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Effect of general anesthesia combined with epidural analgesia on the post-operative recovery of patients undergoing laparoscopic radical resection of rectal carcinoma.

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Abstract

Objective: The effect of general anesthesia combined with epidural analgesia on post-operative recovery was investigated to improve the therapeutic effectiveness of laparoscopic radical resection of rectal carcinoma.

Methods: Eighty patients who underwent laparoscopic radical resection of rectal carcinoma in our hospital from February 2016 to February 2017 were selected according to their hospitalization order as study objects. The patients were grouped using a random number table. Patients accepting general anesthesia comprised the control group, and those accepting general anesthesia combined with epidural analgesia comprised the test group. The influences of the two schemes on observational indices were compared.

Results: Both test and control groups obtained certain application effects. Patients in the test group displayed significant advantages over those in the control group in terms of narcotic dosage, complete block time, and anesthetic effect, and the differences were statistically significant ($p<0.05$). Evaluation indices (recovery time of intestinal functions, length of hospital stay, and off-bed movement time) of patients in the test group were better than those in the control group, and the differences were statistically significant ($p<0.05$).

Conclusion: The application of general anesthesia combined with epidural analgesia to patients who will undergo laparoscopic radical resection of rectal carcinoma leads to improved therapeutic effect and facilitates their recovery. Hence, administering general anesthesia combined with epidural analgesia is worthy of promotion and application.

Keywords: General anesthesia, Epidural analgesia, Laparoscopic radical resection, Rectal carcinoma, Curative effect.

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Introduction

Rectal carcinoma is a major cause of morbidity in China, and the number of deaths due to this cancer has increased in recent years [1]. Many therapeutic measures are available for rectal carcinoma. Radical operation, which was commonly used previously, leads to a certain therapeutic effect but causes large trauma; this procedure is also inapplicable to all patients because it needs laparotomy for focus excision and lymph node dissection [2]. Laparoscopic surgery has been extensively applied for treatment of rectal carcinoma because of its improved therapeutic effect; this technique exhibits advantages of small incision, small post-operative pain stimulation and low occurrence rate of complications [3]. However, in clinical application, laparoscopic radical resection of rectal carcinoma is a long procedure and has high requirements for anesthesia and post-operative analgesia. In addition, different methods for applying anesthesia and post-operative analgesia directly affect the post-operative recovery of patients who underwent laparoscopic surgery. In the present study, 40 patients who underwent the operation in our hospital from February 2016 to February 2017 were selected to accept general anesthesia combined with epidural analgesia. The effects of the treatment were investigated.

Data and Methodology

General data

Eighty patients who underwent laparoscopic radical resection of rectal carcinoma in our hospital from February 2016 to February 2017 were selected according to their hospitalization order as study objects. The patients were grouped through a random number table. Patients who accepted general anesthesia comprised the control group, and those who accepted general anesthesia combined with epidural analgesia comprised the test group. All patients obtained definite pathological results before the operation. The control group contained 40 patients including 26 males and 14 females, with age ranging from 55 to 80 years (average age: 67.6 ± 5.5 years old) and weight of 43–90 kg (average weight of 67.2 ± 6.6). The test group contained 40 patients including 27 males and 13 females, with age ranging from 54 to 81 years (average age: 67.5 ± 5.4 years old) and weight of 41-92 kg (average weight: 67.4 ± 6.7 kg). This study passed the discussion of the Ethics Committee in our hospital. The study protocol was explained to the patients and their family members before they signed informed consent forms. The differences in general data such as age, female and male constitution ratio, and weight were not statistically significant between the two groups ($p>0.05$).

