Journal of Clinical and Nursing Research, 2022, Volume 6, Issue 5
http://ojs.bbwpublisher.com/index.php/JCNR
ISSN Online: 2208-3693
ISSN Print: 2208-3685

Analysis of the Results of Rectal Cancer Treatment via 3D Laparoscopic Natural Orifice Specimen Extraction Surgery (NOSES IV)

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Abstract: *Objective:* To investigate the effect of 3D laparoscopic natural orifice specimen extraction surgery as rectal cancer treatment. *Methods:* The study was carried out in Shaanxi Provincial People's Hospital from July 2021 to July 2022. 80 rectal cancer patients were selected and divided into two groups which are the experimental group and control group. The experimental group was given 3D laparoscopic surgery while the control group was given 2D laparoscopic surgery. The results were compared and analysed. *Results:* The patients in the experimental group had shorter operative and evacuation times, less intraoperative bleeding, and a lower rate of complications. *Conclusion:* The clinical application of 3D laparoscopic radical surgery for rectal cancer via natural lumen extraction is more effective, which can promote patients' recovery and reduce the incidence of adverse events.

Keywords: 3D laparoscopy; Natural orifice specimen extraction surgery; Rectal cancer; Clinical outcome

Online publication: September 5 2022

1. Introduction

This study was based on 3D laparoscopic natural orifice specimen extraction surgery as a rectum cancer treatment. 3D and 2D laparoscopic rectal cancer resection was applied on the patients and its clinical application value was compared and analyzed as follows.

2. Materials and methods

2.1. Data analysis

The study was carried out in Shaanxi Provincial People's Hospital from July 2021 to July 2022. 80 rectal cancer patients were used as subjects, and the patients were grouped and their information were processed. They were then separated into two groups, namely experimental group and control group. In order to exclude the influence of other factors, the patient data of the two groups were compared, the specific comparison results are shown in **Table 1**. Results show the two groups of patients under the statistical results showed no significant differences in the data, P>0.05, in line with the criteria for comparative studies.

Table 1: Comparison of general information between the two groups of patients, n (%).

Group	n	Male (n)	Female (n)	Average age (Years)	BMI (kg/m^2)
Experimental group	40	22	18	65.45 ± 5.44	24.33 ± 2.12
Control group	40	23	17	65.44 ± 5.34	24.42 ± 2.11
χ^2	0.000	0.051	0.051	0.008	0.190
P	1.000	0.822	0.822	0.993	0.850

2.1. Research Methodology

Pre-operative preparation: Firstly, the patient needs to be prepared preoperatively with tumour markers, thoracoabdominal spray CT, pelvic MRI and endoscopic pathological biopsy in order to evaluate the patient's tumour (size, location, infiltration). If the patient has a small tumour, a transendoscopic injection of nanocarbon can be given to the patient before summer to facilitate intraoperative localisation. The patient is monitored for 12 hours before surgery to achieve a cleansing effect by giving the patient an oral dose of compounded polyethylene glycol electrolyte bulk. If the patient has a combination of various underlying diseases, including hypertension and diabetes mellitus, the underlying diseases need to be treated first. Care should be taken to ensure that the patient's organism is in a stable state and to improve the patient's anaemia, hypoproteinaemia and electrolyte disturbances. Antibiotics should be administered 30 minutes before surgery and additional antibiotics should be administered intraoperatively if the patient is operated on for more than 3 hours. Patients are given a urinary catheter to be left in place before surgery.

