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Research Article

Comparative Analysis of Partial Cystectomy versus Total Cystectomy in Colorectal Cancer Patients with Histologically Confirmed Bladder Invasion

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ABSTRACT

Background: Bladder invasion appears in locally advanced cases of colorectal cancers, especially in the areas of sigmoid and upper rectal tumors. The standard treatment involves en bloc excision which achieves R0 margin (microscopically negative margin).

Objective: To compare partial cystectomy with total cystectomy procedure in colorectal cancer patients with histological confirmed bladder invasion.

Methodology: The retrospective comparative study was performed at Department of General Surgery, M. Islam Medical & Dental College, Gujranwala from 1st January 2021 to 30th June 2025 and 75 patients with age group of 40-65 years were included. These patients were admitted with locally advanced stages of colorectal cancer and having clinical suspicion of bladder invasion involvement as well as patients who were pathologically diagnosed with adenocarcinoma and were under curative intent colectomy in combination with partial or total/simple cystectomy ensuing in excision of RO negative margin or R1 microscopic positive margin. The patients undergoing residual-tumor/palliative R2 excision, any other diagnosis than adenocarcinoma and were not having complete clinical as well as histological data were excluded.

Results: There were 55 (73.3%) partial cystectomy and 20 (26.6%) total cystectomy, with a mean age of 56 years. Partial cystectomy demonstrated significantly better perioperative outcomes, including shorter operative time (281 vs. 442 min), lower blood loss (322 vs. 1450 mL), fewer transfusions, and shorter hospital stay (13 vs. 21 days) ($p<0.001$). Most tumors were moderately differentiated. T4b bladder invasion was more frequent in total cystectomy cases (85%). Lymph node metastasis occurred in 45.5% and 40% of partial and total cystectomy groups, respectively. Five-year Disease free survival and overall-survival were 52.7% and 70% in histologically confirmed bladder invasion cases.

Conclusion: Obtaining R0 excision is strongly linked with long term oncological improvement in colorectal cancer advanced stage patients. Partial cystectomy can be opted as a safe and ontologically sound surgical option.in cases with complete tumor excision and with negative surgical margins,

Keywords: Partial cystectomy, Total cystectomy, Colorectal cancer, Bladder invasion

INTRODUCTION

Colorectal cancers are considered as one of the prevailing cancers especially among young adults. The prevalence of colorectal cancer is reported as 5% among Pakistani citizens.[1] The prevalence of with locally advancements and metastasis in colorectal cancer is much higher in western world than Pakistan with more than 5-20% in various countries. In these complex cases, the primary goal remains a complete oncological excision with clear (negative) margins. When the urinary bladder is involved, surgical management may require either partial or total cystectomy as part of an en bloc excision strategy.[1,2]

Conventional treatment by oncologists is considered as total cystectomy with urinary diversions. However, this procedure carried significant incidence of postoperative complications and morbidity as well as causing

negative impact on patients' quality of life. There is only moderate agreement between what is suspected clinically before surgery and what is ultimately confirmed on pathology, with concordance rates of approximately 40%-50%.[3-5]

Owing to the above uncertainty, partial cystectomy must be used in patients with suspected bladder involvement. This bladder-sparing approach avoids urinary diversion with potential to better preserve postoperative function and quality of life.[6]

Despite its increasing use, the oncological reliability of organ-preserving surgery in this setting is still not fully established, largely because most published data are based on clinically suspected rather than pathologically confirmed invasion. In addition, there remains a lack of studies directly comparing outcomes between partial and total cystectomy specifically in patients with histologically proven bladder invasion.[7-10]

Against this background, the present includes both clinically suspected as well as those cases wherein histological bladder invasion is confirmed. The current study evaluated and compared long term outcomes following partial and total cystectomy in both patient groups to better clarify the role of each surgical approach.

