

Transabdominal Pouch Salvage for Failed Minimally Invasive Versus Open IPAA: A Case-Matched Study

H. Hande Aydinli, M.D.¹ • Eren Esen, M.D.¹ • Erman Aytac, M.D.²
 Hasan T. Kirat, M.D.¹ • David M. Schwartzberg M.D.¹
 Shannon Chang, M.D., M.B.A.³ • Feza H. Remzi, M.D.^{1,4}

1 Department of Surgery, New York University Langone Health, New York, New York

2 Department of General Surgery, School of Medicine, Acibadem Mehmet Ali Aydinlar University, Istanbul, Turkey

3 Division of Gastroenterology, Department of Medicine, New York Langone Health, New York, New York

4 Department of Colorectal Surgery, Cleveland Clinic, Cleveland, Ohio

BACKGROUND: Modality of index IPAA creation may affect the results after redo IPAA surgery for IPAA failure. To our knowledge, there is no study evaluating the effects of modality of index IPAA creation on redo IPAA outcomes.

OBJECTIVE: This study aimed to compare short- and long-term outcomes of transabdominal redo IPAA surgery for failed minimally invasive IPAA and open IPAA.

DESIGN: This was a retrospective cohort study.

SETTINGS: This investigation was based on a single-surgeon experience on redo IPAA.

PATIENTS: Patients undergoing transabdominal redo IPAA for a failed minimally invasive IPAA and open IPAA between September 2007 and September 2017 were included.

MAIN OUTCOME MEASURES: Short-term complications and long-term outcomes were compared between 2 groups.

RESULTS: A total of 42 patients with failed index minimally invasive IPAA were case matched with 42 failed index open IPAA counterparts. The interval

between index IPAA and redo IPAA operations was shorter in patients who had minimally invasive IPAA (median, 28.5 vs 56.0 mo; $p = 0.03$). A long rectal stump (>2 cm) was more common after minimally invasive IPAA (26% vs 10%; $p = 0.046$). Redo IPAAAs were constructed more commonly with staplers in the laparoscopy group compared with open counterparts (26% vs 10%; $p = 0.046$), and other intraoperative details were comparable. Although short-term morbidity was similar between 2 groups, abscess formation (7% vs 24%; $p = 0.035$) was more frequent in patients who had index IPAA with open technique. Functional outcomes were comparable. Redo IPAA survival for failed minimally invasive IPAA and open IPAA was comparable.

LIMITATIONS: This study was limited by its retrospective, nonrandomized nature and relatively low patient number.

CONCLUSIONS: A long rectal cuff after minimally invasive IPAA is a potential and preventable risk factor for failure. Due to its technical and patient-related complexity, handsewn anastomoses in redo IPAA are associated with increased risk of abscess formation. See **Video Abstract** at <http://links.lww.com/DCR/B252>.

Funding/Support: None reported.

Financial Disclosure: None reported.

Correspondence: Feza H. Remzi, M.D., NYU Langone Medical Center, IBD Center, 550 First Avenue, 23rd Floor, New York, NY 10016. Email: feza.remzi@nyulangone.org

Dis Colon Rectum 2020; 63: 1102–1107

DOI: 10.1097/DCR.0000000000001609

© The ASCRS 2020

1102

RESCATE DEL RESERVARIO ILEO-ANAL POR VIA TRANSABDOMINAL EN CASOS DE FUGA ANASTOMÓTICA ENTRE ABORDAJE MINIMAMENTE INVASIVO Y ABORDAJE ABIERTO: ESTUDIO DE EMPAREJAMIENTO DE MUESTRAS Y CASOS

ANTECEDENTES: La creación de modalidades e índices de Reservorios Ileo-Anales (RIA) pueden afectar los resultados después de rehacer la cirugía de RIAs por fallas en el

DISEASES OF THE COLON & RECTUM VOLUME 63: 8 (2020)



reservorio. Hasta donde sabemos, no hay ningún estudio que evalúe los efectos de la modalidad de creación de índices *RIA* en los resultados para el rescate del reservorio.

OBJETIVO: Este estudio tuvo como objetivo comparar los resultados a corto y largo plazo de la cirugía transabdominal redo *RIA* en casos de fracaso por vía mínimamente invasiva (MI-*RIA*) o por la vía abierta (A-*RIA*).

DISEÑO: Estudio de cohortes tipo retrospectivo.

