



A retrospective analysis of 20-year data of the surgical management of ulcerative colitis patients in Taiwan: a study of Taiwan Society of Inflammatory Bowel Disease

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Background/Aims: With the recent progress in medical treatment, surgery still plays a necessary and important role in treating ulcerative colitis (UC) patients. In this study, we analyzed the surgical results and outcomes of UC in Taiwan in the recent 20 years, via a multi-center study through the collaboration of Taiwan Society of IBD. **Methods:** A retrospective analysis of surgery data of UC patients from January 1, 1995, through December 31, 2014, in 6 Taiwan major medical centers was conducted. The patients' demographic data, indications for surgery, and outcome details were recorded and analyzed. **Results:** The data of 87 UC patients who received surgical treatment were recorded. The median post-operative follow-up duration was 51.1 months and ranged from 0.4 to 300 months. The mean age at UC diagnosis was 45.3±16.0 years and that at operation was 48.5±15.2 years. The 3 leading indications for surgical intervention were uncontrolled bleeding (16.1%), perforation (13.8%), and intractability (12.6%). In total, 27.6% of surgeries were performed in an emergency setting. Total or subtotal colectomy with rectal preservation (41.4%) was the most common operation. There were 6 mortalities, all due to sepsis. Emergency operation and low pre-operative albumin level were significantly associated with poor survival ($P=0.013$ and 0.034 , respectively). **Conclusions:** In the past 20 years, there was no significant change in the indications for surgery in UC patients. Emergency surgeries and low pre-operative albumin level were associated with poor survival. Therefore, an optimal timing of elective surgery for people with poorly controlled UC is paramount. (**Intest Res 2016;14:248-257**)

Key Words: Colitis, ulcerative; Surgery; Prognosis

INTRODUCTION

Ulcerative Colitis (UC) was first described by the British

physician Sir Samuel Wilks in 1859.¹ It is an IBD that causes diffuse inflammatory mucosal injury, including erosions and ulcers in the colon and rectum.^{2,3} Patients present with symptoms such as diarrhea, the passage of mucobloody stools, tenesmus, and abdominal pain unless appropriate treatment is provided. The goal of treatment is to achieve and sustain clinical remission, as confirmed by the disappearance of clinical symptoms, and endoscopic mucosal healing. Most physicians use the step-up approach while

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treating UC patients. In patients with mild-to-moderate UC, the first line of treatment is a 5-aminosalicylic acid (5-ASA)-related medication, which is considered to be an effective treatment that provides rapid symptom relief.^{4,5} In the case of insufficient response or intolerance to 5-ASA, patients may require corticosteroids and/or immunomodulators (IMMs) such as azathioprine or 6-mercaptopurine as a step-up therapy.^{6,7} Furthermore, for moderate-to-severe UC patients, calcineurin inhibitors or anti-tumor necrosis factor (TNF) agents might be helpful.^{8,9} In cases in which medical therapies fail or there are acute abdominal symptoms, surgical intervention plays a role in salvaging patients and curing UC.

Although most UC patients can be treated effectively by a wide variety of medications, most methods are not curative. However, the removal of the colon and rectum is curative and eliminates the possibility of malignancy, wherein the most important risk factors are the duration and extent of disease.¹⁰ In addition, surgery can eliminate the need for patients to take long-term anti-inflammatory medications or IMMs.

It has been reported that approximately 15%–45% of UC patients require surgery in their lifetime, and the colectomy rates for UC vary geographically.¹¹ The colectomy rate is generally lower in Asians with UC than in patients from Western countries, and ranges from 3%–16%.^{12–17} Surgical indications vary from acute colitis to malignancy and often have a dramatic impact on morbidity, mortality, and quality of life, especially in conditions where surgery is a rescue therapy or in an emergency setting.^{18,19}

Several reports have discussed the surgical outcomes of patients with UC, either in the context of single center^{20–24} or population-based studies.^{25,26} The reported mortality rate in the post-operative period ranged from 0–4.7%. In Asia, some studies have also investigated the surgical outcomes of UC patients.^{17,24} However, to the best of our knowledge, no multi-center studies on the outcomes of colectomy in UC patients have been published, especially in low-endemic areas such as Taiwan.

