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Research Article

Risk Assessment of Perioperative Infection about 263 Diabetic Patients Undergoing Small Bowel Lateral-lateral Anastomos(intestinal bypass)

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Abstract: ***Objective:*** Analyze and summarize the risk assessment of perioperative infection of 263 diabetic patients undergoing small bowel lateral-lateral anastomos(intestinal bypass)in the small intestine's side ,discuss the managerial methods of antimicrobial agents during the perioperative period. Methods: Retrospectively analyze the clinical data of patients who underwent laparoscopic small bowel lateral anastomosis (intestinal bypass) from January 2018 to December 2018. The patients with HBA1c ⩾ 9.0% were selected as the observation group and patients with HBA1c < 9.0% as the control group. Results: The decling range of the average value about blood glucose in the observation group was greater than that in the control group.The difference was statistically significant (P<0.05). The average postoperative neutrophil ratio of the observation group was higher than that of the control group; and the difference was statistically significant (P<0.05).The proportion of patients with postoperative body temperature over 37 degrees in the observation group was higher than that in the control group. Conclusion: Laparoscopic lateral anastomosis (intestinal bypass surgery) may cause intestinal fluid overflow and intestinal flora ectopic, for the diabetic patients with poor blood glucose control, perioperative risk of infection increased, we should consider strengthening the grade of antimicrobial agents in preventive application , better cover gram-negative bacteria and anaerobic bacteria.

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Traditional diabetes depend on medical treatments based on a variety of hypoglycemic drugs and insulin, In October 2009, the American diabetes association (ADA) introduced surgery as a treatment for diabetes for the first time.In November 2010,for the first time, the gastric bypass surgery was included in"the guidelines for the prevention and treatment of diabetes in China" which issued by the Chinese diabetes society of the Chinese medical association [1-2].As an improved method of gastric bypass surgery, small intestine side anastomosis (intestinal bypass surgery) reduces the risk of gastroesophageal reflux and gastroparesis after gastric bypass surgery.Laparoscopic enterostomy has the advantages of less trauma, faster recovery, less bleeding, shorter hospital stay, less risk and less postoperative pain.Diabetic patients are at high risk of surgical infection. During jejunum and ileum anastomosis surgery, some intestinal fluid overflow may contaminate the abdominal cavity. Besides, postoperative small intestinal anastomosis may lead to heterotopic intestinal flora, resulting in an increased risk of postoperative infection in such patients.In this retrospective study, clinical data of 263 patients after laparoscopic small bowel anastomosis (intestinal bypass) in our hospital from January 2018 to January 2019 were reviewed and analyzed to assess and analyze the risk of infection in different diabetes mellitus during the perioperative period.

1 Materials and methods

1.1 General Materials

Retrospectively analyze the postoperative complications ,the process of diagnosis and treatment which were performed on 263 diabetic patients who underwent laparoscopic enterostomy (intestinal bypass operation) in our hospital. The operation plan was discussed and agreed by the medical ethics committee of our hospital . Before the operation, the patient was fully aware of the operation mechanism and the danger and voluntarily accepted the operation. The inclusion criteria: (1) Patients with type 2 diabetes who have been clinically diagnosed. (2) The medical test of pancreas islet function:The low value of c-peptide was ≥ normal low value 1/2. (3) Negative diabetes autoimmune antibody (4) BMI < 32.5kg/m^2 (5)No serious diseases in heart, brain, lung, kidney that affect anesthesia and operation. Age Range of 18 to 69, with an average age of 52; 139 males and 124 females.The mean body weight index (BMI) is 26.4 kg /m2.Among them, 183 patients had diabetes related complications before surgery, mainly including peripheral neuropathy, retinopathy, nephrotic syndrome, etc.

1.2 Research methods

Glycosylated Hemoglobin (HBA1c) reflects the average level of glycemic control of patients in the past two to three months.Glycosylated Hemoglobin (HBA1c) is greater than or equal to 9.0% indicates poor glycemic control.It is a high-risk group for the occurrence and development of diabetic complications[3].Therefore, patients was divided into different groups according to the preoperative Glycosylated Hemoglobin HBA1c of the surgical patients in this study.Patients with Glycosylated Hemoglobin (HBA1c) ⩾ 9.0% before intestinal bypass operation were selected as the observation group (115 cases).Patients with Glycosylated Hemoglobin (HBA1c)< 9.0% were in the control group (148 cases).Clinical data such as blood routine, blood glucose and body temperature were observed before and after operation.

