

## RESEARCH ARTICLE

# Outcomes of Laparoscopic Abdominoperineal Resection in Low Rectal Cancer Using Different Pelvic Drainages

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## Abstract

**Background:** The aim of this study was to establish the feasibility and efficiency of different pelvic drainage routes after laparoscopic abdominoperineal resection (LAPR) for rectal cancer by assessing short-term outcomes. **Materials and Methods:** Clinicopathological data of 76 patients undergoing LAPR for very low rectal cancer were reviewed retrospectively between June 2005 and June 2014. Outcomes were evaluated considering short-term results. **Results:** Of 76 relevant patients at our institution in the period of study, trans-perineal drainage of the pelvic cavity was performed in 17 cases. Compared with the trans-perineal group, the length of hospital stay was shorter in the trans-abdominal group, while the duration of drainage and the infection rates of the perineal wounds between two groups showed no significant differences. **Conclusions:** The outcomes of this study suggest that trans-abdominal drainage of pelvic cavity is a reliable and feasible procedure, the duration of drainage, infection rates and the healing rates of the perineal wounds being acceptable. Trans-abdominal drainage has a more satisfactory effect after laparoscopic abdominoperineal resection for rectal carcinoma.

**Keywords:** Rectal cancer - laparoscopic abdominoperineal resection - pelvic drainage

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## Introduction

Since 1982 when Heald et al. (1982) and MacFarlane et al. (1993) published their seminal paper, total mesorectal excision (TME) has been used as the gold standard for rectal cancer surgery. In recent decades, abdominoperineal resection (APR) is advocated the standard surgical procedure for very low rectal cancer. Minimally-invasive surgical techniques have been applied to abdominal surgery in the last decades. Large comparative studies and multiple prospective randomized control trials (RCTs) have reported equivalence in resection margin, lymph node collection, tumor recurrence, postoperative complications, and long-term outcomes between open and laparoscopic resection for colon cancer (Guillou et al., 2005; Veldkamp et al., 2005; Jayne et al., 2007; Law et al., 2007; Gezen et al., 2012; Green et al., 2013; van der Pas et al., 2013; Schiphorst et al., 2014; Zhang et al., 2014). Generally, in patients operated upon with an abdominoperineal resection (APR), trans-perineal tube placed often caused obvious discomfort and restrained their early activity. While in laparoscopic abdominoperineal resection, we could pass the drain tube through the laparoscopic abdominal port sites on the right side. This retrospective study compares these two forms of drainage in patients with rectal cancer undergoing

laparoscopic abdominoperineal resection to clarify the feasibility and efficiency of different pelvic drainage routes with special regard to the duration of drainage and the length of hospital stay.

## Materials and Methods

In this retrospective study, 76 patients diagnosed with rectal cancer who underwent laparoscopic abdominoperineal resection between June 2005 and June 2014, at the general surgery department, Zhongshan Hospital were included. Preoperative data collection parameters included colonoscopy and biopsy, abdominal ultrasound, a chest X-ray, abdomino-pelvic CT scan, pelvic MRI, pulmonary function tests and routine blood tests. Besides, before the surgery, patients were routinely evaluated by the anesthesia department. Severe medical comorbidity was not considered a contraindication to minimally invasive surgery at our institution. The decision for laparoscopic surgery was reached mutually by the surgeon and the patient.

### *Surgical procedure*

The operations were performed by professor Gu who was experienced with open TME, laparoscopic TME and perineal dissection. All patients had a preoperative bowel

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preparation. LAPR was performed in a standard operative manner. Surgery included the proximal dissection of the rectum, clearance of abdomino-pelvic lymph nodes, which made the excision as radical as possible and the preservation of the hypogastric nerves, pelvic plexuses, and presacral nerves. Then, the perineal incision was closed, and a good haemostasis was achieved, after that, abdomen pelvic cavity were washed by amounts of normal saline. Latex drainage was placed in the presacral cavity. In trans-abdominal group, the perineal cavity was drained upward with a latex tube cutted several side holes which was brought out through lower right abdomen truca incision. Then we stitched the pelvic fascia, muscles, skin and subcutaneous tissue. While in trans-perineal group, a latex tube cutted several side holes from the pelvic cavity were brought out through a separate hole in the perineum lateral to the incision. Also, we stitched the pelvic fascia, muscles, skin and subcutaneous tissue. The choice of perineal or abdominal drainage was randomly dependent on surgeons and the latex tube was pulled out when the daily volume of drainage was less than 30 ml.

*Statistical analysis*

All statistical analyses were performed using a standard statistical software package (Statistical Package for Social Sciences, version 17, SPSS, Chicago, IL). Continuous variables were compared using independent-sample Student t tests for normally distributed variables and nonparametric Mann-Whitney U tests for nonnormally distributed variables. Categorical variables were compared with chi-square tests. The  $p < 0.05$  limit of statistical significance was used for all tests applied.

**Results**

*Characteristics of sample population*

In this study, 76 patients underwent laparoscopic abdominoperineal resection for very low rectal cancer: trans-perineal drainage was performed in 17 patients, while other 59 patients were with trans-abdominal drainage. Characteristics of the entire study population are presented in Table 1. The mean age of the entire cohort was  $57.8 \pm 12.0$  years, and the majority patients (60.5%) were male. Most patients had

minor comorbidities, with 84.2% presenting with an ASA class 1 or 2. A proportion of patients (23.7%) had previous abdominal surgery (Table 1).