Methodology

Patients in the control and test groups were given with intramuscular injection of 0.5 mg of atropine (1 mg/ea, No. H41023676, Anyang Jiuzhou Pharmaceutical Co., Ltd.). Patients in the test group were given with general anesthesia combined with epidural analgesia. The 11^{th} to 12^{th} intravertebral space of the chest was selected by the operator as puncture point, and a 3 cm-long catheter was used to puncture along the direction of head side. The epidural part was injected with 12 ml of 2% lidocaine hydrochloride (2 ml/ea, No.: H14023559, Jingcheng Hayes Pharmaceutical Co., Ltd.). The anesthetic plane was controlled from the 8^{th} to 2^{nd} intervertebral space of the chest after the complete induction of anesthesia. Intravenous injection of 0.06 mg/kg midazolam (5 mg/ea, No. H10980025, Jiangsu Nhwa Pharmaceutical Co., Ltd.) was also provided. Injection of 0.08 $mg \cdot kg^{-1}$ vecuronium bromide (4 mg/ea, No. H19991172, Zhejiang Xianju Pharmaceutical Co., Ltd.) and 2 $mg \cdot kg^{-1}$ propofol (200 mg/ea, No. H19990282, Xi'an Nippon Pharmaceutical Co., Ltd.) was performed to induce catheterization. After anesthesia was completed, propofol was continuously administered, but intravenous injection of remifentanil (0.2 $\mu g \cdot kg^{-1} \cdot min^{-1}$) and vecuronium bromide (4 mg/ea, No. H19991172, Zhejiang Xianju Pharmaceutical Co., Ltd.) was given discontinuously. Up to 1%-3% persistent sevoflurane inhalation was maintained during the operation to maintain the anesthetic effect, and 2% lidocaine hydrochloride injection was discontinuously provided in the epidural part. During the anesthetic period, the respiratory rate of the patient was kept at 12/14 times/min. Patients in the control group accepted general anesthesia through the same procedures.

Evaluation criteria

Observational indices such as narcotic dosage, initial effect time of anesthesia, anesthetic effect, recovery time of intestinal functions, length of hospital stay, and off-bed movement time of patients in the test and control groups were recorded in detail before and after the operation. Data were statistically analyzed.

Statistical processing

Data were processed through SPSS17.0 statistical software package. Enumeration and measurement data were expressed by "%" and "$\bar{x} \pm s$". χ^2 and t tests were performed. Values of $p<0.05$ indicate statistically significant difference.

Results

Comparison of the post-operative recovery effect of patients between the test and control groups

Patients in the test group exhibited significant advantages compared with those in the control group in terms of post-operative recovery evaluation indices (recovery time of intestinal functions, length of hospital stay, and off-bed movement time). The differences between the two groups were statistically significant ($p<0.05$, Table 1).

Table 1. *Comparison of post-operative recovery effects between the test and control groups (x ± S).*

Group	Number of cases	Recovery time of intestinal functions (h)	Length of stay (d)	Off-bed movement time (h)
Test group	40	34.24 ± 6.67	5.25 ± 1.51	30.21 ± 4.22
Control group	40	48.59 ± 8.40	8.43 ± 2.17	40.66 ± 5.40
T	/	8.641	7.608	9.644
P	/	<0.05	<0.05	<0.05

Comparative analysis of anesthetic effects between the two groups

Both test and control groups obtained certain application effects. Compared with those in the control group, patients in the test group showed significant advantages in terms of narcotic dosage, complete block time, and initial effect time of anesthesia. The differences between the two groups were statistically significant ($p<0.05$, Table 2).

Table 2. *Comparative analysis of anesthetic effects between the test and control groups (x ± S).*

Group (n=40)	Initial effect time of anesthesia (s)	Narcotic dosage(mg)	Complete block time (s)
Test group	47.86 ± 14.95	16.77 ± 4.83	14.11 ± 3.60

Control group	247.55 ± 36.86	142.84 ± 21.90	23.52 ± 6.13
t	27.458	35.547	8.372
P	<0.05	<0.05	<0.05

Comparison of Cor, NE, E, and cTnI levels between the two groups

All indices of the control group after the operation were higher than those before anesthesia ($p<0.05$). The levels of Cor, NE, and E in the test group differed before anesthesia and after the operation, but the difference was not statistical significant. Meanwhile the cTnI level was lower in the test group than that in the control group ($p<0.05$). Details are illustrated in Table 3.