AJUSTES: Investigación basada en la experiencia de un solo cirujano en redo del Reservorio Ileo-Anal.

PACIENTES: Se incluyeron aquellos pacientes sometidos a re-operación transabdominal y re-confección de un *RIA* por fallas en el MI-*RIA* y en el A-*RIA* durante un lapso de tiempo entre septiembre 2007 y septiembre 2017.

PRINCIPALES RESULTADOS: Las complicaciones a corto plazo y los resultados a largo plazo se compararon entre los dos grupos.

RESULTADOS: Un total de 42 pacientes con índice fallido de MI-*RIA* fueron emparejados con 42 homólogos con índice fallido de A-*RIA*. El intervalo entre las operaciones de *RIA* y redo *RIA* fué más corto en pacientes que tenían MI-*RIA* (mediana, 28,5 meses frente a 56 meses, $p = 0,03$). Un muñón rectal largo (> 2 cm) fue más común después de MI-*RIA* (26% vs 10%, $p = 0,046$). Redo *RIAs* se construyeron más comúnmente con engrampadoras en el grupo Mínimamente Invasivo en comparación con la contraparte abiertas (26% vs 10%, $p = 0,046$). Aunque la morbilidad a corto plazo fue similar entre los dos grupos, la aparición de abscesos (7% frente a 24%, $p = 0,035$) fue más frecuente en pacientes que tenían *RIA* con técnica abierta. Los resultados funcionales fueron comparables. La sobrevida de las redo *RIAs* para MI-*RIA* y A-*RIA* fallidas, también fué comparable.

LIMITACIONES: Este estudio estuvo limitado por su naturaleza retrospectiva, no aleatoria y el número relativamente bajo de pacientes.

CONCLUSIONES: Un muñón rectal largo después de MI-*RIA* es un factor de riesgo potencial y previsible para el fracaso. Debido a su complejidad técnica y relacionada con el paciente, las anastomosis suturadas a mano en redo *RIA* están asociadas con un mayor riesgo de formación de abscesos. Consulte **Video Resumen** en <http://links.lww.com/DCR/B252>. (Traducción—Dr Xavier Delgado)



KEY WORDS: Ileal pouch-anal anastomosis; Pouch failure; Redo ileal pouch-anal anastomosis; Salvage surgery; Ulcerative colitis.

Restorative proctocolectomy (RP)/IPAA is the procedure of choice to restore the intestinal continuity in patients with mucosal ulcerative colitis and fa-

miliar adenomatous polyposis, as well as in selected patients with colonic Crohn's disease (CD).^{1,2} It minimizes neoplasia risk and provides good long-term quality of life and acceptable functional outcomes.³⁻⁵ After the introduction of laparoscopic surgery for the treatment of colorectal disorders, many institutions have also adopted laparoscopy for RP/IPAA.^{6,7} Laparoscopic RP/IPAA offers better cosmesis, faster return of bowel function, and less analgesic requirement compared with an open technique.^{6,8-10} Nevertheless, long-term quality of life and pouch functions appear similar between open and laparoscopic RP/IPAA operations.¹¹

Three to 15% of the patients with IPAA are under risk of pouch failure.^{2,4,12-14} Redo IPAA is one of the most effective options that enables to maintain intestinal continuity in patients who are otherwise faced with no choice but a permanent stoma.¹⁵ We believe that modality of index IPAA creation may affect the operative course of redo IPAA for failure. To our knowledge there is no study specifically focusing the results after redo IPAA surgery in patients with failed minimally invasive IPAA (MI-IPAA) in the literature. This article aims to compare short- and long-term outcomes of redo IPAA in patients who had failed index MI-IPAA and open IPAA (O-IPAA) creation.

PATIENTS AND METHODS

Patients undergoing transabdominal redo IPAA for failed MI-IPAA by a single surgeon between September 2007 and September 2017 were included. Data were retrieved from the institutional review board–approved ileal pouch databases. Those patients were case matched with patients undergoing redo IPAA for failed O-IPAA in a 1:1 fashion randomly for every possible combination of our matching variables with the help of a computer-based program. The case matching criteria were primary diagnosis, reason of IPAA failure, age, and BMI.

