FEASIBILITY OF LAPAROSCOPIC ABDOMINO-PERINEAL RESECTION FOR LARGE-SIZED ANORECTAL CANCERS: A SINGLE-INSTITUTION EXPERIENCE OF 59 CASES

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ABSTRACT

BACKGROUND: *Laparoscopic surgery for anorectal carcinoma is steadily gaining acceptance. While feasibility has already been reported, there are no reports addressing the impact of the actual size of large tumors on laparoscopic resectability.* **AIM:** *To assess the feasibility and short-term results (including oncological surrogate end points) of performing laparoscopic abdomino-perineal resection (APR) for large rectal cancers.* **MATERIALS AND METHODS:** *Data of 59 patients undergoing laparoscopic APR (LAPR) for anorectal malignancies were reviewed retrospectively. Outcomes were evaluated considering the surgical procedure, surface area of the tumor and short-term outcomes.* **RESULTS:** *Of the 59 cases, LAPR could be completed in 53 (89.8%) patients. Thirty-one (58.4%) patients had Astler-Coller C2 stage disease. The mean surface area of the tumors was 24±17.5 (4-83) cm2. The number of median lymph nodes harvested per case was 12 (1-48). Circumferential resection margin (CRM) was positive in 11 (20.7%) patients. No mortality was reported.* **CONCLUSION:** *This appears to be the first report analyzing the impact of the size of the rectal tumor in LAPR. The data clearly indicates that LAPR is not hampered by the size of the tumor. There appears to be a need for preoperative radiotherapy and chemotherapy before undertaking surgery on larger tumors in view of the higher circumferential resection margin positivity.*

Key words: *Circumferential resection margin, laparoscopy, rectal cancer*

INTRODUCTION

Heald *et al.*[1,2] have stated that total mesorectal excision (TME) is probably the most important factor determining better outcomes. The ability to perform a complete TME has been shown to be technically easier in case of laparoscopy.[3] However, laparoscopy for rectal cancer has been accepted the world over with less enthusiasm than for colon cancer. The reason for this has been the fear of high circumferential resection margin (CRM) positivity encountered with rectal cancers during anterior resection.[3] However, in the case of LAPR, Baker *et al.*[4] have claimed that there was no difference when open surgery

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was compared with laparoscopy with regard to CRM positivity.

It is known that the absence of mesorectum in the lowest 3 cm of the rectum renders the prognosis associated with such tumors to be poorer as compared to higher rectal tumors. This is the exact reason why in low-lying tumors, especially those reaching the anal canal, the performance of a more precise sharp dissection from the abdomen is of utmost importance. The anterior sharp dissection reduces the amount of dissection required to be performed from the perineal side, reducing the tearing of the perirectal fascia and the associated dissemination of cancer cells into the perineum.[1,2,5,6]

While studies have been published on the feasibility of the procedure, addressing issues such as laparoscopic surgery in the complicated patient,[7] a factor that has not been given much importance in relation to the outcome of the procedure is the size of the lesion. While most published manuscripts do comment on the stage of the tumor, the actual size of the tumor is not mentioned. This determinant may play a role in defining the feasibility and the outcome of the surgery. We have reviewed our own data to address this issue.

MATERIALS AND METHODS

The records of all patients who underwent LAPR for very low rectal cancers at the Department of Gastrointestinal Surgical Oncology between 1st January 2003 and 31st December 2006 were included in the study.

Preoperatively, all patients were investigated in the same manner with routine blood investigations, including blood counts, liver and renal functions, ECG and tumor marker (CEA). Preoperative evaluation included a digital rectal examination and colonoscopy.

All patients underwent a contrast-enhanced multi-detector CT (MDCT) imaging for tumor staging preoperatively.

All patients had bowel preparation with polyethylene glycol and were given prophylactic antibiotics on induction of anesthesia.

The LAPR was performed as described by Pikarsky et al.[8] A circumferential resection margin (CRM) of ≤ 2 mm was considered positive.[9]

Perioperative mortality was defined as deaths taking place while the patient was still hospitalized. Deaths were included irrespective of whether they arose as a result of the surgery or other causes (i.e., to include cardiac-related deaths).

The total hospital course was defined as the entire period of hospitalization from the date of surgery until the patient was discharged. Patients were discharged only if they satisfied the following criteria: adequate pain control with oral analgesics, no nausea, ability to take solid foods, passage of flatus and / or stool, mobilization and self-support comparable to the preoperative level.

