Research Paper

Effect of Perioperative Antibiotics on Prognosis of Patients with Hemorrhoids

B. CHEN*, GUO RONG XIN AND S. J. HU

Department of Anorectal Surgery, Ningbo Anorectal Hospital, Ningbo, Zhejiang Province, 315040, China

To explore the feasibility of not using antibiotics before and after hemorrhoid surgery is the main objective of the study. A total of 68 patients with hemorrhoids who were admitted to Ningbo Anorectal Hospital from December 2019 to May 2021 were selected, including 36 males and 32 females. They were randomly divided into an experimental group and a control group, 34 patients in each group. The patients in the experimental group were not given antibiotics, while the patients in the control group were given cefazolin sodium 1-2 g and 100 ml of sodium chloride intravenously 30 min before surgery and the same dose of antibiotics was given intravenously after surgery (1 time/12 h), the postoperative administration time is 24 h, not more than 48 h. The intraoperative conditions, postoperative wound infection rate, hospital stay, postoperative recurrence rate and other aspects of the two groups of patients were observed and compared. There was no significant difference in postoperative body temperature, white blood cell count, postoperative wound infection and average hospital stay and recovery time between the two groups. The adverse drug reaction rate in the experimental group was lower than that in the control group. It is safe and feasible not to use antibiotics in the perioperative period of hemorrhoids.

Key words: Hemorrhoids, perioperative antibiotics, cefazolin sodium, sodium chloride

The application of perioperative antibiotics plays a positive role in preventing surgical infection. In recent years, with the development of antibiotics, the concept of perioperative antibiotic use, that is, preventive antibiotic administration, has changed a lot compared with the traditional concept[1,2]. Clinical practice shows that the prophylactic use of antibiotics can greatly reduce the occurrence of postoperative complications in hemorrhoid surgery[3]. Therefore, the phenomenon of antibiotic abuse in the prevention of infection in surgical clinics is more prominent than the unreasonable use of drugs for treatment[4,5]. A considerable proportion of surgeons do not distinguish between operations. Depending on the type, size, cleanliness or pollution of the operation, the blindly combined use of a large number of new and expensive antibiotics, and the dosage and medication time limit are not standardized, which not only wastes drugs, increases adverse reactions, but also increases the incidence of surgical infection. We analyzed the current situation of the use of antibacterial drugs for hemorrhoid surgery in the surgical department of our hospital from December 2019 to May 2021, in order to provide a basis for formulating the principles of preventive use of antibacterial drugs in the hospital and strengthening standardized management.

MATERIALS AND METHODS

Subjects:

A total of 68 patients with hemorrhoids who were admitted to Ningbo Anorectal Hospital from December 2019 to May 2021 were selected, including 36 males and 32 females; age (45.5±4.3) y old; medical history of 2-17 y, 7 patients had a history of hemorrhoid surgery. There was no significant difference in age, gender, course of disease and disease between the two groups, and they were comparable.

Surgical methods:

All patients were treated with minimally invasive hemorrhoids surgery (Prolapsed Hemorrhoids (PPH)), with intravenous intensification plus local infiltration anesthesia, left lateral position, anorectal cleaning and disinfection, paraffin oil lubricating anal dilator and setting eve dilator. Pull out the inner tube, fix the outer tube at 0, 4 and 8 o'clock on the perianal skin, suture the purse at an appropriate height and insert the stapler. After ligating the purse, pull the front line, rotate the stapler adjusting nut to check that the fit is good and

***Address for correspondence**
E-mail: chenbin1974423@163.com

the anastomosis is fired. After the device was pressed to stop the bleeding, the stapler was removed. The patients were fasted for 24 h after surgery.

Antibiotic administration:

The patients were divided into two groups, the experimental group in which no antibiotics were used in the whole perioperative period; the control group in which 1-2 g of cefazolin sodium and 100 ml of sodium chloride was given intravenously, 30 min before the operation, given the same dose of antibiotics intravenously after surgery (1 time/12 h), the postoperative administration time is 24 h, not more than 48 h. The intraoperative conditions, postoperative wound infection rate, hospital stay, postoperative recurrence rate and other aspects of the patients were observed and compared and analyzed.

Statistical analysis:

Statistical Package for the Social Sciences (SPSS) 20.0 statistical software package was used for data processing. Measurement data were expressed as mean±standard deviation, enumeration data were tested by rate or percentage, comparison between groups was by t-test and enumeration data by chi-square test, $p<0.05$ was considered statistically significant.