Patient characteristics, features of index IPAA, salvage IPAA strategy, features of redo IPAA, long-term outcomes, functional outcomes, and quality of life¹⁶ scores were compared between O-IPAA and MI-IPAA groups. Operative details and postoperative follow-up were described in detail previously.^{16,17}

Overall morbidity was calculated by dividing the number of patients who had postoperative complication by the total number patients who underwent surgery. *IPAA failure* was defined as permanent excision of the ileal pouch or requirement of a permanent/definitive diversion.¹⁸ Categorical variables were reported as frequency (percentage) and compared via Fisher exact or χ^2 test. Continuous variables were reported as mean \pm SD and compared via independent *t* test or Mann–Whitney *U* test considering the normality. Kaplan–Meier method with log-rank test was applied for pouch survival estimation comparison be-

tween 2 groups. Statistical significance was accepted when $p < 0.05$.

RESULTS

There were 56 patients who had redo IPAA for failed MI-IPAA within the study period. Forty two of those patients who had proper counterparts were case matched with patients who underwent redo IPAA for failed O-IPAA ($n = 42$). Thirty-eight patients underwent conventional laparoscopic and 4 patients underwent robotic index IPAA surgery. Diagnoses of the patients were mucosal ulcerative colitis ($n = 39$, $n = 39$), CD ($n = 2$, $n = 2$), and familial adenomatous polyposis ($n = 1$, $n = 1$). Patients had failure because of the following reasons: leak/fistula ($n = 27$, $n = 27$), recurrent obstruction ($n = 10$, $n = 10$), and pouchitis ($n = 3$, $n = 3$). Four patients ($n = 2$, $n = 2$) were operated because of pouch dysfunction without definitive preoperative diagnosis. Age, sex, BMI, previous pouch type, and previous anastomosis type were comparable between the 2 groups (Tables 1 and 2). The interval between index and redo IPAA construction was shorter in patients who had MI-IPAA (median = 28.5 mo (interquartile range (IQR), 17.0–46.5 mo) vs 56 mo (23.0–139.5 mo); $p = 0.03$). At the time of the redo pouch surgery, a long rectal cuff (>2 cm), which was measured with straight rectoscopy, was identified in 26.0% ($n = 11$) of patients in the MI-IPAA group versus 9.5% ($n = 4$; $p = 0.046$). Redo IPAAs were constructed more commonly with staplers in patients who had failed index MI-IPAA compared with their failed index O-IPAA counterparts ($n = 11$ (26%) vs $n = 4$ (10%); $p = 0.046$), and other intraoperative details were shown (Table 3). Intraoperative blood loss (median = 300 mL (IQR, 187.5–538.75 mL) vs 315 mL (200.0–500.0 mL); $p = 0.56$) and postoperative length of stay (median = 7 d (IQR, 5.5–9.0 d) vs 7 d (6.0–10.0 d); $p = 0.37$) were similar

TABLE 1. Comparison of patient characteristics between the MI-IPAA and O-IPAA groups

Variable	MI-IPAA (N = 42)	O-IPAA (N = 42)	p
Age, mean \pm SD, y	35.2 \pm 13.3	36.4 \pm 13	0.68
Women, n	25	21	0.38
BMI, mean \pm SD, kg/m ²	23.3 \pm 3.5	23.2 \pm 3.7	0.94
Diagnosis, n			
MUC	39	39	
CD	2	2	
FAP	1	1	
Reason for IPAA failure, n			
Leak/fistula	27	27	
Recurrent obstruction	10	10	
Pouchitis	3	3	
Pouch dysfunction without preoperative diagnosis	2	2	

MUC = mucosal ulcerative colitis; CD = Crohn's disease; FAP = familial adenomatous polyposis; MI = minimally invasive; O = open.

between the 2 groups. Although short-term morbidity was similar between the 2 groups, abdominopelvic abscess formation ($n = 3$ (7%) vs $n = 10$ (24%); $p = 0.035$) was more frequent in patients who had failed index O-IPAA. Short- and long-term complications were shown (Tables 4 and 5). Functional outcomes were comparable between the 2 groups at their last follow-up (Table 5). Median follow-ups were 57 (IQR, 29.3–76.0 mo) and 64.5 months (IQR, 44.0–87.8 mo) in the failed index MI-IPAA and O-IPAA groups. Three-year estimated redo-IPAA survival rates were 94.9% (95% CI, 88.0%–99.0%) and 81.2% (95% CI, 66.3%–96.1%) in failed index MI-IPAA and O-IPAA groups and were comparable ($p = 0.17$).

