Original Article

The Short-term Outcome of Two-stage Turnbull-Cutait Pull-through Coloanal Anastomosis in Minimal Invasive Total Mesorectal Excision for Rectal Cancer

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Key Words
Rectal cancer;
Two-stage Turnbull-Cutait coloanal anastomosis;
Total mesorectal excision

Purpose. This study evaluated the safety of two-stage Turnbull-Cutait pull-through coloanal anastomosis in minimally invasive total mesorectal excision for rectal cancer.
Methods. We conducted a retrospective, single-center case series study based on our institution's patient registry database from September 2020 to February 2022. The study enrolled patients diagnosed with rectal cancer who received minimally invasive surgery with two-stage Turnbull-Cutait pull-through coloanal anastomosis. The patients might receive chemotherapy or radiation therapy before the operation based on the clinical stage. In the first stage of the operation, total mesorectal excision was performed using laparoscopic or robotic surgery. The colon was left protruding outside the anal canal by 5 to 10 cm and secured. The patients received close monitoring in the ward and the second stage operation of delayed coloanal anastomosis was conducted after 5 to 10 days typically. Patients were followed for at least one year to analyze the morbidities of surgery, cancer outcomes, and function results.
Results. This study enrolled 41 patients. The 30-day overall postoperative morbidity rate was 21.95%. No 30-day postoperative mortality was observed. The anastomosis leakage rate was 9.76% and no further surgical intervention was done in these patients. The one-year local recurrence rate was 7.31%, and the one-year distant metastasis rate was 12.20%.
Conclusions. The two-stage Turnbull-Cutait pull-through coloanal anastomosis procedure used in minimally invasive total mesorectal excision might be an alternative choice for some specific patients who refuse or encounter difficulties with stomas formation based on short-term surgical outcomes. Close monitoring of the patient for functional outcomes and oncologic recurrence over time is crucial.

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Globally, cancer ranks as one of the primary causes of mortality.[1,2] In 2020, colorectal cancer (CRC) accounted for approximately 1.9 million recent cases and 0.9 million fatalities worldwide, making it the third most frequent type of cancer and the second most lethal.[3] In Taiwan, the trend of colorectal cancer incidence is gradually increasing. Surgery is considered the standard treatment option for potentially curable

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rectal cancer. Middle to lower rectal cancer often needs total mesorectal excision (TME) with temporary stoma construction. The TME technique has become the standard approach for dissecting rectal cancer in specific anatomical planes. The primary objective of TME is to achieve a thorough removal of the mesorectum while preserving the integrity of the mesorectal fascia. However, some patients refuse to receive a stoma due to inconvenience.[4-6] Moreover, a diverting stoma does not necessarily guarantee the prevention of postoperative anastomotic leakage. Complications associated with stomas include small bowel obstruction, wound sepsis, the requirement for relaparotomy, incisional hernia at the stoma site, leakage, prolonged ileus, fistula, bleeding, and intra-abdominal abscess.[7]

Previously regarded as a surgical approach of the past, the Turnbull-Cutait technique for delayed coloanal anastomosis (DCA) has shown a resurgence in recent times and has been reintroduced to surgical practice.[6] Turnbull and Cutait described abdominoperineal pull-through followed by delayed coloanal anastomosis (DCA) in 1961.[8,9] The two-stage Turnbull-Cutait coloanal anastomosis (TCA) constitutes an effective surgical alternative in the current approach to treating low rectal cancer without temporary stoma construction, preventing the wide range of complications related to stoma surgery.[6,10-12]

A minimally invasive approach in TME has become a trend due to emerging technologies in instrumentation with the advantages of a quick recovery time and less postoperative pain.[6,13-16] We retrospectively obtained the data using hospital records to evaluate the safety and short-term outcomes of TCA in assisted minimally invasive TME for rectal cancer.