Table 3. *Comparison of Cor, NE, E, and cTnI levels between the two groups.*

Group	n	Cor (μg/Ml)		NE (mol/L)		E (mol/L)		cTnI (ngMl)	
		Before	30min	Before	30min	Before	30min	Before	30min
Test group	40	197.23 ± 12.34	202.61 ± 4.56	55.68 ± 4.89	56.81 ± 6.45	21.65 ± 5.89	22.10 ± 4.35	0.24 ± 0.05	0.51 ± 0.11
Control group	40	196.54 ± 4.36	284.61 ± 5.01	56.01 ± 5.84	69.85 ± 6.22	21.08 ± 5.36	26.45 ± 6.587	0.25 ± 0.06	0.75 ± 0.12
t		0.526	11.524	0.329	9.671	0.373	4.628	0.216	2.108
P		P>0.05	P<0.05	P>0.05	P<0.05	P>0.05	P<0.05	P>0.05	P<0.05

Discussion

Laparoscopic radical resection of rectal carcinoma has gained extensive attention in clinical application because of its advantages of small trauma, high safety, and easy post-operative recovery. A large number of clinical studies confirmed that traditional laparotomy and laparoscopic radical resection of rectal carcinoma exhibit similar therapeutic effects [4]. Although laparoscopic radical resection causes all kinds of complications, it has been easily accepted by patients. The patient experience all kinds of acute pain, such as incision pain and visceralgia, during the initial operation phase considering the broad surgical range of laparoscopic radical resection of rectal carcinoma [5]. Thus, clinical studies have focused on anesthetic and sedative treatments before and after laparoscopic radical resection of rectal carcinoma. In particular, the application of general anesthesia combined with epidural analgesia has been extensively investigated [6].

Before implementation of general anesthesia, not only the cerebral cortex but also most central nerves are inhibited. The most sensitive to anesthesia is the cerebral cortex, followed by relatively low-class central nerves [7]. The different inhibitory levels from advanced functions to low-level functions and from mild to severe are called anesthesia depth. Epidural anesthesia does not considerably influence the hemodynamics of patients. Thus, all intraoperative vital signs should be steady [8,9]. Furthermore, epidural anesthesia can shorten the surgical waiting time because of its immediate effect, thereby significantly improving the comfort level of patients. Epidural anesthesia also exhibits ideal anesthetic and analgesic effects and can effectively reduce intraoperative stress response to protect patients against cardiovascular and cerebrovascular diseases to a certain degree [10]. This study showed that both test and control groups obtained certain application effects. Compared with those in the control group, patients in the test group displayed significant advantages in terms of evaluation indices, such narcotic dosage, complete block time, and initial effect time of anesthesia. The differences between the two groups were statistically significant ($p<0.05$). The other indices (recovery time of intestinal functions, length of hospital stay, and off-bed movement time) were better in patients in the test group than those in the control group. The differences between the groups were statistically significant ($p<0.05$). Sympathetic nervous excitation occurred in patients after general anesthesia because of the enhanced secretion of the pituitary–adrenal cortex system and increased contents of hormones. These phenomena led to a series of stress reactions, such as fast heartbeat and elevation of blood pressure, and decreased the recovery speed of patients. General anesthesia combined with epidural analgesia cannot only reduce peripheral resistance by expanding peripheral vessels but can also excite the vagus nerves to reduce the heart rate of patients and allow the recovery of the circulatory system.

Conclusion

The application of general anesthesia combined with epidural analgesia to patients who will undergo laparoscopic radical resection of rectal carcinoma can satisfactory anesthetic effect and facilitate their recovery. Thus, this method is worthy of clinical application.

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