RESULTS AND DISCUSSION

Analysis of postoperative body temperature monitoring results of patients was shown here. After operation, the experimental group had 8 patients with elevated body temperature, 1 with high fever and 7 with low fever, while the control group had 7 patients with elevated body temperature, 1 with high fever and 6 with low fever (Table 1). Chi-square test showed that there was no significant difference in the proportion of patients with rising body temperature between the two groups.

Peripheral blood leukocyte count results after surgery was shown here. The blood routine examination on the 4th d after operation showed that the white blood cell count of the experimental group was significantly increased in 6 patients, of which 1 patient had the highest white blood cell count of 15.9×10^9/l and 6 patients had different degrees of elevated body temperature. There were 5 patients with significantly increased white blood cell count in the group and similarly, 5 patients had different degrees of elevated body temperature (Table 2). The chi-square statistical analysis showed that there was no significant difference in the proportion of patients with elevated white blood cell counts between the two groups.

Comparison of postoperative wound infection between the two groups was shown here. 1 case of obvious wound infection in the experimental group showed obvious wound pain, obvious redness and swelling of the skin around the wound, and a large amount of purulent secretions on the wound surface, and 1 case of wound infection in the control group showed the same symptoms as redness, pain and purulent secretions on the wound surface (Table 3). The chi-square statistical analysis showed that there was no significant difference in the proportion of patients with wound infection between the two groups.

Comparison of the average hospitalization time and average recovery time of the two groups of patients was explained here. The longest hospital stay of patients in the experimental group was 17 d, the shortest was 1 d, the average hospital stay was 8.1±1.2 d, the average recovery time was 15.3±4.3 d. The longest hospital stay of the control group was 17 d, the shortest was 1 d, the average hospital stay 8.9±2.1 d, the average recovery time was 15.9±2.6 d. The experimental group and the control group was compared, the difference was not statistically significant (Table 4).

Adverse drug reactions in the study were shown here. The patients in the experimental group did not use antibacterial drugs, so there was no adverse drug reaction. Among the 34 patients in the control group, 5 patients had skin itching, 3 patients improved after drug withdrawal and 2 patients received oral antiallergic drugs (loratadine dispersible tablets), after remission (Table 5).

TABLE 1: COMPARISON OF THE NUMBER OF PATIENTS WITH ELEVATED BODY TEMPERATURE AFTER OPERATION

Group	Experimental group	Control group
Number of patients with elevated body temperature [n (%)]	8 (23.5 %)	7 (20.6 %)
Number of patients with no significant change in body temperature [n (%)]	26 (76.5 %)	27 (79.4 %)
p	0.764	

TABLE 2: COMPARISON OF THE NUMBER OF PATIENTS WITH ELEVATED LEUKOCYTES AFTER OPERATION

Group	Experimental group	Control group
The number of patients with significantly increased white blood cells [n (%)]	6 (17.6 %)	5 (14.7 %)
The number of patients with no significant change in white blood cells [n (%)]	28 (82.4 %)	29 (85.3 %)
p	0.568	

TABLE 3: COMPARISON OF POSTOPERATIVE WOUND INFECTION

Group	Total number of patients	Wound infection cases
Experimental group	34	1 (2.9 %)
Control group	34	1 (2.9 %)
p	0.984	

TABLE 4: COMPARISON OF AVERAGE HOSPITAL STAY AND AVERAGE RECOVERY TIME OF PATIENTS

Group	Average length of hospital stay	Average recovery time
Experimental group	8.1±1.2 d	15.3±4.3 d
Control group	8.9±2.1 d	15.9±2.6 d
p	0.462	0.592

TABLE 5: COMPARISON OF ADVERSE DRUG REACTIONS

Group	The number of cases of adverse drug reactions	Number of cases without adverse drug reactions
Experimental group	0	34
Control group	5	29
p	0.021	

