

Clinical Presentation, Diagnostic Evaluation, and Impact of Colorectal Anastomotic Leakage: A Review

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Abstract

Background: Clinical detection of anastomotic leakage is often difficult, as symptoms can range from minor physiological changes to severe septic shock. In modern colorectal surgery, the emphasis has switched from "late-stage rescue" to "early-phase detection" to reduce the high morbidity associated with delayed diagnosis. Anastomotic leakage (AL) is still the "Achilles' heel" of colorectal surgery. It is a sentinel occurrence that goes beyond localized surgical failure, causing a cascade of systemic physiological damages. This review aims to discuss the clinical presentation, diagnostic algorithms, severity grading, morbidity, and mortality of colorectal anastomotic leakage. **Conclusion:** Every 24-hour delay in diagnosing AL increases the risk of permanent stoma and mortality by approximately 10–15%. This "Time-is-Tissue" paradigm is why this research on VAC therapy is so vital it offers a way to "salvage" Grade B leaks before they escalate to Grade C disasters. Beyond the financial cost, the "Psychosocial Morbidity" is profound; patients often suffer from Post-Traumatic Stress Disorder (PTSD) and severe depression following the life-threatening experience of a major surgical complication and prolonged sepsis.

Keywords: Anastomotic Leakage; Colorectal Surgery; Clinical presentation; Permanent stoma.

Introduction

Clinical detection of anastomotic leakage is often difficult, as symptoms can range from minor physiological changes to severe septic shock. In modern colorectal surgery, the emphasis has switched from "late-stage rescue" to "early-phase detection" to reduce the high morbidity associated with delayed diagnosis.

The "General Malaise" and Mental Status: A subtle but significant indicator in the elderly is postoperative perplexity or a "sense of impending doom." These are frequently the initial systemic signs of an occult pelvic collection or micro-leak ^(1,2).

Abdominal and Pelvic Symptoms: Patients with high-level (intraperitoneal) leaks have classic peritonitis, which includes rebound tenderness, guarding, and abdominal rigidity. However, in Low Rectal Anastomoses, the leak is frequently "contained" in the pelvis and manifests as tenesmus, pelvic discomfort, or purulent/feculent discharge from the pelvic drain (if present)⁽³⁾.

The "Achilles' heel" of colorectal surgery is still anastomotic leakage (AL). It is a sentinel occurrence that sets off a series of systemic physiological insults that go beyond localized surgical failure. In the current surgical age, AL is acknowledged as a major factor in determining both short-term survival and long-term functional and oncological outcomes, in addition to being a complication.

The Increase in Lethality In high-volume hospitals, the baseline mortality rate for elective colorectal resections has stabilized below 2%, but the risk is drastically increased when a "Grade C" leak (fecal peritonitis) occurs. According to recent clinical audits conducted between 2024, the 30-day mortality rate increased three to five times, reaching 6% to 15% in high-risk groups^(1,2).

The paradigm of "Failure to Rescue" (FTR): The "Failure to Rescue," which describes the hospital's incapacity to stop death after AL occurs, is a crucial metric. Multi-organ dysfunction syndrome (MODS) and septic shock, which continue to be the main causes of early postoperative death, are linked to a proportionate increase in mortality for every 24-hour delay in diagnosing a leak^(3,4).

The Spectrum of Clinical Presentation

The "Dutch Leakage Score" and Early Warning Signs: Between Postoperative Day (POD) 3 and POD 7, clinical suspicion usually appears. Early symptoms, such as low-grade fever, "failure to progress" (prolonged ileus or delayed resumption of bowel function), and unexplained tachycardia (>100 bpm), are frequently non-specific.

The "General Malaise" and Mental Status: Postoperative disorientation or a "sense of impending doom" are subtle but important indicators in the elderly. These are frequently the initial systemic signs of a micro-leak or occult pelvic collection^(1,2).

Abdominal and Pelvic Symptoms: Patients with high-level (intraperitoneal) leaks typically exhibit rebound tenderness, guarding, and stiffness in the abdomen. But with Low Rectal Anastomoses, the leak is frequently "contained" in the pelvis and manifests as pelvic pain, tenesmus, or, if the pelvic drain is present, purulent or feculent discharge⁽³⁾.

Biochemical Markers: The Search for the "Early Signal"

Kinetics of C-Reactive Protein (CRP): CRP is still the most accurate negative predictor in 2026. An imminent leak can be predicted with high sensitivity if the CRP result on POD 3 or POD 4 is greater than 150 mg/L. On the other hand, a declining trend in CRP is very comforting for a safe release.

Lactate and procalcitonin (PCT): Elevated PCT levels signify systemic bacterial translocation, although they are less selective than CRP. A late indicator of tissue hypoperfusion and established sepsis is rising serum lactate^(5,6).