In this study, we aimed to analyze the surgical results and outcomes of UC patients in Taiwan in the past 20 years via a multi-center study in collaboration with the Taiwan Society of IBD.

METHODS

1. Patients

In collaboration with the Taiwan Society of IBD, we conducted a retrospective analysis of the surgical data of UC patients in six medical centers in Taiwan from January 1, 1995 to December 31, 2014. The medical centers included Linkou Chang Gung Memorial Hospital, Mackay Memorial Hospital, National Taiwan University Hospital, Taichung Veterans General Hospital, Taipei Veterans General Hospital, and Tri-Service General Hospital. Diagnosis of UC was based on clinical, radiological, and histological features.^{7,27} The collected data included sex, age at diagnosis, the extent of UC, surgery dates and times, the medications used before and after surgery, indications for surgery, surgical methods and disease status after surgery, last follow up, and survival condition. For further analysis of chronological changes, we divided the study period into quarters, with 5 years for each period. In addition, laboratory data before surgery, such as albumin levels, hemoglobin levels, white blood cell counts, platelet levels, and CRP levels, were also collected for analysis.

2. Definitions of Disease Extent, Emergency/Elective Surgery, and Remission

The extent of UC was categorized into three groups:²⁸ proctitis involvement limited to the rectum, left-sided colitis limited to the proportion of the colon distal to the splenic flexure, and extensive colitis extending proximally to the splenic flexure, including pancolitis. Medications before and after surgery included 5-ASA or sulfasalazine, systemic steroids, IMMs (azathioprine, 6-mercaptopurine, or methotrexate), calcineurin inhibitors (cyclosporine or tacrolimus), and anti-TNF- α agents.

An emergency indication was defined as a medical emergency for which immediate surgical intervention was the only way to solve the life-threatening problems successfully, while elective surgery was defined as surgery scheduled in advance because it did not involve a medical emergency. An emergency operation may be indicated in cases of toxic megacolon,²⁹ perforation, hemorrhage, and toxic colitis³⁰ unresponsive to medical therapy.

Remission was defined as a complete resolution of symptoms (bowel movement frequency <3 per day without bleeding or urgency).³¹ Otherwise, patients were considered to have active disease. The last follow-up date was the latest patient visit or the date of patient death.

3. Statistical Analysis

Continuous data variables were expressed as means \pm SD and categorical data as percentages. Student's *t*-test was used to assess continuous variables and the chi-square test was used for the assessment of categorical variables. If the cells had an expected count of <5 , then Fisher's exact test was applied. Normally distributed and asymmetric variables were compared using the Mann-Whitney *U* test. Receiver operating characteristics analysis was used for the selection of cut-off values of serodiagnostic tests. Survival analysis was performed using the Kaplan–Meier method and log-rank test. All statistical analyses were conducted using SPSS software version 16.0 (SPSS Inc., Chicago, IL, USA).

RESULTS

1. Demographic Characteristics

A total of 87 UC patients who underwent surgery in the six medical centers between January 1, 1995 and December 31, 2014 were enrolled in this study. The median post-operative follow up duration was 51.1 months and ranged from 0.4–300 months. The mean age at UC diagnosis was 45.3 ± 16.0 years and the mean age at the time of surgery was 48.5 ± 15.2 years (Table 1). An overall male predominance (62.1%) was noted in the cohort. Extensive colitis was the most common phenotype (77.0%). Among the surgical cohort, 64.4% patients were receiving 5-ASA or sulfasalazine and 40.2% were receiving systemic steroids before surgery. Most of the surgeries were performed in the past 10 years and most patients (67.8%) achieved remission after surgery. There were six mortalities in the study period.