Our postoperative follow-up consisted of history and clinical examination (scar, supraclavicular lymph nodes, per abdominal examination,

perineal examination [for patients having undergone APR]) every 3 months for 2 years, then every 6 months for a total of 5 years. Serum CEA levels were measured at every visit stated above. Chest/abdominal/pelvic CTs were considered annually for 3 years for patients at high risk of recurrence. Colonoscopy was performed in 1 year. In patients in whom a preoperative colonoscopy was not performed due to an obstructing lesion, colonoscopy was performed within 3 to 6 months of surgery through the end stoma. PET scan was performed in patients with rising titers of CEA or in whom radiological evidence of recurrence was determined by chest x-ray or CT scan.

All statistical analyses were performed using SPSS version 14.0 for Windows. Continuous data are expressed as mean ± standard deviation. The median has been used wherever applicable. Pearson's correlation was used to assess correlation between tumor area and T-stage. One-way ANOVA was performed to find an association between tumor area and CRM positivity. The Kaplan-Meier method was used to estimate survival curves. Ninety-five percent confidence intervals (95% CIs) were calculated for the survival estimates.

RESULTS

During the period between 1st January 2003 and 31st December 2006, 59 patients were taken up for LAPR.

Patient characteristics
A total of 45 patients were classified as grade I; and 14 patients, as grade II by the American Society of Anesthesiologists (ASA) grading. These included 33 (55.9%) males and 26 (44.1%) females. The mean patient age was 46.8±15 (24-80) years. The average distance from the anal verge was 1.4±1.97 cm.

Operative factors
Complete laparoscopic resection could be completed in 53 (89.8%) patients. The reasons for conversion included 1 case of bleeding from vaginal wall; 1 case of dense adhesions following a previous hysterectomy; and 3 cases of bulky disease involving adjacent structure, including the vagina and parametra and bladder (not predicted on preoperative imaging). In 1 case, conversion had to be resorted to due to technical difficulties with the equipment resulting in poor vision.

The median operating time was 255 (45-470) minutes, with a median blood loss of 300 (20-1200) mL.

Tumor characteristics
The mean tumor area measured at the time of histopathological examination as the length (craniocaudal axis) multiplied by the breadth (lateral margin to lateral margin) of the tumor, was 24±17.5 (4-83) cm^2. The histopathological characteristics have been tabulated in Table 1. Applying Pearson's correlation, there

Table 1: Histopathological characteristics of the excised tumors

Characteristic	Total number (n = 53)
Tumor type	
Adenocarcinoma	48 (90.6%)
Melanoma	5 (9.4%)
Modified Astler Coller stage	
A	1
B1	7
B2	12
C1	2
C2	31
CRM positive	11 (20.7%)
Proximal and Distal cut margins	100% free
Median Lymph nodes (range)	12 (1-48)

was no correlation between area of the tumor and tumor T-stage (R=0.056, $P = 0.713$)

Postoperative factors
The morbidity rate was 9.4% (5/53). This included 2 cases of superficial perineal dehiscence necessitating secondary suturing, 1 case of complete perineal wound dehiscence with bowel evisceration necessitating emergency repositioning of the bowel and closure, 1 case of stomal retraction managed by local stomal refashioning, and 1 case of bleeding from the prostatic capsule requiring an emergency exploration via the perineal wound and hemostatic suture on the offending vessel.

There was no mortality in the entire group. The mean duration of hospital stay was 10.0±1.9 days.

Survival data
There were 7 recurrences — 2 local, 2 liver metastases, 1 case each of lymph nodal, peritoneal and cutaneous recurrences. As a result, the 48-month disease-free survival was 72% [Figure 1]. There was no significant correlation between either the patient sex, tumor

Figure 1: Disease-free survival by Kaplan-Meier estimates

type (including degree of differentiation, T- or N-stage) or circumferential resection margin and disease-free survival. There was no significant correlation between tumor surface area and CRM positivity ($P < 0.707$).

DISCUSSION

The advantage offered by laparoscopy has always centered on improved vision. This advantage seems to be put to best use in the case of rectal cancer surgery, where logistic impediments, viz., narrow pelvis and impaired visibility as the dissection proceeds caudad, have proved to be obstacles to colorectal surgeons during open surgery.