MATERIALS AND METHODS

This retrospective comparative was performed at Department of General Surgery, M. Islam Medical & Dental College, Gujranwala from 1st January 2021 to 30th June 2025. Seventy-five patients who were admitted with locally advanced stages of colorectal cancer within the age group of 40-65 years were included. The sample size was generated using online available open EPI sample size calculator using prevalence of adjacent organ involvement in 5-20% of CRC cases.[2] The sample size further applied 95% CI, 80% power of test and 5% margin of error. These patients were admitted with locally advanced stages of colorectal cancer and having clinical suspicion of bladder invasion involvement as well as patients who were pathologically diagnosed with adenocarcinoma and were under curative intent colectomy in combination with partial or total/simple cystectomy ensuing in excision of RO negative margin or R1 microscopic positive margin. The patients undergoing residual-tumor/palliative R2 excision were excluded. A written informed consent was signed by each enrolled patient in the study. The medical files of each patient where total formalities for the subject study were completed were thoroughly explored. The records of partial or total colorectal surgeries though cystectomy, followed by colonoscopy and CT imaging were assessed. It was noted that MRI and cystoscopy were also performed selectively in patients for further assessing the excision as well as the preoperative TNM staging. The team performed the complete set of procedures wherein urologists inserted a preoperative ureteral stent in patients with hydronephrosis or those with suspicions of ureteral invasion. Each surgery goal was en bloc excision. In RO excision cases with unavailability of clear margins, a total cystectomy was performed as tumor was presented in either the bladder sphincter/trigone, or bladder remaining had a volume less than 50 mL. Post-operative care was delivered as per standard operating procedures. Cystography was conducted post seven days of surgery when Foley catheter was removed.[11,12] This was further followed by six months interval. Patients were categorized into two groups depending upon partial and total cystectomy performed. All surgeries were performed as open surgery and no case was treated through laparoscopic procedure. The variable assessed included, demographic variables, clinicopathological and perioperative variables including operative approach (partial versus total cystectomy), operative duration, blood loss during operation, postoperative hospital stay, postoperative-complications which were categorized in line with the Clavien-Dindo system[13], number of retrieved lymph nodes, histopathological subtype, presence of lymph node metastasis, extent of bladder involvement, and evidence of lymphatic, venous, or perineural invasion. Tumor invasion depth (T stage), regional nodal involvement (N stage), and overall tumor stage were determined in accordance with the seventh edition of the Union for International Cancer Control (UICC) TNM classification system.[14] All quantitative variables were analyzed by SPSS-25 using Student's t test while qualitative variables were analyzed using Chi-square and Fisher exact test. Survival curves were plotted using the KaplanMeier statistical method and were related. Disease free survival (DFS) was termed as the duration from the date of intervention to the occurrence of a new event, including tumor recurrence or death, or to the final follow-up visit. Overall-survival (OS) was termed as interventional date verses mortality interval.

RESULTS

There were 55 (73.3%) patients where partial cystectomy and 20 (26.6%) where total cystectomy was performed. The mean age of the patients with partial cystectomy was 54 years while those with total cystectomy were within a

mean age of 56 years. The study presented an overall higher number of male patients within both group such as 14/55 and 17/20 in partial and total cystectomies respectively. The body mass index of the patients presented mixed values with mean value within the normal range. The primary tumors were in the sigmoid colon within both groups (35/55 vs 12/20). This was followed by rectum as second most prevalent tumor location (18/55 vs 08/20) respectively. Chemoradiotherapy and chemotherapy were more prevalently conducted in totally cystectomy cases than partial cystectomy patients (Table 1).

The pelvic exenteration was observed in only five cases of total cystectomy. There was a significant variance observed in partial cystectomy operating time (281 min), estimated blood loss (322 ml), interoperative transfusion (9 cases) and length of hospital stay (13 days) verses total cystectomy cases where the respective values of operating time, predictable blood loss, inter-operative transfusion and length of duration of hospital were 442 min, 1450 ml, 15 cases and 21 days respectively ($p<0.001$). Whereas there were more partial cystectomy cases where adjuvant chemotherapy ($n=40$) than of total cystectomy having only 14 cases for adjuvant chemotherapy deliverance. There was no significant difference in number of cases of harvested lymph nodes according to the total number of enrolled patients within each group ($p=0.8$). Around 90% of cases within both groups had a significant number of histopathological moderately differentiated types. While bladder invasion T4B was observed in 54.5% of partial cystectomy and 85% total cystectomy cases. Lymph nodes metastasis was observed in 45.5% partial and 40% total cystectomy cases. In addition to the above lymph node invasion and venous invasion were observed in 61.8% and 30.9% partial cystectomy patients. Whereas 55% and 40% cases in total cystectomy had lymph node invasion and venous invasion respectively. Complications (Clavien-Dindo Grade III/IV), number and percentage were observed as one in each Intestinal anastomosis-leakage, intrapelvic abscess as well as in ileus, ischemic colitis or through urinary-retention of partial cystectomy cases while only 1 case each was observed in Intestinal anastomosis leakage and ileus of total cystectomy cases. Nominal number of cases as only three and two were reported with surgical site infection within partial and total cystectomy cases respectively (Table 2).

