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COMPLICATED ACUTE DIVERTICULITIS: SURGICAL INDICATIONS IN THE FACE OF CLINICAL TREATMENT FAILURE

DIVERTICULITE AGUDA COMPLICADA: INDICAÇÕES CIRÚRGICAS FRENTE À FALHA DO TRATAMENTO CLÍNICO

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ABSTRACT: Acute diverticulitis is a frequent gastrointestinal emergency, and although most episodes are uncomplicated and resolve with conservative measures, a clinically relevant subgroup develops complicated disease or fails non-operative management, raising the question of when surgical intervention becomes necessary. This narrative review aimed to critically analyse the surgical indications for complicated acute diverticulitis when clinical treatment fails, integrating current guidelines and randomised evidence. A search of PubMed/MEDLINE, SciELO, LILACS, the Cochrane Library and Google Scholar was performed using descriptors related to diverticulitis, peritonitis and surgical management, prioritising publications from the last fifteen years without excluding landmark works. The literature indicates that clinical failure encompasses clinical deterioration, sepsis, free perforation with diffuse peritonitis and abscesses not amenable to or unresponsive to percutaneous drainage. Image-guided drainage and antibiotics manage most contained abscesses, whereas emergency resection remains the reference for diffuse peritonitis. Randomised trials support sigmoidectomy with primary anastomosis over Hartmann's procedure in selected stable patients, while laparoscopic peritoneal lavage has shown inconsistent results. In conclusion, the surgical decision should be individualised according to haemodynamic status, peritoneal contamination, comorbidities and local expertise, and further studies are needed to refine patient selection.

Keywords: Diverticulitis. Colonic Diseases. Digestive System Surgical Procedures. Peritonitis. Colectomy.

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RESUMO: A diverticulite aguda é uma emergência gastrointestinal frequente e, embora a maioria dos episódios seja não complicada e responda a medidas conservadoras, um subgrupo clinicamente relevante evolui com doença complicada ou com falha do tratamento não operatório, suscitando a questão de quando a intervenção cirúrgica se torna necessária. Esta revisão narrativa teve como objetivo analisar criticamente as indicações cirúrgicas da diverticulite aguda complicada diante da falha do tratamento clínico, integrando diretrizes atuais e evidências randomizadas. Foi realizada busca nas bases PubMed/MEDLINE, SciELO, LILACS, Cochrane Library e Google Acadêmico, com descritores relacionados a diverticulite, peritonite e manejo cirúrgico, priorizando publicações dos últimos quinze anos sem excluir trabalhos seminais. A literatura indica que a falha clínica compreende deterioração clínica, sepse, perfuração livre com peritonite difusa e abscessos não passíveis de drenagem percutânea ou sem resposta a ela. A drenagem guiada por imagem e a antibioticoterapia controlam a maioria dos abscessos contidos, enquanto a ressecção de urgência permanece a referência para a peritonite difusa. Ensaios randomizados favorecem a sigmoidectomia com anastomose primária em relação à cirurgia de Hartmann em pacientes estáveis selecionados, ao passo que a lavagem peritoneal laparoscópica apresentou resultados inconsistentes. Conclui-se que a decisão cirúrgica deve ser individualizada conforme o estado hemodinâmico, a contaminação peritoneal, as comorbidades e a expertise local, sendo necessários novos estudos para refinar a seleção dos pacientes.

Palavras-chave: Diverticulite. Doenças do Colo. Procedimentos Cirúrgicos do Sistema Digestório. Peritonite. Colectomia.

INTRODUCTION

Colonic diverticular disease is one of the most prevalent gastrointestinal conditions in industrialised countries and represents a substantial and growing burden for health systems, accounting for a large number of hospital admissions and emergency department visits each year (PEERY AF, et al., 2012). Diverticulosis, the presence of mucosal herniations through the colonic wall, is largely asymptomatic, but a fraction of affected individuals will develop acute inflammation of one or more diverticula, the condition known as acute diverticulitis. Acute diverticulitis occurs in approximately 4% of patients with diverticulosis, and of these around 15% present with complicated disease, defined by the presence of abscess, perforation, fistula or obstruction (STOLLMAN N, et al., 2015).

The clinical relevance of the topic is reinforced by the progressive ageing of the population and by lifestyle factors, since several modifiable determinants such as obesity, low-fibre diet and physical inactivity have been consistently associated with the development and recurrence of diverticulitis (STRATE LL and MORRIS AM, 2019). In parallel, the epidemiological transition observed in middle-income countries, including Brazil, has been accompanied by an increase in the incidence of diverticular disease and its complications, which

makes the rational management of severe presentations a matter of direct interest for national surgical practice (DIAS AR, et al., 2009).

