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Original Article

Clinicopathologic features of obese patients with rectal cancer and short-term results of surgery

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Abstract

Aim: Some authors related the increased body mass index (BMI) with postoperative complication rates also increase, number of harvested lymph nodes reduce and sparing the anal sphincter is much more challenging in the surgical management of rectal cancer. In this study, we evaluated clinic-pathologic features and short-term surgical results in obese and non-obese patients with rectal cancer.

Material and Methods: 54 obese and 326 non-obese patients are evaluated for clinic-pathological features, postoperative complications, re-operation rates and mortality rates.

Results: The rate of distally located rectal tumor is found significantly higher in obese patients than non-obese patients ($p<0.05$). Although anterior resection has been performed more commonly in Group-I, abdominoperineal resection procedure is found significantly higher in Group-II, ($p<0.05$)..Harvested lymph nodes ratio between two groups was quite close to each other so this difference is not statistically significant. .Postoperative results were similar between the groups except total postoperative complications and re-operations for anastomotic leak. Although re-operation rates for anastomotic leak are found different, they are quite close between the two groups and this difference is not statistically significant. In contrast to some of the previously published articles, there was not any significant difference in morbidity and mortality between the two groups in our study.

Conclusion: In our opinion there is not a clear conclusion to change the operative strategy for enough number of harvested lymph nodes but meticulous technique should be utilized to reduce the rate of anastomotic leak and resultant re-operations in this group of patients.

Keywords: Obesity; Rectal Cancer; Rectal Surgery.

INTRODUCTION

Obesity is a major challenge for health-care providers and body mass index (BMI) is generally used to identify this entity. Increased BMI is implicated in colorectal carcinogenesis (1). Some authors related the increased BMI with higher postoperative complication rates (2), reduced harvested lymph nodes (3), and found anal sphincter sparing much more challenging with higher failure rates (4) during surgical management of rectal cancer.

There are 2 major surgical options in rectal cancer surgery; sphincter sparing or abdominoperineal resection. Tumor size and extent, tumor distance to the anal verge, status of the sphincters, experience of the surgeon and patients' preference are major factors which affect the choice of the procedure. Co-morbidities and age may also affect the decision.

Obesity seems to be a co-morbidity that can change the surgical strategy and may affect the outcomes in rectal cancer patients. There are studies demonstrating unfair outcomes of colorectal operations in obese patients (5,6). Increased rates of surgical site and cardiopulmonary complications, anastomotic leak and prolonged hospital stay after colorectal resections are reported in obese patients (7). Mean hospital stay and duration of operation are found longer in obese rectal cancer patients with advanced disease and underwent LAR after neo-adjuvant therapy (6). A relation between local recurrence and BMI after rectal resection has also been reported (8). In the postoperative period, recovery process is affected by co-morbidities like diabetes mellitus, hypertension, cardiovascular diseases and dyslipidemia caused by obesity. Accordingly, overall risk is accepted to be higher in obese patients. Additional technical challenges are also encountered during rectal surgery in obese patients. More bulky and fatty organs in the abdomen especially in pelvis

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further, increases the inherent limitations and challenges of the surgery. It is challenging to deliver the mobilized colon to distal rectum or to the anal canal for an anastomosis in obese patients. Due to these factors, rectal cancer surgery in obese patients is thought to be more complicated and challenging whether or not sphincter sparing is intended.

As a result; obesity seems to impact the operative strategy, all stages of management and postoperative outcomes of rectal cancer surgery; and eventually cause to question if intestinal continuity willbe able to maintain.

Our aim is to compare the clinic-pathologic features and early surgical outcomes between obese and non-obese rectal cancer patients.

MATERIAL AND METHODS

Our study protocol is approved bye institutional ethics committee. Informed consent is obtained from all of the patients at the beginning of the study after informing the planned surgical procedure. Data of 380 patients who had rectal resection in our clinic from January 2002 to December 2013 are reviewed retrospectively. Patient charts are used as supplementary data. According to the World Health Organization (WHO) definition of obesity (9), patients are divided into two groups based on their BMI values. In the first group (Group I), patients were with BMI value of < 30 and in the second group (Group II), patients were with BMI value of ≥ 30 (obese). Patients with a BMI< 30 are included in Group I (non-obese) and patients with a BMI ≥ 30 are included in Group II (obese).