There was not a significant ($P=0.82$) variance observed in the TNM (Tumor, Node, Metastasis) staging within both groups. Maximum number of cases of partial and total cystectomy was observed in the stage II with 27/55 and 10/20 cases presented within both groups respectively (Fig. 1). The recurrence pattern showed overall recurrence in 21.8% partial while 40% total cystectomy cases with significant value ($P=0.047$). There was almost similar pattern observed in locoregional recurrence presentation with both groups, however there were more prevalence distant recurrence in total cystectomy cases (20%) than partial cystectomy as 12.7% (Table 3). The 5-year disease-free survival (DFS) and overall survival (OS) rates among patients with clinically suspected invasion inside the bladder were 56.3% and 75% in partial and total cystectomy cases, respectively. In contrast, patients with histologically confirmed invasion in bladder demonstrated five year disease free survival as well as overall survival rates of 52.7% and 70% partial and total cystectomy cases, respectively (Fig. 2)

Table 1: Demographic and pathological characteristics of the patients

Variable	**Partial cystectomy (n = 55)**	**Total cystectomy (n = 20)**
Age (years)	54±5.7	56±6.2
Gender		
Male	41 (74.5%)	17 (85%)
Female	15 (27.7%)	3 (15%)
BMI (kg/m²)	23±3.5	22±4.2
American Society of Anesthesiologists physical status classification III–IV	4 (7.27%)	3 (30%)
Tumor Location		
Cecum	2 (3.63%)	-
Sigmoid colon	35 (63.6%)	12 (60%)
Rectum	18 (32.7%)	8 (40%)
Preoperative Therapy		
Chemoradiotherapy	1 (1.81%)	2 (10%)
Chemotherapy	2 (3.63%)	3 (15%)

Table 2: Perioperative results, characteristics and outcomes of enrolled patients

Variable	Partial cystectomy (n = 55)	Total cystectomy (n = 20)	P-value
Pelvic-exenteration	-	5 (25%)	—
Operation time (minute)	281	442	<0.001
Estimated blood loss (mL)	322	1450	<0.001
Intraoperative transfusion	9 (16.4%)	15 (75%)	<0.001
Length of hospital stay (days)	13	21	0.004
Adjuvant chemotherapy	40 (72.7%)	14 (70%)	0.621
Harvested lymph nodes	38	14	0.800
Histopathologic Type			
Well/Moderately differentiated	50 (90.9%)	18 (90%)	0.821
Mucinous/Poorly differentiated	5 (9.1%)	2 (10%)	
Bladder invasion (T4b)	30 (54.5%)	17 (85%)	<0.001
Microscopic residual tumor	1 (1.8%)	1 (5%)	0.912
Lymph node metastasis	25 (45.5%)	8 (40%)	0.600
Lymphatic invasion	34 (61.8%)	11 (55%)	0.720
Venous invasion	17 (30.9%)	8 (405)	0.241
Perineural invasion	15 (27.3%)	8 (405)	0.127
Clavien Dindo Grade ¾-Complications	7 (12.7%)	4 (20%)	0.142
leakage(Intestinal-anastomosis)	1	1	
Intrapelvic-abscess	1	—	
Ileus	1	1	
Ischemic-colitis	1	—	
Urinary retention	1	—	
SSI (Surgical site infection)	3	2	
Reintervention within 30 days	2 (3.6%)	3 (15%)	0.023
Re-admission within 30 days	2 (3.6%)	3 (15%)	0.025
30-day mortality	1 (1.8%)	1 (5%)	0.520