With the advent of penicillin, antibiotics have been widely used clinically with significant anti-infective effects, but while antibiotics have therapeutic effects, they are also accompanied by many adverse reactions. Hu *et al.*[6] believed that there are five major hazards of the abuse of antibiotics through comprehensive analysis, the first is the harm to patients. Renal toxicity-The abuse of antibiotics can induce drug-induced renal failure, manifested as proteinuria, hematuria, etc., and in severe cases, azotemia can occur, resulting in decreased renal function[7]; hepatotoxicity-Drugs cause liver damage through direct damage or allergic mechanisms; the abuse of antibiotics can destroy the normal bacteria in the human body, leading to a double infection; ototoxicity-The abuse of antibiotics can damage to vestibular function and auditory nerves, resulting in vision loss, nystagmus, nausea, vomiting and ataxia, hearing loss and even permanent deafness[8]; gastrointestinal reaction-Nausea, vomiting, abdominal pain, diarrhea and constipation reactions, toxic reactions, low immunity[9]; blood toxicity-Red blood cells, white blood cells, platelet blood reduction and even cause hemolytic anemia, aplastic anemia, etc.,[10]; Secondly, the abuse of antibiotics can lead to the emergence of super-resistant bacteria; thirdly, the abuse of antibiotics poses a threat to clinical practice; fourth, the abuse of antibiotics wastes resources; fifth, the antibiotics exist in sewage in an active form, destroying the ecological balance. The abuse of antibiotics is particularly serious in China[11]. According to World Health Organization (WHO) data, the antibiotic usage rate in China is as high as 95 % for surgical operations and 80 % for hospitalized patients, which is much higher than the international standard of no more than 30 % antibiotic usage rate. Moreover, more than 80 000 people in China die directly or indirectly from the abuse of antibiotics every year and results in damage to the body and the drug resistance of pathogenic bacteria is even more immeasurable[12].

Perioperative application of antibiotics as an important means to prevent surgical infection is widely used in clinical practice, as it is a case in anorectal department. The 2006 edition of the clinical guidelines for the diagnosis and treatment of hemorrhoids formulated by the Colorectal and Anal Surgery Group of the Chinese Medical Association, the Anorectal Disease Professional Committee of the Chinese Association of Traditional Chinese Medicine, and the Colorectal Anal Diseases Professional Committee of the Chinese Association of Integrative Medicine clearly pointed out that for the perioperative management of hemorrhoids antibiotics can be used prophylactically before surgery[13]. In 2010, the "Hemorrhoids (Mixed Hemorrhoids) Traditional Chinese Medicine Clinical Pathway Hospitalization Form" in the "Hemorrhoids (Mixed Hemorrhoids) Traditional Chinese Medicine Clinical Pathway" issued by the State Administration of Traditional Chinese Medicine clarifies that antibiotics should be used on the day of surgery and on the 1st and 2nd d after the operation to prevent infection.

There is no doubt that the formulation of relevant guidelines and clinical pathways has standardized clinical diagnosis and treatment, and has played a curb on the abuse of antibiotics in anorectal departments. The main purpose of antibiotics in the perioperative period is to prevent surgical site infection, but attention to aseptic operation, gentle operation and thorough hemostasis during surgery are more important than antibiotics to prevent infection; sometimes antibiotics are used for the doctor's psychological comfort or the patient's request. Clinically, antibiotics are not necessary to prevent infection for some clean and near-clean operations with less trauma[14], and it has become a consensus that antibiotics should not be used in the perioperative period of a class of incisions such as inguinal hernia surgery, thyroid surgery and craniocerebral surgery, also reported in the literature[15,16]. With the standardization of the use of antibiotics in clinical work, there are reports that antibiotics are not used in the second type of incision such as gallbladder surgery and appendix surgery and even some third type incisions such as abscess drainage surgery may not use antibiotics.

We reviewed the literature and found no reports of not using antibiotics during the perioperative period for hemorrhoids. Hemorrhoid surgery, as a second-class open incision, is different from deep surgery on the brain, gallbladder, appendix, etc., and is also different from thyroid cleaning surgery. However, hemorrhoid surgery is a surface surgery, visible under direct vision, with abundant local blood circulation and strong anti-infection ability, so it is feasible to not use antibiotics in the perioperative period. The American Society of Colorectal Physicians revised "Evidence-based medical treatment guidelines for perianal abscesses and fistulas (2004)" pointed out that, antibiotics after routine incision and drainage of uncomplicated perianal abscesses in the hospital are unnecessary. The addition of antibiotics after routine incision and drainage of abscesses does not improve healing time or reduce recurrence and is not usually used. Accordingly, we designed this clinical study to observe the feasibility of not using antibiotics in hemorrhoid surgery. Like other surgical operations, avoiding postoperative infection focuses on strict aseptic operation, reducing normal tissue damage and complete hemostasis. It is impossible to completely avoid infection by relying solely on the application of antibiotics.

From the data of this study, the clinical effect of not using antibiotics is the same as that of those who use antibiotics and there is no incision infection in surgery-related parts and infection in non-related parts such as respiratory tract and urinary tract, which reduces the pain of patients and avoids drug-induced infections. The toxic and side effects of this method reduce the medical expenses of patients and it is worthy of further clinical application.