DISCUSSION

Timing of operation and optimization of a patient's general condition to handle the postoperative period uneventfully are the fundamentals of achieving good long-term

TABLE 2. Comparison of primary pouch characteristics between the MI-IPAA and O-IPAA groups

Variable	MI-IPAA (N = 42)	O-IPAA (N = 42)	p
Previous pouch type, n			0.55
J-pouch	37	39	
S-pouch	4	3	
Straight	1	0	
Previous anastomosis, n			0.12
Stapled	17	27	
Handsewn	6	3	
Missing ^a	19	12	
Time between index pouch and redo pouch surgery, median (IQR), mo	28.5 (17.0–46.5)	56.0 (23.0–139.5)	0.031*
Long rectal cuff (>2 cm), n	11	4	0.046*

MI = minimally invasive; O = open; IQR = interquartile range.

^aMissing data are a result of inability to reach the previous operative records of the patients.

*P value is significant.

TABLE 3. Comparison of the redo operative characteristics between the MI-IPAA and O-IPAA groups

Variable	MI-IPAA (N = 42)	O-IPAA (N = 42)	p
Diversion before redo, n	36	36	1
New pouch creation, n	26	21	0.27
Redo pouch type, n			1
J-pouch	39	40	
S-pouch	3	2	
Redo anastomosis, n			0.046*
Handsewn	31	38	
Stapled	11	4	
Postoperative morbidity, n	23	27	0.37
Postoperative mortality, n	0	0	1

MI = minimally invasive; O = open.

*P value is significant.

TABLE 4. Short-term (≤ 30 d) complications

Variable	MI-IPAA (N = 42)	O-IPAA (N = 42)	p
Anastomotic leakage/fistula, n	4	5	1
Abscess, n	3	10	0.035
SSI, n	2	6	0.27
Ileus, n	5	5	1
Urinary, n	6	3	0.48
Transfusion, n	4	1	0.36
Pouchitis, n	1	0	1
Deep vein thrombosis, n	0	1	1
Pulmonary, n	0	1	1
Renal insufficiency, n	1	0	1

SSI = superficial skin infection; MI = minimally invasive; O = open.

outcomes after IPAA creation, regardless of surgical modality, including minimally invasive or open technique. Adequate blood supply to the ileal pouch, tension-free anastomosis, keeping the mesentery untwisted, and not leaving long rectal cuff (>2 cm) are the basic technical steps of IPAA creation.¹⁶ Our study on redo-IPAA for failed MI-IPAA revealed an important potentially preventable drawback of MI-IPAA. Long remnant rectum during MI-IPAA seems to be a major technical drawback associated with pouch failure in some cases. Deep rectal dissection with minimally invasive techniques requires operative dexterity and experience. Large series evaluating long-term outcomes of laparoscopic RP have reported similar functional outcomes and pouch survival rates in experienced hands compared with their open counterparts in experienced hands.^{7,19} Under the circumstances, when a proper rectal resection cannot be done laparoscopically, some surgeons suggested to perform open rectal dissection or to use a modified Pfannenstiel incision for open IPAA, which proposed to provide similar advantages of MI-IPAA in well-selected patients.²⁰ Caseload of surgeon and operative experience on a proper IPAA technique is one of the most important denominators associated with improved pouch survival and function.^{2,21}

Symptoms resulting from technical issues tend to appear relatively earlier compared with biologic causes of IPAA failure, such as de novo development of CD.²² Time to IPAA failure was shorter after MI-IPAA compared with the patients who underwent redo surgery after O-IPAA in our study. This result supports the existence of the potential technical problem in MI-IPAA. Robots, which have been developed to overcome limitations of laparoscopy, provide better visualization and increased maneuverability in confined spaces.²³ Introduction of the da Vinci Xi has facilitated the use of robots in the field of colorectal surgery.²⁴ However, robotic IPAA is an emerging procedure, and no superiority to laparoscopic IPAA has been reported yet. In our series, 4 patients had IPAA failure after a robotic RP.

