvi M.B., Thallaj A., et al.* Ultrasound-guided transversus abdominis plane block: description of a new technique and comparison with conventional systemic analgesia during laparoscopic cholecystectomy // Br J Anaesth. 2009;102(6):763-7.

5. *Griffiths J.D., Barron F.A., Grant S., Bjorksten A.R., Hebbard P., Royse C.F.* Plasma ropivacaine concentrations after ultrasound-guided transversus abdominis plane block // Br J Anaesth. 2010;105(6):853-6.

6. *Guirguis M.N., Abd-Elsayed A.A., Girgis G., Soliman L.M.* Ultrasound-guided transversus abdominis plane catheter for chronic abdominal pain // Pain Pract. 2013;13(3):235-8.

7. *Gustafsson U.O., Scott M.J., Schwenk W., Demartines N., Roulin D., Francis N., et al.* Guidelines for perioperative care in elective colonic surgery: Enhanced Recovery After Surgery (ERAS((R))) Society recommendations // World J Surg. 2013;37(2):259-84.

8. *Hebbard P., Fujiwara Y., Shibata Y., Royse C.* Ultrasound-guided transversus abdominis plane (TAP) block // Anaesth Intensive Care. 2007;35(4):616-7.

9. *Ma N., Duncan J.K., Scarfe A.J., Schuhmann S., Cameron A.L.* Clinical safety and effectiveness of transversus abdominis plane (TAP) block in post-operative analgesia: a systematic review and meta-analysis // J Anesth. 2017;31(3):432-52.

10. *McDermott G., Korba E., Mata U., Jaigirdar M., Narayanan N., Boylan J., et al.* Should we stop doing blind transversus abdominis plane blocks? // Br J Anaesth. 2012;108(3):499-502.

11. *McDonnell J.G., Curley G., Carney J., Benton A., Costello J., Maharaj C.H., et al.* The analgesic efficacy of transversus abdominis plane block after cesarean delivery: a randomized controlled trial // Anesth Analg. 2008;106(1):186-91, table of contents.

12. *McDonnell J.G., O'Donnell B., Curley G., Heffernan A., Power C., Laffey J.G.* The analgesic efficacy of transversus abdominis plane block after abdominal surgery: a prospective randomized controlled trial // Anesth Analg. 2007;104(1):193-7.

13. *Mukhtar K., Singh S.* Transversus abdominis plane block for laparoscopic surgery // Br J Anaesth. 2009;102(1):143-4.

14. *Mukhtar K., Singh S.* Ultrasound-guided transversus abdominis plane block // Br J Anaesth. 2009;103(6):900; author reply -1.

15. *Nedeljkovic S.S., Kett A., Vallejo M.C., Horn J.L., Carvalho B., Bao X., et al.* Transversus Abdominis Plane Block With Liposomal Bupivacaine for Pain After Cesarean Delivery in a Multicenter, Randomized, Double-Blind, Controlled Trial // Anesth Analg. 2020;131(6):1830-9.

16. *Niraj G., Searle A., Mathews M., Misra V., Baban M., Kiani S., et al.* Analgesic efficacy of ultrasound-guided transversus abdominis plane block in patients undergoing open appendicectomy // Br J Anaesth. 2009;103(4):601-5.

17. *O'Donnell B.D., McDonnell J.G., McShane A.J.* The transversus abdominis plane (TAP) block in open retropubic prostatectomy // Reg Anesth Pain Med. 2006;31(1):91.

18. *Oderda G.M., Said Q., Evans R.S., Stoddard G.J., Lloyd J., Jackson K., et al.* Opioid-related adverse drug events in surgical hospitalizations: impact on costs and length of stay // Ann Pharmacother. 2007;41(3):400-6.

19. *Petersen P.L., Hilsted K.L., Dahl J.B., Mathiesen O.* Bilateral transversus abdominis plane (TAP) block with 24 hours ropivacaine infusion via TAP catheters: A randomized trial in healthy volunteers // BMC Anesthesiol. 2013;13(1):30.

20. *Rafi A.N.* Abdominal field block: a new approach via the lumbar triangle // Anaesthesia. 2001;56(10):1024-6.

21. *Smith S.R., Draganic B., Pockney P., Holz P., Holmes R., McManus B., et al.* Transversus abdominis plane blockade in laparoscopic colorectal surgery: a double-blind randomized clinical trial // Int J Colorectal Dis. 2015;30(9):1237-45.

22. *Tian C., Lee Y., Oparin Y., Hong D., Shanthanna H.* Benefits of Transversus Abdominis Plane Block on Postoperative Analgesia after Bariatric Surgery: A Systematic Review and Meta-Analysis // Pain Physician. 2021;24(5):345-58.

Correspondence to:
Marat Syzdykbayev, Department of Hospital Surgery, Anaesthesiology and Reanimatology, Semey Medical University, University Hospital.
Adress: Kazakhstan, 071400, Semey,1st Sechenov street.
Phone: +7 777 633 4757
Email: fortunato74@mail.ru