The three leading indications (Table 2) for surgical intervention were uncontrolled bleeding (16.1%), perforation (13.8%), and intractability (12.6%). More than 50% of patients underwent surgery in an elective setting (55.2%). The most common surgical method was total or subtotal colectomy with rectal preservation (41.4%), followed by total abdominal proctocolectomy with ileal pouch-anal anastomosis (IPAA) (25.3%), and segmental colectomy (17.2%). One patient received total proctocolectomy with IPAA due to persistent moderate active colitis after segmental colectomy and end colostomy. Only nine patients (10.3%) received laparoscopic surgery. Among the 87 patients, 60 patients (69.0%) received diversion in the index operation and 42 patients (48.8%) were left with a permanent stoma (Table 2).

Table 1. Characteristics of the UC Population

Item	Patients (n=87)
Age	45.3 \pm 16.0
BMI	21.0 \pm 3.8
Sex	
Male	54 (62.1)
Female	33 (37.9)
Extent at diagnosis	
Proctitis	3 (3.4)
Left-side colitis	15 (17.2)
Extensive colitis	67 (77.0)
NA	2 (2.3)
Medications before operation	
5-ASA or sulfasalazine	56 (64.4)
Systemic steroid	35 (40.2)
^a Immunomodulators	3 (3.4)
^b Calcineurin inhibitors	3 (3.4)
TNF antagonists	1 (1.1)
No medication	16 (18.4)
NA	13 (14.9)
Medications after operation	
5-ASA or sulfasalazine	31 (35.6)
Systemic steroid	11 (12.6)
^a Immunomodulators	3 (3.4)
^b Calcineurin inhibitors	0
TNF antagonists	0
No medication	34 (39.1)
NA	15 (17.2)
Operation year	
1994–1999	3 (3.4)
1999–2004	5 (8.2)
2004–2009	32 (36.8)
2009–2014	35 (40.2)
NA	12 (13.8)
Disease status after operation	
Active	8 (9.2)
Remission	59 (67.8)
NA	20 (23.0)
Disease to operation	
≤ 1 yr	38 (43.7)
1–5 yrs	12 (13.8)
6–10 yrs	11 (12.6)
≥ 10 yrs	13 (14.9)
NA	13 (14.9)
Survival	
Yes	68 (78.2)
No	6 (6.9)
NA	13 (14.9)

Values are presented as mean \pm SD or n (%).

^aImmunomodulators: azathioprine, 6-mercaptopurine, or methotrexate.

^bCalcineurin inhibitors: cyclosporine or tacrolimus.

NA, not available; 5-ASA, 5-aminosalicylic acid; TNF, tumor necrosis factor.

Table 2. Operative Details of UC Patients

Item	Patients (n=87)
Indication for operation	
Toxic megacolon	5 (5.7)
Toxic colitis	8 (9.2)
Perforation	12 (13.8)
Uncontrolled bleeding	14 (16.1)
Intractability	11 (12.6)
Stenosis	4 (4.6)
Dysplasia or adenocarcinoma	9 (10.3)
Adhesion ileus	3 (3.4)
NA	21 (24.1)
Emergency or elective	
Emergency	24 (27.6)
Elective	48 (55.2)
NA	15 (17.2)
Operation method	
Proctocolectomy with ileostomy	4 (4.6)
Total or subtotal colectomy with rectal preservation	34 (41.4)
Total abdominal proctocolectomy with IPAA	22 (25.3)
Segmental colectomy	15 (17.2)
Hartmann procedure	3 (3.4)
Diverting loop ileostomy	6 (6.9)
Others	1 (1.1)
Laparoscopic surgery	
Yes	9 (10.3)
No	78 (89.7)
Diversion at the initial operation	
Yes	60 (69.0)
No	27 (31.0)
Permanent stoma	
Yes	42 (48.3)
No	45 (51.7)

Values are presented as n (%).

NA, not available; IPAA, ileal pouch-anal anastomosis.

