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ORIGINAL ARTICLE

Improving the Outcomes in Oncological Colorectal Surgery

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ABSTRACT

Aim: To evaluate the improvement in the outcomes in oncological colorectal surgery.
Study Design: Prospective study,
Place & duration of study: Department of General Surgery, LUMHS Jamshoro from 1st January 2020 to 31st December 2022.
Methodology: One hundred and fifty cases of colorectal cancer undergoing surgery were enrolled. They were multidisciplinary requiring compliance of surgeons at the operating room with their surgical teams. These interventions were based on sequential implementation of the evidence-based surgical site infection bundle (SSIB) and enhanced recovery after surgery (ERAS) protocols for all the patients undergoing colorectal surgery. Primary outcomes evaluated were duration of hospital stay as well as rate of complication in accordance with wound healing. Inverse proportional-weighting method was used for controlling possible variance within groups. The secondary outcome measures post improvement strategies were mortality within day 30, readmission within same period (30 days) or unplanned return to the operating table as well as numerous related complications.
Results: The mean age of the cases in group A (pre-ERAS or pre-SSIB) was 61.2±10.9 years while in group B (pre-ERAS or post-SSIB) was 61.8±9.9 years and the mean age of Group C (post-ERAS or post-SSIB) was 63.7±10.1 years. There were more females within three groups such as 60%, 56% and 54% respectively than males. Hospital stay was highest within group A. The 30 days outcomes showed that the outcomes in group A showed highest number of death, wound infection and blood transfusion however the difference was insignificant for all other variable except wound infection.
Conclusion: The subsequent addition of quality improvement within groups added positive outcomes in patients of oncological colorectal surgery with reduction in mortality, hospital stay as well as wound infection.
Key words: Outcome, Colorectal carcinoma, Mortality, Hospital stay, Wound infection

INTRODUCTION

The incidence of colorectal oncological surgeries is increasing all over the globe with passing years. This was considered as a main problem of the western world, however within recent years many cases have been reported from South Asian countries including India and Pakistan. The expected incidence of colorectal cancer increases with the increase in age. Therefore, is more related with adult population than among youth. The incidence related with age is static within decades of research.[1,2]

The major primary treatment plan for colon cancer is based on surgery.[3] The decision could however get very challenging due to the age of the patient and requires skillful surgical interventions. There is a high risk of comorbidities in adult patients which needs to be addressed for health betterment and successful operative results. The poor nutritional status of older patients is add on challenge in colorectal surgeries.[4-6]

The higher risk of complications and post-operative treatment are the two main factors on which the survival of the patient is greatly dependent. The outcomes of a surgical procedure are therefore measured in terms of 30 days and one year survival rate post operation.[7,8] The outcomes of these patient's care can be improved by skillful surgical and anesthetic techniques during colorectal surgery with the application of enhanced recovery program (ERAS) subsequently improving the survival rate in patients[9,10].

The present study was designed to assess the impact of improvement in oncological colorectal surgery inform of primary and secondary outcomes. The result of this study provided beneficial data which is highly significant in designing proper treatment plan pre and post-operative for beneficial outcomes and reduction in mortality of colorectal cancer patients.

MATERIALS AND METHODS

This prospective study was performed at Department of General Surgery, Department of General Surgery, Liaquat University of Medical & Health Sciences, Jamshoro from 1st January 2020 to 31st December 2022 after IRB permission. There were 150 cases of colorectal cancer surgery which were included. The sample size was taken through WHO sample size calculation based on 7% margin of error, 95% CI and 80% power of test. The inclusion criteria were based on clinical and diagnostic confirmation of the cases for colorectal surgery. The data was extracted from the medical surgical files of the surgical department. All the elective procedures conducted through laparoscopic or open surgery were included. These also included the abdominoperineal-resection as well as partial colectomy and or total abdominal colectomy which were either with or deprived of proctectomy or proctectomy as well as low anterior-resection. The cases which were under the age of 18 years were excluded from this study. The reason being that peri-operative care pathway could not be applied on them as on adult patients. None of the patients was missed in follow-ups. The interventions were based on sequential implementation of the evidence-based surgical site infection bundle (SSIB) and enhanced recovery after surgery (ERAS) protocols for all the patients undergoing colorectal surgery. These two interventions were multidisciplinary requiring compliance of surgeons at the operating room with their surgical teams. For improving the outcomes more than ten frontline health providers jointly placed their effort in SSIB as well as ERAS during colorectal surgery. The patient were grouped according to the interventions proceeded in them. Each group had 50 cases. Group A was a control group and were those having pre ERAS or pre SSIB, while group B was pre ERAS or post SSIB and Group C was post ERAS or post SSIB. Primary outcomes evaluated were duration of hospital stay as well as rate of complication in accordance with wound healing. Inverse proportional-weighting method was used for controlling possible variance within groups. The secondary outcome measures post improvement strategies were mortality within day 30, readmission within same period (30 days) or unplanned return to the operating table as well as numerous related complications. Data was analyzed using Fisher Exact Test through SPSS-26.0 application. For estimation of the average treatment result of the SSIB as well as ERAS interventions, inverse proportional weighting with the weighted-comparisons within groups was conducted. The statistical significance level was taken as <0.05.

