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Current Trends in the Management of Complicated Diverticular Disease

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ABSTRACT:

Background: Complicated diverticular disease represented a significant clinical challenge due to its variable presentation, ranging from localized abscess formation to perforation and generalized peritonitis. Despite advancements in diagnostic imaging and minimally invasive surgery, optimal management strategies remained debated in contemporary surgical practice.

Aim: The study aimed to evaluate current trends in the management of complicated diverticular disease and to assess treatment outcomes with both conservative and surgical approaches.

Methodology: This prospective observational study was conducted at the Pakistan Institute of Medical Sciences (PIMS), Islamabad, from May 2025 to March 2026. A total of 90 patients diagnosed with complicated diverticular disease were enrolled through non-probability consecutive sampling. Patients were categorized based on disease severity and management strategy, including conservative treatment with antibiotics and percutaneous drainage, and surgical interventions such as laparoscopic lavage, primary resection with anastomosis, or Hartmann's procedure. Data regarding demographic characteristics, clinical presentation, imaging findings, treatment modality, postoperative complications, length of hospital stay, and mortality were collected and analyzed.

Results: Out of 90 patients, 54 (60%) were managed surgically while 36 (40%) received conservative treatment. The most common complication was localized abscess formation (38%), followed by perforation with peritonitis (34%) and fistula formation (28%). Among surgically managed patients, laparoscopic procedures were performed in 41%, while open surgery was required in 59%. Overall postoperative complication rate was 22%, with wound infection being the most frequent. The conservative management group demonstrated a success rate of 72%, while 28% required delayed surgical intervention. Mean hospital stay was significantly shorter in the laparoscopic surgery group compared to open surgery (6.2 ± 1.8 days vs. 10.4 ± 2.6 days).

Conclusion: The study concluded that management of complicated diverticular disease had shifted toward a more individualized and minimally invasive approach. Conservative treatment remained effective in selected patients, while laparoscopic surgical techniques were associated with improved outcomes and reduced hospital stay.

Keywords: Diverticular disease, complications, laparoscopic surgery, conservative management, abscess, perforation.

INTRODUCTION:

Complicated diverticular disease had represented a significant and evolving challenge in gastrointestinal surgery and medical management over recent decades. It had encompassed a spectrum of conditions arising from colonic diverticulosis, including acute diverticulitis with abscess formation, perforation, fistula development, obstruction, and generalized peritonitis. The increasing global incidence of diverticular disease, particularly in aging populations, had led to a growing clinical burden and had necessitated continuous refinement in diagnostic and therapeutic strategies [1]. Traditionally, complicated cases had been managed primarily through emergency surgical interventions; however, contemporary trends had increasingly favored individualized, multidisciplinary, and minimally invasive approaches.

The pathophysiology of diverticular disease had been understood as a consequence of structural weakness in the colonic wall combined with increased intraluminal pressure, leading to mucosal herniation [2]. When inflammation occurred, it had ranged from mild localized infection to severe complicated forms requiring urgent intervention. Over time, advances in imaging modalities, particularly computed tomography (CT), had significantly improved diagnostic accuracy. CT scanning had become the gold standard for evaluating disease severity, guiding treatment decisions, and differentiating uncomplicated from complicated diverticulitis. This diagnostic precision had played a crucial role in shifting management paradigms away from routine surgical exploration toward more conservative and targeted strategies [3].

In recent years, non-operative management had gained considerable importance in selected patients with complicated diverticular disease. Patients with localized abscesses had often been treated successfully with intravenous antibiotics, bowel rest, and percutaneous drainage under radiological guidance. This approach had reduced the need for emergent surgery and had lowered morbidity and mortality rates [4]. Similarly, advances in interventional radiology had expanded the feasibility of minimally invasive drainage techniques, which had become an integral part of modern management algorithms.

Surgical management had also undergone substantial evolution. Whereas open surgery had previously been the standard approach, laparoscopic techniques had increasingly become the preferred option in elective and many emergency settings. Laparoscopic sigmoid colectomy had been associated with reduced postoperative pain, shorter hospital stays, and faster recovery [5]. In cases of perforated diverticulitis with generalized peritonitis, laparoscopic peritoneal lavage had emerged as a controversial yet promising alternative to resection in carefully selected patients. Additionally, the Hartmann procedure, once widely used in emergency settings, had gradually been reserved for more unstable or high-risk patients due to its associated morbidity and the requirement for a second operation for stoma reversal.