2. Chronological Changes

To further analyze the changes over time, we divided the past 20 years into quarters, with 5 years for each period. We found that the enrolled number of surgeries increased chronologically from three during 1994–1999, five during 1999–2004, 32 during 2004–2009, to 35 during 2009–2014

(Table 1). To facilitate further analysis, we separated the study period into the periods before and after 2009 (Table 3). No patients received calcineurin inhibitors or anti-TNF- α agents before 2009. After 2009, two patients received calcineurin inhibitors and one patient received anti-TNF- α agents before surgery. There were also changes in surgical methods between the periods before and after 2009. Total or subtotal colectomy with rectal preservation and total abdominal proctocolectomy with IPAA were the two major surgical methods before 2009, while total or subtotal colectomy with rectal preservation and segmental colectomy were the two leading surgical methods after 2009. In addition, there were significantly more surgeries performed laparoscopically after 2009.

3. Analysis of the Factors Associated With Mortality

The mortality rate was 8.1%. All six non-survivors had extensive colitis at the time of diagnosis. The interval between diagnosis and surgery was <1 year in four patients (66.7%). Before surgery, five patients received 5-ASA, two patients systemic steroids, and one patient azathioprine. The cause of death was sepsis in all cases. Four patients died within 30 days post-operatively. One patient died on the 40th day after surgery and the other died on the 61th day post-operatively. Among them, five patients received an emergency operation. Three patients received ileostomy, two patients received subtotal colectomy, and one patient received right hemicolectomy.

We tried to identify the possible risk factors for non-survivors who underwent surgery for UC (Table 4). In the analysis, pre-operative albumin level was significantly lower in the non-survival group than in the survival group (2.6 \pm 0.3 vs. 3.3 \pm 0.9 g/dL, $P=0.004$) according to Student's t -test. Compared to elective surgery, emergency surgery significantly more associated with non-survival ($P=0.017$). Furthermore, using the Kaplan–Meier method and log-rank test, patients with a pre-operative albumin level >2.5g/dL were shown to have significantly better survival than patients with an albumin level <2.5g/dL before surgery ($P=0.034$) (Fig. 1). Patients who underwent elective surgery had a significantly better survival rate than patients who underwent emergency surgery ($P=0.013$) (Fig. 2).

DISCUSSION

Although most UC patients are treated and controlled effectively with a wide variety of medications, approximately

Table 3. Chronological Changes in Surgical Methods Before and After 2009

Item	Before 2009	After 2009	P-value
Age	46.6±12.7	41.6±18.2	0.180
BMI	21.5±4.0	20.6±3.8	0.471
Sex			0.128
Male	23 (57.5)	26 (74.3)	
Female	17 (42.5)	9 (25.7)	
Extent at diagnosis			0.236 ^a
Proctitis	3 (7.5)	0	
Left-side colitis	7 (17.5)	8 (23.5)	
Extensive colitis	30 (75.0)	26 (76.5)	
Medications before operation			
5-ASA or sulfasalazine	28 (70.0)	25 (71.4)	0.770
Systemic steroid	17 (42.5)	17 (48.6)	0.225
Immunomodulators	1 (2.5)	1 (2.8)	0.587 ^a
Calcineurin inhibitors	0	2 (5.7)	0.089 ^a
TNF antagonists	0	1 (2.8)	0.455 ^a
Indication for operation			0.932 ^a
Toxic megacolon	3 (8.3)	2 (8.0)	
Toxic colitis	4 (11.1)	3 (12.0)	
Perforation	6 (16.7)	6 (24.0)	
Uncontrolled bleeding	9 (25.0)	4 (16.0)	
Intractability	7 (19.4)	3 (12.0)	
Stenosis	2 (5.6)	2 (8.0)	
Dysplasia or adenocarcinoma	3 (8.3)	4 (16.0)	
Adhesion ileus	2 (5.6)	1 (4.0)	
Emergency or elective			1.000
Emergency	13 (33.3)	11 (33.3)	
Elective	26 (66.7)	22 (66.7)	
Operation method			0.058
Proctocolectomy with ileostomy	1 (2.7)	2 (5.7)	
Total/subtotal colectomy with rectal preservation	18 (45.9)	11 (31.4)	
Total abdominal proctocolectomy with IPAA	13 (32.4)	5 (14.3)	
Segmental colectomy	5 (10.8)	10 (28.6)	
Hartmann procedure	2 (5.4)	1 (2.9)	
Diverting loop ileostomy	1 (2.7)	5 (14.3)	
Abdominoperineal resection	0	1 (2.9)	
Disease status after operation			0.321 ^a
Active	2 (5.9)	6 (18.2)	
Remission	32 (94.1)	27 (81.8)	
Disease to operation			0.330 ^a
≤1 yr	24 (60.0)	14 (41.2)	
1–5 yrs	6 (15.0)	6 (17.6)	
6–10 yrs	5 (12.5)	5 (14.7)	
≥10 yrs	5 (12.5)	9 (26.5)	
Laparoscopic surgery			0.010 ^a
Yes	1 (2.5)	8 (22.9)	
No	39 (97.5)	27 (77.1)	
Diversion or not (initial operation)			0.805
Yes	28 (70.0)	23 (65.7)	
No	12 (30.0)	12 (34.3)	

