Original Article

Comparison of Sphincter Saving Resection (SSR) & Sphincter Losing Abdominoperineal Resection (APR) in Very Low Rectal Cancer

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Abstract

Oncological outcomes of sphincter-saving resection (SSR) and sphincter losing abdominoperineal resection (APR) in 210 consecutive patients with very low-lying rectal cancer (i.e. lower margin of tumor is within 3.5 cm from the anal verge) were studied and compared. 54 (25.71%) patients underwent SSR and 156 (74.28%) patients underwent SLR-APR. The APR group comprised higher proportions of men (61.53% vs 55.5%, P =.049) and advanced-stage disease (P <.001). Preoperative chemoradiotherapy (PCRT) was administered in both the group with almost similar distribution (62.82 % vs 59.25%, P <.001). Overall, (the systemic and local) recurrence rates were almost similar i.e. 33.31% in SSR and 33.32% in APR. On stratification according to PCRT and pathologic stage, the mode of surgery did not affect the recurrence type. Moreover, recurrence-free survival (RFS) did not differ according to the mode of surgery in different cancer stages. Patients who were stratified according to cancer stage and PCRT also showed no differences in RFS according to the mode of surgery. The results of the study demonstrate that, regardless of PCRT administration, SSR is an effective treatment for very low rectal cancer.

Key Words: Sphincter-saving resection, Sphincter Losing resection, Abdominoperineal resection, Oncological outcomes, Recurrence, Preoperative chemo radiotherapy, Rectal cancer.

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Introduction

Treatment of very low-lying rectal cancer is always a challenge for colorectal surgeons, with abdominoperineal resection (APR) is the conventional treatment. In this operation anal sphincter is lost and patient has to manage colostomy bag for remaining life. Recent advancements in surgical techniques such as ultra-low anterior resection (ULAR) and inter-sphincteric resection (ISR), enabled patients with low rectal cancer to undergo surgery saving anal sphincter and avoiding lifelong stoma on abdomen.

In many studies, the distal resection margin, which is an important determinant of local recurrence as well as survival, was set as short as 1 cm and total mesorectal excision was done in every resection for oncological clearance. Preoperative chemoradiotherapy (PCRT) also contribute to the success rates of sphincter-saving resection (SSR). Furthermore, the development of anastomotic devices has also simplified surgeries and shortened their durations, even for tumors located very low in the rectum with exception of ISR manual Colo-Anal anastomosis was done.

When SSR is performed for very low rectal tumors that are close to the anal sphincter complex, the distal boundary of the resection is located in the anal canal. Some studies have shown ISR to be generally safe on the basis of oncological safety profile of the resection of very low rectal tumors with ambiguous external anal sphincter involvement and uncertain circumferential resection margin (CRM) remains unclear.

Methods

The study was a prospective study conducted in Bangabandhu Sheikh Mujib Medical University (BSMMU) Hospital, Khulna Medical College Hospital (KMCH) & Khulna Colon Rectal Research Center (KCRC). The study period was from January 2005 to December 2018 including 5 year follow up time. However, the patient's registry & surgery were done up to December, 2013. Stage IV Disease were excluded from the study. The patients who failed to continue follow up also were excluded. The surgical intervention i.e. SSR and APR were done by two classified colorectal surgeons of the country together during research and apprenticeship for initial three (3) years and individually thereafter.

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Patients who underwent PCRT received external beam radiation therapy. Intravenous fluoro-uracil-based chemotherapy or capecitabine was administered as concomitant chemotherapy. At 4 to 6 weeks after PCRT completion, patients underwent radical resection (SSR or APR) following principles of total mesorectal excision. In patients who received PCRT, pathologic responses were evaluated in the resected specimens doing post operative histopathology. Only presence of tumor extent and lympho-vascular invasions were accounted for staging. The follow-up period ended when the subjects developed new onset recurrence. Recurrence free survival (RFS) was evaluated on the basis of survival at least for 5 years and time to death. The primary endpoints were the time to the development of new onset recurrence and the time to death. The type (local or systemic) of recurrence was investigated as a secondary endpoint.

The variables were compared using Pearson Chi-square test and an unpaired t test. The influence of each variable on the survival time of the patient was calculated using the Kaplan–Meier method, and significant differences between survival times were evaluated using the log-rank test. Statistical significance was set as a P-value <0.05. All calculations were performed using the SPSS, version 20.

