

The Effect of Probiotics on Surgical Site Infections in Colorectal SurgeryVijay Vasantlal Paria¹, Pradip Nautamlal Malaviya²¹Assistant Professor, Department of General Surgery, Shantabaa Medical College and General Hospital, Amreli, Gujarat, India²Assistant Professor, Department of General Surgery, GMERS Medical College, Junagadh Gujarat, India

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Conflict of interest: Nil

Abstract:

Background and Aim: It is widely recognised that elective colorectal procedures carry a significant risk of surgical site infections (SSI). Alternately, perioperative stabilisation of microflora could be considered. The purpose of this observational follow-up study was to determine the incidence of surgical site infections in elective colorectal cases and the factors that influence such infections, in addition to assessing the burden of elective colorectal surgery at our centre.

Material and Methods: The participants in the study were department-admitted individuals whose open colonic surgery was scheduled. The investigation employed various radiological examinations, including X-ray, CT scan; contrast X-ray, MRI, pus culture swabs, and probiotic bacefac PB capsules. In total, two hundred patients participated in the investigation. In accordance with standard preoperative protocol, probiotics were administered, and the occurrence of SSI was monitored for thirty days. The information gathered in this manner underwent descriptive analysis.

Results: The average haemoglobin level of the subjects was $12.08 \pm 4.2 \pm$ gm/dl. Leukocyte count was $10.95 \pm 5.9/1$ on average. The mean albumin concentration was 4.10 ± 2.97 g/l. Probiotics were administered for a minimum of three to six days prior to surgery and for a minimum of seven days following. Probiotic use persisted for an average of 13.90 ± 4.10 days. Carcinoma rectum emerged as the prevailing malignancy, affecting 50% of all malignancies and 40% of the individuals enrolled in the study. A cumulative of 68 patients underwent an ascending, transverse, descending loop or end colostomy as a palliative measure or to address partial obstruction of the large intestine caused by a distal colonic or anorectal tumour.

Conclusion: Perioperative probiotic administration may reduce the incidence of infection-related complications; however, this cannot be demonstrated statistically due to a paucity of data. Additionally, early gastrointestinal function decreases the average length of hospitalisation, which improves surgical outcomes and quality of life.

Keywords: Bowel, Malignancy, Probiotic, Surgical Site Infections.

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Introduction

Surgical site infections (SSIs), comprising approximately 16% of nosocomial infections, rank third among health-care-associated infections, following urinary tract infections and intensive care unit infections. Despite advancements in infection control techniques, SSIs continue to be the primary cause of morbidity and mortality. For example, the microorganisms accountable for surgical site infections (SSI) are primarily impacted by the specific surgical procedure and the microbiome of the patient, with foreign sources having a relatively minor influence. Surgical site infection (SSI) incidence increases the duration of hospital stays, which may result in escalated admission expenses and a decline in the quality of life for patients. [1,2] It is believed that probiotics that improve the microbial balance of the host's intestines are beneficial to human health. An intestinal microbial

imbalance was identified in patients diagnosed with colorectal cancer (CRC) through a comparative analysis of the intestinal environments of healthy individuals and patients with CRC (Wang et al. [3]). An increase in opportunistic microorganisms and a decline in the number of butyrate producers are indicators of this. [4-6] It appears that intestinal flora disruption plays a substantial role in the onset of perioperative SSI. The aforementioned disturbances arise due to several factors: the strain associated with invasive surgical procedures, the use of antibacterial drugs to mitigate the risk of infection, the reduction in intestinal mucosal elasticity caused by fasting prior to the procedure, and intestinal ischemia and peristalsis. [7,8] Colorectal cancer (CRC) ranks third in terms of prevalence and mortality among both males and females, trailing only lung, prostate, and breast

malignancies. Tumours affecting the gastrointestinal tract (GIT), specifically the colon and rectum, account for the second highest incidence of cancer-related mortality. Metastases to the liver are the most common site of spread. [9,10] Liu et al. [11] suggest that probiotic therapy may improve the clinical and laboratory prognosis of patients undergoing gastrointestinal surgery. These individuals are administered probiotics to combat the microorganisms responsible for postoperative inflammation. Consequently, this inquiry was conducted as an observational follow-up study with the purpose of determining the incidence of surgical site infections in elective colorectal cases and the determinants thereof, in addition to assessing the burden of such procedures at our institution.

Material and Methods

The present inquiry was carried out within the general surgery department of the affiliated medical college and hospital. The duration of the research was twelve months. The research was duly disclosed to the institutional ethics committee, and a certificate of ethical clearance was obtained before the inquiry commenced. Patients completed a written informed consent form after being completely informed about the investigation prior to their participation in the trial. In total, two hundred patients participated in the investigation.

The participants in the study were department-admitted individuals whose open colonic surgery was scheduled. The study participants comprised individuals who were 18 years of age or older. Individuals who were below the age of 18 were not permitted to partake in the study. Exclusion criteria for the study included patients who had a history of immunodeficiency, lactose intolerance, antibiotic use for other gastrointestinal diseases, or emergency OT. The investigation employed various radiological examinations, including X-ray, CT scan, contrast X-ray, MRI, pus culture swabs, and probiotic bacelec PB capsules.