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RESULTS

The mean age of the cases in group A as control group (pre-ERAS or pre-SSIB) was 61.2±10.9 years, while in group B (pre-ERAS or post-SSIB) was 61.8±9.9 years and in group C (post-ERAS or post-SSIB) was 63.7±10.1 years. There were more females within three groups such as 60%, 56% and 54% respectively than males. A significant variance within wound categorization was noticed with groups B and C having 84% of the cases with clean wound while highest infected wound percentage was noted in group A as 12%. Most of the cases underwent laparoscopic procedure. There were minimal number of comorbidities as diabetes and chronic obstructive pulmonary disease. Chemotherapy was conducted only in minimal cases with highest in group A (6%) [Table 1].

Hospital stay was highest within control group A. The 30 days outcomes showed that in group A highest number of deaths, wound infection and blood transfusions were reported. The difference within groups was insignificant for all other variables except wound infection and superficial surgical site infection. Unplanned reoperation was highest in Group B (Table 2).

The 30 days post-operative outcomes subsequent the inverse proportional weighting presented percentage data where death, readmission wound infection\, blood transfusion were highest in group A in comparison with group B and group C (Table 3).

Table 1: Demographic characteristics of the three groups with their clinical and surgical features

Characteristics	Group A	Group B	Group C	P value
Age in year, median value (Q1, Q3)	61 (55,65)	61 (60, 74)	63 (58, 71)	0.048
BMI median value (Q1, Q3)	27 (24, 28)	26 (23, 31)	28 (24.2, 31)	0.89
Age in year (mean±SD)	61.2±10.9	61.8±9.9	63.7±10.1	0.04
Gender				
Male	20 (40%)	22 (44%)	23 (46%)	0.06
Female	30 (60%)	28 (56%)	27 (54%)	
Wound cataloguing				
Clean	34 (68%)	42 (84%)	42 (84%)	0.007
Contaminated	10 (20%)	5(10%)	6 (12%)	
Infected	6(12%)	3 (6%)	2 (4%)	
Laparoscopic procedure	40 (80%)	45 (90)	47 (94%)	0.007
Diabetes	6 (12%)	5 (10%)	8 (16%)	0.4
Chronic obstructive-pulmonary disease	4 (8%)	3 (6%)	5 (10%)	0.7
Smoker	11 (22%)	8 (16%)	11 (22%)	0.4
Chemotherapy	3 (6%)	2 (4%)	2 (4%)	0.6

Table 2: Comparison of 30 days outcomes within groups

Variable	Outcome			P value
	Group A	Group B	Group C	
Length of hospital stay Median (Q1, Q3)	5 (4, 9)	3 (3, 8)	3 (2, 6)	<0.001
Length of hospital stay (days)	9.1±9.5	6.6±9.2	5.3±5.1	0.01
Death	2 (4%)	1 (2%)	1 (2%)	0.51
Readmission	4 (8%)	3 (6%)	4 (8%)	0.72
Unplanned reoperation	3 (6%)	5(10%)	3 (6%)	0.33
Wound infection	8 (16%)	5 (10%)	2 (4%)	0.012
Superficial surgical site infection	4 (8%)	2 (4%)	1 (2%)	0.002
Organ space surgical site infection	4 (8%)	2 (4%)	2 (4%)	0.3
Wound disruption	1 (2%)	1 (2%)	1 (2%)	1.1
Pneumonia	-	1 (2%)	2 (4%)	1.0
Unplanned intubation	1 (2%)	-	2 (4%)	0.62
Cardiac arrest	-	-	1 (2%)	0.45
Blood transfusion	6 (12%)	5 (10%)	4 (8%)	0.51
Sepsis	-	1 (2%)	-	0.82
Septic shock	2 (4%)	2 (4%)	1(2%)	0.61