Peritoneal Drain Fluid Analysis: New guidelines in recommend examining the drain fluid for pH, amylase, or cytokines. Clinical signs of a leak may appear 24 to 48 hours before there is a noticeable drop in drain fluid pH or an increase in lactate levels relative to serum levels.

Radiological Diagnosis: The Gold Standard

Computed Tomography (CT) with Triple Contrast: The most reliable diagnostic method is a CT scan of the belly and pelvis using oral, IV, and rectal contrast. Important conclusions include:

Rectal contrast extravasation is a "pathognomonic" indicator of a leak.

Perianastomotic Air/Fluid Collections: Air bubbles localized around the anastomosis after POD 3 are extremely suspicious, even though some "free air" is normal right after laparoscopy. A confined leak (Grade B) is indicated by pelvic fat stranding and abscess formation^(4,7).

Water-Soluble Contrast Enema (Gastrografin): Often used when CT is not conclusive or prior to closing a defunctioning stoma. Although it might overlook tiny, contained posterior leaks, it offers a dynamic view of the "mechanical" integrity of the anastomosis, as shown in Figure 1.

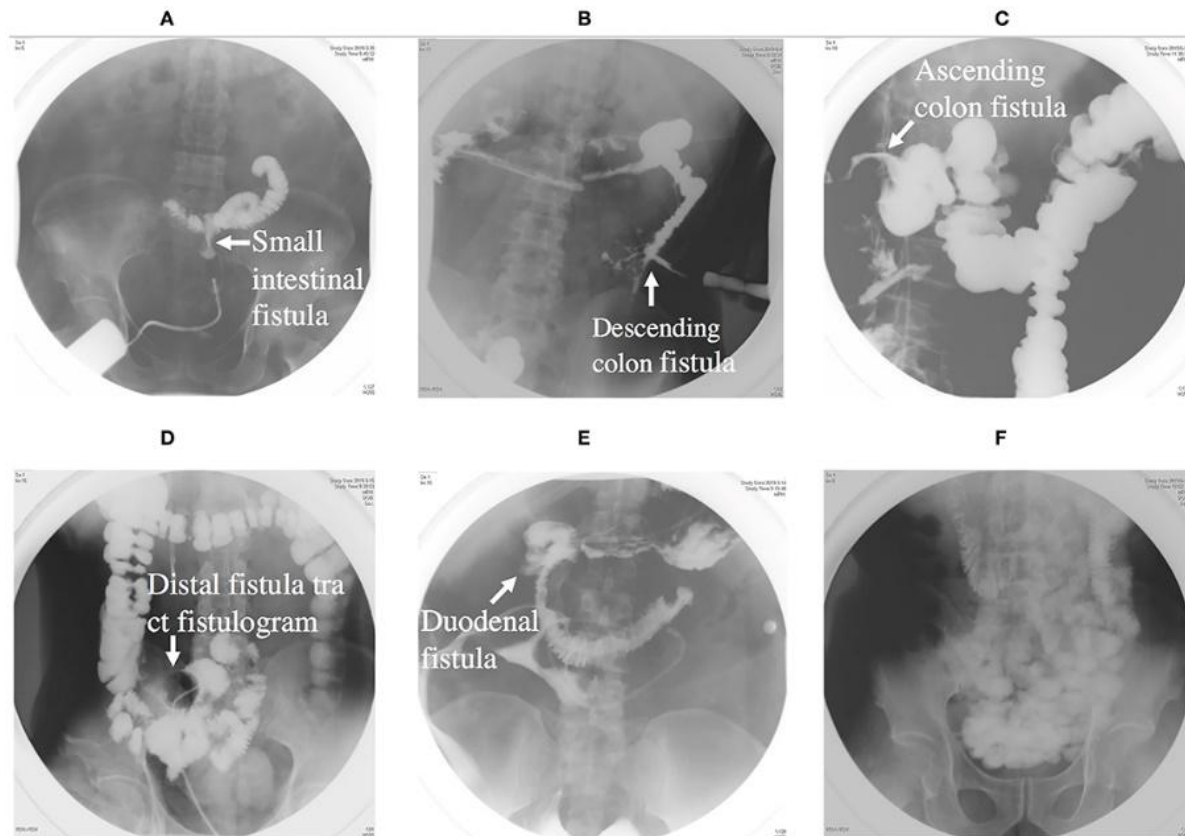


Figure 1. Water-Soluble Contrast Enema Gastrografin to detect intestinal leakage⁽⁸⁾.

Endoscopy and Severity Grading

Endoscopy (Early Sigmoidoscopy): early mild sigmoidoscopy is recommended instead of being frightened for "worsening" the leak. It enables direct visibility of the anastomosis to evaluate the magnitude of any defect, staple line integrity, and mucosal color (ischemia) critical information for choosing between endosurgical VAC therapy and re-operation⁽⁹⁾.

