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Management of Anastomotic Leakage after Low Anterior Rectal Resections with Total Mesorectal Excision - A Retrospective Study

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Rezumat

Managementul fistulei anastomotice după neoplasm rectal - un studiu retrospectiv

Introducere: Studiul de faţă şi-a propus să investigheze procedurile de diagnostic, modalităţile de tratament şi consecinţele fistulei anastomotice (FA) la pacienţii cu neoplasm rectal la care s-a practicat rezecţie anterioară joasă.
Metodă: S-a efectuat o analiză retrospectivă pe 186 de pacienţi internaţi şi trataţi în Clinica I Chirurgie Craiova, în perioada ianuarie 2018 – iunie 2022, care au efectuat intervenţii chirurgicale pentru adenocarcinom rectal. Dintre acestia, 106 pacienţi au suferit rezecţii rectale anterioare joase şi ultrajoase programate cu excizie totală mezorectală, fiind selectaţi pentru analiză ulterioară. Douăzeci şi patru de pacienţi au fost diagnosticaţi cu FA postoperatorie şi au urmat diverse strategii de management în funcţie de severitatea stării lor.
Rezultate: Studiul a relevat o incidenţă de 22.6% pentru FA postoperatorii, toate fiind de grad B şi C conform clasificarii International Study Group of Rectal Cancer din 2010, şi asociind o morbiditate şi mortalitate semnificative. Comorbiditatile asociate au inclus obezitate, hipertensiune arterială, diabet zaharat de tip 2 şi insuficienţă renală cronică. Selectarea managementului optim a depins de severitatea tabloului clinic şi de disponibilitatea opţiunilor de tratament. Diagnosticul prompt şi managementul

conservator au constituit strategia terapeutică inițială pentru fistulele de grad B, intervențiile chirurgicale sau drenajul aspirativ transanal fiind utilizate în cazul FA de grad C.
Concluzii: Incidența şi mortalitatea asociată FA după rezecțiile anterioare joase este una importantă. FA grad B au fost manageriate cu success prin tratament conservator, pe când cele de grad C au impus fie reintervenție chirurgicală pentru drenaj sau diversie supraiacentă, fie drenaj aspirativ transanal.

Cuvinte cheie: fistula anastomotica, factori de risc, chirurgia rectului, cancer rectal

Abstract
Background: This study sought to investigate the diagnostic procedures, treatment modalities, and consequences of anastomotic leakage (AL) in low anterior resection rectal cancer patients.
Methods: A retrospective analysis was conducted on 186 patients consecutively admitted and treated in the 1st Department of Surgery in Craiova, between January 2018 and June 2022, all of whom had undergone surgical interventions for adenocarcinoma of the rectum. Among this cohort, 106 patients who had undergone scheduled low and ultralow anterior rectal resections with total mesorectal excision were selected for further analysis. Twenty-four patients were diagnosed with postoperative AL and underwent diverse management strategies based on the severity of their condition.
Results: The study revealed an incidence of 22.6% for postoperative AL, with all of them being classified as grade B and C, according to the 2010 International Study Group of Rectal Cancer Classification, which were associated with significant morbidity and mortality. Notably, patients exhibited various comorbidities, including obesity, arterial hypertension, type 2 diabetes mellitus, and kidney failure. The management approach depended on the severity of the clinical presentation and the availability of treatment options. Early diagnosis and conservative management constituted the initial therapeutic strategy for grade B AL, with surgical reintervention or transanal vacuum therapy being used in grade C AL.
Conclusions: The incidence and mortality associated with AF following low anterior resections were notably elevated. Grade B AL were successfully managed through conservative treatment, whereas grade C AL required either surgical reintervention for drainage or diversion procedures, or transanal vacuum therapy.

Key words: anastomotic leakage, risk factors, rectal surgery, rectal cancer

Introduction

Anastomotic leakage (AL) is defined as a wall defect at the site of the anastomosis leading to a communication between intraluminal and extraluminal space in the peritoneal cavity or retroperitoneum (1). This complication usually occurs in up to 20% of patients after curative rectal cancer resection and may lead to prolonged length of hospital stay, frequent surgical reinterventions, increased perioperative morbidity, poor quality of life, and significant mortality (2,3).