Table 3: Recurrence pattern observed in enrolled cases of cystectomy

Recurrence pattern	Partial cystectomy (n = 55)	Total cystectomy (n = 20)
Locoregional recurrence only	2 (3.6%)	2 (10%)
• Bladder	1	1
• Recta- stump	1	1
• Pelvis	-	-
Distant recurrence only	7 (12.7%)	4 (20%)
• Distant lymph node	1	1
• Lung	2	1
• Kidney	-	-
• Peritoneum	1	0
• Liver	3	2
Locoregional and distant relapse	2 (3.6%)	1 (5%)
• Bladder and lung	1	-
• Bladder and peritoneum	1	-
• Rectal stump andliver	-	1
• Pelvis and liver	-	-
Multiple-distant relapse	1 (1.8%)	1 (5%)
• Liver and lung	-	-
• Liver, lung and lymph node	-	-
• Adrenal gland and brain	-	-
• Lung and bone	-	1
• Liver and peritoneum	1	-
• Distant lymph node and peritoneum	-	-

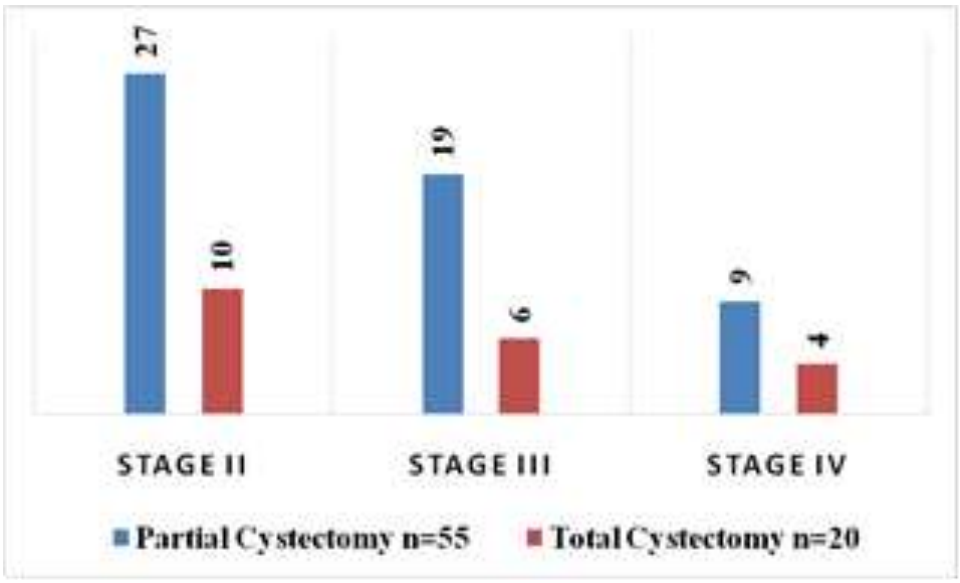

Figure 1: TNM staging of enrolled cases of cystectomy

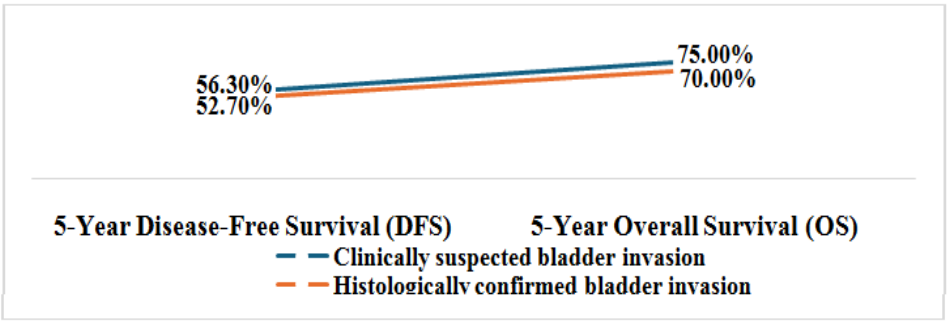

Figure 2: Comparison of DFS with OS up to five years among enrolled patients of colorectal cancer, having suspected cancer invasion in bladder