The International Study Group of Rectal Cancer (ISREC) assigns the following grades to leaks in order to standardize management:

Grade A: Subclinical leak, requiring no change in management.

Grade B: Requires active intervention (e.g., antibiotics, percutaneous drainage, or Endoscopic VAC) but can be managed without re-laparotomy.

Grade C: Requires emergency re-operation (laparotomy) due to generalized peritonitis or severe sepsis^(1,10).

The "Diagnostic Delay" and Morbidity

The risk of permanent stoma and mortality rises by around 10–15% for every 24-hour delay in identifying AL. This research on VAC therapy is crucial because it provides a means to "salvage" Grade B breaches before they worsen into Grade C disasters, which is consistent with the "Time-is-Tissue" concept.

Mortality Dynamics

The Rise in Lethality: In high-volume centers, the baseline mortality rate for elective colorectal resections has stabilized below 2%, but the risk is drastically increased when a "Grade C" leak (fecal peritonitis) occurs. According to recent clinical audits conducted between 2024, the 30-day mortality rate increased three to five times, reaching 6% to 15% in high-risk groups^(1,2).

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which continue to be the main causes of early postoperative death, are linked to a proportionate increase in mortality for every 24-hour delay in diagnosing a leak ^(3,4).

Acute Morbidity and Systemic Physiological Insult

Septic Sequelae in Intensive Care: Emergency re-interventions and unscheduled ICU hospitalizations are mostly caused by AL. Hospital stays for those who survive a significant leak are typically extended by 15 days. Patients are vulnerable to secondary morbidities during this time, such as catheter-related bloodstream infections (CRBSI), acute kidney injury (AKI) necessitating dialysis, and ventilator-associated pneumonia (VAP) ⁽⁵⁾.

Thromboembolic Risk: A pro-thrombotic state is induced by the severe systemic inflammatory response syndrome (SIRS) brought on by AL. Despite standard preventive measures, patients with leaks have a significantly higher incidence of pulmonary embolism (PE) and deep vein thrombosis (DVT) because of the cytokine storm and prolonged immobilization ⁽¹⁰⁾.

Long-term Functional Morbidity

The "Stoma-of-No-Return" (Permanent Stoma): The possibility of a permanent stoma is arguably the most catastrophic morbidity. About 25% to 40% of AL patients never have their stomas reversed, despite the fact that a diverting loop ileostomy is frequently meant to be temporary. This results in a lasting change in body image and quality of life and can be caused by severe anastomotic strictures, chronic pelvic sepsis, or a reduction in the patient's performance status ^(9,10), as shown in Figure 2.



Figure 2. Stoma post colorectal tumor resection⁽¹²⁾.

Low Anterior Resection Syndrome (LARS): Severe LARS is independently predicted by AL. Permanent fecal urgency, fragmentation, and incontinence result from the localized pelvic inflammation and fibrosis, which also impair rectal compliance and harm the sensitive innervation of the pelvic floor ⁽²⁾.

The Oncological Morbidity and Impact on Cancer Survival

Decreased Disease-Free Survival (DFS): New research indicates that the inflammatory milieu linked to AL may "prime" the pelvis for cancer recurrence. When a leak heals slowly, growth factors and pro-angiogenic cytokines are released, which can encourage the implantation of exfoliated tumor cells and raise the risk of local recurrence by 20–30% ^(6,11).

Adjuvant Therapy Delays: A leak usually causes a 6–10 week delay in the start of adjuvant chemotherapy. Because it permits the possible growth of micrometastases and jeopardizes the overall oncological success of the original resection, this "therapeutic gap" is clinically relevant ⁽¹⁰⁾.

The Economic and Psychosocial Burden

Healthcare Utilization: The cost of the surgical episode is essentially doubled or tripled by AL. Beyond the financial expense, there is significant "Psychosocial Morbidity"; after a major surgical complication and protracted sepsis, patients frequently experience severe depression and Post-Traumatic Stress Disorder (PTSD) ⁽¹⁾.

Conclusion

Clinical detection of anastomotic leakage is often difficult, as symptoms can range from minor physiological changes to severe septic shock. In modern colorectal surgery, the emphasis has switched from "late-stage rescue" to "early-phase detection" to reduce the high morbidity associated with delayed diagnosis.

Every 24-hour delay in identifying AL raises the risk of permanent stoma and death by about 10-15%. This "Time-is-Tissue" perspective is what makes VAC treatment research so important; it provides a chance to "salvage" Grade B breaches before they become Grade C disasters.

Anastomotic leakage (AL) is still the "Achilles' heel" of colorectal surgery. It is a sentinel occurrence that goes beyond localized surgical failure, causing a cascade of systemic physiological damages. In the modern surgical era, AL is recognized not only as a complication, but also as a primary predictor of both short-term survival and long-term functional and oncological outcomes.

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