Materials and Methods

Study population and design

We conducted a retrospective, single-center case series study based on our institution's patient registry database from September 2020 to February 2022. The study enrolled patients diagnosed with rectal cancer who received minimally invasive surgery with two-stage Turnbull-Cutait pull-through coloanal anastomosis. The lower rectum is defined as 0 to 6 cm from anal verge, and the middle rectum is defined as 7 to 11 cm from anal verge. Twenty patients accepted neoadjuvant CCRT which was administered by 5-FU 400 mg/m^2 IV bolus + 2400 mg/m^2 IV run 48 hours + leucovorin 20 mg/m^2 IV bolus for 4 days during week 1 and 5 of radiotherapy, or capecitabine 825 mg/m^2 PO twice daily 5 days/week + radiotherapy 5 weeks. Radiotherapy involved a total dose of 50.4 Gy given in 28 fractions of 1.8 Gy. Surgery was performed 8-12 weeks after the completion of neoadjuvant CCRT.

First stage operation

In the first stage of operation, the patients underwent total mesorectal excision using the laparoscopic or robotic technique. Complete splenic flexure mobilization with high ligation of the inferior mesenteric artery was done. The inferior mesenteric vein was ligated near the pancreatic border, and the mesorectum was divided down to the pelvic floor. A transanal approach was used to open the rectal wall and pull the rectum and colon from the anal canal (Fig. 1A). An intraoperative indocyanine green test was used to check colon perfusion (Fig. 1B). After tumor identification, the specimen was resected with an adequate margin. The colon wound leave 5 to 10 cm in length outside the anal canal (Fig. 1C). Four stitches in four directions with 3-0 Vicryl were used to fix the colon to the anal canal.

If the tumor or mesorectum was too bulky that cannot be pulled out from the anal canal, we did the mesorectum excision down to pelvic floor and did transanal mesorectum excision to totally mobilize the rectum. Pfannenstiel incision was done and pulled out the specimen. Resection the proximal site of tumor under adequate margin with stapler. Re-pneumoperitoneum was done, and we pulled out the proximal loop of colon from the anal canal about 5-10 cm in length. Four stitches in four directions with 3-0 Vicryl were used to fix the colon to the anal canal.

We checked the specimen to clarify the completeness of mesorectal excision based on M.E.R.C.U.R.Y. criteria.[17]

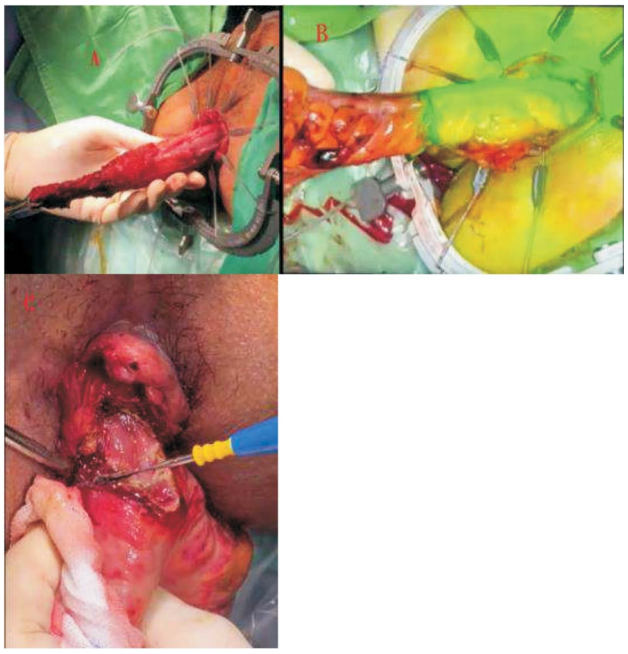

Fig. 1. (A) Pull out the rectum and colon from the anal canal. (B) The Intraoperative Indocyanine Green test was used to check colon perfusion. The specimen was then resected under adequate margin. (C) Resected the specimen and left residual colon loop 5 to 10 cm in length outside the anal canal.

Perioperative care between the two-stage operation

After the first stage of surgery, the patient was taken to the ordinary ward and administered empirical antibiotics with peripheral parenteral nutrition. The colon outside the anal canal was covered by white gauze containing 50% dextrose in water. We arranged early enteral feeding for the patient. Daily inspections included an assessment of outer colon perfusion every eight hours and a daily examination of the anal margin to monitor colon healing. Postoperative care included vital sign assessment, surgical site inspection for signs of infection or other complications, and urine output monitoring. The second stage operation is typically performed between 5 to 10 days, based on the perfusion status of the exteriorized colon and the patient's clinical condition.