Most episodes of acute diverticulitis are uncomplicated and resolve with conservative treatment, and contemporary evidence has even questioned the routine use of antibiotics in mild presentations (STOLLMAN N, et al., 2015; HALL J, et al., 2020). The central problem addressed by this review, however, lies precisely at the opposite end of the disease spectrum: the patient with complicated disease, or the patient initially managed non-operatively who deteriorates or does not improve. In these circumstances the clinician faces a decision that is simultaneously time-sensitive and consequential, because both an unnecessary emergency operation and an inappropriately delayed one carry significant morbidity and mortality.

Despite the existence of several international guidelines and a number of randomised controlled trials published in the last decade, important uncertainties persist regarding the precise threshold at which clinical treatment should be considered to have failed, the choice of operative strategy in the emergency setting, and the role of less invasive alternatives such as laparoscopic peritoneal lavage. The justification for the present article therefore rests on the need to organise and critically appraise this dispersed and sometimes conflicting body of evidence in a way that is useful for clinical reasoning. Accordingly, the objective of this review is to critically analyse the surgical indications for complicated acute diverticulitis in the context of clinical treatment failure, examining the conceptual definitions involved, the available scientific evidence, its practical applications, and the controversies and perspectives that surround this clinical problem.

METHODS

This study was conducted as a narrative, critical and descriptive review of the literature. The narrative design was chosen deliberately and in accordance with the nature of the research question: the aim was not to produce a quantitative synthesis of homogeneous outcomes, which would require a systematic review with meta-analysis, but rather to integrate and critically interpret heterogeneous sources – clinical practice guidelines, consensus statements, randomised controlled trials, observational studies and reference reviews – that jointly inform the decision to operate in complicated acute diverticulitis. The narrative format is appropriate when the objective is to articulate a clinical reasoning process and to weigh evidence of differing types and quality against one another, rather than to estimate a single pooled effect. To

attenuate the well-recognised susceptibility of narrative reviews to selection bias, the search, selection and synthesis steps were made explicit and are described below.

The review was organised around a guiding question formulated according to a population–concept–context structure adapted to the topic: in adult patients with complicated acute diverticulitis (population), what are the indications for surgical intervention and the comparative outcomes of the available operative strategies (concept) when conservative clinical treatment fails or proves insufficient (context)? This question delimited the scope of the search and provided the criterion against which the relevance of each retrieved source was judged.

Bibliographic searches were performed in the PubMed/MEDLINE, SciELO, LILACS and Cochrane Library databases, with Google Scholar used as a complementary tool to retrieve additional records and to track citations of pivotal studies. Controlled vocabulary terms drawn from the Medical Subject Headings (MeSH) and from the Health Sciences Descriptors (DeCS) were combined with free-text terms in order to balance specificity and sensitivity. The principal English descriptors were 'Diverticulitis', 'Diverticulitis, Colonic', 'Peritonitis', 'Colectomy', 'Colostomy', 'Anastomosis, Surgical' and 'Peritoneal Lavage', complemented by the free-text expressions 'complicated diverticulitis' and 'perforated diverticulitis'; the corresponding Portuguese descriptors were 'Diverticulite', 'Diverticulite do Colo', 'Peritonite', 'Colectomia', 'Colostomia', 'Anastomose Cirúrgica' and 'Lavagem Peritoneal'. These terms were articulated through the Boolean operators AND and OR – for example, ('complicated diverticulitis' OR 'perforated diverticulitis') AND ('Colectomy' OR 'Hartmann' OR 'primary anastomosis' OR 'Peritoneal Lavage') – and the reference lists of the most relevant articles were additionally hand-searched to identify further pertinent studies.

The search prioritised publications from the last fifteen years, in keeping with the rapid evolution of surgical evidence in this field, and particularly with the randomised trials published from 2012 onwards. Classic and foundational works were retained whenever they remained indispensable for the conceptual understanding of the subject, as in the case of the original description of the surgical staging of perforated disease, which predates this window but continues to structure clinical practice. Publications in English, Portuguese and Spanish were considered eligible.

Records identified through the searches were screened by title and abstract for thematic pertinence to the guiding question, and the potentially relevant articles were subsequently examined in full text. Selection was governed by an explicit hierarchy of evidence rather than

by a predefined numerical target: clinical practice guidelines developed with formal methodology, systematic reviews, meta-analyses and randomised controlled trials were assigned the greatest weight, followed by prospective observational studies and, lastly, by narrative reviews and reference chapters used for conceptual or contextual support. When several sources addressed the same question, preference was given to the most recent, the most methodologically robust and the most directly applicable to the clinical scenario under analysis.

Inclusion criteria comprised studies addressing the definition, classification, diagnosis or treatment of complicated acute diverticulitis, with particular attention to the criteria for surgical intervention and to the comparison of operative strategies. Exclusion criteria comprised publications unrelated to the central theme, duplicate records, editorials and letters without original data, and texts whose methodological fragility or absence of essential information compromised their interpretation. The methodological quality and the level of evidence of each retained source were taken into account when weighing its contribution, although a formal quantitative risk-of-bias assessment, proper to systematic reviews, was not undertaken, consistent with the narrative nature of the study.