1.3 Statistical methods

SPSS statistical software is used for data analysis,The measurement data by the t test are expressed as mean±standard deviation ($\bar{x} \pm s$). The enumeration data are expressed as (%) and tested by χ^2. P<0.05 is statistically significant.

2 Consequence

2.1 Comparison of preoperative and postoperative blood glucose of patients blood

Venous blood was taken for examination to test blood glucose during the day before the operation and the next morning after the operation. The blood glucose of all Patients in both groups underwent laparoscopic small bowel lateral anastomosis (intestinal bypass) decreased.The decrease of blood glucose in the observation group was greater than that in the control group.The difference was statistically significant at P<0.05. (The details are in Table 1.)

2.2 Comparison of postoperative white blood cells and neutrophil ratio between the two patients groups

Venous blood was taken for examination to test routine blood during the day before the operation and the next morning after the operation. The white blood cell counts of the two groups were compared before the operation,the white blood cell count of the observation group was higher than that of the control group.The difference was not statistically significant at P>0.05.Preoperative neutrophil ratio was compared between the two groups,The postoperative neutrophil ratio of the observation group was higher than that of the control group.The difference was statistically significant at P>0.05.The white blood cell counts of the two groups were compared after surgery, the difference was not statistically significant at P>0.05. Postoperative neutrophil ratio was compared between the two groups, the postoperative neutrophil ratio of the observation group was higher than that of the control group,the difference was statistically significant P<0.05. (The details are in Table 2.)

Table 1. Comparison of preoperative and postoperative blood glucose of patients blood

Group	Age	Body mass index (kg/m^2)	Preoperative HMA1c(%)	Preoperative blood glucose (mmol/l)	Postoperative blood glucose (mmol/l)	Decrease of blood glucose (%)
Observation group	49.94±10.55	26.58±2.95	10.36±1.16	12.79±3.06	9.36±2.19	26.01±15.76
Control group	53.69±8.54	26.31±3.89	7.65±0.84	9.06±2.46	7.22±1.93	17.34±23.10
T value	-3.1	0.646	21.035	10.66	8.374	3.449
P value	0.002	0.531	0	0	0	0.001

Table 2. Comparison of postoperative white blood cells and neutrophil ratio between the two patients groups

Group	Preoperative white blood cell count (10^9/l)	Preoperative neutrophil ratio (%)	Postoperative white blood cell count (10^9/l)	Postoperative neutrophil ratio (%)	Postoperatively temperature>37 degrees (%)
Observation group	6.87±1.69	62.15±7.69	9.31±2.72	74.92±6.31	(21)115, 18.26
Contraol group	6.71±1.48	61.85±8.26	8.881±2.23	71.02±7.47	(10)126, 7.93
T value	1.196	1.386	1.396	2.195	
P value	0.59	0.168	0.164	0.029	

3 Discussion

3.1 Operation method of intestinal bypass and blood sugar falling principle

Laparoscopic bowel bypass surgery is Jejunum and ileum side-to-side anastomosis under general anesthesia,change some of the flow of digestive juices and food.Partial digestive juices and small amounts of food that is not fully digested,stimulating L cells in the terminal ileum to produce GLP-1 (glucagon-like peptide -1) and PYY (leptin).Glp-1 can stimulate islet cells proliferation,reduce islet cell apoptosis,increase the sensitivity of blood sugar to insulin,eliminate insulin resistance.PYY can resulte in a slight postoperative weight loss so that the islet function gradually returned to normal and long-term remission of diabetes can be achieved [4-7].

3.2 Increased risk of perioperative infection in diabetic patients

Data indicated that the probability of patients with diabetes developing acquired infections during hospitalization is significantly higher than that in non-diabetic patients .[8]There are many factors leading to infection as a major complication in the perioperative period of diabetic patients.For example,people with diabetes usually have a long disease history,organ's storage capacity decreased,the body's resistance to the irritable damage capacity recedes after operation. At the same time, diabetic patients are in a long-term hyperglycemic environment,the chemotaxis and bactericidal abilities of neutrophils were weakened. Long-term high sugar stimulation leads to imbalance of immune regulating function,and the decrease of the body's ability to resist disease,etc.After the preliminary statistics of the surgical patients in our hospital,patients who underwent laparoscopic intestinal bypass surgery usually have a disease history of more than 10 years and are often associated with diabetes-related complications.