The risk factors for AL made the object of many studies and at least 20 different risk factors were identified, such as advanced T stage, obesity, preoperative radiotherapy, elevated Charlson comorbidity index (CCI), male sex, perioperative blood transfusion, etc (4,5).

Patients with AL may present with a variety of symptoms such as fever or abdominal pain. In more severe instances, these patients may

exhibit signs of peritonitis or even pelvic fecal discharge (1).

In 2010, the International Study Group of Rectal Cancer introduced a classification system for rectal AL, delineating it into the following categories: grade A, indicating the absence of necessity for medical interventions; grade B, which signifies that conservative treatment suffices; and grade C, implying the requirement for a subsequent surgical intervention (1).

Diagnosis of rectal AL is mostly based on the use of endoscopy and computed tomography scan, which are able to indicate the wall defect and its size. CT scan also reveals the externalization of the contrast substance into the extraluminal space (4).

Management of the AL depends on the severity of symptoms, patient status, and available therapeutic options, bearing in mind that early reanimation can prevent sepsis, subsequent multisystem organ failure, and even death. Emergency cases presenting with signs of peritonitis require immediate surgical intervention, while more conservative treatment employing pelvic drainage can be safely used in pelvic abscesses or localized peritonitis (5). A temporary diverting stoma may be implemented as treatment safe option, but if the leakage is persistent, there is a high risk of a permanent stoma or the need of anastomotic repair. Furthermore, in instances of complex AL, tissue grafts, such as adipose tissue grafting, may be employed. Adipose tissue grafting exhibits a protective influence that fosters healing at the anastomotic site and concurrently diminishes the necessity for resection of the anastomosis (6). Endoscopic vacuum therapy has proven to be an effective method in closing defects by generating granulation tissue, accelerating wound closure, and improving the overall therapeutic results (7).

The objective of this investigation is to systematically assess our institutional expertise concerning the diagnosis, treatment, and consequences of AL following low anterior resections with total excision of the mesorectum for middle and low rectal cancers.

Material and Methods

Study Design

We conducted a retrospective study of a consecutive series of 186 patients undergoing surgical intervention for adenocarcinoma of the rectum, admitted to and treated in the 1st Department of Surgery in Craiova, between January 2018 and June 2022.

Out of the initial cohort of 186 patients, a subset of 106 individuals had undergone planned low and ultralow anterior rectal resections with total mesorectal excision (TME) for rectal cancer. The distal anatomic limit between low and ultralow anterior resection was considered at 4 cm above the pectinate line.

Patients who underwent emergency surgical procedures that resulted in colostomies, abdominoperineal resections, Hartmann procedures, or those with other histological types of cancer were deliberately omitted from the research cohort.

The clinical records of the individuals included in the study were meticulously examined, and relevant information was documented. This included demographic characteristics, the stage of the disease, comorbid conditions, administration of neoadjuvant therapy, the presence of a protective ileostomy, the diagnostic approach employed, the distance from the external anal orifice, dimensions of the leakage, the postoperative day on which the leakage manifested, and the specific course of management, which could involve surveillance, conservative therapeutic measures, or surgical re-intervention.

This study was conducted according to the guidelines of the Declaration of Helsinki and approved by the Ethics Committee of the University of Medicine and Pharmacy of Craiova (protocol no 7121/30.07.2021).

Diagnosis and Tumor Staging

In all patients, diagnosis was made on colonoscopy with biopsy. Laboratory work-up consisted in complete blood count, bleeding

tests, such as prothrombin time and activated partial thromboplastin time, CEA, as well as CA 19-9. Tumor staging was based on pelvic MRI to assess local extension, and chest, abdomen, and pelvic CT scan with intravenous contrast for detection of metastases.

Preoperative Preparation

Each patient received mechanical bowel preparation consisting of 4 liters of polyethylene glycol (PEG), administered 48 hours before the surgical intervention. Additionally, antibiotic prophylaxis was administered, including metronidazole at a dose of 250 mg three times daily, commencing after the completion of mechanical bowel preparation. An initial dose of second-generation cephalosporin was administered at the induction of anesthesia, and this dose was repeated if the surgical procedure extended beyond 3 hours or in the event of significant intraoperative hemorrhage. In some patients in which there was an intraoperative spillage of bowel content the prophylaxis was continued for 24 hours postoperatively.