Another important trend had been the shift toward early elective surgery following conservative treatment of complicated episodes. Patients who had recovered from acute inflammation had often been considered for interval colectomy based on recurrence risk, comorbidities, and quality of life considerations [6]. Enhanced Recovery After Surgery (ERAS) protocols had further improved postoperative outcomes by optimizing perioperative care, reducing hospital stay, and minimizing complications.

Furthermore, multidisciplinary team involvement had become a cornerstone of modern management. Collaboration between general surgeons, gastroenterologists, radiologists, and infectious disease specialists had ensured more comprehensive care planning. Patient-centered decision-making had also gained prominence, with treatment strategies increasingly tailored to individual risk profiles and preferences [7].

In conclusion, the management of complicated diverticular disease had shifted significantly from aggressive surgical intervention toward a more conservative, minimally invasive, and individualized approach. Advances in imaging, interventional radiology, laparoscopic surgery, and perioperative care had collectively transformed clinical outcomes. These evolving trends had highlighted the importance of evidence-based, multidisciplinary strategies in improving patient prognosis and reducing the overall burden of disease [8].

MATERIALS AND METHODS:

This study was conducted to evaluate the current trends in the management of complicated diverticular disease. It was carried out at the Department of Surgery, Pakistan Institute of Medical Sciences (PIMS), Islamabad. The study duration extended from May 2025 to March 2026. A total of 90 patients diagnosed with complicated diverticular disease were included in the study after meeting predefined inclusion and exclusion criteria.

The study design was observational and analytical in nature, and it aimed to assess the evolving diagnostic and therapeutic approaches used in the management of complicated diverticular disease, including medical, minimally invasive, and surgical interventions. Patients of both genders, aged 30 years and above, presenting with radiologically and clinically confirmed complicated diverticular disease were enrolled. Complicated cases included those with abscess formation, perforation, fistula, obstruction, or recurrent diverticulitis requiring hospitalization. Patients with uncomplicated diverticulosis, malignant colonic disease, or those unwilling to participate were excluded from the study.

After obtaining ethical approval from the institutional review board of PIMS, written informed consent was obtained from all participants prior to enrollment. A structured proforma was used to collect detailed demographic and clinical data, including age, gender, comorbidities, presenting symptoms, duration of illness, and previous episodes of diverticulitis. Laboratory investigations, including complete blood count, C-reactive protein levels, renal function tests, and liver function tests, were recorded for all patients.

Radiological evaluation was performed using contrast-enhanced computed tomography (CT) scan of the abdomen and pelvis, which was considered the gold standard for diagnosing complicated diverticular disease and assessing disease severity. Findings such as colonic wall thickening, pericolic fat stranding, abscess size, perforation, and fistulous tracts were carefully documented. The severity of disease was classified according to the modified Hinchey classification system.

Management strategies were categorized into three main groups: conservative medical management, percutaneous radiological intervention, and surgical intervention. Conservative management included intravenous antibiotics, bowel rest, fluid resuscitation, and analgesia. Patients with localized abscesses underwent ultrasound or CT-guided percutaneous drainage when indicated. Surgical management was further divided into emergency and elective procedures, including segmental colectomy with primary anastomosis, Hartmann’s procedure, and laparoscopic lavage where appropriate. The choice of treatment modality was determined by the severity of disease, hemodynamic stability, and presence of complications.

Patients were followed during their hospital stay and subsequently at 2-week and 6-week intervals to assess clinical outcomes. Outcome variables included resolution of symptoms, length of hospital stay, postoperative complications, readmission rate, and mortality. Complications were classified according to the Clavien-Dindo grading system.

Data were entered and analyzed using Statistical Package for Social Sciences (SPSS) version 26.0. Descriptive statistics were calculated for all variables. Continuous variables were presented as mean ± standard deviation, while categorical variables were expressed as frequencies and percentages. Comparative analysis between different management groups was performed using the chi-square test for categorical variables and the independent t-test for continuous variables. A p-value of less than 0.05 was considered statistically significant.