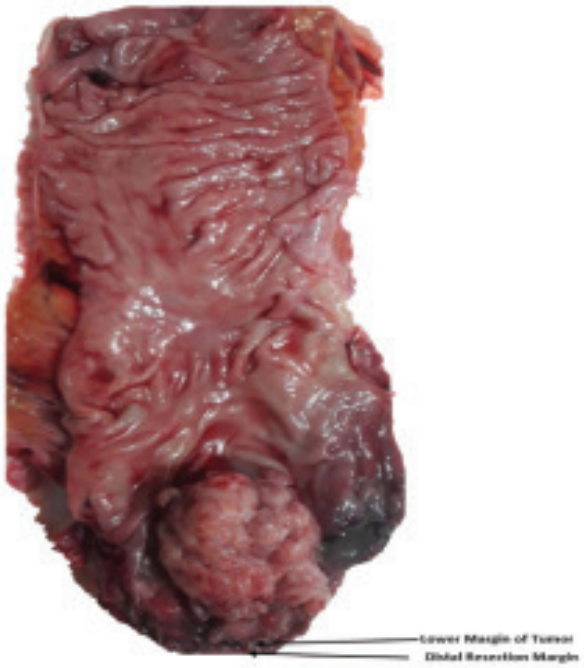

Fig.-1: *Resected specimen after Sphincter Saving Resection (SSR).*

Results

The study included 210 patients who received treatment for very low rectal cancer where lower margin of tumor was located within 3.5 cm of the anal verge. The patients underwent either sphincter saving resection (SSR) or sphincter losing abdominoperineal resection (APR). For SSR, 42 underwent Ultra-Low Anterior Resection (ULAR) and 12 patients underwent ULAR with ISR. In ISR, manual anastomosis was done but in case of only ULAR circular and linear cutter devices were used for anastomosis. However, this stratification was not evaluated in this study.

The mean follow-up duration for patients who underwent SSR and APR were 52.5 months and 68.6 months, respectively (P<.001). The APR group comprised of a higher proportion of men than the SSR group. Almost similar number of both group patients received PCRT. There were no differences in patient age, preoperative carcinoembryonic antigen (CEA) level, LVI, or CRM involvement (Table 1).

Among patients who did not undergo PCRT, there was no significant deference in rate of recurrence. In both groups, oval all, SSR group comprised 43.75% and APR groups comprised 46.85%. The mean heights of lower limit of tumor for both SSR and APR groups where within 3.5 cm from anal verge. Scale measurement showed the mean distance 3.4 cm in SSR and that of 3.1 cm in APR which is not significantly different in respect to statistical analysis. Outcome parameters after every stratification of patients were not documented adequately. There were no significant differences in CRM and lymphovascular involvement between SSR and APR groups. Adjuvant Chemo radiation were performed to most of the patients except four (4) patients in APR groups. But it was ignored due to this very small variable.

The recurrence is the primary in point of this study. It was documented as overall, local and systemic fashion. Overall, SSR groups showed 38.53% and APR groups showed 40.08%. It showed no significant deference between two groups. But stratification shows systemic recurrence is more than local recurrence in both groups. Patients receiving PCRT developed almost same overall recurrence rate in both groups. It is SSR = 33.31% and APR = 33.32%. Patients without PCRT developed overall recurrence as SSR = 43.75% and APR = 46.85%. There is also no significant statistical deference (P = .001). When the patients were stratified by PCRT and pathological stage, the recurrence rates were similar between the 2 surgical treatment groups. In contrast, APR-treated patients who did not receive PCRT had more systemic recurrences at Stage III compared to their SSR-treated counterparts (P=.018). The 5-year recurrence free survival rate (RFS) for SSR and APR groups were 71.01% and 83.50% respectively (P = .318). When the patients were stratified according to PCRT and stage the 5-year RFS rates were not significantly different (Figs. 2).

Table -1

Clinicopathological data of the patients (n=210) (%)

Variables	SSR (n =54)	APR (n =156)	P
Age, mean	55	54	.322
Gender			
Male	(55.5%)	(61.53%)	.049
Female	(44.44%)	(38.46%)	
Location of tumor (cm) from AV, mean	3.4	3.1	.001
Preoperative CEA	5.5	5.85	.146
PCRT	32 (59.25%)	98 (62.82%)	.05
Stage I	(40.7%)	(09.61%)	.02
Stage II	(24.07%)	(30.76%)	.227
Stage III	(35.18%)	(59.61%)	.152
Lymphovascular invasion	(05.55%)	(10.25%)	.169
CRM involvement	(0%)	(03.84%)	.330
Follow-up duration	52.5M	68.6M	.001

SSR =sphincter saving resection, APR =abdominoperineal resection, AV =anal verge, CRM =circumferential resection margin, PCRT =preoperative chemoradiotherapy, CEA =carcinoembryonic antigen.