Oral intake of both solid food and liquids was ceased with a minimum interval of 6 hours and 4 hours, respectively, preceding the surgical procedure.

Thrombosis prophylaxis was administered using low molecular weight heparins (LMWH), with an initiation of treatment occurring more than 8 hours before surgery for individuals deemed at high risk for developing deep vein thrombosis (DVT). For the remaining patients, prophylaxis was initiated during the postoperative period, ensuring a minimum 8-hour interval had elapsed since surgery.

Intraoperatively, a standard general anesthesia with oro-tracheal intubation and goal directed fluid therapy was aimed by the anesthesiology team.

Surgical Technique

The patient was positioned in a Lloyd Davies position, with right arm tucked to the body.

For open approach, a midline laparotomy from pubis to umbilicus extended cranially in case of splenic flexure mobilization. A high tie was employed in all cases to allow good mobilization of the descending and sigmoid. Splenic flexure was mobilized in case of short sigmoid and on every occasion when the surgeon considered necessary in order to ensure a tension free anastomosis. The rectum was dissected in the mesorectal plane - the "holy plane" described by W. Heald - in order to perform a total mesorectal excision. A margin of mesentery of at least 2 cm and a rectal margin of at least 1 cm was aimed and achieved in all cases. The distal rectum was sectioned with staplers and anastomosis performed with a 24 mm or 29 mm circular stapler, depending on the size of the descending or sigmoid colon, to well accommodate the anvil without forcing. In case of ileostomy, one to two drainage tubes were placed in the pelvic region, with a preference for externalization within the left iliac fossa; alternatively, they were positioned in the right iliac fossa, and occasionally, both sites were utilized. The same principles were followed for laparoscopic approach.

Postoperative Follow-up

ERAS principles were partially followed. Nasogastric suction was removed at the end of surgery, patients were helped out of bed in the next morning and encouraged to walk a few meters in the evening of the 1st postoperative day. A regimen of non-opioid analgesics was employed in all cases, based upon paracetamol and metamizole. Clear fluids were started in the afternoon of the 1st postoperative day, and semi-solid food from the 2nd postoperative day. In case of postoperative ileus medication was instituted accordingly and a nasogastric aspiration was inserted in case of failure of medication. The urinary catheter was removed the 3-4th postoperative day and reinserted in case of urinary retention. All patients had their temperature recorded, and drains were checked daily for pus or fecal content. Anastomosis was inspected by digital rectal examination on the 5-6th postoperative

day. When anastomosis integrity was confirmed, along with the absence of leukocytosis and fever, the drainage tubes were removed. In case of ileus, fever, or leukocytosis, and no findings on digital tract or integrity not well assessed, an abdominal radiological investigation with water-soluble contrast agent instilled in the rectum by a Foley catheter was performed to identify any possible leak. The procedure was performed under either X-ray or pelvic CT with i.v. contrast. In case of minimal defect with limited output, the case was managed conservatively. In leakages that occurred after the removal of the drains, the leakages were managed by transanal defect drainage with sponge. The classification of the anastomotic leakages according to Rakhbari is depicted in the *Fig. 1.*

Statistical Analysis

The statistical analysis was conducted using Microsoft Excel (Microsoft, Redmond, USA). The Student's t-test was applied to evaluate potential statistically significant distinctions between the two groups for normally distributed variables. Statistical significance was determined at a threshold of $p < 0.05$.

Results

Twenty-four patients with postoperative anastomotic leakage were identified from a total of 106 cases with low anterior resections with total excision of mesorectum for rectal adenocarcinoma, resulting in an incidence of 23%.

The median age of the study population was 63 years, with the male group representing 75% of the patient cohort. Patients exhibited comorbid conditions including obesity, arterial hypertension, type 2 diabetes mellitus, chronic kidney failure, hepatitis B infection, and two patients presented with liver metastasis from rectal cancer (*Table 1*). Notable postoperative complications included postoperative ileus, urinary retention, and pelvic abscesses.

In 84% of the cases, the tumors were located in the middle rectum, while in 16% of patients in the lower rectum. In two cases there was invasion in the urinary bladder and the ureters, and in one case the rectal tumor was completely obstructive and was associated with rectal hemorrhage. In 63% of cases the patients underwent neoadjuvant chemotherapy and in 67% of the cases neoadjuvant radiotherapy was deemed necessary.