Second stage operation

The patient was then sent to the operation room under general anesthesia and received the second stage operation. The exteriorized colon was cut at the level of the anal canal section. A hand-sewn coloanal anastomosis was carried out using a single stitch in at least eight directions (Fig. 2). Following the second stage operation, the patient underwent close clinical monitoring in the ward and was discharged after 3 days.

Follow-up

As a part of postoperative care, a follow-up clinic was scheduled for each patient seven days after hospital discharge. A digital examination was performed to evaluate anastomosis. The patient was followed up for at least one year to assess postoperative morbidity and oncologic and functional outcomes. The median and mean follow-up time were 13 and 16.43 months (12-28 months), respectively.

Results

Patient characteristics

The study enrolled 41 patients. The demographic data are summarized in Table 1. There were 27 men and 14 women with a mean age of 60 and a mean body mass index of 25.98 kg/m^2. Three patients had tumors in the middle rectum, and 38 showed tumors in the lower rectum. Thirty-three patients received laparoscopy, and 8 patients received robotic-assisted operation. No conversion to laparotomy was noted in our

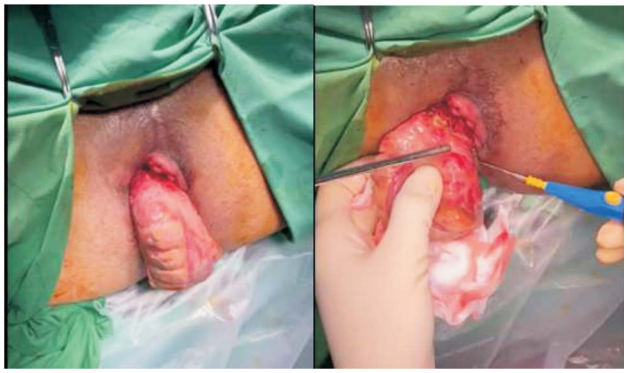

Fig. 2. The exteriorized colon was transected at the level of the anal canal section.

Table 1. Characteristics of patients, perioperative data

Characteristic	All (N = 41)
Sex	
Men	27 (65.85%)
Women	14 (34.15%)
Age, mean ± SD (median and range) years	60 ± 12.02 (59, 33-78)
BMI, mean ± SD (median and range)	25.98 ± 5.1 (25.09, 17.37-40.12)
ASA score	
II	21 (51.2%)
III	20 (48.8%)
Tumor location	
Middle rectum	3 (7.32%)
Lower rectum	38 (92.68%)
Clinical TNM	
T	
1	0 (0%)
2	10 (24.39%)
3	27 (65.85%)
4	4 (9.76%)
N	
0	10 (24.39%)
1	11 (26.83%)
2	20 (48.78%)
M	
0	35 (85.37%)
1	6 (14.63%)
Stage	
I	2 (4.88%)
II	4 (9.76%)
III	28 (68.29%)
IV	6 (14.63%)
Neoadjuvant treatment	
No chemoradiation	6 (14.63%)
Chemotherapy only	6 (14.63%)
Radiation (short course RT)	6 (14.63%)
SCRT + chemotherapy	1 (2.44%)
CCRT	20 (48.78%)
Induction chemotherapy + RT	2 (4.88%)
Surgical technique	
Laparoscopy	33 (80.49%)
Robotic surgery	8 (19.51%)
Conversion	0 (0)

study. Three patients underwent a combined operation. One patient received combined laparoscopy hepatic mastectomy, and one underwent combined thoracoscopic lobectomy for a metastatic lung lesion. One patient received combined robotic cystectomy due to an advanced rectal tumor with urinary bladder invasion.

Hospital stays and pathology result

The pathology reports are summarized in Table 2. The mean operative time was 243.34 minutes for the first stage operation and 42.29 minutes for the second stage. The mean interval days between two-stage operation is 7.04. The mean hospital stay was 12.36 days.

