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Original Article

The choice of anesthesia for acute abdomen surgery patients and its influence on gastrointestinal function recovery

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Abstract: Objective: To study the clinical anesthesia options for patients undergoing acute abdomen surgery and its effect on the recovery of patients' gastrointestinal function. Methods: 120 patients who underwent abdomen surgery in our hospital from January 2018 to January 2019 were recruited as the research cohort and placed into group A (n=40) or group B (n=80) according to different anesthesia method each underwent. Group A was administered combined spinal-epidural anesthesia, and group B was administered general anesthesia with tracheal intubation. The anesthesia-related time indicators, the postoperative analgesia, the complication rates (CR), the gastric function indicators, and the gastrointestinal function recovery times were compared between the two groups. Results: Group A's anesthesia-related time indicators were significantly lower than group B's (P<0.001). The visual analogue scale (VAS) postoperative pain score in group A was (2.21±0.41), which was observably lower than the corresponding score in group B (P<0.001). There was no significant difference in the CR between the two groups (7.5% vs 17.5%) (P>0.05). The motilin and ghrelin levels in group A were significantly higher than they were in group B (P<0.05). The gastrointestinal function recovery time in group A was notably less than it was in group B (P<0.05). Conclusion: Spinal-epidural anesthesia is a preferred technique because of its strengths in gastric function and operation success rates by taking patients' actual situations into consideration.

Keywords: Acute abdomen, surgery, anesthesia treatment method, gastrointestinal function

Introduction

Acute abdomen is one of the most common diseases seen in clinical practice and is characterized by acute onset and rapid progression. Electrolyte imbalance or shock usually arises in acute abdomen, it should be addressed urgently to improve patients' health and save their lives. And surgery is the mainstay, for which anesthesia is essential. At present, the commonly used methods are tracheal intubation general anesthesia, epidural anesthesia, combined spinal epidural anesthesia, or other anesthesia methods. Consequently, the selection should be made by taking patients' specific situations into consideration [1-3]. Moreover, anesthesia methods function discriminately. Despite considerable research efforts into the anesthesia methods in the past decades, there is some space for improvement in overall gastrointestinal function recovery [4-7]. On account of this, 120 acute abdomen patients who underwent surgery in our hospital from January 2018 to January 2019 were recruited as the research cohort, and we set out to explore the choice of clinical anesthesia treatment methods in acute abdomen surgery and its impact on the recovery of gastrointestinal function.

Data and methods

General data

120 acute abdomen patients who underwent surgery in our hospital from January 2018 to January 2019 were recruited as the research cohort. They were placed in group A (n=40) or

Table 1. Comparison of the general data

Groups	group A (n=40)	group B (n=80)	χ^2/t	P
Gender			0.017	0.896
Male	23	45		
Female	17	35		
Average age (±s, years)	51.21±6.20	51.23±6.21	0.017	0.987
Hypertension	10	23	0.188	0.665
CHD	6	10	0.144	0.704
Lung diseases	3	6	0.000	1.000
Emergency classification				
I-II	22	40	0.267	0.605
III	10	18	0.093	0.760
IV	6	12	0.000	1.000
V	2	10	1.667	0.197
Acute abdomen Types				
Perforated type	8	17	0.025	0.874
Inflammatory type	7	15	0.028	0.868
Injured type	7	14	0.000	1.000
Hemorrhagic type	9	14	0.430	0.512
Obstructive type	6	13	0.031	0.860
Organ torsion type	3	7	0.055	0.815

group B (n=80) based on the different anesthesia treatment method each patient underwent.

Inclusion criteria

Inclusion criteria: (1) Patients with surgical acute abdomen. (2) Patients or their family members who had sufficient knowledge of the research process and who signed the informed consent. (3) This research was approved by the Medical Ethics Committee of Cangzhou Hospital, Hebei Province (Approval No. of the ethics committee: 2018-037P).

Exclusion criteria

Exclusion criteria: (1) Patients with other organ diseases. (2) Patients with mental problems or who were unable to communicate.

Methods

Preoperative preparation: (1) Patients undergoing surgeries usually have unhealthy emotions such as nervousness or anxiety, so the anesthesiologist should inform the patients about the anesthesia and eliminate their fear. (2) Patients suffering from acute abdomen are vulnerable to complications, so operating room temperature should be set at about 23°C and the humidity should be between 45% to 55% before the operation to ensure that the blood circulation function of the hemorrhagic acute abdomen patients will not be affected. (3) The patients should fast for eight hours and should not drink for four hours before the operation. The doctors should pay attention to any vomiting and airway obstructions during the operation [8-11].