Laparoscopic resection was conducted in

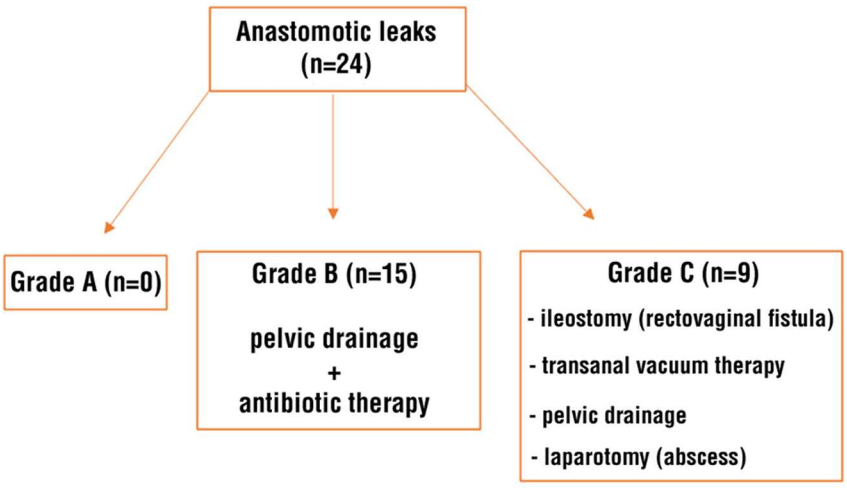

Figure 1. Flowchart of the therapeutic algorithm for anastomotic leaks

Table 1. Comorbidities in patients with anastomotic leakage vs those without leakage

Characteristics	No. of patients without leaks	%	No. of patients with AL	%	p†
Total	82		24		
Gender					
Male	54	65.9	19	79.2	0.1285
Female	28	34.1	5	20.8	
Age (years)					
< 65	40	48.8	14	58.3	0.3340
≥ 65	42	51.2	10	41.7	
Comorbidities					
Cardiovascular disease	35	42.7	11	45.8	0.8076
Diabetes mellitus	8	9.7	2	8.3	N/A
Smoking	7	8.5	4	16.6	0.1860
Obesity	13	15.8	10	41.7	
Neoadjuvant radiotherapy	33	40.2	12	50	0.3233
Anastomotic level from the anal verge					
< 7 cm	44	53.7	8	33.3	0.0277*
≥ 7 cm	38	46.3	16	66.7	
Preoperative hemoglobin (dg/ml)					
<12	41	50	9	37.5	0.2246
≥12	41	50	15	62.5	
Multivisceral resection					
Yes	14	17.1	5	20.8	0.319
No	68	82.9	19	79.2	
TNM stage					
T0-T2	27	32.9	10	41.7	0.3095
T3-T4	55	67.1	14	58.3	
N0-N1	70	85.4	21	87.5	1.00
N2-N3	12	14.6	3	12.5	
M1	3	3.6	2	8.33	0.2036

*, p-value<0.05 for the statistical significance, † , Student's t test.

41.6% of cases, while the classical surgical approach was employed in 58.4% of cases. Surgical procedures included low anterior resections in 83% of cases and ultra-low anterior rectal resections in 17% of cases. Anastomoses were executed mechanically in 66.6% of patients and manually in 33.4% of cases. Notably, within the laparoscopic approach, 90% of anastomoses were mechanical, whereas only 42.8% were recorded within the classical approach. Conversely, 10% of laparoscopic cases involved manual anastomoses, compared to 57.2% in the classical approach (*Table 2*). End-to-side anastomoses were infrequent, comprising only 2 cases, with one performed using the laparoscopic approach (mechanical) and the other through the open approach (manual), while the remaining

Table 2. The surgical approach and the type of the anastomosis in patients with AL

Type of surgical approach	Laparoscopic		Open	
No. of procedures (% total)	10	41.6%	14	58.4%
Mechanical anastomosis	9	90%	6	42.8%
Manual anastomosis	1	10%	8	57.2%

Table 3. Anastomotic leakage diagnosis in days after surgery

No. of days after surgery	5-7 days		8-10 days		10-16 days	
No. of anastomotic leakages (% total)	9	37.5%	5	20.8 %	10	41.7 %
Laparoscopic approach	2	22.2%	4	80%	4	40%
Open approach	7	77.8%	1	20%	6	60%
Mechanical anastomosis	4	44.4%	4	80%	8	80%
Manual anastomosis	5	55.6%	1	20%	2	20%

91.6% consisted of end-to-end anastomoses.

