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Erector spinae plane block as a component of intensive care for acute pancreatitis: a prospective randomized pilot study

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ABSTRACT

BACKGROUND: Analgesia is crucial in the treatment of patients with acute pancreatitis, which includes the increased use of regional analgesia. In recent years, less-invasive and safer methods of pain relief, particularly erector spinae plane block (ESP-block), has drawn attention from the anesthesiological community. However, studies on its use in acute pancreatitis are rare.

OBJECTIVE: Our aim was to make a clinical evaluation of bilateral erector spinae plane block in patients with acute pancreatitis.

MATERIALS AND METHODS: A pilot prospective randomized study was conducted. The patients were divided into two groups: group 1 (n=7), ESP blockade was used, and group 2 (n=12), epidural analgesia (EA) was used. The primary points were considered to be an assessment of pain syndrome intensity and the need for analgesics. Additional results were liver and kidney function, acid-base condition, inflammatory response level, and the time of onset of peristalsis.

RESULTS: The decrease in pain intensity in both groups was unidirectional: after 8 h, it was 3.57±1.98 points to the NRS in group 1 and 2.91±1.97 points to the NRS in group 2, and after 24 h, it was 1.42±1.27 and 1.75±2.3 points to the NRS, respectively. No significant difference was found in pain intensity between the groups (p >0,05). The average consumption of ketorolac was 78.2±16.3 mg in group 2 — 63.28±17.23 mg for 1 patient. The average need for narcotic analgesics, that is, morphine, per patient was 22±8 mg in group 1 and 36.3±17.2 mg in group 2 (p <0,05). During the therapy, blood α-amylase, diuresis rate, creatinine level, and glomerular filtration rate did not have a significant difference between the groups, as well as pH, BE, and blood lactate levels (p >0,05). Peristalsis was noted after 12.49±19.73 h in the ESP-block group and after 16.9±21.3 h in the 2nd group (p <0,05). The ICU length of stay between the groups did not differ and was 62±3 and 62±7 h, respectively (p >0,05).

CONCLUSION: Bilateral erector spinae plane block is a simple and safe method that induces analgesic effect and effect on homeostasis in acute pancreatitis, similar to epidural blockade. Further study of the role and location of erector spinae plane block in treating pain in acute pancreatitis is required.

Keywords: erector spinae plane block; ESP-block; epidural analgesia; homeostasis; acute pancreatitis.

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Блокада межфасциального пространства мышц, выпрямляющих позвоночник, как компонент интенсивной терапии острого панкреатита: пилотное проспективное рандомизированное исследование

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АННОТАЦИЯ

Обоснование. Аналгезия является значимым компонентом лечения пациентов с острым панкреатитом и всё чаще включает в себя использование регионарной аналгезии. В последние годы внимание анестезиологического сообщества привлечено к менее инвазивным и более безопасным методам обезболивания, в частности к блокаде межфасциального пространства мышц, выпрямляющих позвоночник (ESP-блокада), однако публикации по её применению при остром панкреатите единичны.

Цель. Провести клиническую оценку билатеральной блокады межфасциального пространства мышц, выпрямляющих позвоночник, у пациентов с острым панкреатитом.

Материалы и методы. Проведено пилотное проспективное рандомизированное исследование. Пациентов распределили на 2 группы: в 1-й группе (n=7) использовали ESP-блокаду, во 2-й (n=12) — эпидуральную аналгезию (ЭА). Первичными результатами считали оценку интенсивности болевого синдрома и потребность в анальгетиках, дополнительными — функциональное состояние печени, почек, кислотно-основное состояние, уровень воспалительного ответа, время появления перистальтики.