Table 3: Days 30 postoperative-outcomes subsequent of inverse proportional weighting

Variable	Percent of patients								
	Group A	Group B	*P* value	Group B	Group C	*P* value	Group A	Group C	*P* value
Duration of hospital	8	6	0.3	6	5	0.3	8	5	0.04
Death	3	2	0.9	-	2	0.7	2	-	0.8
Readmission	10	6	0.5	6	8	0.3	10	8	0.9
Unplanned reoperation	6	10	0.2	10	6	0.2	6	6	1.0
Wound infection	14	12	0.6	8	4	0.2	14	6	0.049
Superficial SSI	8	6	0.6	4	0	0.1	8	2	0.047
Organ space SSI	8	6	0.7	4	4	0.8	6	4	0.4
Wound disruption	-	1	0.8	-	-	0.9	-	-	0.9
Pneumonia	-	4	0.2	2	2	0.9	-	2	0.1
Unplanned intubation	-	-	0.8	-	2	0.3	2	4	0.3
Blood transfusion	12	10	0.6	8	6	0.8	12	10	0.6

DISCUSSION

Colorectal cancer is the third most prevalent cancer all over the globe, causing profuse mortalities and morbidities every year. Data suggests that, it is the second leading cause of cancer related death in the world. Adverse outcomes are excessively reported after colorectal surgery and present treatment options are way to expensive.[11,12] Certain interventions has introduced in modern era to combat and prepare the person for the oncological surgery. Purpose of rehabilitation in cancer patients is to augment the recovery and efficacy of the treatment.[13,14] It can be done through various modules including exercise, nutrition, reduction in psychological stress and intoxication. Present study was design for evaluating the outcomes of colorectal surgery.

It is well-established fact that, exercise in pre-operative period induce substantial benefits on well-being of the patient. Exercise helps in improving body' metabolism, quality of life, physical fitness, alleviate symptoms of anxiety and depression, thus reducing cancer stress and fear[15-17]. There is still no mutual consensus over the best exercise program for colorectal cancer

patients. Different exercises may include resistance; aerobics and some other training combinations prove explicitly improve cardiac, respiratory, physical and musculoskeletal function.

Surgical site infection proceeding colorectal surgery is related with extremely worse postoperative-outcomes in addition to longer length of hospital stay, and advanced rates of re-admission. SSI rates have been considered as surrogate-metric for the overall assessment of surgical care quality and are complicatedly linked with institutional reputation and cost effectiveness [18]. Keenan J E, et al elaborated in his study the similar results as to the current study where reduction in surgical site infection rate was associated with decrease in length of hospital stay and early recovery[19].

ERAS programs in colorectal surgery aim to reduce the stress related with surgery as well as decrease complications of colorectal cancer and reduced the hospital stay. In a metanalysis by Zhuang et al[20], comparison of traditional care with enhanced recovery post-surgery programs was conducted. It was found that a significant decrease in primary hospital stay as well as overall hospital stay, total complications (relative risk, 0.71; 95% CI, 0.58-0.86; p=0.0006), and general complications (relative risk, 0.68; 95% CI, 0.56–0.82; p<0.0001) was seen through ERAS program. ERAS has been reported as a safe and effective program with augmented implementations in peri-operative colorectal surgery care.

Malnutrition is also the appeared commonly in cancer patients, also effecting majority of CRC patients. This could possibly be explained through systemic inflammation and division of cancer cells. Invasion of cancer cells results in the release of pro-inflammatory cytokines which could result in insulin resistance and muscle breakdown as well. Frequent impairment and deterioration of health further curtailed down therapy tolerability/ efficacy and worsen the prognosis[21-23]. Timely nutritional interventions may prove beneficial in lowering the rate of mortality and morbidity in CRC patients.

CONCLUSION

The subsequent addition of quality improvement within groups added positive outcomes in patients of oncological colorectal surgery with reduction in mortality, hospital stay as well as wound infection

Conflict of interest: Nil

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