Anesthesia methods: (1) Combined spinal-epidural anesthesia: it is suitable for patients in sound physical condition and with good blood circulation. Based on the patients' surgical location, the appropriate epidural puncture site should be selected, and the epidural catheter should be inserted by an anesthesiologist. 4 ml of 1.5% lidocaine (Tongfang Pharmaceutical Group Co., Ltd., SFDA approval number H20063466) was chosen as the test drugs, and the patients could be administered epidurally if no adverse reactions arose. During the operations, the anesthesiologists practiced assistant analgesia on the patients according to specific situations, and strictly prevented the occurrence of respiratory and circulatory depression or local anesthetic overdose [12-15]. (2) General anesthesia for tracheal intubation: it is suitable for patients with serious symptoms and complicated operations. 0.05 mg/kg midazolam (Jiangsu Enhua Pharmaceutical Co., Ltd., SFDA approval number H10980025), 0.05 mg/kg atracurium (Shanghai Hengrui Pharmaceutical Co., Ltd., SFDA approval number H20061298) and 2.5 ug/kg fentanyl (Jiangsu Enhua Pharmaceutical Co., Ltd., SFDA approval number H20143314) was used as the anesthesia induction. Each patient was endotracheally intubated, and mechanical ventilation was performed during the operation. A tidal volume of 9 ml/kg was administered to ensure that the patient breathed smoothly. Atracurium was given once again according to each actual situation. A continuous injection of 0.05 ug/(kg min) of fentanyl with a micro pump, and 1.5% sevoflurane (Jiangsu Shengdi Pharmaceutical Co., Ltd.,

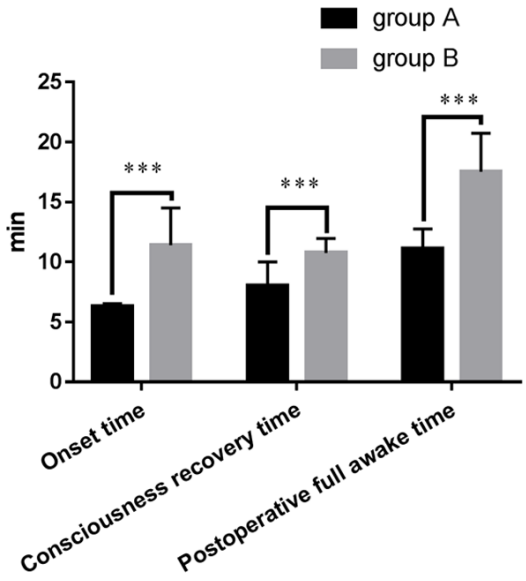

Figure 1. The anesthesia-related time index. Note: The horizontal axis of **Figure 1** from left to right includes the onset times, the postoperative consciousness recovery times, and the postoperative full awake times. The three time indexes of group A were (6.31±0.23) min, (8.00±2.01) min, and (11.12±1.65) min. The three time indexes of group B were (11.40±3.11) min, (10.75±1.21) min, and (17.54±3.20) min. *** indicates P<0.001.

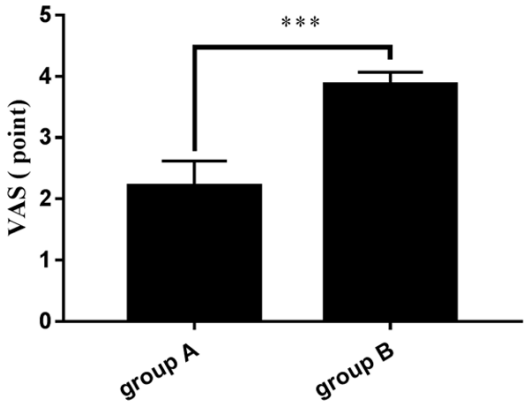

Figure 2. Comparison of the postoperative analgesia effects. Note: group A and group B are shown in the horizontal axis of **Figure 2** from left to right. The VAS of group A was (2.21±0.41), and the VAS of group B was (3.87±0.20). *** indicates P<0.001.

SFDA approval number H20040771) was inhaled, and the anesthetic injection stopped when the operation was about to end. To prevent reflux and aspiration caused by increased intra-abdominal pressure, the medical staff monitored the patient's physical signs closely.

Outcome measures

(1) Anesthesia-related time indicators: Onset time, postoperative consciousness recovery time, and postoperative awake time. The data from the three time points were compared. (2) Postoperative analgesia effect: VAS with a full score of 0-10 points was used as the evaluation standard. The lower the score, the less pain the patient feels. (3) CR: The complications were classified into three types (nausea and vomiting, dizziness and drowsiness, and lung infections). The number of cases was counted and the proportion of each type was calculated. (4) Stomach function index: We compared the two groups' motilin, gastrin, and ghrelin levels before and after the surgery. (5) Gastrointestinal function recovery times: The of bowel sound recovery times, the first time to eat after surgery, and the anal exhaust time were recorded.

Statistical analysis

The statistical analysis was done using SPSS 20.0, and GraphPad Prism 7 (GraphPad Software, San Diego, USA) was used to plot the graphics. The statistical differences were determined using the count data and the measurement data using x^2 tests and t tests, respectively. Significance was claimed at P<0.05.