Результаты. Уменьшение интенсивности болевого синдрома в обеих группах носило однонаправленный характер: через 8 ч в 1-й группе оно составляло 3,57±1,98 балла по цифровой рейтинговой шкале (ЦРШ), во 2-й — 2,91±1,97 балла по ЦРШ, через 24 ч — 1,42±1,27 и 1,75±2,3 балла по ЦРШ соответственно. Статистически значимой разницы в интенсивности боли между группами не установлено (p >0,05). Средний расход кеторолака в 1-й группе был равен 78,2±16,3 мг, во 2-й — 63,28±17,23 мг на 1 пациента (p <0,05). Средняя потребность в наркотических аналгетиках на 1 пациента в пересчёте на морфин в 1-й группе составляла 22±8, во 2-й — 36,3±17,2 мг (p <0,05). В процессе терапии динамика активности α-амилазы крови, темп диуреза, уровень креатинина, скорость клубочковой фильтрации не имели значимой разницы между группами, так же, как и показатели pH, BE (дефицит оснований) и концентрации лактата крови (p >0,05). Возникновение перистальтики было зафиксировано в 1-й группе через 12,49±19,73, во 2-й — через 16,9±21,3 ч (p <0,05). Длительность нахождения в реанимации между группами на различалась и составляла 62±3ч и 62±7 ч соответственно (p >0,05).

Заключение. Билатеральная блокада межфасциального пространства мышц, выпрямляющих позвоночник, при остром панкреатите является простым и безопасным методом аналгезии, аналогичным по своему анальгетическому эффекту и влиянию на показатели гомеостаза эпидуральной блокаде. Требуется дальнейшее изучение роли и места блокады межфасциального пространства мышц, выпрямляющих позвоночник, в лечении боли при остром панкреатите.

Ключевые слова: билатеральная блокада межфасциального пространства мышц, выпрямляющих позвоночник; ESP-блок; эпидуральная аналгезия; гомеостаз; острый панкреатит.

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BACKGROUND

Currently, acute pancreatitis (AP) has one of the highest morbidity rates in the structure of urgent surgical pathology [1, 2], which amounts to 30–40 cases per 100 thousand population per year [3]. Significant pain in the epigastrium or diffuse abdominal pain is reported in 80–95% of patients with AP, [4]. Analgesia is a significant component of treatment in AP patients.

A multimodal approach is used for pain management in AP patients, including various combinations of nonsteroidal anti-inflammatory drugs (NSAIDs), paracetamol, narcotic analgesics, and epidural analgesia (EA). Effective pain management in AP ranges from the administration of basic analgesics, which may be sufficient for patients with a mild disease, to the administration of potent opioids in cases of severe disease [5].

Widely used NSAIDs (ketorolac, diclofenac, ketoprofen), which are included in most European protocols for AP treatment, as well as dexketoprofen, a dextrorotatory stereoisomer of ketoprofen [6], have several disadvantages: not always adequate analgesic effect, increased wound bleeding, gastrointestinal bleeding, and nephrotoxic effects. NSAIDs and paracetamol can provide adequate pain relief in AP patients compared to opioids [7]. However, it has been shown that acetaminophen itself can contribute to the development of AP [8]. Recent studies have shown that NSAIDs are not inferior to narcotic analgesics in terms of analgesic effectiveness [9, 10].

It is generally accepted that the use of narcotic analgesics (particularly morphine) in AP patients is undesirable due to the likelihood of spasm of the sphincter of Oddi and aggravation of intraductal pancreatic hypertension, decreased gastrointestinal motility, development of nausea and vomiting, itching, and tachyphylaxis. However, it should be noted that there is currently no data indicating the negative effect of opioids (morphine, fentanyl) on the disease outcome [11, 12].

Treatment of patients with pain syndrome in severe AP increasingly includes the use of EA, which is characterized by some advantages compared to opioid analgesia [13]. Thus, EA provides pain relief, improves pancreatic perfusion [7] and, in addition, helps prevent respiratory distress syndrome, acute kidney injury and even the probability of death [14]. Nevertheless, the use of EA is associated with a high risk of hypotension, increased severity of intoxication, as well as with the possibility of undesirable motor blockade in the lower extremities with restriction of patients' activity [15, 16].

There is a well-founded opinion that EA is no longer the gold standard of postoperative anesthesia [17]. In recent years, the attention of the anesthesiologists' community has been drawn to less invasive and safer, but no less effective alternatives to EA: paravertebral blocks, transversus abdominis plane block, erector spinae plane block (ESP-block) [18]. There are few publications on the use of ESP-block in AP [19, 20].