AL occurred at variable timing postoperatively, with 41.7% of cases occurring between postoperative day (p.o.d.) 10 and 16, 37.5% between p.o.d. 5 and p.o.d. 7, and 20.8% between p.o.d. 8 and 10 (*Table 3*). Among AL manifesting within the 10-16 day interval post-surgery, 50% of cases were associated with laparoscopic procedures, with 80% of these cases featuring mechanically executed anastomoses, while only one was manually constructed. Conversely, among cases of AL occurring within the 8-10 day timeframe, laparoscopic approaches were employed in 80% of instances, with 80% of these cases also involving mechanically created anastomoses. In the subgroup of anastomotic leaks arising between p.o.d. 5 and 7, 77.8% of the surgeries were performed using the classical approach, and manual anastomoses were prevalent in 55.5% of these cases. Notably, 58% of patients who experienced AL had a diverting ileostomy.

Predominantly, anastomotic leakages were categorized as grade B in 63% of cases, while 37% were classified as grade C, with no instances of grade A anastomotic leakages observed. Regarding the extent of parietal defects, approximately 80% of cases exhibited dimensions of 2 cm or less, 16% had dimensions between 2-3 cm, and a single case presented with complete anastomotic dehiscence. The distance from the external anal orifice varied, with 12.5% of cases showing a proximity of 5 cm or less, 67.5% falling within the 6-10 cm range, and 20% situated at distances of 11-18 cm.

Figure 2. Extravasation of the contrast agent on the drain tube after it reaches the extraluminal space

The majority of patients with anastomotic leakage were initially identified in the outpatient clinical setting, constituting 83% of cases, while 17% of patients presented themselves to the Emergency Department. Most instances of anastomotic leakage were primarily clinically diagnosed, with patients

Figure 3. Irrigography – side-to-end colorectal anastomosis integrity check before ileostomy

Figure 4. Irrigography – end-to-end colorectal anastomotic leakage with extraluminal extravasation of contrast substance in a presacral abscess

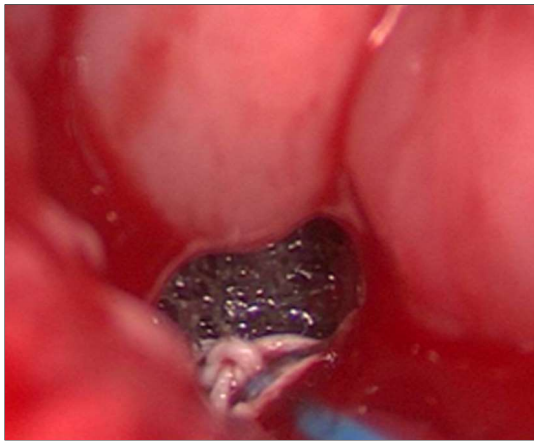

Figure 5. The intraluminal aspect of vacuum therapy

Figure 6. Transanal tube placement for vacuum therapy of anastomotic leak following low rectal resection

exhibiting symptoms such as fever and fecal pelvic drainage, and these clinical suspicions were further substantiated through diagnostic means such as computed tomography with intravenous contrast material and transanal assessment (*Fig. 2*), and contrast radio-diagnostic enema (*Fig. 3* and *4*). Among these cases, 37.5% necessitated a re-intervention to address the anastomotic leakage, while the remaining cases were effectively managed through conservative therapeutic approaches.

Depending on the grade of the anastomotic leakage, different therapeutic methods were used. Patients with grade B AL were treated by antibiotherapy and by ensuring an adequate drainage of the septic content, with good results regarding the closure of the defect. Patients with grade C AL received different types of therapy. In one case transanal vacuum therapy was applied, with sponge replacement at intervals of 48 to 72 hours, until the cavity size was reduced to less than 1 cm (*Fig. 5* and *6*). Another patient required the creation of a diverting ileostomy due to the presence of a recto-vaginal fistula, while two additional patients, who presented with pelvic abscesses, necessitated a re-intervention to facilitate pelvic drainage.