Considering the characteristics of the patients with a failed MI-IPAA, redo IPAA in those patients can be less

TABLE 5. Long-term complications

Variable	MI-IPAA (N = 42)	O-IPAA (N = 42)	p
Pelvic sepsis, n	4	6	0.5
Stricture, n	3	4	1
Parastomal hernia, n	2	0	0.49
Ventral hernia, n	0	1	1
Functional results ^a			
Bowel movements, mean \pm SD			
Daytime ^b	5 \pm 3	6 \pm 3	0.96
Nighttime ^b	2 \pm 1	2 \pm 1	0.74
Seepage, n			
Daytime	17	25	0.08
Nighttime	12	17	0.25
Pad usage, n			
Daytime	17	19	0.66
Nighttime	20	18	0.66
Restrictions, n			
Dietary	13	18	0.26
Social	10	15	0.23
Work	9	11	0.61
Sexual	9	12	0.45
CQOL	0.7 \pm 0.2	0.6 \pm 0.3 ^b	0.95

MI = minimally invasive; O = open; CQOL = Cleveland Global Quality of Life Score.

^aOutcomes were taken based on most recent office visits.

^bDecimals were rounded to the nearest tenth.

complex compared with the patients with a failed O-IPAA because of several factors. First, long rectal cuff gives us the opportunity to perform a stapled redo IPAA. A stapled anastomosis can only be performed if a rectal stump is long enough to be transected with a linear stapler. In those cases, the distal mesorectum is reached and dissected easily, because the natural plains are left intact at the time of index IPAA creation. Stapled anastomoses have been shown to be associated with increased pouch survival compared with handsewn IPAA because of lower risk of pelvic sepsis causing pouch failure.²⁵ Pelvic abscess formation is also less prevalent after stapled redo IPAA in our series. Risk of incontinence and seepage was reported less in stapled IPAA compared with mucosectomy and handsewn anastomosis in large series from major tertiary referral centers.²⁵ Although the number of patients who underwent a stapled redo IPAA was higher in patients with a failed MI-IPAA, outcomes after redo IPAA surgery were similar in study groups.

Our study is important because of the fact that that is the first study specifically comparing the short- and long-term outcomes of redo IPAA in patients operated by a single surgeon for failed MI-IPAA or O-IPAA in a case-matched setting. The largest redo article that we have the privilege of being part of revealed no impact of laparoscopic index IPAA creation on redo IPAA outcomes.² However, that article focused on general outcomes of redo transabdominal IPAA surgery and had some limitations to analyze this topic in details because of heterogeneity of the patient population. Inclusion of multiple surgeons

with various experience and patients with different characteristics would directly affect the outcomes. Single-surgeon and case-match setting design aimed to minimize confounders in this article. Functional outcomes with several factors mainly related to completeness of the anal sphincters and the nerves related to the anal functions. Reoperations may impair sphincter functions. On the other hand, similar outcomes after stapled and handsewn IPAA were also reported in some series.²⁶ It is crucial to inform patients about the fact that redo IPAA is associated with worse functional outcomes compared with index IPAA.²⁷ Average number of bowel movements of 5 to 6 per day and 1 to 2 per night with an acceptable daily life restriction directly reveals the fact that interpretation and tolerance of redo IPAA outcomes depend on patient tolerance and expectations regarding salvage IPAA surgery. Approximately one third of our patients had dietary restrictions and the other one fourth of the patients had social, work, or sexual restrictions in both of our cohorts. Even those restrictions seem satisfactory for patients who appeal to avoid a permanent ileostomy at any cost. Additional studies including endorectal ultrasonography anorectal physiology would provide more accurate evidence on the functional outcomes of redo IPAA surgery. The second technical advantage of operating a patient for a failed MI-IPAA is less intra-abdominal adhesion formations compared with patients who had a failed O-IPAA.²⁸ Complexity of redo IPAA is associated with the severity of intra-abdominal adhesions. Operations performed from smaller incisions with laparoscopy result in less tissue trauma and provide faster recovery compared with an open technique.²⁹

Our results show 3-year estimated survival rates of 95% and 81% in MI-IPAA and O-IPAA. These results seem acceptable considering the high rates of pelvic sepsis in both of our study groups, which is the most common complication causing pouch failure.² Series from the Mayo Clinic including 81 patients undergoing revisional and reconstructive surgery reported recurrent fistula rates of 14% and abdominal abscess rates of 6%.³⁰ The 5-year survival rate of the revised and reconstructed pouches was 85%.³⁰ Their results showed that abdominal abscess formation after index IPAA construction is associated with a 5-fold increased risk of redo IPAA failure.³⁰ Therefore, prevention and management of the pelvic sepsis before and after redo surgery are key factors to maintain intestinal continuity with IPAA. A majority of the patients with failed pouch become malnourished because of prolonged pelvic sepsis, and a significant portion of them are on steroids and/or biologics due to the fact that they are being misdiagnosed as CD of the pouch.²⁷ Thus, those patients are generally too deconditioned to be able to handle a major redo IPAA without a loop ileostomy before their redo IPAA construction. Redo IPAA is the last resort for that patient group, and construction of a redo IPAA in