Conflict of interests:

The authors declared no conflict of interest.

REFERENCES

1. Assoumy MA, Bedekelabou AP, Teko-Agbo A, Ossebi W, Akoda K, Nimbona F, *et al*. Antibiotic resistance of *Escherichia coli* and *Salmonella* spp. strains isolated from healthy poultry farms in the districts of Abidjan and Agnibilékrou (Côte d'Ivoire). Vet World 2021;14(4):1020-7.
2. Torres NF, Chibi B, Middleton LE, Solomon VP, Mashamba-Thompson T. Evidence of factors influencing self-medication with antibiotics in LMICs: A systematic scoping review protocol. Syst Rev 2018;7(1):1-5.
3. Hajdarevic B, Slaku J, Pandza H, Salihefendic N, Hadziahmetovic Z. Application of simple digital methods in the treatment of hemorrhoid disease. Stud Health Technol Inform 2009;150:433-7.
4. Sancho Puchades M, Herráez Vilas JM, Berini Aytés L, Gay Escoda C. Antibiotic prophylaxis to prevent local infection in oral surgery: Use or abuse? Med Oral Patol Oral Cir Bucal 2009;14(1):28-33.
5. Kaczmarzyk T. Abuse of antibiotic prophylaxis in third molar surgeries. J Oral Maxillofac Surg 2009;67(11):2551-2.
6. Hu L, Sun Z, Xu C, Wang J, Mallik AU, Gu C, *et al.* High nitrogen in maize enriches gut microbiota conferring insecticide tolerance in lepidopteran pest *Spodoptera litura*. iScience 2022;25(1):103726.

7. Luo SS, Yu CP, Hsieh YW, Chao PD, Sweet DH, Hou YC, *et al.* Effects of antibiotics on the pharmacokinetics of indoxyl sulfate, a nephro-cardiovascular toxin. Xenobiotica 2020;50(5):588-92.
8. Kranzer K, Elamin WF, Cox H, Seddon JA, Ford N, Drobniewski F. A systematic review and meta-analysis of the efficacy and safety of N-acetylcysteine in preventing aminoglycoside-induced ototoxicity: Implications for the treatment of multidrug-resistant TB. Thorax 2015;70(11):1070-7.
9. Wu XY, Xiong JB, Fei CJ, Dai T, Zhu TF, Zhao ZY, *et al.* Prior exposure to ciprofloxacin disrupts intestinal homeostasis and predisposes ayu (*Plecoglossus altivelis*) to subsequent *Pseudomonas plecoglossicida*-induced infection. Zool Res 2022;43(4):648-65.
10. Helmy YA, Deblais L, Kassem II, Kathayat D, Rajashekara G. Novel small molecule modulators of quorum sensing in avian pathogenic *Escherichia coli* (APEC). Virulence 2018;9(1):1640-57.
11. Fang H, Lin X, Zhang J, Hong Z, Sugiyama K, Nozaki T, *et al.* Multifaceted interventions for improving spontaneous reporting of adverse drug reactions in a general hospital in China. BMC Pharmacol Toxicol 2017;18(1):1-9.
12. Zhang M, Ma XY, Feng ZQ, Gao L. Survey of antibiotic use among hospitalised children in a hospital in Northeast China over a 4-year period. J Spec Pediatr Nurs 2020;25(2):e12282.
13. Colorectal and Anal Surgery Group, Chinese Society of Surgery, Chinese Medical Association, Anorectal disease Committee, Chinese Association of Traditional Chinese Medicine, Colorectal and anal disease Committee, *et al.* clinical guideline for diagnosis and treatment of hemorrhoids (2006 edition). J Gastroenterol 2006,9(5):46.
14. Bradshaw AW, Pe M, Bechis SK, Dipina T, Zupkas P, Abbott JE, *et al.* Antibiotics are not necessary during routine cystoscopic stent removal: A randomized controlled trial at UC San Diego. Urol Ann 2020;12(4):373-8.
15. Zapata-Martínez J, Medina MF, Gramajo-Bühler MC, Sánchez-Toranzo G. Participation of PLA2 and PLC in DhL-induced activation of *Rhinella arenarum* oocytes. Zygote 2016;24(4):495-501.
16. Hajra S, Das D, Ghosh P, Pal S, Nath P, Maitra S. Regulation of recombinant human insulin-induced maturational events in *Clarias batrachus* (L.) oocytes *in vitro*. Zygote 2016;24(2):181-94.

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