Considered the specimen, the mean proximal and distal margin is 11.46 cm and 1.85 cm. All resection margins were free of malignancy. The mean amount of lymph node harvest was 14.90 (Table 3).

Thirty-day postoperative morbidity outcomes

According to the Clavien-Dindo Grading System,[18] Dindo Grade ≤ 2 was 21.95%, and Dindo Grade ≥ 3 was 2.44% (Table 4). Three patients showed anastomosis dehiscence at the first-time clinic follow-up. No fever or other abdominal discomfort was present, and three patients received oral antibiotics for one week. One patient presented a perianal abscess without marked anastomosis dehiscence based on the digital examination and further sigmoidoscopy examination and received oral antibiotics for two weeks. Two patients revealed urinary tract infection during the hospitalization period. Two patients had postoperative ileus, which needed symptomatic treatment. One patient was transferred to the intensive unit after surgery due to multiple comorbidities and then presented with postoperative ileus, which required prolonged nasogastric usage for two weeks. This patient also presented duodenal ulcer bleeding after discharge for 10 days. Readmission to the gastroenterologist ward was arranged for a gastroscopy procedure for duodenal bleeding. As a result, the 30-day overall rate of postoperative morbidity was 21.95% (9 patients). No 30-

Table 2. Postoperative pathology data

Surgical pathology (TNM)	
T	
0	3 (7.32%)
1	7 (17.07%)
2	9 (21.95%)
3	21 (51.22%)
4	1 (2.44%)
N	
0	27 (65.85%)
1	9 (21.95%)
2	5 (12.20%)
M	
0	34 (82.93%)
1	7 (17.07%)
Stage	
I	12 (29.27%)
II	9 (21.95%)
III	12 (29.27%)
IV	5 (12.20%)

Table 4. Thirty-day postoperative morbidity and oncologic outcomes

Outcomes	All (N = 41)
Postoperative complication	
Minor complication (I + II)	Total: 9 (21.95%)
	Ileus (3)
	Urinary tract infection (2)
	Anastomosis dehiscence (3)
	Perianal abscess (1)
Major complication (III)	Total: 1 (2.44%)
	Duodenal ulcer bleeding (1)
Oncologic outcome	
Local recurrence	3 (7.31%)
Distant metastasis	5 (12.20%)
Mortality	0 (0%)

Table 3. Hospital stay and pathology result

Hospital stay	
First stage operative time, mean (median, range) minutes	243.34 (292, 169-692)
First stage operative blood loss, mean (median, range) mL	61.22 (50, 10-250)
Second stage operative time, mean (median, range) minutes	42.29 (43.5, 22-257)
Hospital stays after second stage operative, mean (median, range) days	3.3 (3, 2-14)
Hospital stays, mean (median, range) days	12.36 (11, 8-30)
Interval between two stage operation, mean (median, range) days	7.04 (7, 4-14)
Pathology	
Specimen length, mean (median, range) cm	16.34 (16.3, 6-33)
Proximal margin, mean (median, range) cm	11.46 (12, 1.5-24)
Distal margin, mean (median, range) cm	1.85 (1.5, 0.1-5)
Circumferential margin, mean (median, range) cm	0.88 (0.7, 0.1-3.5)
Lymph node harvest amount, mean (median, range)	14.90 (14, 6-32)

day postoperative mortality was observed.

As for the one-year oncologic outcome, three patients had local recurrence; five patients showed distant metastasis at the first-year follow-up; no patient was dead during the first year of follow-up. The characteristic of the patient who had local recurrence or distant metastasis in the first-year follow-up was summarized as Table 6.

Functional outcome

The low anterior resection syndrome (LARS) score was used to evaluate functional outcomes, and the patients were assessed at 1-, 3-, and 6-months following discharge.[19] Thirty-one patients had major LARS after surgery (76%) (Table 5).

Discussion

In our study, the total hospital stays for two-stage Turnbull-Cutait pull-through coloanal anastomosis in minimally invasive, robot-assisted total mesorectal excision was 12.36 days, and the overall 30-day morbidity was 21.95% with no mortality.