Values are presented as mean±SD or n (%).

^aFisher's exact test.

5-ASA, 5-aminosalicylic acid; TNF, tumor necrosis factor; IPAA, ileal pouch-anal anastomosis.

Table 4. Differences in the Characteristics of Survivors and Non-Survivors After Surgery for Ulcerative Colitis

Item	Survivors (n=68)	Non-survivors (n=6)	P-value
Age	43.8±15.9	50.0±10.0	0.354
BMI (kg/m ²)	21.1±4.0	19.6±2.0	0.456
Sex ^a			1.000
Male	44 (64.7)	4 (66.7)	
Female	24 (35.3)	2 (33.3)	
Extent at diagnosis ^a			0.490
Proctitis	3 (4.5)	0	
Left-side colitis	14 (20.9)	0	
Extensive colitis	50 (74.6)	6 (100)	
Medications before operation ^a			
5-ASA or sulfasalazine	48 (70.6)	5 (83.3)	1.000
Systemic steroid	32 (47.1)	2 (33.3)	0.672
Immunomodulators	1 (1.5)	1 (16.7)	0.256
Calcineurin inhibitors	2 (2.9)	0	1.000
TNF antagonists	1 (1.5)	0	1.000
Laboratory data before operation			
Albumin (g/dL)	3.3±0.9	2.6±0.3	0.004
WBC (k/cumm)	15.9±3.0	9.2±8.2	0.592
Hemoglobin (g/dL)	10.2±2.6	10.5±1.0	0.680
Platelet (k/cumm)	312.4±164.6	187.3±144.1	0.078
CRP (mg/dL)	34±7.2	87.0±14.3	0.245
Operation year ^a			0.681
Before 2009	36 (52.9)	4 (66.7)	
After 2009	32 (47.1)	2 (33.3)	
Disease to operation ^a			0.676
≤1 yr	34 (50.7)	4 (66.7)	
>1 yr	33 (49.3)	2 (33.3)	
Diversion or not ^a			1.000
Yes	46 (67.6)	4 (66.7)	
No	22 (32.4)	2 (33.3)	
Laparoscopic surgery ^a			1.000
Yes	9 (13.2)	0	
No	59 (86.8)	6 (100)	
Emergency or elective operation ^a			0.017
Emergency	20 (30.3)	4 (66.7)	
Elective	46 (69.7)	2 (33.3)	

Values are presented as mean±SD or n (%).

^aFisher's exact test.

5-ASA, 5-aminosalicylic acid; TNF, tumor necrosis factor; WBC, white blood cells.