AIM

Our aim was to perform clinical evaluation of bilateral erector spinae plane block in AP patients.

MATERIALS AND METHODS

Study design

A pilot, prospective, randomized study was conducted.

Randomization

Randomization was performed by random number method (Fig. 1). The ESP-block group and the EA group were designated by number 1 and number 2, respectively. Randomization was performed using https://randstuff.ru/.

Eligibility criteria

Inclusion criteria:

- patients with AP, established based on 2 out of 3 criteria: typical abdominal pain, increase in serum amylase level more than 3 times the upper limit of normal, and the results of abdominal computed tomography (necrosis of parenchyma and peripancreatic area) [21];
- patients who gave a written informed consent to participate in the study;
- age of 18 to 65 years;
- diagnosed AP with pain intensity of ⩾ 6 according to the numeric rating scale (NRS).

Non-inclusion criteria:

- age of <18 to >65 years;
- <10 to >20 APACHE II score (disease severity and mortality prediction scale);
- >6 SOFA score (organ failure and mortality risk assessment scale);
- terminal, incurable diseases;
- sub- and decompensation stages of severe comorbidity;
- pregnancy;
- sepsis;
- multiple organ dysfunction syndrome;
- shock of various etiologies;
- gas exchange disorders (PaO_2 <60 mm Hg);
- contraindications for epidural catheterization.

Exclusion criteria:

- severe multiple organ dysfunction syndrome with a SOFA score of 6;
- decompensation of chronic comorbidity;
- protocol violation;
- withdrawal from the study.

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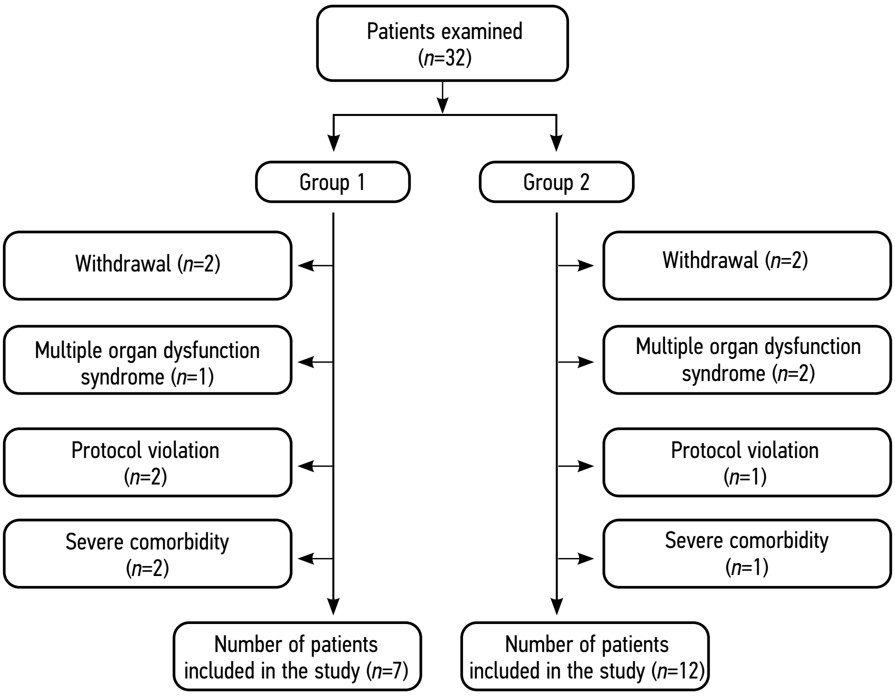

Fig. 1. Patient randomization scheme.

Study conditions and duration

The study was conducted in the Department of Intensive Care for Surgical Patients No. 3 of the Buyanov Moscow City Clinical Hospital (Moscow, Russia) from November 1, 2022 to November 1, 2023.