those fragile patients risks losing the redo IPAA because of increased risk of anastomotic leak and ongoing pelvic sepsis.³¹ Considering all of the above facts, we routinely perform a 3-stage procedure consisting of initial proximal diverting loop ileostomy for 6 months, followed by redo IPAA with temporary stoma and, lastly, stoma closure.³² Diversion with a loop ileostomy helps the pelvic septic process to resolve and allows the pouch and small bowel to return to their normal size before definitive redo IPAA surgery.

Although case matching helped to create comparable study groups in terms of patient characteristics, our study is limited by its nonrandomized, retrospective nature and relatively low patient number. However, the single-surgeon setting may provide a technical homogeneity among the patients. We believe that our study is important, because this is the first study evaluating the impact of modality of the index IPAA creation on redo IPAA outcomes.

CONCLUSION

A long rectal cuff after MI-IPAA is a potential and preventable risk factor for failure. Because of its technical and patient-related complexity, handsewn anastomoses in redo IPAA are associated with increased risk of abscess formation.

REFERENCES

1. Fazio VW, Kiran RP, Remzi FH, et al. Ileal pouch anal anastomosis: analysis of outcome and quality of life in 3707 patients. *Ann Surg*. 2013;257:679–685.
2. Remzi FH, Lavryk OA, Ashburn JH, et al. Restorative proctocolectomy: an example of how surgery evolves in response to paradigm shifts in care. *Colorectal Dis*. 2017;19:1003–1012.
3. Hahnloser D, Pemberton JH, Wolff BG, Larson DR, Crownhart BS, Dozois RR. Results at up to 20 years after ileal pouch-anal anastomosis for chronic ulcerative colitis. *Br J Surg*. 2007;94:333–340.
4. Fazio VW, Ziv Y, Church JM, et al. Ileal pouch-anal anastomoses complications and function in 1005 patients. *Ann Surg*. 1995;222:120–127.
5. McGuire BB, Brannigan AE, O'Connell PR. Ileal pouch-anal anastomosis. *Br J Surg*. 2007;94:812–823.
6. El-Gazzaz GS, Kiran RP, Remzi FH, Hull TL, Geisler DP. Outcomes for case-matched laparoscopically assisted versus open restorative proctocolectomy. *Br J Surg*. 2009;96:522–526.
7. Baek SJ, Lightner AL, Boostrom SY, et al. Functional outcomes following laparoscopic ileal pouch-anal anastomosis in patients with chronic ulcerative colitis: long-term follow-up of a case-matched study. *J Gastrointest Surg*. 2017;21:1304–1308.
8. Polle SW, Dunker MS, Slors JF, et al. Body image, cosmesis, quality of life, and functional outcome of hand-assisted laparoscopic versus open restorative proctocolectomy: long-term results of a randomized trial. *Surg Endosc*. 2007;21:1301–1307.
9. Fichera A, Silvestri MT, Hurst RD, Rubin MA, Michelassi F. Laparoscopic restorative proctocolectomy with ileal pouch anal