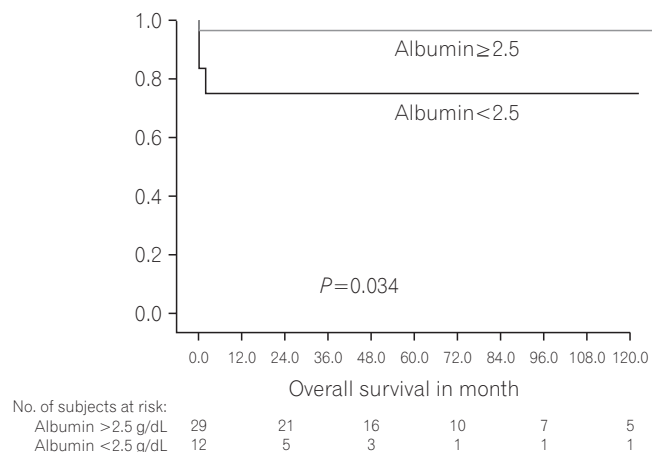


Fig. 1. The patient overall survival depends on albumin level. Patients with a pre-operative albumin level ≥ 2.5 g/dL had a significant better survival rate than patients with an albumin level < 2.5 g/dL.

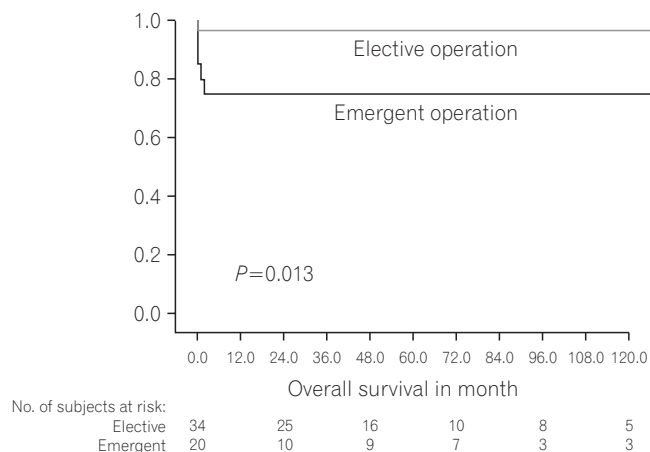


Fig. 2. The patient overall survival depends on elective or emergency surgery. Patients who underwent elective surgery had a significantly better survival rate than patients who underwent emergency surgery.

15%–45% of patients require or elect for surgery in Western countries.^{32,33} In Asia, studies focusing on surgical management with long-term follow-up data for UC patients are scarce, and the results are conflicting. Jiang et al.¹² reported that only 3% of patients required surgery in China. Hiwatashi et al.¹³ published a long-term follow-up study from 1973–1990, and found that 114 of 778 patients (14.7%) received a colectomy in China. Results from 304 Korean UC patients between 1989 and 2005 demonstrated that the cumulative probability of colectomy was 2.0% after 1 year, 2.8% after 3 years, and 3.3% after 5–15 years.¹⁴ Our results showed that there were only 87 colectomies in the study period of 20 years. In one of the hospitals (National Taiwan University Hospital), there were 742 admissions due to UC from 1991–2014. Among them, 14 patients received colectomy and the estimated colectomy rate was 1.9%. The low colectomy rate in Taiwan added further evidence for the lower colectomy rate in Asia compared to that in Western countries. The possible reasons included milder clinical courses and the fact that Asian people are more reluctant to undergo colectomy. Koreans are thought to have a milder course than Westerners, as indicated by the lower rate of colectomy among Koreans.¹⁷ Currently, we keep both possibilities of treatment open for Taiwanese patients, as we have no direct evidence of a milder disease course. In addition, Taiwanese people cannot easily be persuaded to undergo colectomy.