In addition to gathering demographic and anthropometric information, a comprehensive clinical, haematological, and microbiological assessment was conducted. Prior to surgery, Bacelec PB capsules were administered to all patients thrice daily for a minimum of three to six days. These capsules were then restarted on the day the patients resumed water intake and continued for a minimum of seven days.

The history of the population under investigation was obtained and a clinical examination was conducted at the moment of admission. As per the protocol of the facility, all patients underwent standard preoperative preparation. SSI development was monitored on a daily basis during dressing changes, and postoperative complications

including bacterimia, urinary tract infections, and pneumonia were identified. The patient was monitored for 30 days following discharge via post-procedure OPD visits or telephone.

The information was gathered and tabulated. The descriptive analysis was used to analyse the data.

Results

In the current study, there were more men than females. There were 60% men and 40% women. The individuals involved in the study ranged in age from 18 to 90 years. The majority of volunteers were between the ages of 45 and 55, whereas the majority of patients were between the ages of 85 and 95. The average age of the patients involved in the study was 51 years. There were 10% of diabetic individuals and 12% of hypertensive patients.

Routine haematological and biochemical testing were performed on all individuals. The subjects' mean haemoglobin level was 12.08 gm/dl 4.2 gm/dl. The average leukocyte count was 10.95 5.9/l. The average albumin level was 4.10 2.97 g/l. Probiotics were given for at least 3-6 days before surgery and continued for at least 7 days afterward. The average length of probiotic use was 13.9 4.10 days.

The most prevalent reason for elective colorectal surgery was colorectal cancer. The second most prevalent reason for colostomy closure was a previously established colostomy for another reason (trauma, covering stoma). The third most prevalent reason for right hemicolectomy was ileocaecal TB.

The most frequent malignancy was carcinoma rectum, which accounted for 50% of all malignancies and 40% of all individuals included in the research. A total of 68 individuals had an ascending, transverse, or descending loop or end colostomy done as a palliative treatment or for partial large bowel blockage due to a distal colonic or ano-rectal tumour. A total of 46 individuals had a right hemicolectomy for cancer or ileocaecal TB. Anorectal cancer was removed from 32 individuals using abdomino-perineal resection.

For localized cancer, 20 patients had colonic resection anastomosis. After complete healing of the ulcer, 20 patients had elective colostomy closure that had previously been created as a covering stoma, in case of trauma, or in case of non-healing perianal ulcers. For cancer rectum, 12 patients got low anterior resection, and one patient underwent complete proctocolectomy with end to end ilioanal anastomosis.

17% of the study's subjects had surgical site infections. There were 12 female participants and 22 male ones. An analysis of surgical site infections revealed that 24 individuals had superficial SSI and 10 had deep/organ space SSI.

Table 1: Surgical complications in the analyzed population (n = 200)

Complications	Number
Surgical site infections	34
Superficial incisional	24
Organ space	10
Urinary tract infection	4
Pneumonia	4
Anastomotic leak	4
Mortality	4

Discussion

Numerous randomised controlled trials (RCTs) have established that administering probiotics to patients following abdominal surgery may serve as a viable strategy to avert postoperative infection complications. This notion was endorsed by patients with minimal adverse effects. Nevertheless, within the realm of abdominal surgery, certain researchers have documented a lack of evidence substantiating the potential advantages of preoperative probiotic administration for critically ill patients undergoing elective abdominal surgery while also carrying an elevated risk of death; in certain instances, the risk of death was even heightened. [12,13]

Probiotics have been demonstrated in multiple studies to inhibit the onset or advancement of cancer through various mechanisms: modification of intestinal microbial composition, facilitation of host defence against pathogenic bacteria and fungi, generation of biological compounds (e.g., conjugated linoleic acid and short-chain fatty acid), inactivation of carcinogenic compounds, enhancement of gut barrier function, regulation of immune responses, induction of apoptosis, anti-proliferative effects, and antioxidant effects. [14,15]

In our study, colorectal malignancy constituted the leading cause of elective colorectal surgery; globally, this stands as the most prevalent cause for elective colorectal surgery. Seventy percent of all malignancies were located on the left side, according to our research. Least pronounced symptoms include discomfort and overt leakage per the rectum, which increases the likelihood that left-sided tumours will become apparent earlier.

In cases of right-sided illness, only minimal localised discomfort associated with distensibility of the caecum and ascending colon are present as symptoms. Consequently, the prognosis for right-sided colonic malignancies is inferior to that of left-sided colorectal tumours. [16]

Conclusion

In this study, we reached the conclusion that the use of probiotics during perioperative procedures may reduce the incidence of infection complications; however, due to a lack of data, this cannot be statistically proven. Additionally, early

gastrointestinal function decreases the average length of hospitalisation, which improves surgical outcomes and quality of life.

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