Results

The general data

There were no significant differences in the general data of the two groups (P>0.05). See **Table 1**.

Anesthesia related time index

The anesthesia related time index of group A was significantly lower than the anesthesia related time index of group B (P<0.001). See **Figure 1** for details.

Postoperative analgesic effect

Both anesthesia methods' analgesic effects had good outcomes. The postoperative VAS of group A was significantly lower than the postoperative VAS of group B (P<0.001). See **Figure 2** for details.

Table 2. Comparison of the CR

	Nausea and Vomiting	Dizziness and Drowsiness	Pulmonary Infection	Asymptomatic
group A	1 (2.5%)	1 (2.5%)	1 (2.5%)	37 (92.5%)
group B	4 (5.0%)	6 (7.5%)	4 (5.0%)	66 (82.5%)
X^2				2.193
P				0.069

CR

There was no significant difference between the two groups' CR (7.5% vs 17.5%) (P>0.05). See **Table 2** for details.

Index of gastric function

The motilin and ghrelin levels in group A were significantly higher than they were in group B after the operation (P<0.05). See **Table 3** for details.

Recovery time of gastrointestinal function

The gastrointestinal function recovery times in group A were significantly lower than they were in group B (P<0.05). See **Table 4** for details.

Discussion

A common disease, acute abdomen is prone to secondary massive hemorrhage or shock. The anesthesia should be selected based on the patient's symptoms when the patients undergo surgery, so as to reduce their CR and ensure the quality of the surgery [16-19]. In our study, the 40 patients in group A were selected for combined spinal epidural anesthesia, and the 80 patients in group B were selected for endotracheal intubation general anesthesia. We observed no significant differences in the CR between the two groups (P>0.05), which proved that the appropriate anesthesia method can control the CR, and both methods had only a slight impact on the patients' CR.

Also, the anesthesia related time index of group A was significantly lower than it was in group B, and the postoperative VAS of group A was also significantly lower than group B', which indicates that combined spinal epidural anesthesia plays a role in alleviating patients' postoperative pain. And the anesthesia time index was found to be in favor of combined spinal epidural anesthesia, which confirms its advantage over general anesthesia.

Furthermore, three gastric function indexes were compared in this research: motilin, gastrin and ghrelin. Among them, motilin is the key factor for promoting gastrointestinal emptying, and ghrelin plays an important role in improving appetite and gastrointestinal function. The authors found that the motilin and ghrelin levels in group A were evidently higher than they were in group B, and it was demonstrated that the gastrointestinal function in group A was less affected. The gastrointestinal function recovery time in group A was significantly lower, indicating that combined spinal epidural anesthesia is more conducive to the recovery of gastrointestinal function. By comparing the gastric function recovery in patients with tracheal intubation general anesthesia and in patients with combined spinal epidural anesthesia, scholar Ashley Hilton concluded that the bowel sound recovery times in patients with combined spinal epidural anesthesia was (13.64±2.59) hours and the first eating time after the operation was (7.20±1.16) hours, which were significantly lower than they were in the general anesthesia group (P<0.001), indicating that the recovery of gastrointestinal function in patients with combined spinal epidural anesthesia was faster [20], which is consistent with the results of this study. Nevertheless, the main limitation in our study is that the cohort of 120 patients was not big enough to draw a reliable conclusion, so we therefore plan to continue our experiment in future work.

To sum up, anesthesiologists should choose anesthesia methods by taking patients' specific conditions into consideration in acute abdomen surgery to garner a robust outcome. Compared with tracheal intubation general anesthesia, combined spinal epidural anesthesia is superior in terms of the patients' gastrointestinal function.

Disclosure of conflict of interest

None.

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Table 3. Comparison of the gastric function indexes (±C, pg/ml)

Category	group A		group B		t	P
Motilin	Before operation	212.31±30.00	Before operation	212.30±31.21	0.002	0.999
	After operation	179.02±24.12	After operation	145.56±25.13	6.967	0.000
	t	5.470	t	14.898		
	P	<0.001	P	<0.001		
Gastrin	Before operation	239.15±30.12	Before operation	239.45±29.15	0.053	0.958
	After operation	204.12±26.21	After operation	204.56±26.31	0.086	0.931
	t	5.549	t	7.947		
	P	<0.001	P	<0.001		
Ghrelin	Before operation	42.23±7.51	Before operation	42.51±7.54	0.192	0.848
	After operation	37.56±6.02	After operation	34.13±5.20	3.229	0.002
	t	3.069	t	8.183		
	P	0.003	P	<0.001		

Table 4. Comparison of the gastric function recovery times (±o, H)

Groups	Recovery time of bowel sounds	Time of first eating after operation	Anal exhaust time
group A	13.59±3.21	7.20±1.16	32.23±2.21
group B	15.23±3.31	8.45±1.20	34.08±2.56
t	2.584	5.438	3.900
P	0.011	<0.001	<0.001

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