Our results revealed that the overall post-operative mortality rate was 6/74 (8.1%), and in all cases, the cause of death was sepsis during the first 2 months after surgery. The mortality rates were 17.4% and 4.3% for emergent and elective surgeries, respectively. The post-operative mortality rate has

been reported as 2.4%–13.6% for emergent surgeries,^{25,34–36} and 0.6%–5.6% for elective surgeries.^{25,34–36} The reasons for the higher mortality rate in our study may be due to the higher proportion of emergent surgeries performed and poor general patient condition before surgery, which meant that 50% of the non-survivors could only receive diversion. There are some predictive variables for post-operative 30-day mortality in UC patients, such as emergent versus elective surgery,^{25,36} age,^{26,36,37} male sex,³⁷ *Clostridium difficile* infection,³⁷ low volume or high volume of surgery for UC,²⁶ and increased comorbidities.²⁶ In addition to emergent surgery, we demonstrated that a lower pre-operative albumin level was a significant factor for post-operative mortality. Low albumin level might be related to poor nutrition as well as high inflammatory activity. Therefore, when aiming to decrease post-operative mortality rates, clinicians should optimize medical treatment to decrease inflammation and provide good nutritional support in order to minimize the probability of the patient requiring emergent surgery.

The three leading indications for surgical intervention in the current study were uncontrolled bleeding (16.1%), perforation (13.8%), and intractability (12.6%). Although there was no significant change in the indications for surgery before and after 2009, we observed that dysplasia or adenocarcinoma increased up to two-fold after 2009 (16.0% vs. 8.3%). The reasons for this may be the improved quality of equipment for the detection of dysplasia.³⁸ Besides, a more aggressive usage of medication to control the inflammation associated with UC could reduce the need for emergent surgery. However, the role of medication to prevent carcinogenesis remains elusive.

It has been reported that restorative proctocolectomy with IPAA, as described first by Parks and Nicholls in 1978³⁹ and Utsunomiya in 1980,⁴⁰ is the standard of care for patients with UC who require surgery.³² Moreover, some studies have showed that subtotal colectomy is a safe surgical option for acute severe colitis.⁴¹ In our series, more patients received total or subtotal colectomy with rectal preservation than total abdominal proctocolectomy with IPAA (41.4% vs. 25.3%). Thirteen patients (32.4%) in the cohort before 2009 and five patients (14.3%) in the cohort after 2009 received total abdominal proctocolectomy with IPAA. Although large-scale studies have showed that good functional outcomes can be expected in most patients receiving total proctocolectomy with IPAA,^{32,42} 2.4%–15.5% patients still experience pouch failure,^{43,44} and approximately one-third of patients experience pouchitis.⁴² As Taiwan is a low-endemic area, it would not be possible to have a high surgical volume center for UC. In the study period, the number of patients at each center ranged from 5 to 24. This may explain the low incidence of total proctocolectomy with IPAA in Taiwan. In addition, although most patients had their rectum preserved, 32 out of 40 patients (80%) experienced remission. This may be another reason for the lower prevalence of total proctocolectomy with IPAA in Taiwan, especially after 2009.

Over the past decades, therapy for IBD has changed due to the widespread use of unosuppressive therapy (purine antimetabolites and methotrexate) and the introduction of anti-TNF therapy.⁹ The overall effectiveness of IMMs and anti-TNF agents in reducing the need for surgery in UC remains controversial.⁴⁵⁻⁴⁷ In this study, because very few UC patients received IMMs and/or calcineurin inhibitors and anti-TNF agents, we could not draw any definitive conclusions from the data. So far, there is no evidence for the impact of medical therapy on surgery in UC patients.

There were some limitations to the current study. First, this was a retrospective multi-center study with a significant amount of missing data. Therefore, exact information on medications, disease activities, durations of hospitalization, and patient comorbidities and statuses was not available for analysis. Second, we had no population data for the UC patients during the study period. Many short segment colitis or proctitis patients were not properly registered. Therefore, it is difficult to elucidate whether the chronological increase in the number of surgeries was due to an increased risk for surgery in UC patients or the result of sampling bias.

In summary, our results demonstrate that in the past 20 years, the three leading indications for the surgical management of UC were uncontrolled bleeding, perforation, and

intractability. More patients received laparoscopic surgery in the most recent 5 years (since 2009). In addition, lower albumin levels (<2.5 g/dL) and emergent surgery were associated with mortality. Therefore, the optimal timing of elective surgery in people with poorly controlled UC is of paramount importance.

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