Rectal cancer is seen to occur around a decade earlier in Indians,[10] the reasons for which are still uncertain.

Our lymph nodes yield compares favorably to a worldwide series reporting yields of 11.5 to 14 lymph nodes per case.[6,11-13]

Our operating time (255 minutes), as well as average duration of hospital stay (10 days), is also comparable to other similar studies.[4,6,12-15]

Our morbidity rate of 9.4% is better than the reported morbidity rates following laparoscopic surgery for rectal cancers in other series.[13-16] Similarly, our conversion rate of 9.4% is comparable to most studies (10%-21%).[14-16]

The above data clearly reflect the technical feasibility of laparoscopy for very low rectal cancers in our setting. The factor that we wish to highlight, though, is not the technical feasibility but the oncological safety.
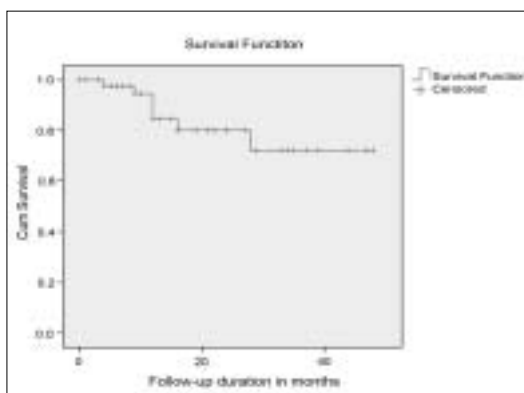
We would like to consider for the first time the average surface area (size) of the tumor.

In different parts of the world, patients present with advanced disease status the reasons of which are varied. Some common reasons for delayed presentations are misdiagnosis of bleeding per rectum as being hemorrhoidal in origin; and among patients who are diagnosed correctly, a substantial subset of patients seek alternative forms of therapy before presenting for surgery. As can be seen from the current study, our patients presented with large (average surface area of 24 cm^2) and often advanced malignancies (58.4% of the patients with C2 disease, in our study). These tumors pose a serious challenge to surgeons.

The recommended surgical standards include clear margins, not only along the luminal length but also along the circumferential margin (CRM). This issue was briefly addressed in the MRC CLASICC trial.[1] Unfortunately, Korolija *et al*.[17] in their meta-analysis had compared, mainly, distal margins. Similarly, Pugliese *et al*.[6] only concentrated on the distal margins. The CRM seemed to have been ignored. The significance of radial clearance was first addressed by Quirke *et al*.[18] They claimed that recurrence was directly influenced by the involvement of the edge of mesorectal excision. This view was further supported by de Haas-Kock *et al*.[19] To prove that laparoscopy is as safe as open surgery for cancer of the rectum, we must be able to prove beyond doubt that margins of resection are comparable, if not better.[20]

In our series, the CRM positivity was 20.7% — a value that is well within reported rates of CRM positivity (up to 25%) for curative resections.[9,21]

This, as has been explained in previous studies, is probably an indicator of the large size of the tumors as well as their advanced stage. It is important to note, though, that the oncological safety is not only dependant on the abdominal procedure but also on the adequacy of the perineal part of the operation. Besides, should tumor injury be detected intraoperatively, it is advisable to convert to open surgery to control the amount of contamination and complete the rest of the procedure.

We have been gradually shifting towards the introduction of neoadjuvant chemo-radiotherapy protocols.[22] This has been difficult because our patient referral base is mainly from outside Mumbai.

CONCLUSION

The size of the tumor does not hamper the feasibility of performing LAPR. We need to consider the possibility of an increased CRM rate for large-size tumors. This may be addressed by preoperative radiotherapy and chemotherapy before undertaking surgery on these large tumors.

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REFERENCES

1. Heald RJ. Rectal cancer: The surgical options. Eur J Cancer Am 1995;31:1189-92.
2. Heald RJ, Moran BJ, Ryall RD, Sexton R, MacFarlane JK. Rectal cancer: The Basingstoke experience of total mesorectal excision, 1978-1997. Arch Surg 1998;133:894-9.

3. Guillou PJ, Quirke P, Thorpe H, Walker J, Jayne DJ, Smith AM, *et al*. Short-term endpoints of conventional versus laparoscopic-assisted surgery in patients with colorectal cancer (MRC CLASICC trial): Multicentre randomized controlled trial. Lancet 2005;365:1718-26.