Obese patients (BMI≥30) are compared with non-obese (BMI < 30) patients with regard to age, gender, preoperative hemoglobin (g/dl), albumin (g/dl), serum Carcino-embriyogenic Antigen (CEA) (ng/ml) and Carbohydrate Antigen 19-9 (CA19-9) levels (U/ml), American Society of Anesthesiologists (ASA) score, type of the resection, duration of operation (minutes), amount of the blood loss (ml), tumor size (cm), depth of invasion (T stage), number of removed lymph nodes, metastatic lymph node ratio, length of hospital stay (days), postoperative complications and mortality rate. ASA scores are divided into two groups for ease of calculation. Patients with ASA I and II scores are included in Group 1, and patients with ASA III and IV are included in the second group. In the same way, depth of invasion (T stage) are also divided into two groups; patients with T1 and T2 tumors are included in Group I and the patients with T3 and T4 tumors are included in Group 2. Anastomotic leakage, evisceration, intra-abdominal hemorrhage, surgical site infection, intra-abdominal fluid collection and pulmonary embolus are evaluated as postoperative complications. Re-operations for anastomotic leak are also evaluated. SPSS ver. 16 (SPSS; Team EQX, Chicago, USA) software is used for all statistical analyses.

RESULTS

Review of our institutional database from January 2002 to December 2013 identified 380 patients who had curative surgery for rectal cancer. There are 138 female and 242 male patients. Mean age is 58.8±14.2 years in Group I and 58.9±11.9 years in Group II. Demographics and clinical features of the patients are given in Table 1.

Female to male ratio is found significantly higher in Group II($p < 0.05$). Also, mean CEA level is found significantly higher in Group I ($p<0.05$).

Operative and (histological) features of the patients are given in Table 2. Most of the operative and (histological) features are found similar between the two groups except tumor location and type of the surgical procedure. Rate of distal rectal tumor is found significantly higher in obese group ($p< 0.05$). Anterior resection has been performed significantly higher in Group I; whereas abdominoperineal resection has been performed significantly higher in Group II ($p<0.05$).

Harvested lymph nodes ratio between two groups was quite close to each other so this difference is not statistically significant. Postoperative outcomes of the patients are given in Table 3. Postoperative outcomes are found similar between the two groups except postoperative complications and re-operation for anastomotic leak. Although re-operation rates for anastomotic leak are found different, they are quite close between the two groups and this difference is not statistically significant.

Table1. Demographics and clinical features of the patients

	Group I (BMI < 30 kg/m^2) n=326	Group II (BMI ≥ 30 kg/m^2) n=54	p
Age	58.8±14.2	58.9±11.9	>0.05
Gender (fe-male/male)	110 (% 33.7) / 216 (% 66.3)	28 (% 51.8) / 26 (% 48.2)	<0.05
ASA score 1-2/3-4	261 (% 80.1) / 65 (% 19.1)	47 (% 87.1) / 7 (% 12.9)	>0.05
Hemoglobin (g/dL)	12.8±1.9	12.8±2	>0.05
Albumin (g/dL)	4.4±0.9	4.3±0.3	>0.05
CEA (ng/ml)	35.27±1.28	5.66±7.5	<0.05
CA 19-9 (U/ml)	61.04±1.85	25.79±4.6	>0.05

BMI: Body Mass Index
CEA: Carcinoembriyogenic Antigen
CA 19-9: Carbohydrate Antigen 19-9

Table 2. Operative and pathologic features of the patients

	Group I (BMI < 30 kg/m²) n=326	Group II (BMI ≥ 30 kg/m²) n=54	p
Tumor location within the rectum			
-Upper third	37(%11.4)	2(%3.7)	
-Mid-rectum	100(%30.6)	10(%18.5)	<0.05
-Lower third	175(%58)	42(%77.8)	
Type of the resection			
- Anterior resection	37 (% 11.4)	2 (% 3.7)	
- Low anterior resection	190 (% 58.2)	31 (% 57.4)	>0.05
- Abdominoperineal resection	85 (% 26.1)	21 (% 38.9)	
- Hartman procedure	14 (% 4.3)	0	
Operation time (minute)	217.4±75.1	222.4±75.2	>0.05
Blood loss (ml)	208.8±302.3	271.8±498.8	>0.05
Tumor size (cm)	6.1±1.6	4.9±1.7	>0.05
Number of resected lymph nodes	21.7±15	17.9±10	>0.05
Metastatic lymph node ratio (%)	13.9	16.8	>0.05
T stage (1-2/3-4) (%)	67 (% 20.5) / 259 (% 79.5)	12 (% 22.2) / 42 (% 77.8)	>0.05