Medical intervention

Erector spinae plane block

After treating the puncture area with antiseptic solution, the Th_{VII} process was visualized in the lateral position, then the transducer was moved laterally 3–4 cm to the left and the Th_{VII} transverse process, trapezius muscle and spinal erector muscles were identified. Using ultrasound (US), an 18 G needle was inserted 30 mm deep until it stops in the surface of the Th_{VII} transverse process and 5 mL of 0.9% sodium chloride was injected to hydroseparate the tissues, followed by 25–30 mL of 0.2% ropivacaine at 0.4 mL/kg. After injection of the local anesthetic solution, a catheter was inserted into the tissue hydroseparation space for 30–40 mm. The catheter was replaced on the opposite side. 0.2% ropivacaine was injected into the catheters using an elastomeric pump at 3.0–7.0 mL/h.

Epidural analgesia

Epidural puncture and catheterization were performed under local anesthesia using a median access at Th_{VI}–Th_{VII}. The loss of resistance technique was used to identify the correct needle location. The catheter was inserted 4–6 cm deep. Four mL of 2% lidocaine were injected as a test dose. After a negative aspiration test, a bacterial filter was connected to the catheter. The catheter was fixed to the skin with an adhesive tape. Infusion of 0.2% ropivacaine was performed using a syringe pump at 3.0 to 10.0 mL/h.

Study outcomes

Primary outcome

The primary outcomes were the pain intensity against the background of blocks performed and the need for narcotic analgesics.

Secondary outcomes

Secondary outcomes included liver function, renal function, acid-base status (ABS), level of inflammatory response, time to peristalsis onset, and length of stay in the intensive care unit (ICU).

Subgroup analysis

Before treatment, depending on the type of regional anesthesia, all patients were divided into 2 groups with comparable characteristics: Group 1 (*n*=7) including patients who received the ESP-block and Group 2 (*n*=12) including patients who received EA.

Outcome measures

On the patient's admission to the ICU, the American Society of Anesthesiologists (ASA) physical status, the Sequential Organ Failure Assessment (SOFA) score, and the risk of adverse outcome defined according to the APACHE II scale were assessed.

All patients received standard intensive therapy based on clinical guidelines [11], including analgesia, infusion therapy, antispasmodics, and tube feeding.

The pain intensity was determined using a 10-point NRS. The need for opioids was recorded.

The amylase ratio by the end of Day 1 was determined using the following formula [22]:

$$\text{Amylase ratio} = \frac{\text{Serumamylase after 24 h}}{\text{Serumamylase on admission}}$$

The degree of pancreatic damage was determined by blood α-amylase level, the urinary function of the kidneys was evaluated by the diuresis rate; the filtration function was assessed by glomerular filtration rate (GFR) and creatinine level. The degree of tissue hypoxia was assessed by blood lactate and ABS, the severity of inflammation was evaluated by WBC count, procalcitonin and C-reactive protein (CRP) levels. In addition, ultrasound was used to determine the time of peristalsis onset. Adverse events (bradycardia, hypotension, intestinal paresis, gastric stasis) were recorded. The duration of stay in the ICU was assessed. All the above parameters were recorded on admission (baseline values) and 8, 24, 48 and 72 h after analgesia administration.

Ethical approval

The study was approved by the Local Ethics Committee of the St. Petersburg State Pediatric Medical University (Protocol No. 8 dated September 12, 2022).

Statistical analysis

Principles of sample size calculation

The sample size was not pre-calculated.

Statistical methods

Statistical analysis was performed using MedCalc v. 22 2024 (MedCalc Software Ltd, USA). The data are presented in the tabular format. Mean values and standard deviation (Me ± SD) were evaluated. Mann–Whitney *U*-test was used to evaluate quantitative variables. Differences were considered statistically significant at p <0.05.

RESULTS

Study subjects

A total of 19 patients were included in the study and divided into 2 groups comparable in their characteristics. The ESP-block was used for anesthesia in Group 1 (n=7), and EA was used in Group 2 (n=12) (Table 1). There were no significant inter-group differences (p >0.05).

Primary results

The baseline pain NRS score in Group 1 and Group 2 was 9.14±1.21 and 8.91±1.26, respectively. Analgesia in the ESP-block and in EA groups developed in 19.71±3.09 and in 31.6±11.14 min, respectively.