Within the initial 30 days following surgery, three patients succumbed, with two cases affiliated with group B and the remaining one associated with group C, yielding an overall mortality rate of 12.5%.

The closure of diverting ileostomies occurred predominantly after an average period of five months from their initial creation, corresponding to the assessment of healed anastomotic defects. This delay in stoma closure was influenced by the imperative for postoperative chemotherapy administration.

Discussion

Anastomotic fistula is perhaps the most feared complication after anterior low resection. There are several studies approaching the leakage rates, risk factors, diagnosis, and treatment, but there is still a lack of consensus.

The clinical signs of alarm are pelvic or perianal pain, the occurrence of a purulent or even fecal secretion in the pelvic drainage if the anastomosis was not protected, while at the same time, biologically, there is an increase in C reactive protein and leukocytosis. The general condition of the patient is not perfect, but even if it does not inspire great concern, it is justified to perform an abdomino-pelvic CT with the injection of intraluminal contrast substance, which will confirm the diagnosis by the presence of contrast agent outside the intestinal lumen.

The risk factors associated with the occurrence of AL include male gender, advanced

age, elevated body mass index (particularly exceeding 27), especially when combined with other risk factors. Additional factors contributing to this risk include tumor size or anastomotic proximity to the anal verge, extended operative duration (exceeding 200 minutes), significant intraoperative hemorrhage, histologic features, and underlying comorbidities that compromise microcirculation at the anastomotic site, such as cardiovascular disease or diabetes mellitus, and exposure to neoadjuvant radiotherapy.

Furthermore, smoking is a notable risk factor due to its adverse impact on vascular wall integrity (9-13). Within our investigated cohort, the examination of risk factors showed a substantial overlap of numerous previously mentioned comorbidities. However, the analysis did not revealed statistically significant differences between the group experiencing AL and those individuals who did not encounter such complications.

On the other hand, early instances of AL are predominantly attributed to suboptimal surgical technique stemming from challenges in maneuverability within the confined pelvic space, which subsequently influences blood supply at the anastomotic site. In contrast, late occurrences of anastomotic leakage are strongly associated with the aforementioned risk factors (14).

The higher incidence of AL among male patients, as observed in our cohort, can be attributed to the anatomical constraints posed by the narrower male pelvis, which can impede visibility during the surgical dissection process. Additionally, elevated ASA (American Society of Anesthesiologists) scores, corticosteroids, and substantial intraoperative blood loss necessitating transfusion are recognized as significant contributors to the risk of anastomotic leakage. Moreover, the preoperative use of certain chemotherapeutics such as Bevacizumab, may cause arterial microthromboembolic disease and increase the risk of ischemia and bowel perforation. Therefore, the association between neoadjuvant chemotherapy and an increased susceptibility to anastomotic dehiscence and leakage should be considered in certain cases (15-16).

The use of a diverting stoma did not demonstrate a significant protective effect against late anastomotic leakage and, therefore, it is not recommended in all patients with low anterior resection of the rectum, but it decreased the risk of early anastomotic leaks in selected patients (11-14).

A diverting stoma becomes useful when there are multiple risk factors such as neoadjuvant radiotherapy or anastomotic level <6 cm from the anal verge, preventing additional surgery for AL and improving morbidity and mortality. Nevertheless, it is essential to acknowledge the potential emergence of complications associated with stoma creation, which may ultimately necessitate further surgical interventions. Therefore, when considering the creation of a stoma, it is imperative to carefully weigh the risk factors associated with AL (11).

Another method used in order to reduce the incidence of AL is the placement of a transanal tube. There are studies that support the effectiveness of this method in preventing the AL and reducing the length of hospital stay even if it does not influence the occurrence of postoperative diarrhea that may itself increase the risk of anastomotic leaks (17). There are also studies that suggest its lack of effectiveness and therefore do not recommend it (18). However, more studies are required to establish the exact role of the transanal tube placement in anastomotic leakage prophylaxis.

The AL incidence after anterior resection of the rectum is not influenced by the surgical approach (open or laparoscopic approach), but patient selection may be a confusing factor that needs caution (19).