With respect to tumor TMN stage, 22 (28.9%) patients had stage I cancers, 17 (22.4%) patients had stage II cancers, 37 (48.7%) had stage III cancers while none of the patients had IV cancers (Table 1).

*Comparison of characteristics by study group*

A comparison of demographic and oncologic characteristics by surgical approach is presented in Table 2. There were no differences between the Perineal Drainage and Abdominal Drainage groups in age ( $59.5 \pm 13.0$  years vs  $57.3 \pm 11.8$ , TPD vs TAD,  $p = 0.52$ ), sex (TPD vs TAD,  $p = 0.26$ ), ASA class (TPD vs TAD,  $p = 0.71$ ). There were also no differences in the history of abdominal surgery (TPD vs TAD,  $p = 0.53$ ). With respect

to oncologic factors, there was no difference in TMN stage by study group (TPD vs TAD,  $p = 0.63$ ) (Table 2).

*Comparison of short-term outcomes by study group*

A comparison of postoperative short-term outcomes is presented in Table 3. In general, outcomes were similar between the 2 groups. The only significant difference

**Table 1. Characteristics of Sample Population (n=76)**

Characteristic	No. (%)
Age (mean±Sd)	57.8±12.0
Sex	Male 46 (60.5%) Female 30 (39.5%)
ASA	1 13 (17.1%) 2 51 (67.1%) 3 12 (15.8%) 4 0 (0%)
TMN	I 22 (28.9%) II 17 (22.4%) III 37 (48.7%) IV 0 (0%)
Previous Abdominal Surgery	Yes 18 (23.7%) No 58 (76.3%)

**Table 2. Comparison of Characteristics by Study Group**

Characteristic	Approach		p value
	Perineal Drainage (n=17)	Abdominal Drainage (n=59)	
Age (mean± SEM)	59.5±13.0	57.3±11.8	0.52
Sex			0.26
Male	8	38	
Female	9	21	
ASA			0.71
1	3	10	
2	12	39	
3	2	10	
4	0	0	
TMN			0.63
I	5	17	
II	5	12	
III	7	30	
IV	0	0	
Previous Abdominal Surgery			0.53
Yes	5	13	
No	12	46	

**Table 3. Comparison of Short-term outcomes by Study Group**

Outcome	Approach		p value
	Perineal Drainage (n= 17)	Abdominal Drainage (n= 59)	
Operative time [min (median, range)]	205.9	200.68	0.462
Length of stay [days (median, range)]	20.1	16.8	0.017
duration of drainage [days (median, range)]	7.12	7.73	0.455
Infection	2	4	0.872
Postoperative Mortality(30d)	0	0	

noted was a longer length of stay in the Perineal Drainage group with the Abdominal Drainage groups (20.1d vs 16.8d, TPD vs TAD;  $p=0.017$ ). Operative time (205.9 vs 200.6min, TPD vs TAD,  $p=0.46$ ) and duration of drainage (7.12 vs 7.73d, TPD vs TAD,  $p=0.46$ ) both did not have statistical significance. With respect to postoperative morbidity, there were no differences in the rate of surgical site infections. Patients in the Perineal Drainage group had a higher, although nonsignificant, rate of infections (11.8% vs 6.8%). None of the patients died 30 days after the surgery (Table 3).

## Discussion

In patients undergoing APR, some known complications include intra-abdominal or pelvic abscess, nerve injury, ureteric injury, and perineal wound complications (Murrell et al., 2005; Simorov et al., 2011; Kellokumpu et al., 2012). Due to the special anatomy that the rectal anal is located at the end of the digestive tract, there is a high occurrence of postoperative infection in patients with a radical rectal cancer surgery, especially in the abdominoperineal resection. When operated laparoscopic abdominoperineal resection, there are only several trocar holes besides the stoma in the abdomen, which benefits the patients and keeps them avoiding abdominal incision infection caused by stoma feces contamination. But the perineum incision is still easy to get infection. Such a complication is painful and troublesome, involving a long stay in the hospital. On the other hand, the effect of pelvic drainage in improving postoperative complication is still controversial (Jatzko et al., 1996; Merad et al., 1999; Gong et al., 2014). The duration of drainage, the types of drains, the ways to place the drains, and the use of irrigation varied in different studies. The common way is to bring drains out through the perineal wound or through a separate incision lateral to the perineal incision. But we think that the trans-abdominal drainage could make full use of the trocar holes, reducing the perineal trauma, and patients' postoperative pain. In our study, the drainage both in the trans-abdominal group and the trans-perineal group works with the siphon action, and the low rates of infection in the two groups suggests the effect of atax drainage tubing is reliable. Patients with trans-perineal drainage showed a significantly longer in the length of stay than those with trans-abdominal drainage. The approach of trans-abdominal drainage after laparoscopic abdominoperineal resection is more in accordance with the concept of minimal invasive surgery and it could relieve patients' postoperative pain which prompts patients' rapid recovery. The current series represents a retrospective analysis of different pelvic drainage routes after laparoscopic abdominoperineal resection for rectal cancer. Patients with abdominal drainage stayed significantly shorter length of stay than those with perineal drainage. Our article only reports a single unit's practice, and it may not give a true reflection of outcomes that would be achieved in other units. We do, however, believe that our data support the feasibility of trans-abdominal drainage approach after laparoscopic abdominoperineal resection for rectal cancer and demonstrate benefits in terms of time

to patient recovery and length of hospital stay.

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