The NRS pain score 8 h after the block in Group 1 and in Group 2 was 3.57±1.98 and 2.91±1.97, respectively. After 24 h, the NRS pain score was 1.42±1.27 and 1.75±2.3, respectively. At time point 4 (48 h) and after 72 h, the NRS pain score in the ESP-block group and the EA group was 1.28±1.25 and 1.33±1.43, and 1.13±0.42 and 0.98±0.81, respectively.

Ketorolac 30 mg was used as an NSAID after 8 h in 4 and 2 patients, and after 24 h in 6 and 5 patients in Group 1 and Group 2, respectively. After 48 h, the NSAID was administered to 6 patients in Group 1 and 3 patients in Group 2; after 72 h, the NSAID was administered in 3 patients in each group. The total need for NSAIDs during the entire follow-up period was 78.2±16.3 per patient in Group 1 and 63.28±17.23 mg per patient in Group 2.

Indications for narcotic analgesics occurred after 8 h in Group 1 and Group 2 in 2 and 5 patients, respectively;

Table 1. Clinical and demographic characteristics of the patients

Parameters	Group 1 (n=7)	Group 2 (n=12)
Male, n	2	7
Female, n	5	5
Age, years	55.28±10.56	46.25±9.05
BMI, kg/m^2	28.8±7.05	28.67±4.55
ASA, class II/III	3/4	5/7
SOFA, score	2.42±1.13	2.75±1.35
APACHE II, score	14.85±4.81	11.58±3.36

Note. BMI — Body Mass Index, ASA — classification of the risk level of general anesthesia, SOFA — Sequential Organ Failure Assessment Scale to assess organ failure, mortality and sepsis risk in ICU patients, APACHE-II — Acute Physiology and Chronic Health Evaluation to measure disease severity in adult ICU patients and predict mortality.

after 24 h — in 1 and 7 patients, respectively. After 48 h, there were no indications for opioids in Group 1, whereas in Group 2 they were administered to 6 patients. After 72 h, no narcotics were used in both groups. The average need for narcotic analgesics per patient during the entire follow-up period in Group 1 and Group 2 in terms of morphine was 22±8 and 36.3±17.2 mg, respectively.

The pain intensity 8 h after block in Group 1 and Group 2 decreased by 62 and 67%, respectively. The NRS pain score after 8 h of analgesia in Group 1 was 3.57±1.98 *vs*. 2.91±1.97in Group 2. At time point 3, the NRS pain score was 1.42±1.27 in Group 1 *vs*. 1.75±2.3 in Group 2. After 48 h, the NRS score was 1.28±1.25 *vs*. 1.33±1.43, and at time point 5 it was 1.13±0.42 and 0.98±0.81, respectively. The pain intensity reduction over time is presented in Fig. 2.

On anesthesia, painless deep palpation of the abdomen was possible in all patients of both groups. There was no significant inter-group difference in pain intensity (p >0.05).

Secondary results

Changes in homeostasis parameters against the background of anesthesia are presented in Table 2.

The amylase ratio by the end of Day 1 of hospital stay in the ESP-block group and the EA group was 4.09±1.82 and 4.94±2.7 U/L, respectively. During therapy, the decrease in blood α-amylase levels over time were similar, without significant inter-group differences (p >0.05).

The diuresis rate in Group 1 and Group 2 was 1.23±0.21 and 0.65±0.39 mL/min during the first 8 h (p >0.05), 0.79±0.45 and 0.75±0.41 mL/min after 24 h (p <0.05), 1.31±0.32 and 1.36±0.46 mL/min after 48 h (p <0.05), and 0.95±0.25 and 0.84±0.23 mL/min after 72 h, respectively. Creatinine level in Group 1 and Group 2 was 68.14±19.9 and 91.8±37.66 mmol/L during the first 8 h (p <0.05), and 57.82±16.89 and 87.25±27.6 mmol/L after 24 h (p <0.05), respectively. After 48 h, the creatinine levels in Group 1 and Group 2 were 73.28 and 73.41±15.18 mmol/L (p <0.05), and after 72 h, they were 70.41±12.77 and 75.75±13.03 mmol/L, respectively. Changes in GFR had no significant inter-group differences (p >0.05). pH (hydrogen index), BE (base excess) and blood lactate level showed no significant inter-group differences either (p >0.05).