Table - II

Rate of recurrences in both groups receiving PCRT %

PCRT Variables	SSR	ARP	P
Stage I			
Recurrences (overall)	3/22 (13.63%)	2/55 (03.63%)	.884
Local	1/3 (33.3%)	0/2 (0%)	.152
Systemic	2/3 (66.66%)	2/2 (100%)	.326
Stage II			
Recurrences (overall)	0/13 (0 %)	13/48 (27.08%)	.053
Local	—	2/13 (15.38%)	-
Systemic	—	11/13 (84.61%)	-
Stage III			
Recurrences (overall)	7/19(36.84%)	52/93(55.91%)	.942
Local	1/7 (14.28%)	16/52 (30.76%)	.637
Systemic	6/7 (85.71%)	36/52 (69.23)	.437

SSR =sphincter saving resection, APR =abdominoperineal resection, PCRT =preoperative chemoradiotherapy.

Table-III

Rate of recurrences in both groups receiving no PCRT %

NO PCRT Variables	SSR	ARP	P
Stage I			
Recurrences	0/0 (00%)	0/25 (0%)	.884
Local	—	—	
Systemic	—	—	
Stage II			
Recurrences	1/8 (12.50%)	7/20 (35.00%)	.053
Local	—	2/7 (28.57%)	.248
Systemic	1/1(100%)	5/7 (71.42%)	.527
Stage III			
Recurrences	1/2(50%)	6/13(46.15%)	.942
Local	—	1/6 (16.66%)	.637
Systemic	1/1 (100%)	5/6 (83.33%)	.421

SSR =sphincter saving resection. APR =abdominoperineal resection, PCRT =preoperative chemoradiotherapy.

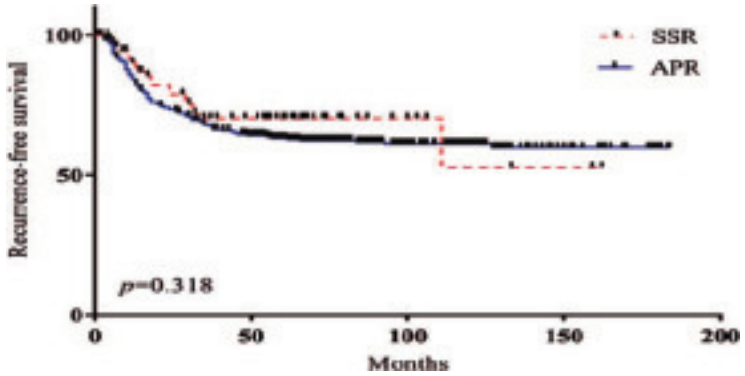

Figure 2: *Recurrence-free survival (RFS). No significant difference in RFS was observed between sphincter-saving resection (SSR) and abdominoperineal resection (APR).*

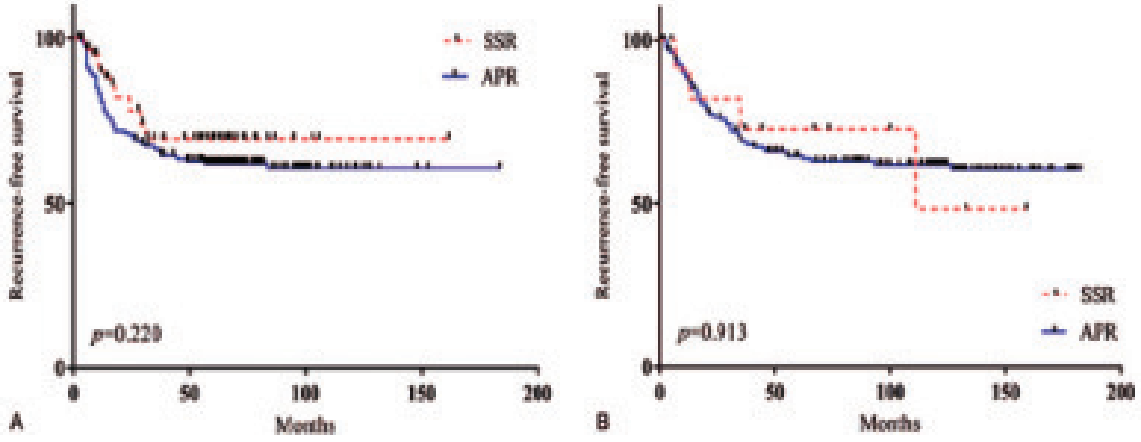

Figure 3: *Recurrence-free survival (RFS) after PCRT. RFS was similar in patients who underwent SSR and APR regardless of PCRT. (A) Comparison of RFS among patients who received PCRT. (B) Comparison of RFS among patients who did not receive PCRT.*

Discussion

In this study, SSR did not impair oncologic outcomes in patients with very low rectal tumors when stratified according to pathologic stage or PCRT administration. As there are different surgical options, it is important to select the best option for particular patient with particular parameters and stage. Here patients were categorized according to their pathologic stage or whether they received PCRT or not. Patients with Stage IV cancers were excluded from the study. Patients with tumor margin within 3.5 cm from anal verge were included.