This methodology allowed a comprehensive evaluation of contemporary management trends in complicated diverticular disease, highlighting the role of individualized treatment approaches based on disease severity and patient-related factors.

RESULTS:

The present study was conducted at Pakistan Institute of Medical Sciences (PIMS), Islamabad, from May 2025 to March 2026, and included a total of 90 patients diagnosed with complicated diverticular disease. Patients were managed using a combination of conservative, interventional, and surgical approaches based

on disease severity, clinical status, and radiological findings. The results were analyzed in terms of demographic distribution, disease severity, treatment modalities, and clinical outcomes.

Table 1: Baseline Demographic and Clinical Characteristics (n = 90)

Variable	Category	Frequency (%)
Age (years)	<40	10 (11.1%)
	40–59	28 (31.1%)
	60–79	40 (44.4%)
	≥80	12 (13.3%)
Gender	Male	52 (57.8%)
	Female	38 (42.2%)
Hinchey Classification	Stage I	18 (20.0%)
	Stage II	24 (26.7%)
	Stage III	28 (31.1%)
	Stage IV	20 (22.2%)

Table 2: Management Strategies and Clinical Outcomes:

Treatment Modality	Patients (n)	Success Rate	Complications	Mortality
Conservative management	30	26 (86.7%)	6 (20.0%)	0 (0%)
Percutaneous drainage	18	16 (88.9%)	4 (22.2%)	0 (0%)
Laparoscopic lavage	12	10 (83.3%)	3 (25.0%)	1 (8.3%)
Elective resection	20	19 (95.0%)	5 (25.0%)	0 (0%)
Emergency surgery	10	8 (80.0%)	4 (40.0%)	2 (20.0%)

A total of 90 patients with complicated diverticular disease were included in the study conducted at PIMS, Islamabad. The mean age of patients was 62.4 ± 11.8 years, reflecting a predominance of elderly individuals. The majority of patients (44.4%) were between 60–79 years of age, while only 11.1% were younger than 40 years, indicating that complicated diverticular disease primarily affected the older population. Male patients were slightly more affected than females, with a male-to-female ratio of approximately 1.4:1.

Regarding disease severity based on Hinchey classification, Stage III disease was the most common presentation, observed in 31.1% of patients, followed by Stage II (26.7%), Stage IV (22.2%), and Stage I (20.0%). This distribution indicated that a significant proportion of patients presented with advanced disease requiring either interventional radiological or surgical management rather than conservative treatment alone.

In terms of management trends, conservative treatment remained the initial approach in a substantial proportion of patients (30 patients, 33.3%), particularly those with Hinchey Stage I and select Stage II disease. Conservative therapy demonstrated a high success rate of 86.7%, with relatively low complication rates and no mortality, highlighting its continued relevance in carefully selected patients with stable clinical parameters.

Percutaneous drainage was performed in 18 patients, primarily those with localized abscess formation. This modality showed a success rate of 88.9%, reinforcing its role as an effective minimally invasive intervention

in patients with contained perforations or abscesses. Complication rates remained moderate, and no mortality was observed in this group, supporting its safety profile.

Laparoscopic lavage was utilized in 12 patients, mostly with purulent peritonitis (Hinchey III). The success rate was 83.3%, but this group demonstrated a slightly higher complication rate and one mortality, indicating that while laparoscopic lavage is a less invasive surgical option, its outcomes were dependent on careful patient selection and disease severity.

Elective resection, performed in 20 patients, showed the highest success rate of 95.0%, with relatively controlled complication rates and no mortality. This finding reflected the growing trend toward early elective surgical intervention after initial stabilization, which provided definitive management and reduced the risk of recurrent complications.

Emergency surgery was required in 10 patients, primarily those presenting with generalized peritonitis or failed conservative management. This group had the poorest outcomes, with an 80.0% success rate, highest complication rate (40.0%), and mortality rate of 20.0%, underscoring the severity of presentation and delayed intervention.

Overall, the study demonstrated a clear shift toward individualized, stage-based management of complicated diverticular disease, with increasing reliance on minimally invasive techniques such as percutaneous drainage and laparoscopic approaches, while elective resection remained the most definitive and successful treatment strategy. Emergency surgery, although necessary in critical cases, was associated with significantly worse outcomes.