During treatment, the leukocytosis level in both groups decreased with a significant difference recorded only after 24 h: the average blood WBC count in Groups 1 and 2 was 5.7´10^9/L and 7.9´10^9/L, respectively (p <0.05).

A significant increase in procalcitonin level after 24 h was noted, which amounted to 0.69±0.12 ng/mL in Group 1 and 0.91±0.31 ng/mL in Group 2 and was significantly (p <0.05) higher compared with the baseline.

The CRP level in both groups significantly increased after 8 h compared with the baseline, and then smoothly decreased: after 72 h, it amounted to 41±1.39 mg/L in Group 1 and 39.2±16.8 mg/L in Group 2. A significant (p <0.05) inter-group difference was recorded only after 24 h from the initiation of treatment.

Peristalsis after the intervention was recorded in 12.49±19.73 h in the ESP-block group, and in 16.9±21.3 h in the EA group.

Gastric stasis was registered in 3 patients in Group 1 and in 4 patients in Group 2. In both groups, a nasojejunal tube was placed in all patients with gastric stasis using ultrasound. Gastric stasis resolved in 13.96±16.2 h in Group 1 and in 18.33±8.36 h in Group 2.

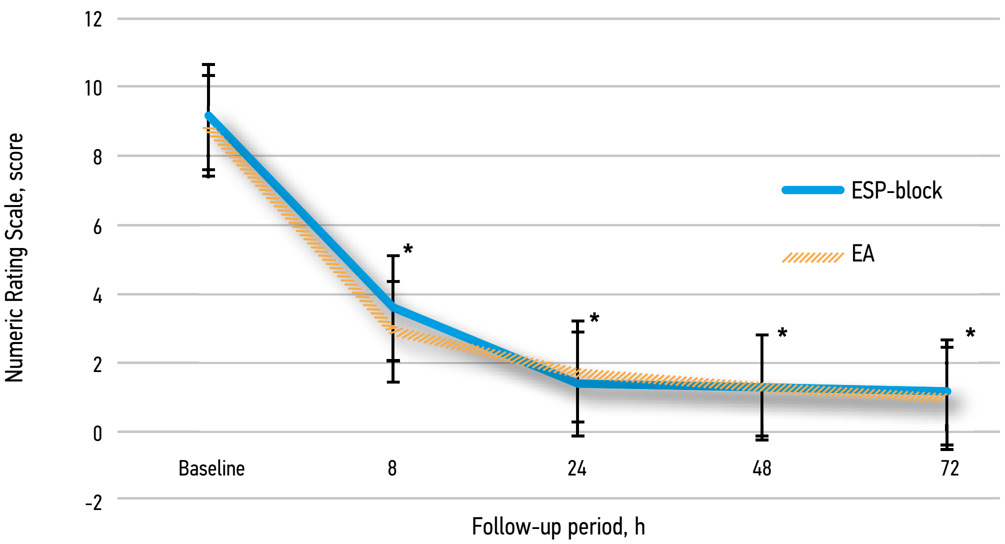

Fig. 2. Dynamics of pain intensity during ESP block and epidural anesthesia.
Note. ESP-block — erector spinae plane block, EA — epidural analgesia, * — p <0.05 compared with the initial indicators.

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Table 2. Dynamics of homeostasis indicators in the studied groups (Me ± SD)