Compared to the previous trial, our overall 30-day morbidity was lower than the result for the Turnbull-Cutait pull-through coloanal anastomosis group (34.8%) and the coloanal anastomosis with the ileostomy group (45.7%).[8] Three patients had anastomosis dehiscence in out study, and the anastomosis leakage rate was 9.76%. All patients needed only oral antibiotic treatment as a control instead of the surgical intervention or drainage. The formation of adhesions between the colonic serosa, pelvic tissues, and the anal canal wall during the first and second surgical steps played a vital role in reducing the severity of the anastomotic leak and, therefore, could serve as a suitable alternative to diverting ileostomy. Furthermore, in cases with anastomotic dehiscence, patients showed local abscess formation, successfully treated with antibiotics without requiring a laparotomy to address peritonitis.

Only one patient had major postoperative morbidity of duodenal bleeding, which needed esophagogastroduodenoscopy as a control. No unexpected re-operation was noted in our study group. We also compared the postoperative complication with other study and listed as Table 7. Our anastomosis leakage rate was similar to Guner 2021[23] and less than Biondo 2020,[8] and the result of our anastomosis leakage had

Table 5. Functional outcome

	Post-OP		
	1st month	3rd month	6th month
No LARS (0~20)	0%	0%	0%
Minor LARS (21~29)	0%	2 (5%)	10 (24%)
Major LARS (30~42)	41 (100%)	39 (95%)	31 (76%)

Table 6. The characteristic of the patient who had local recurrence or distant metastasis

Age	Sex	Clinical staging	Treatment before the operation	Pathologic staging	Combined operation	Local recurrence or distant metastasis
50	M	cT3N2bM1 (lung)	Chemotherapy only	ypT1, ypN0, ypM1a	Lobectomy + wedge resection of lune metastasis	Local recurrence after 2 months Bilateral lung metastasis after 12 months
33	M	cT3N2bM1 (paraaortic)	nCCRT	ypT3, ypN2a, cM1	No	Local recurrence after 12 months
67	M	cT4 (bladder invasion) N2M0	Chemotherapy only	ypT4b, ypN0, cM0	Radical cystectomy	Local recurrence after 9 months. Liver, lung, peritoneal metastasis after 8 months
56	M	cT3N2bM0	nCCRT	ypT3, ypN0, cM0	No	Lung metastasis after 8 months
61	M	cT3N2M0	nCCRT	ypT3, ypN0, cM0	No	Liver metastasis after 3 months
55	F	cT3N0M0	SCRT only	ypT3, ypN0, cM0	No	Lung and liver metastasis after 8 months

Table 7. Comparison surgical complication to other study

	Postoperative complications	Clavien-Dindo classification grade > 3b	Anastomosis related complication	Pelvic sepsis	Definitive stoma
Biondo 2020[8]	34.8% (16/46)	15.2% (7/46)	13.04% (6/46)	13.04% (6/46)	4.35% (2/46)
Guner 2021[23]	18.2% (4/22)	9.1% (2/22)	9.1% (2/22)	9.1% (2/22)	4.55% (1/22)
Xiong 2016[24]	22.2% (16/72)	5.6% (4/72)	1.4% (1/72)	2.78% (2/72)	0% (0/72)
Our study	21.95% (9/41)	0% (0/41)	9.76% (4/41)	0% (0/41)	0% (0/41)

no need of further drainage or surgical intervention. Our study showed less rate of pelvic abscess and further need of definite stoma formation compared to other study. The anastomosis leakage showed only minor leakage and caused no severe complication.

Based on the results, laparoscopic or robotic TME with TCA might be safe and feasible considering the postoperative morbidity. Besides, the TCA procedure can be used as a transrectal natural orifice specimen extraction (NOSE) method. Only two patients in our study group needed additional incisions to pull out the specimen due to the presence of bulky tumors or mesorectum. No surgical infection was present in our study. The patient who received TCA showed benefits of the NOSE procedure, including less wound pain and infection.