The experimental group was given 3D surgery, in which the patient was first given general anaesthetic intervention and placed the lithotomy position. The patient's abdominal cavity was explored and the absence of metastases was confirmed. The "yellow-white junction line" in front of the sacral promontory was used as the starting point and the patient is then dissected in the direction of the inferior mesenteric artery and vein in order to separate, expose and dissect the inferior mesenteric artery and vein. Care was taken in removing the surrounding lymphatic tissue, to cut the colonic mesentery and to separate along the rectal wall on both sides according to a total rectal mesenteric resection, taking care to protect the inferior abdominal plexus and ureter. It was also necessary to free the rectum along the anterior wall until a distance of 5 cm from the tumour below. A linear cut was made 2 cm below the tumour and the obturator was cut and the distal bowel was dissected. Next, complex iodine was applied to achieve disinfection of the intestinal cavity and the rectal stump was opened using an electric hook. A sterile protective sleeve was placed through the main operating hole, one end was dislodged through the anus and the other end was placed on the distal rectal stump and the base of the offset spike was passed through the rectal stump and fed into the pelvic cavity and the intestinal canal was disarticulated by cutting the closure about 15 cm from the proximal end of the tumour using the linear cutting method and the oval forceps are applied and the specimen tape containing the specimen was passed through the anus in a slow and gentle movement. A slow and gentle movement was used to dislodge the specimen. A 2 cm incision was then made at the proximal bowel section using an electric hook and continued with adequate disinfection using complex iodine, followed by laparoscopic assistance to encase the proximal colon with an offset staple holder. The linear cutting closure was applied again, the distal rectal stump was closed and removed through the main operating hole and subsequently sent for pathology. The circular anastomosis is applied transanally and the anastomosis is achieved with the aid of a laparoscope. The pelvic cavity was then irrigated, a drainage tube was placed in it and the incision was sutured.

In the control group, a 2D surgical method was used, with the same surgical methods, steps and reconstructive anastomosis of the digestive tract as in the experimental group. Besides, the same specimen

was removed in the same way as in the experimental group, with a drainage tube left in place after completion of the procedure.

2.2. Statistical methods

SPSS20.0 was used to do data comparison, calculate the measurement data and count data. The two expressions used are ($x \pm s$) and [n (%)] respectively and the results are validated using P value of 0.05. If it is greater than the standard value, it indicates that this study comparison is insignificant. In contrast if it is smaller than the standard value, it indicates that this comparison is significant, corresponding to the validation expressions are. The corresponding validation expressions are x^2 values and *t* values.

3. Results

3.1. Comparison of patient hospitalisation indicators

Patients in the experimental group had a shorter ($P < 0.05$) and better recovery than the control group, as shown in **Table 2**.

Table 2. Comparison of all inpatient indicators between the two groups ($x \pm s$).

Group	Surgery duration (min)	Flatulence time (d)	Bleeding volume (m)
Experimental group (n = 4)	111.23 ± 6.44	2.90 ± 0.33	52.23 ± 5.45
Control group (n = 40)	136.45 ± 6.99	3.54 ± 0.34	56.56 ± 6.77
χ^2	16.782	8.543	3.151
P	0.000	0.000	0.002

3.2. Incidence of complications

The incidence of complications in the experimental group was 7.50%, which was significantly lower than the incidence of 35.00% in the control group, with a significant difference in the data comparison, $P < 0.05$.

Table 3. Comparison of patient complication rates [n (%)].

Group	Anastomotic leak	Anastomotic bleeding	Infection of the incision	Abdominal infection	Incidence rate
Experimental group (n = 40)	1 (2.50)	0 (0.00)	1 (2.50)	1 (2.50)	3 (7.50)
Control group (n = 40)	3 (7.50)	4 (10.00)	4 (10.00)	3 (7.50)	14 (35.00)
χ^2					9.038
P					0.002

4. Discussions

From the current development of China, the incidence of gastrointestinal tumours in China is increasing. This poses a serious threat to people's life and health, among which rectal cancer has a high incidence and needs to be clinically given surgical treatment [1-3]. In the current development, the clinic mainly applies surgical methods and combines radiotherapy, chemotherapy and immunotherapy for patients [4-7]. The application of the surgical approach to rectal cancer is mainly based on the location of the tumour from the anus, analysis of the tumour, the patient's blood flow and the patient's underlying disease, and other aspects of its comprehensive assessment [8-11]. However, in actual situations, the incidence of postoperative complications in patients is still high, which has a negative impact on the clinical treatment effect [12-16]. In

view of this, the application of 3D laparoscopy and instrumentation equipment to promote the gradual development of surgery in the direction of refinement and precision, and the implementation of natural cavity extraction surgery, has huge clinical significance. This method provides hand-eye coordination consistency and is more conducive to improving the accuracy of suturing and needle entry, which has significant application advantages and high clinical application value [17-20].

5. Conclusion

In conclusion, the clinical application of 3D laparoscopic radical rectal cancer surgery via natural cavity extraction of the specimen is effective in which it can promote patient recovery and reduce the incidence of adverse reactions in patients, and can be promoted in the clinical application.

Disclosure statement

The author declares no conflict of interest.

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