Parameter	Group	Follow-up periods				
		Baseline	After 8 h	After 24 h	After 48 h	After 72 h
Amylase, U/L	ESP-block	838.57±62.88	692±301.2	397.32±194.33	208.85±188.3	66.6±51.2**
	EA	1044.66±289.33	914.76±69	517.83±192.14	231.83±118.3	107.5±21.6**
Creatinine, μmol/L	ESP-block	89.75±48.06	68.14±19.9*	57.82±16.89*,**	73.28±23.09	70.41±12.77
	EA	101.92±46.54	91.8±37.66**	87.25±27.6**	73.41±15.18	75.75±13.03
Diuresis rate, mL/min	ESP-block	0.31±0.11	1.23±0.21*,**	0.79±0.45**	1.31±0.32**	0.95±0.25**
	EA	0.43±0.21	0.65±0.39	0.75±0.41**	1.36±0.46**	0.84±0.23**
GFR, mL/min per 1.73 m^2	ESP-block	91.57±27.58	98.8±16.65	108.16±14.1	99.83±24.28	100.8±8.63
	EA	81.66±12.1	100.6±19.4	92.16±28.93	98.9±21.1	97.6±8.4
pH	ESP-block	7.402±0.07	7.392±0.03	7.398±0.06	7.436±0.07	7.421±0.05
	EA	7.396±0.05	7.374±0.08	7.399±0.02	7.421±0.04	7.394±0.07
BE, mmol/L	ESP-block	1.12 ±0.29	-0.13±0.42	-0.15±0.35	0.32±0.29	0.71±0.39
	EA	-0.23±0.36	-0.73±0.30	-1.1±0.19	-0.9±0.26	1.2±0.22
Lactate, mmol/L	ESP-block	1.35±1.37	1.38±0.72	1.58±0.66	1.26±0.69	0.89±0.33
	EA	1.26±0.58	1.1±0.51	1.31±0.41	1.31±0.21	0.97±0.21
Leukocytes, ´10^9/L	ESP-block	11.7±2.14	10.98±1.12	5.7±0.98*,**	9.89±0.69**	6.8±1.12**
	EA	14.81±5.3	11.39±1.17	7.9±1.1**	8.31±0.31**	7.92±3.11**
PCT, ng/mL	ESP-block	0.09±0.01	0.07±0.11	0.69±0.12*,**	0.09±0.08	0.11±0.03
	EA	0.12±0.03	0.09±0.01	0.91±0.31**	0.19±0.07	0.09±0.01
CRP, mg/L	ESP-block	84.5±31.6	99.32±21.2*	79.32±12.2*	78.21±23.21	41±1.39**
	EA	98.24±21.33	119±12.2**	133.61±13.3**	88.21±19.9	39.2±16.8**

Note. * — p <0.05 compared with the EA group, ** — p <0.05 compared with the baseline indicators. ESP-block — erector spinae plane block, EA — epidural analgesia, GFR — glomerular filtration rate, pH — *pondus hidrogeni*, BE — base excess, PCT — procalcitonin, CRP — C-reactive protein.

In the ESP-block group, no significant changes in blood pressure and heart rate were recorded (p >0.05), all parameters were within the normal range. In the EA group, bradycardia and hypotension were noted in two patients and one patient, respectively. The latter was successfully eliminated by increasing the infusion rate.

In the ESP-block group, one patient complained of pain at the catheterization site. In the EA group, two patients reported backpain with intensity up to 1.0 NRS score, which was intermittent and did not require additional anesthesia.

The duration of stay in the ICU did not differ between the groups and amounted to 62±3 and 62±7 h, respectively (p >0.05).

Adverse events

The following adverse events were reported during the study:

- bradycardia and hypotension (n=1) due to pronounced sympathetic block due to EA;
- pain at the catheterization site (n=2) in the EA group, associated with difficulties in epidural catheter insertion due to morbid obesity;
- intestinal paresis (n=6) in both groups, which is relatively often associated with acute pancreatitis, corresponding to the disease, as well as gastric stasis. No deaths were reported.

DISCUSSION

Summary on the primary result

The primary result of our study was the proof that the bilateral ESP-block is similar to EA in its analgesic effect and influence on homeostasis in the treatment of AP and can be used in real-world practice as an alternative to EA.

Discussion of the primary result

Patients with AP usually need to be transferred to the ICU due to severe pain, nausea and vomiting, respiratory distress and acute renal failure. The World Society of Emergency Surgery considers analgesia as one of the main problems in the AP treatment [23], which includes EA along with NSAIDs and opioids. It has been shown that EA provides adequate analgesia in 87.5–100% of patients [24], improves pancreatic perfusion, eliminates ischemia and reduces inflammatory response [25].