According to a previous study, the oncologic and functional outcomes following laparoscopic surgery for low rectal cancer were not compromised by performing transanal extraction of the rectal specimen.[21] Our study showed that the first-year local recurrence rate was 7.31%, which was higher than the previous study.[22] Of the three patients with local recurrence, two were original stage IV patients. Another patient had an advanced tumor with urinary bladder invasion with initial clinical staging cT4bN2M0. Three patients showed advanced stage initially, which probably resulted in a high local recurrence rate in our study.

Regarding the functional outcome, 76% of patients still developed severe LARS after surgery. A previous study compared the TCA to CAA with ileostomy for functional outcomes; both groups had a median level of LARS score over 30 at one-year follow-up.[8] There was no statistically significant difference between the two groups. Severe LARS remained the problem in these patients. Further long-term follow-up of LARS is necessary.

Recent years, minimally invasive surgery for rectal cancer has seen remarkable improvement. Our study focus on group who received laparoscopy or robotic total mesorectal excision with two-stage Turnbull-Cutait pull-through coloanal anastomosis. The procedure can be an alternative method for the patients who suffered lower rectal cancer and might have difficulty in stoma formation. The procedure also had the advantage of natural orifice specimen extraction operation including less wound pain and good cosmetic result.

The limitation of the study included that the study was a retrospective study and lacked of the randomized control comparison to the total mesorectal excision with ileostomy formation. The follow-up time of these patient was not long enough considered the oncologic outcome and function outcome. Further study for the long-term outcome might be needed for these group of patients.

Conclusions

The two-stage Turnbull-Cutait pull-through coloanal anastomosis procedure used in minimally invasive total mesorectal excision might be an optional choice for some specific patient based on the short-term surgical outcomes especially the patients that the tumor located in lower rectum and the patient refuse or encounter difficulties with stomas formation. Severe morbidity was relatively less, and anastomosis leakage needed only antibiotic treatment. The procedure can serve as an alternative to avoid temporary stoma. Patients who refuse or encounter difficulties with stomas might be candidates for the TCA procedure. However, it is crucial to continue close monitoring and evaluate functional outcomes and oncologic

recurrence in the long term.