- anastomosis: a comparative observational study on long-term functional results. *J Gastrointest Surg.* 2009;13:526–532.
10. Larson DW, Cima RR, Dozois EJ, et al. Safety, feasibility, and short-term outcomes of laparoscopic ileal-pouch-anal anastomosis: a single institutional case-matched experience. *Ann Surg.* 2006;243:667–670.
 11. Kjaer MD, Laursen SB, Qvist N, Kjeldsen J, Poornorooy PH. Sexual function and body image are similar after laparoscopy-assisted and open ileal pouch-anal anastomosis. *World J Surg.* 2014;38:2460–2465.
 12. Kelly KA. Anal sphincter-saving operations for chronic ulcerative colitis. *Am J Surg.* 1992;163:5–11.
 13. Foley EF, Schoetz DJ Jr, Roberts PL, et al. Rediversion after ileal pouch-anal anastomosis. Causes of failures and predictors of subsequent pouch salvage. *Dis Colon Rectum.* 1995;38:793–798.
 14. Belliveau P, Trudel J, Vasilevsky CA, Stein B, Gordon PH. Ileo-anal anastomosis with reservoirs: complications and long-term results. *Can J Surg.* 1999;42:345–352.
 15. Remzi FH, Aytac E, Ashburn J, et al. Transabdominal redo ileal pouch surgery for failed restorative proctocolectomy: lessons learned over 500 patients. *Ann Surg.* 2015;262:675–682.
 16. Aytac E, Remzi FH. Reoperative transabdominal surgery for ileo-anal pouch salvage. *Semin Colon Rectal Surg.* 2015;26:187–193.
 17. Aytac E, Esen E, Aydinli HH, Kirat HT, Schwartzberg DM, Remzi FH. Transabdominal re-do pouch surgery in pediatric patients for failed ileal pouch anal anastomosis: a case matched study. *Pediatr Surg Int.* 2019;35:895–901.
 18. Remzi FH, Fazio VW, Kirat HT, Wu JS, Lavery IC, Kiran RP. Repeat pouch surgery by the abdominal approach safely salvages failed ileal pelvic pouch. *Dis Colon Rectum.* 2009;52:198–204.
 19. Ozdemir Y, Kiran RP, Erem HH, et al. Functional outcomes and complications after restorative proctocolectomy and ileal pouch anal anastomosis in the pediatric population. *J Am Coll Surg.* 2014;218:328–335.
 20. Duraes LC, Schroeder DA, Dietz DW. Modified Pfannenstiel open approach as an alternative to laparoscopic total proctocolectomy and IPAA: comparison of short- and long-term outcomes and quality of life. *Dis Colon Rectum.* 2018;61:573–578.
 21. Mark-Christensen A, Erichsen R, Brandsborg S, et al. Pouch failures following ileal pouch-anal anastomosis for ulcerative colitis. *Colorectal Dis.* 2018;20:44–52.
 22. Melton GB, Fazio VW, Kiran RP, et al. Long-term outcomes with ileal pouch-anal anastomosis and Crohn's disease: pouch retention and implications of delayed diagnosis. *Ann Surg.* 2008;248:608–616.
 23. Hamzaoglu I, Baca B, Esen E, et al. Short-term results after totally robotic restorative total proctocolectomy with ileal pouch anal anastomosis for ulcerative colitis. *Surg Laparosc Endosc Percutan Tech.* 2020;30:40–44.
 24. Esen E, Aytac E, Ozben V, et al. Adoption of robotic technology in Turkey: a nationwide analysis on caseload and platform used. *Int J Med Robot.* 2019;15:e1962.
 25. Kirat HT, Remzi FH, Kiran RP, Fazio VW. Comparison of outcomes after hand-sewn versus stapled ileal pouch-anal anastomosis in 3,109 patients. *Surgery.* 2009;146:723–729.
 26. Schluender SJ, Mei L, Yang H, Fleshner PR. Can a meta-analysis answer the question: is mucosectomy and handsewn or double-stapled anastomosis better in ileal pouch-anal anastomosis? *Am Surg.* 2006;72:912–916.
 27. Garrett KA, Remzi FH, Kirat HT, Fazio VW, Shen B, Kiran RP. Outcome of salvage surgery for ileal pouches referred with a diagnosis of Crohn's disease. *Dis Colon Rectum.* 2009;52:1967–1974.
 28. Hull TL, Joyce MR, Geisler DP, Coffey JC. Adhesions after laparoscopic and open ileal pouch-anal anastomosis surgery for ulcerative colitis. *Br J Surg.* 2012;99:270–275.
 29. Fortin CN, Saed GM, Diamond MP. Predisposing factors to post-operative adhesion development. *Hum Reprod Update.* 2015;21:536–551.
 30. Lightner AL, Shogan BD, Mathis KL, et al. Revisional and reconstructive surgery for failing IPAA is associated with good function and pouch salvage in highly selected patients. *Dis Colon Rectum.* 2018;61:920–930.
 31. Remzi FH, Fazio VW, Gorgun E, et al. The outcome after restorative proctocolectomy with or without defunctioning ileostomy. *Dis Colon Rectum.* 2006;49:470–477.
 32. Schwartzberg DM, Esen E, Remzi FH. Thoughtful ileostomy creation in patients undergoing redo IPAA. *Dis Colon Rectum.* 2020;63:117–120.