DISCUSSION

Pakistan is a country with various ethnicities and backgrounds. Various people with different lifestyles and genetics are residing within different parts of this country. Considering the heterogeneity, the attaining statistical data of various cancers reported within different provinces of this country becomes difficult. In addition to this, there is no cancer registry within this country, making the situation more complicated.[1]

The present study details the option as partial and total cystectomy in patients with colorectal cancer having bladder invasions. It is important to understand that histopathological invasions of urinary bladder affect the cases long term prognosis. However, many of the studies on the subject topic only dealt with suspected bladder invasions and do not focus on histopathological invasions as does the present study results. The present study results have evidently shown that partial cystectomy can be a preferable option. The results of the present study have proved that patrial cystectomy has better results including operation time, blood loss and interoperative transfusion than total cystectomy cases. Further, the overall five-year patient survival and disease survival was also potentially viable in partial cystectomy patients making it to be a considerable choice in colorectal cancer patients with bladder invasion. There has been limited data available in coordination with the present study which has presented similar findings.[14] The potential impact of selection bias on both short and long term outcomes cannot be completely excluded, these findings suggest that, in carefully selected patients, partial cystectomy may achieve outcomes comparable to those of total cystectomy.[15]

Majority of the cases reported were males with the mean age above fifty years. This result presents the fact that most of the cases reported of colorectal cancer with bladder invasion in Pakistan are above middle age and are male dominant. Although similar gender dominancy and age distribution has been seen in other studies.[16,17] From various regions, still there is a need for further investigation in the

findings for determining any ethnic involvement.

In a study of more than a hundred patients conducted French Scientist the reported 3-year disease-free survival (DFS) and overall survival (OS) rates were 83% and 59%, respectively.[18] In another cohort of 90 patients, the five year relapse free survival and overall survival rates were 62.9% and 62.5%, respectively.[11] In the present study, long term outcomes in both the clinically suspected and histologically confirmed bladder invasion groups were comparable to, or marginally lower than, those reported in these previous studies.[11,18]

In the current study within the total cystectomy group, the incidence of rectal tumors and the use of preoperative chemoradiotherapy were relatively higher, while the distribution of TNM stages remained comparable between groups. Similar results were observed in studies elsewhere which also explained that this pattern may be explained by tumor down staging following neoadjuvant chemoradiotherapy prior to surgical intervention.[19,20]

CONCLUSION

Achieving R0 excision remains the most important factor linked with improved long term oncological outcomes and survival in patients with locally advanced colorectal cancer involving the bladder. When complete tumor clearance with negative surgical margins can be achieved, partial cystectomy represents a safe and effective surgical approach, offering favorable perioperative and oncological outcomes while preserving bladder function and reducing treatment-related morbidity compared with total cystectomy.