Here, the proportion of patients in both groups was very different. Sphincter preservation in low rectal cancer would be affected by surgeon's experience and planning. Two surgeons participated in the present study both together initially and then individually. So, quality and standard of surgery carries less bias in intervention.

As well as pathologic and therapeutic factors are concerned, the distal margin of low rectal tumour was the key factor for local recurrence.[15] The risk of local recurrence has been shown to be higher for tumors in the lower third of the rectum than for those in the upper third.[15] In cases of very low rectal tumors that are adjacent to the anal sphincter complex, positive circumferential margins and tumor perforations could influence local recurrence and survival rates after surgery. To compare the oncological outcomes between SSR and APR, therefore, it is necessary to limit investigations to very low rectal cancers. Although several studies compared outcomes between SSR and APR, most included patients with higher tumors (i.e., 5–6 cm from the anal verge) that were relatively distant from the anal sphincter.[18–20]

In this study, there was a higher proportion of men in the APR group, and PCRT was performed more frequently in the APR group. Although most studies did not show differences according to sex, some showed that more men undergo APR compared to SSR.[20,21]

Ages of the patients in both groups of this study were not significantly different (P= .322); however, aging is known to be associated with atrophy of the anal sphincter, and the incidence of fecal incontinence ranges from 2% to 17% in the population at large.[22] Moreover, old age is a contributing factor to postoperative incontinence after low anterior resection.[21] Though age was not associated with oncologic outcomes after surgery for very low rectal cancer but age is an important consideration when treatment options for patients with low rectal cancer is selected.

The study of patients carried out in Japan comparing SSR and APR was the largest study on this ground. There they found that SSR produced higher overall survival (OS) rates than APR, although disease-free survival (DFS) rates were similar.[9] However, the positions of the tumors in their study were relatively high (up to 5 cm from the anal verge), and some of their patients who underwent SSR experienced extensive surgeries. Moreover, the number of patients who had received PCRT was different in each subgroup (36% in the SSR subgroup vs none in the APR group). Klose et al [19] also reported comparable DFS rates of SSR and APR for patients with rectal tumors within 5 cm from the anal verge; their study included similar numbers of patients who received PCRT in each surgery subgroup. However, they performed no additional analyses of factors associated with oncologic out-comes.

In this study, the rate and type of recurrence were not statistically different between the SSR and APR groups. Although there have been many controversial reports regarding influence of PCRT on OS, it generally known to improve local control.[17,26]

The pathologic stage is also an independent predictive factor for oncologic outcome after treatment according to most previous studies. When patients were stratified according to PCRT use and pathologic stage in this study, the incidences and patterns of recurrence did not differ among patients with different cancer stages. However, in patients with Stage III disease who underwent SSR but did not receive PCRT, the local recurrence rate was higher than that of the APR group (50% VS 46.15%) even though CRM involvement was similar between the 2 groups. However, the number of patients in that group was too small (n =2); thus, a reliable analysis was not possible. Adjuvant chemoradiotherapy was also potential associated factors with oncologic outcomes. In the present study, patients who received adjuvant treatment were not different between 2 groups. Although completion of adjuvant treatment was not reported because of some limitation of patient's follow up.

CRM involvement is a well-known risk factor for RFS after rectal cancer surgery [20] Here there was no association between CRM involvement and RFS in patients who received PCRT (P= .330). Patients who underwent long-course PCRT did not show any effect on positive CRM status.

Conclusion

Sphincter saving surgery without lifelong stoma is desirable in very low rectal cancer but it is a challenge to surgeons for last decades. As per the result of the study anal sphincter saving surgery can safely be done in case of very low-lying rectal cancer and it is comparable to Abdomino-Perineal Resection in respect to oncologic

outcome and disease-free survival. Pathologic staging based on local invasion, nodal and lympho-vascular involvement showed variable data but those didn't dictate significant difference in between two groups with two treatment modalities. Overall survival and disease-free survival (DFS) were comparable irrespective of chemoradiotherapy (PCRT).So, SSR can safely be done and counselling with patient may be done in favor of sphincter preservation rather than to sphincter loss in case of very low-lying rectal cancer.

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