The current study emphasizes that the AL represents an important postoperative complication after anterior resection of the rectum, affecting almost one-quarter of the patients who underwent this type of surgery, but with multiple treatment possibilities and acceptable results. The incidence of AL was elevated in case of open surgical procedures (58.4% vs. 41.6%) and when mechanical anastomosis

techniques were employed (66.6% vs. 33.4%). However, it is important to note that these findings were influenced by the limited sample size in our study, as well as the predominance of the open surgical approach and the utilization of mechanical anastomosis methods. In our investigation, no statistically significant differences in the rates of AL were observed between patients with a pre-existing diverting ileostomy and those without (58% vs. 42%). Furthermore, no notable disparities were identified between individuals who underwent chemotherapy and those who underwent radiotherapy concerning the incidence of AL. Further investigation is warranted to evaluate whether the correlation between chemotherapy and radiotherapy exerts a more substantial influence on the formation of anastomotic defects.

Regarding the dimensions of the anastomotic defects, the majority of these defects measured less than 2 cm in size and were situated at a distance of 9-10 cm from the external anal orifice, with 58% of them exhibiting a circumferential distribution. Despite the small size of the defect, the patients included in our study were mostly elderly with multiple comorbidities that may have influenced the anastomosis healing and the complication rates in a negative manner.

The majority of the AL in our cohort had a late occurrence, as being diagnosed between the 10th and 16th postoperative days (41.7%). Notably, the majority of these leaks were classified as grade B, enabling the application of conservative management strategies. Patients experiencing grade C AL necessitated interventions such as vacuum therapy, diverting ileostomy, or pelvic drainage, yielding favorable outcomes. Subsequently, stoma closure was successfully performed in all patients following the complete healing of the anastomotic defect.

Generally, for millimetric or minimally larger anastomotic defects, radiological drainage through a trans-gluteal approach can be a viable option. However, in cases where the defect measures one centimeter or more, the placement of a trans-anastomotic trans-anal drainage system may be performed during examination under general anesthesia, coupled with targeted antibiotic therapy (20,21).

Grade C AL often associates more severe clinical signs such as abdominal pain and fever, signs of peritoneal irritation followed by a deterioration of the general condition that may reach a state of septic shock, purulent or fecal drainage and require surgical re-intervention (22-25).

An important question that arises pertains to the management of these severe cases. One potential approach involves the creation of a terminal colostomy, albeit with the inherent risk of additional technical hurdles and the potential inability to subsequently restore digestive continuity. This option is typically reserved as a last resort when no other viable alternatives remain (26-28).

An alternative strategy, applicable to patients who did not have a diverting stoma created earlier in the treatment plan, involves preserving the anastomosis while concurrently establishing a protective ileostomy. This approach facilitates the healing of the anastomotic defect and affords the possibility of subsequent stoma closure. However, this particular variant is only feasible when the anastomosis exhibits less than 50% dehiscence and is complemented by the placement of a transanal transanastomotic drain (29-32). In the current study, a range of surgical interventions was employed, providing varying levels of efficacy. This diversity underscores the distinctive viewpoint of a tertiary care surgical unit concerning the challenges in diagnosing and managing colorectal AL.

This study has several limitations, notably its retrospective design and the fact that it was conducted at a single-center site. However, our research may be important for the current literature because it brings up the unique perspective of a tertiary care surgery center regarding the struggles with the diagnosis and management of colorectal AL along with a summarized literature review in order to guide the surgeon who is confronted with this frequent postoperative complication.

Conclusion

The colorectal AL after low and ultralow anterior resections had a surprisingly high frequency. The AL were limited to grades B and C exclusively, with an anastomotic defect of less than 2 cm in diameter in most of the cases. Their management depended on the severity of clinical presentation and the available treatment options. In case of grade B AL, conservative management was the predominant therapeutic strategy. Conversely, for grade C leaks, the therapeutic approach was more nuanced, either involving the creation of superjacent diverting stomas or transanal vacuum therapy, both of which proved to be effective solutions.

Authors' Contributions

Study conception and design: G.G., D.C., D.M.; acquisition of data: S.R., M.B., A.M.P.; analysis and interpretation of data: A.T., V.S.; drafting the manuscript: D.P., S.P., S.C.; critical revision: V.P., R.R., V.S.; All authors reviewed the manuscript. Georgiana Graure and Daniel Preda have equal contributions as first author.

Conflict of Interests

Authors declare that there are no conflicts of interest.

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Ethical Statement

The research was performed in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Committee for Human Rights.

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