3.3 Intestinal bypass changes the distribution of intestinal flora

The composition of intestinal flora in normal adults is very complex,a wide variety of bacteria,about 500 to 1,000.It is mainly divided into probiotics represented by bacaeroides, bifidobacterium and lactobacillus;conditional pathogenic bacteria mainly includes enterococcus and enterobacteria;pathogenic bacteria group represented by salmonella, escherichia coli.In the normal population, the upper end of the intestinal tract is mainly gram-positive aerobe.The lower down it goes, the more number and species of bacteria there are.There are more gram-negative bacteria than gram-positive bacteria in the terminal ileum,and there are some anaerobic bacteria.After passing the ileocecal region and entering the colon, the concentration of bacteria increased sharply, mainly anaerobic bacteria, which could reach more than 95%[9-10].Normally,the whole intestinal flora is in a state of dynamic equilibrium.They play an important role in digestive absorption,energy metabolism,immunoregulation ,disease resistance ofthe body.Nowadays studies have shown that intestinal flora is associated with a variety of diseases. Amomg of them,the occurrence and development of diabetes are also related to intestinal flora[11].At

present, intestinal bypass surgery is to anastomose the upper end of jejunum and the lower end of ileum. By changing the direction of food,GLP-1 cells are stimulated to generate and control blood glucose. Whether the decrease of blood glucose in diabetic patients after intestinal bypass surgery is correlated with the translocation of intestinal flora or not,we still need to carry out a further study.But the shifting of the intestinal flora must upset the balance of the intestinal flora and increase the risk of infection during perioperative bowel bypass surgery.By our clinical observation, we found that some patients had postoperative complications of constipation or diarrhea , which may be related to the disorder of intestinal flora caused by ectopic intestinal flora.

3.4 Perioperative management of antibiotics in intestinal bypass surgery

According to the 2015 antimicrobial guidelines,there are two or three types of incisions that involved in the small intestine's surgery.Possible contaminating bacteria are gram-negative bacilli,streptococcus.The recommended antibiotics are the first and second generation cephalosporins or cephalomycin .The antimicrobial spectrum of this class of antibiotics mainly targets gram-positive bacteria.The effect on gram-negative bacilli and anaerobe is relatively weak.At present, antibiotics used in perioperative operation in our hospital are mainly three-generation cephalosporin combined with nitroimidazoles and oxycephalosporin, aminoglycosides combined with nitroimidazoles are used in patients with hypersensitivity to cephalosporin and amtronine combined with nitroimidazoles,etc.Among them, oxycephalosporin antibiotics can cover most gram-negative bacteria,anaerobic bacteria.It is weak to gram-positive bacteria.The antimicrobial spectrum is similar to that of tri-generation cephalosporin combined with nitroimidazoles.It is more effective in preventing gram-negative bacterial infections. It is convenient to give the drug alone before the perioperative period.This choice of perioperative prophylactic medication is inconsistent with the guidelines,however, clinical observation shows it can reduce the risk of perioperative infection in patients undergoing laparoscopic enterostomy.

This study suggests that patients with Glycosylated Hemoglobin (HBA1c) $\geqslant$ 9.0% have poor glycemic control,counting the white blood cell before and after surgery .The percentage of neutrophils was significantly higher than that of patients with Glycosylated Hemoglobin (HBA1c) < 9.0%.And these patients are at greater risk of perioperative infection.Although laparoscopic surgery has little disruption to the internal organs of the abdomen,avoid the irritation and pollution of enterocoelia which led by air and air bacteria .But after laparoscopic enterostomy (intestinal bypass),proximal and distal small intestine were anastomosed laterally.It is inevitable that some intestinal fluid will overflow in the process of small intestinal anastomosis and make it possible to cause abdominal infection. Besides, according to the distribution of intestinal bacteria,postoperative infection caused by ectopic flora should be considered.Currently there is no literature or guidelines on this type of surgery. At present, the third generation of cephalosporins combined with imidazole antibiotics are used in laparoscopic small bowel lateral anastomosis (intestinal bypass) in our hospital.Or using oxycephalosporin antibiotics alone as preventive medication to cover most gram-negative bacilli and anaerobic bacteria,reduce the perioperative risk of infection beacuse of intestinal fluid spillage and ectopic intestinal flora lying in patients who underwent laparoscopic enterostomy (intestinal bypass).

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