BMI: Body Mass Index

Table 3. Postoperative results of the patients

	Group I (BMI < 30 kg/m²) n=326	Group II (BMI ≥ 30 kg/m²) n=54	p
Length of hospital stay (day)	12.4±7	15.6±10	>0.05
Postoperative complication	81 (% 25.1)	21 (% 38.9)	<0.05
-Anastomotic leakage (%)	10.1	14.7	<0.05
-Reoperation due to anastomotic leakage(%)	7.9	15.3	<0.05
-Evisceration (%)	2.1	5.5	<0.05
-Intraabdominal hemorrhage (%)	7.9	3.03	<0.05
-Surgical site infection (%)	13.8	27.7	<0.05
-Intraabdominal collection (%)	4.6	3.7	<0.05
-Pulmoner embolus	0.53	3.03	<0.05
Mortality (%)	8 (% 2.4)	1 (% 1.8)	<0.05

BMI: Body Mass Index

DISCUSSION

Our aim is to evaluate the impact of BMI on clinic-pathological features and early surgical results of patients with rectal cancer. Studies investigating whether obesity have an impact on colorectal surgery have demonstrated conflicting results about the relation between postoperative complications and increased BMI values (10-12).

Although some suggested higher thromboembolic events and postoperative infections in obese patients, others found similar postoperative outcomes in obese and non-obese patients. CA 19-9 and CEA markers are routinely used in the clinical setting. They are used for diagnosis, prognosis and follow-up of the disease. Some have demonstrated that elevated levels of CEA and CA 19-9 are predictive of negative outcomes for colorectal cancer patients (13). Which means rectal cancer patients with elevated levels of these markers may have worse outcome than patients with normal levels of these markers. In two recent studies it has been stated that obesity might be one of the factors effecting CEA levels, and also may reduce the sensitivity and diagnostic accuracy of this marker. In obese patients, decreased concentration of CEA and CA 19-9 may be the result of hemodilution effect (14,15).

In our study, the difference of CEA levels between two groups is compatible with the literature. So, one may suggest that BMI value is important when assessing serum CEA levels during diagnosis and subsequent course and should be kept in mind by the physicians taking care of these patients.

In a retrospective study, ASA score, tumor localization, tumor size and stage and metastatic lymph node ratio were not different between obese and non-obese groups (16). And also in our study, ASA score, metastatic lymph node ratio and tumor stage were similar between two groups but tumor localization and the surgical procedure are found different. Predominance of abdominoperineal resection in obese group and anterior resection in non-obese group are attributed to the localization of the tumors.

In a retrospective study of 369 patients from Spain, no difference could be demonstrated for lymph node harvesting between obese and non-obese colorectal cancer patients (17). We also could not find any difference for lymph node harvesting and even metastatic lymph node ratio between obese and non-obese individuals.

In our study, we found higher total postoperative complications, re-operation for anastomotic leak with higher BMI values. With higher BMI values, postoperative complication rate increases from 25.1% to 38.9%. Similarly, re-operation rate for anastomotic leak increases from 7.9% to 15.3%. And these differences are found statistically significant ($p<0.05$). But this relation could not be demonstrated for other complications.

Some other papers studying the impact of obesity on rectal cancer surgery have demonstrated different association between BMI and postoperative complications (18,12). Some studies showed higher rates of postoperative infection and thromboembolic events in obese patients. Whereas, in other studies have reported similar results for obese and non- obese patients. Rate of thromboembolic events was not different in our study between obese and non-obese patients as for intra-abdominal hemorrhage, intra-abdominal fluid collection and evisceration.

CONCLUSION

In conclusion, retrospective design of our study is an important limitation. But we think that one should keep in mind the BMI status of the patient when assessing a blood CEA level. However there is minimal difference in morbidity and no difference in mortality. Our study indicates increased body mass index (BMI) with postoperative complication rates also increase but number of harvested lymph nodes not reduce and sparing the anal sphincter is not much more challenging in the surgical management of rectal cancer. In our opinion there is not a clear conclusion to change the operative strategy for enough number of harvested lymph nodes but meticulous technique should be utilized to reduce the rate of anastomotic leak and resultant re-operations in this group of patients.

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