Due to possible complications, which include hypotension, epidural hematomas, or epidural abscess, EA is currently not commonly used. Moreover, a recent multicenter randomized study showed no benefits of EA in the treatment of AP [26]. The use of the ESP-block in AP is mainly described in clinical cases [20, 27, 28].

Our data about the increase in the time of EA effects development are associated with the exclusion of the loading bolus dose and use of only continuous ropivacaine infusion to ensure stable hemodynamic parameters in AP and hypovolemia. The data on the effect of this approach on blood pressure are in full agreement with the data obtained by other researchers [29].

In our study, the analgesic effect was similar between the groups, with the need for NSAIDs per patient being 78.2±16.3 mg in Group 1 and 63.28±17.23 mg in Group 2. The opioid dose in terms of morphine was significantly lower in the ESP-block group (22±8 mg) *vs*. the EA group (36.3±17.2 mg; p <0.05). The reduction of narcotic analgesics decreased the likelihood of spasm of the sphincter of Oddi, aggravation of intraductal hypertension, development of nausea and vomiting, itching, and respiratory depression [12]. The data on the reduction of opioids against the background of the ESP-block confirm the data obtained by other researchers [30, 31].

Back in the early 2000s, it was suggested that repeated determinations of serum amylase level have little diagnostic value in assessing changes in the patient's condition over time and the disease prognosis [32]. Relatively recently, A. Kumaravel et al. [33] suggested a model to determine the probability of severe AP. Later, W. Hong et al. [22] showed that patients with a day 2/day 1 amylase ratio of 0.3 or more had a higher incidence of severe AP than those with a lower ratio. In our study, the amylase ratio at the beginning of Day 2 of hospital stay was 4.09±1.82 in the ESP-block group and 4.94±2.7 in the EA group. Although amylase ratio exceeded 0.3, it was adequate analgesia and improvement of pancreatic perfusion that contributed to the absence of severe complications of AP.

When using the ESP-block, the mechanism of action of which involves blocking of both ventral and dorsal branches of spinal nerves, thus providing somatic and visceral analgesia [34] due to improvement of splanchnic blood flow [35], the diuresis rate progressively increased. The improvement of pancreatic perfusion was indirectly evidenced by GFR, which was within the normal range.

In our study, the lactate level, pH and BE were within the reference range without significant inter-group difference, which indicates that the adequacy of tissue perfusion was preserved in AP patients against the background of the ESP-block and EA [36], and there was redistribution of splanchnic blood flow to non-perfused areas of the pancreas due to sympathetic nerve block [7].

By the end of Day 1 of treatment, we noted a significant increase in the procalcitonin and CRP levels, which are among the most sensitive laboratory tests to detect infected pancreatic necrosis and complications [37]. The increase in procalcitonin and CRP is considered to be associated with impaired gastrointestinal barrier function and translocation of toxins into the blood [38]. After 2 days of treatment, peristalsis was restored and procalcitonin and CRP levels decreased.

Along with technical simplicity, the ESP-block compared to EA has significant advantages, including minimal risk of hypotension, epidural hematoma, and other complications [39]. While the EA complications are well known [40], pneumothorax, motor blockade, systemic toxicity of local anesthetic, and priapism have been described in the ESP-block [41]. No serious complications and fatal outcomes were observed in our study.

Study limitations

Our study has several limitations. First, it was a single-center study; second, due to the small number of observations, no preliminary sample size calculation was performed; therefore, large randomized studies will be required to definitively confirm the role and significance of the ESP-block; third, our data were obtained during hospitalization, so we did not evaluate long-term postoperative outcomes.

CONCLUSION

We suppose that despite the limited sample size, there is every reason to consider the bilateral ESP-block, which effectively manages somatic and visceral pain in acute pancreatitis and improves splanchnic blood flow, a promising method of regional anesthesia. Bilateral ESP-block is a simple and safe method of analgesia, contributes to reducing the need for narcotics and can be an alternative to epidural anesthesia in case of impossibility of its use. Further study of the role and place of the ESP-block in the treatment of pain in acute pancreatitis is required.

ADDITIONAL INFORMATION

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