REFERENCES

1. Idrees R, Fatima S, Abdul-Ghafar J, Raheem A, Ahmad Z. Cancer prevalence in Pakistan: meta-analysis of various published studies to determine variation in cancer figures resulting from marked population heterogeneity in different parts of the country. *World J Surg Oncol.* 2018;16:129.
2. Hossain MS, Karuniawati H, Jairoun AA, Urbi Z, Ooi J, John A, et al. Colorectal cancer: a review of carcinogenesis, global epidemiology, current challenges, risk factors, preventive and treatment strategies. *Cancers (Basel).* 2022;14(7):1732.
3. Bong JW, Ju Y, Seo J, Lee JA, Kang SH, Lee SI, et al. Clinical characteristics of rectal cancer patients with neoadjuvant chemoradiotherapy: a nationwide population-based cohort study in South Korea. *Ann Surg Treat Res.* 2021;100:e282-90.
4. Gosavi R, Chia C, Michael M, Heriot AG, Warrier SK, Kong JC. Neoadjuvant chemotherapy in locally advanced colon cancer: a systematic review and meta-analysis. *Int J Colorectal Dis.* 2021;36:e2063-70.
5. Morton D, Seymour M, Magill L, Handley K, Glasbey J, Glimelius B, et al. Preoperative chemotherapy for operable colon cancer: mature results of an international randomized controlled trial. *J Clin Oncol.* 2023;41:e1541-52.
6. Komono A, Kajitani R, Matsumoto Y, Nagano H, Yoshimatsu G, Aisu N, et al. Preoperative T staging of advanced colorectal cancer by computed tomography colonography. *Int J Colorectal Dis.* 2021;36:e2489-96.
7. Croner RS, Merkel S, Papadopoulos T, Schellerer V, Hohenberger W, Goehl J. Multivisceral excision for colon carcinoma. *Dis Colon Rectum.* 2009;52:e1381-86.
8. Tominaga T, Nonaka T, Fukuda A, Shiraishi T. Combined transabdominal and transperineal endoscopic pelvic exenteration for colorectal cancer: feasibility and safety of a two-team approach. *Ann Surg Treat Res.* 2021;101:102-10.
9. Lehnert T, Methner M, Pollok A, Schaible A, Hinz U, Herfarth C. Multivisceral excision for locally advanced primary colon and rectal cancer: an analysis of prognostic factors in 201 patients. *Ann Surg.* 2002;235:217-25.
10. Kimura S, Iwata T, Abufaraj M, Janisch F, D'Andrea D, Moschini M, et al. Impact of gender on chemotherapeutic response and oncologic outcomes in patients treated with radical cystectomy and perioperative chemotherapy for bladder cancer: a systematic review and meta-analysis. *Clin Genitourin Cancer.* 2020;18(2):78-87.
11. Kang SI, Oh HK, Yoo JS, Ahn S, Kim MH, Kim MJ, et al. Oncologic outcomes of preoperative stent insertion first versus immediate surgery for obstructing left-sided colorectal cancer. *Surg Oncol.* 2018;27:216-24.
12. Kang SB, Park JW, Jeong SY, Nam BH, Choi HS, Kim DW, et al. Open versus

laparoscopic surgery for mid or low rectal cancer after neoadjuvant chemoradiotherapy (COREAN trial): short term outcomes of an open-label randomised controlled trial. *Lancet Oncol.* 2010;11:637-45.
13. Dindo D, Demartines N, Clavien PA. Classification of surgical complications: a new proposal with evaluation in a cohort of 6336 patients and results of a survey. *Ann Surg.* 2004;240:205-13.
14. Union for International Cancer Control. *TNM classification of malignant tumours.* 7th ed. New York: Wiley-Blackwell; 2017.
15. Milowsky MI, Rumble RB, Booth CM, Gilligan T, Eapen LJ, Hauke RJ, et al. Guideline on muscle-invasive and metastatic bladder cancer (European Association of Urology Guideline): American Society of Clinical Oncology Clinical Practice Guideline Endorsement (European Association of Urology Guideline). *J Clin Oncol.* 2016;34:1945e1.
16. Chou R, Selph SS, Buckley DI, Gustafson KS, Griffin JC, Grusing SE, et al. Treatment of muscle-invasive bladder cancer: a systematic review. *Cancer.* 2016;122:842-51.
17. Kondo A, Sasaki T, Kitaguchi D, Tsukada Y, Nishizawa Y, Ito M. Excision of the urinary bladder for locally advanced colorectal cancer: a retrospective comparison of partial versus total-cystectomy. *BMC Surg.* 2019;19:63.
18. Vuillermet C, Meillat H, Manceau G, Creavin B, Eveno C, Benoist S, et al. Advanced colonic cancer with clinically suspected bladder invasion: outcomes and prognosis from a multicentric study of 117 patients from the FRENCH research group. *Surgery.* 2020;168(5):786-92.
19. Suh JW, Kim DW, Lee J, Yang IJ, Ahn HM, Oh HK, et al. Comparison of partial and total-cystectomy for colorectal cancer with histologically confirmed bladder invasion. *Surgery.* 2024;176(3):652-59.
20. Tsang YP, Lau CW. Outcomes of partial or total-cystectomy in advanced colon cancer with suspected bladder invasion-our 8-year experience and literature review. *J Gastrointest Cancer.* 2022;53(2):394-402.