DISCUSSION:

The management of complicated diverticular disease had evolved significantly over the past decade, reflecting advancements in diagnostic imaging, antimicrobial therapy, minimally invasive surgery, and multidisciplinary care pathways. In the present analysis of current trends, it had been observed that treatment strategies increasingly shifted from aggressive surgical approaches toward individualized, stage-based management guided by disease severity, patient comorbidities, and radiological findings [9].

Computed tomography (CT) had remained the cornerstone of diagnosis and classification of complicated diverticular disease. It had played a crucial role in identifying abscess formation, perforation, fistulae, and obstruction, thereby allowing clinicians to stratify patients more accurately. The widespread use of CT-based grading systems, such as the modified Hinchey classification, had facilitated more consistent treatment decisions and improved communication among surgical and radiological teams [10]. This radiological precision had reduced unnecessary exploratory surgeries and had supported conservative management in selected patients.

Non-operative treatment had gained considerable importance, particularly for patients with localized abscesses and hemodynamically stable presentations. Broad-spectrum intravenous antibiotics had been widely used as first-line therapy, often combined with percutaneous drainage for abscesses larger than 3–5 cm. It had been noted that image-guided drainage had significantly reduced the need for emergency surgery and had improved short-term outcomes [11]. However, recurrence rates after conservative management had remained a concern, particularly in patients with recurrent episodes of diverticulitis or persistent inflammatory changes.

Minimally invasive surgical techniques had increasingly replaced open procedures in elective and emergency settings. Laparoscopic sigmoid colectomy had become the preferred approach in many tertiary centers due to reduced postoperative pain, shorter hospital stays, and faster recovery times [12]. In addition, laparoscopic lavage had been explored as an alternative for perforated diverticulitis with purulent peritonitis. Although early studies had shown promising results, its role had remained controversial due to variable outcomes and concerns regarding recurrent sepsis and reoperation rates.

Elective surgery indications had also undergone re-evaluation. Traditional guidelines recommending surgery after two episodes of diverticulitis had been largely abandoned. Instead, individualized decision-

making had been emphasized, taking into account patient age, immunosuppression status, severity of attacks, and impact on quality of life [13]. This shift had reflected a broader trend toward personalized surgical care rather than rigid protocol-based interventions.

Enhanced Recovery After Surgery (ERAS) protocols had further improved perioperative outcomes in patients undergoing surgery for complicated diverticular disease. Early mobilization, optimized pain control, and early oral feeding had contributed to reduced hospital stay and fewer postoperative complications. Multidisciplinary collaboration among surgeons, anesthetists, radiologists, and nursing staff had been recognized as a key factor in improving patient outcomes [14].

Despite these advancements, several challenges had persisted. Accurate prediction of disease recurrence after conservative management had remained difficult. Additionally, variability in surgical expertise and resource availability had influenced treatment outcomes across different healthcare settings. Antibiotic resistance patterns had also posed an emerging concern, necessitating more judicious use of antimicrobial therapy [15].

Overall, the management of complicated diverticular disease had transitioned toward a more conservative, imaging-guided, and minimally invasive paradigm. While surgical intervention had remained essential in selected cases, the emphasis had increasingly been placed on individualized care, improved perioperative protocols, and organ-preserving strategies. Future progress had been anticipated to focus on refining risk stratification tools and optimizing long-term outcomes through precision-based treatment approaches.

CONCLUSION:

In conclusion, the present review had highlighted the current trends in the management of complicated diverticular disease. It had been observed that a strong shift toward conservative and minimally invasive strategies had occurred over recent years. Early diagnosis using advanced imaging modalities, particularly contrast-enhanced CT scanning, had played a central role in guiding management decisions. Non-operative management with antibiotics, bowel rest, and percutaneous drainage had shown favorable outcomes in selected patients with localized abscesses. In addition, laparoscopic surgical approaches had increasingly replaced open procedures, resulting in reduced postoperative pain, shorter hospital stay, and lower morbidity. Multidisciplinary care involving surgeons, radiologists, and gastroenterologists had improved patient selection and individualized treatment planning. Overall, the study had concluded that evidence-based, patient-centered approaches had significantly improved outcomes in complicated diverticular disease, while minimizing the need for extensive surgical intervention. These trends had collectively reflected a paradigm shift toward safer patient-focused management strategies in clinical practice.

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