4. Baker RP, White EE, Titu L, Duthie GS, Lee PW, Monson JRT. Does laparoscopic abdominoperineal resection of the rectum compromise long-term survival? Dis Colon Rectum 2002;45:1481-5.

5. Heald RJ, Smedh RK, Kald A, Sexton R, Moran BJ. Abdominoperineal excision of the rectum: An endangered operation. Dis Colon Rectum 1997;40:747-51.

6. Pugliese R, Di Lernia S, Sansonna F, Ferrari GC, Maggioni D, Scandroglio I, *et al*. Outcomes of laparosocpic Miles' operation in very low rectal adenocarcinoma: Analysis of 32 cases. Eur J Surg Oncol 2007;33:49-54.

7. Plocek MD, Geisler DP, Glennon EJ, Knodyis P, Reilly JC. Laparoscopic Colorectal surgery in the complicated patient. Am J Surg 2005;190:891-5.

8. Pikarsky AJ, Rosebthal R, Weiss EG, Wexner SD. Laparoscopic total mesorectal excision. Surg Endosc 2002;16:558-62.

9. Nagtegaal ID, Marijnen CA, Kranenbarg EK, van de Velde CJ, van Krieken JH; Pathology Review Committee; Cooperative clinical investigators. Circumferential margin involvement is still an important predictor of local recurrence in rectal carcinoma: Not one millimeter but two millimeters is the limit. Am J Surg Pathol 2002;26:350-7.

10. Shrikhande SV, Saoji RR, Barreto SG, Kakade AC, Waterford SD, Ahire SB, *et al*. Outcomes of resection for rectal cancer in India: The impact of the double stapling technique. World J Surg Oncol 2007;5:35.

11. Decanini C, Milsom JW, Bohm B, Fazio VW. Laparosocpic oncologic abdominoperineal resection. Dis Colon Rectum 1994;37:552-8.

12. Liang JT. Lai HS, Lee PH. Laparoscopic abdominoperineal resection for low rectal cancers: How do we do it? Surg Endosc 2006;20:695-6.

13. Kockerling F, Scheidbach H, Schneider C, Barlehner E, Kohler L, Bruch HP, *et al*. Laparoscopic abdominoperineal resection: Early postoperative results of a prospective study involving 116 patients: The Laparoscopic Colorectal Surgery Study Group. Dis Colon Rectum 2000;43:1503-11.

14. Fleshman JW, Wexner SD, Anvari M, Latulippe JF, Birnbaum EH, Kodner IJ, *et al*. Laparoscopic vs, open abdominoperineal resection for cancer. Dis Colon Rectum 1999;42:930-9.

15. Wong DT, Chung CC, Chan ES, Kwok AS, Tsang WW, Li MK. Laparoscopic abdominoperineal resection revisited: Are there any health-related benefits? A comparative study. Tech Coloproctol 2006;10:37-42.

16. Ramos JR, Petrosemolo RH, Valory EA, Polania FC, Pecanha R. Abdominoperineal resection: laparoscopic versus conventional. Surg Laparosc Endosc 1997;7:148-52.

17. Korolija D, Tadic S, Simic D. Extent of oncological resection in laparoscopic vs. open colorectal surgery: Meta-analysis. Langenbecks Arch Surg 2003;387:366-71.

18. Quirke P, Durdey P, Dixon MF, Willams NS. Local recurrence of rectal adenocarcinoma due to inadequate surgical resection. Lancet 1986;1:996-8.

19. De Haas-Kock DF, Baeten CG, Jager JJ, Langendijk JA, Schouten LJ, Volovics A, *et al*. Prognostic significance of radial margins of clearance in rectal cancer. Br J Surg 1996;83: 781-5.

20. Shukla PJ, Barreto G, Gupta P, Shrikhande SV. Laparoscopic surgery for colorectal cancers: Current Status. J Min Access Surg 2006;2:205-10.

21. Adam IJ, Mohamdee MO, Martin IG, Scott N, Finan PJ, Johnston D, *et al*. Role of circumferential margin involvement in the local recurrence of rectal cancer. Lancet 1994;344:707-11.

22. Barlehner E, Benhidjeb T, Anders S, Schicke B. Laparoscopic resection for rectal cancer: Outcomes in 194 patients and review of the literature. Surg Endosc 2005;19:757-66.