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References

1. Cao W, et al. Changing profiles of cancer burden worldwide and in China: a secondary analysis of the global cancer statistics 2020. *Chinese Medical Journal* 2021;134:783-91.
2. Sung H, et al. Global cancer statistics 2020: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. *CA: A Cancer Journal for Clinicians* 2021; 71:209-49.
3. Xi Y, Xu PF. Global colorectal cancer burden in 2020 and projections to 2040. *Translational Oncology* 2021;14:101174.
4. Mahjoubi B, Kiani Goodarzi K, Mohammad-Sadeghi H. Quality of life in stoma patients: appropriate and inappropriate stoma sites. *World Journal of Surgery* 2010;34:147-52.
5. Salomé GM, de Almeida SA, Silveira MM. Quality of life and self-esteem of patients with intestinal stoma. *Journal of Coloproctology* 2014;34:231-9.
6. Hallet J, et al. The clinical results of the Turnbull-Cutait delayed coloanal anastomosis: a systematic review. *Techniques in Coloproctology* 2014;18:579-90.
7. Seo SI, et al. The role of diverting stoma after an ultra-low anterior resection for rectal cancer. *Annals of Coloproctology* 2013;29:66.
8. Biondo S, et al. Two-stage Turnbull-Cutait pull-through coloanal anastomosis for low rectal cancer: a randomized clinical trial. *JAMA Surgery* 2020;155:e201625.
9. Cutait DE, Figliolini FJ. A new method of colorectal anastomosis in abdominoperineal resection. *Diseases of the Colon & Rectum* 1961;4:335-42.
10. Rullier E, et al. Low rectal cancer: classification and standardization of surgery. *Diseases of the Colon & Rectum* 2013; 56:560-7.
11. Pisarska M, et al. Defunctioning ileostomy reduces leakage rate in rectal cancer surgery-systematic review and meta-analysis. *Oncotarget* 2018;9:20816.
12. Garg PK, et al. Protective diversion stoma in low anterior resection for rectal cancer: a meta-analysis of randomized controlled trials. *Visceral Medicine* 2019;35:156-60.
13. Jarry J, et al. Delayed colo-anal anastomosis is an alternative to prophylactic diverting stoma after total mesorectal excision for middle and low rectal carcinomas. *European Journal of Surgical Oncology (EJSO)* 2011;37:127-33.
14. Hallet J, et al. Anastomotic salvage after rectal cancer resection using the Turnbull-Cutait delayed anastomosis. *Canadian Journal of Surgery* 2014;57:405.
15. Portale G, et al. Delayed colo-anal anastomosis for rectal cancer: pelvic morbidity, functional results and oncological outcomes: a systematic review. *World Journal of Surgery* 2019; 43:1360-9.
16. Biondo S, et al. Two-stage Turnbull-Cutait pull-through coloanal anastomosis versus coloanal anastomosis with protective loop ileostomy for low rectal cancer. Protocol for a randomized controlled trial (Turnbull-BCN). *International Journal of Colorectal Disease* 2017;32:1357-62.
17. Herzog T, Belyaev O, Chromik AM, Weyhe D, Mueller CA, Munding J, et al. TME quality in rectal cancer surgery. *European Journal of Medical Research* 2010;15:292-6.
18. 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. *Annals of Surgery* 2004;240:205-13.
19. Emmertsen KJ, Laurberg S. Low anterior resection syndrome score: development and validation of a symptom-based scoring system for bowel dysfunction after low anterior resection for rectal cancer. *Annals of Surgery* 2012;255:922-8.
20. Juul T, et al. International validation of the low anterior resection syndrome score. *Annals of Surgery* 2014;259:728-34.
21. Denost Q, et al. Laparoscopic total mesorectal excision with coloanal anastomosis for rectal cancer. *Annals of Surgery* 2015;261:138-43.
22. Maurer CA, et al. The impact of the introduction of total mesorectal excision on local recurrence rate and survival in rectal cancer: long-term results. *Annals of Surgical Oncology* 2011;18:1899-906.
23. Guner OS, Tumay LV. Turnbull-Cutait technique without ileostomy after total mesorectal excision is associated with acceptably low early post?operative morbidity. *ANZ Journal of Surgery* 2021;91(1-2):132-8.
24. Xiong Y, Huang P, Ren QG. Transanal pull-through procedure with delayed versus immediate coloanal anastomosis for anus-preserving curative resection of lower rectal cancer: a case-control study. *The American Surgeon* 2016;82(6):533-9.

原　著

微創手術行全直腸繫膜切除術併兩階段 Turnbull-Cutait 拖出式結腸肛管吻合術於直腸癌之短期結果

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目的　此研究之目的在於評估使用微創手術行全直腸繫膜切除術併兩階段 Turnbull-Cutait 拖出式結腸肛管吻合術於直腸癌的安全性。

方法　此為單一醫學中心回顧性病例系列研究，收錄從 2020 年 9 月到 2022 年 2 月，診斷為直腸癌並接受微創手術合併兩階段 Turnbull-Cutait 拖出式結腸肛管吻合術的患者。病患於術前根據期別可能接受化學治療或放射治療。在手術的第一階段會以微創手術方式執行全直腸系膜切除術，同時使結腸在肛管外露出 5 至 10 公分並固定；持續住院 5 到 10 天後進行第二階段全身麻醉手術：將露出腸段切除並做吻合。病人持續追蹤至少一年以分析手術效果、癌症結果和功能結果。

結果　共有 41 名患者收錄進我們的研究，術後 30 天的總體併發症率為 21.95%、死亡率為 0%；術後滲漏率為 9.76%；一年局部復發率為 7.31%、遠端轉移率為 12.20%。

結論　我們的經驗證實了從短期手術結果，針對罹患直腸癌且病人拒絕造口手術或有困難執行造口成形術，經由微創手術行全直腸系膜切除術中使用的兩階段 Turnbull-Cutait 牽引式結腸肛管吻合術可以是一個選擇，然而，腫瘤治療以及功能性結果仍需長期持續追蹤及評估。

關鍵詞　直腸癌、全直腸繫膜切除術、兩階段 Turnbull-Cutait 拖出式結腸肛管吻合術。