The information extracted from the selected sources was organised thematically into the conceptual axes that structure the following section. Findings were synthesised narratively, and divergences between studies, most notably the conflicting results concerning laparoscopic peritoneal lavage, were presented explicitly rather than reconciled artificially, so that the persisting degree of uncertainty in the field would remain apparent to the reader. As this is a literature review based exclusively on previously published data, without the participation of human subjects or the use of identifiable personal information, evaluation by a research ethics committee was not required.

RESULTS AND DISCUSSION

Conceptual foundations: complicated diverticulitis and its classification

The distinction between uncomplicated and complicated acute diverticulitis is the conceptual cornerstone of management. Uncomplicated disease corresponds to inflammation confined to the colonic wall and pericolic fat, whereas complicated disease is defined by the presence of an abscess, free or contained perforation, fistula, obstruction or generalised peritonitis (STOLLMAN N, et al., 2015; HALL J, et al., 2020). This separation is not merely

descriptive: it directly conditions the probability that conservative treatment will succeed and, consequently, the likelihood that surgery will be required.

The most influential framework for stratifying severity remains the classification proposed by Hinchey EJ, et al. (1978), which graded perforated diverticular disease according to operative findings into four stages: stage I, localised pericolic abscess; stage II, distant or pelvic abscess; stage III, generalised purulent peritonitis; and stage IV, generalised faecal peritonitis. The clinical value of this system lies in its correlation with prognosis and with the aggressiveness of the required intervention, since the higher stages are associated with greater contamination, instability and mortality.

Because the original Hinchey classification was based on intraoperative findings at a time when cross-sectional imaging was not routinely available, it was subsequently adapted to incorporate the information provided by computed tomography. Kaiser AM, et al. (2005) proposed a modified classification that integrated tomographic findings, allowing severity to be estimated preoperatively and supporting decisions about percutaneous drainage versus operative management. Computed tomography of the abdomen and pelvis is currently regarded as the reference imaging modality for the diagnosis and staging of acute diverticulitis, as it identifies abscesses, free air and distant collections and thereby guides the therapeutic pathway (SARTELLI M, et al., 2020; HALL J, et al., 2020).

Table 1 summarises the Hinchey stages and their usual therapeutic correlates, which serve as a reference framework for the discussion that follows. It should be emphasised, however, that the correspondence between radiological stage and intraoperative reality is imperfect, a limitation that will be revisited when the controversies of the field are addressed (Table 1).

Table 1 - Hinchey classification of perforated diverticulitis and usual therapeutic correlates.

Stage	Description	Usual therapeutic correlate
I	Localised pericolic abscess	Antibiotics; percutaneous drainage if large
II	Distant or pelvic abscess	Antibiotics and image-guided percutaneous drainage
III	Generalised purulent peritonitis	Emergency surgery (resection; lavage in selected cases)
IV	Generalised faecal peritonitis	Emergency resection with source control

Fonte: HINCHEY EJ, et al., 1978; KAISER AM, et al., 2005; SARTELLI M, et al., 2020.

Epidemiological and pathophysiological basis

Understanding why a minority of patients progress to complicated disease requires attention to both epidemiology and pathophysiology. From an epidemiological standpoint, approximately one in five patients with an incident episode of diverticulitis will experience at least one recurrence, although, importantly, the risk of severe complications such as free perforation tends to be highest at the first presentation and decreases with subsequent episodes (STRATE LL and MORRIS AM, 2019). This observation has profound implications for surgical indication, since it undermines the historical rationale of operating electively simply to prevent future complicated recurrences.

The pathophysiology of diverticulitis is increasingly understood as multifactorial. Mechanical factors related to elevated intraluminal pressure and altered colonic neuromuscular activity interact with low-grade mucosal inflammation, alterations in the intestinal microbiome and genetic predisposition (STRATE LL and MORRIS AM, 2019). Complicated disease arises when transmural inflammation progresses to microperforation and then to abscess formation or, in more severe cases, to free perforation with peritoneal contamination. The degree and nature of this contamination, purulent or faecal, is precisely what the Hinchey stages attempt to capture.

Certain host factors substantially increase the probability of complicated disease and of clinical failure. Immunosuppression, whether due to transplantation, chronic corticosteroid use or other causes, is repeatedly identified as a determinant of worse outcomes and a lower threshold for surgical consideration (HALL J, et al., 2020; SARTELLI M, et al., 2020). Advanced age, significant comorbidity and haemodynamic instability at presentation likewise shift the balance towards early operative management, because these patients tolerate prolonged unsuccessful conservative treatment poorly.

In the Brazilian and broader Latin American context, the rising prevalence of diverticular disease accompanying population ageing and dietary westernisation reinforces the relevance of standardised criteria for surgical indication, since access to advanced radiological and surgical resources is heterogeneous across services (DIAS AR, et al., 2009).

Clinical treatment and the concept of treatment failure

Conservative or clinical treatment is the initial approach for the great majority of patients and forms the necessary backdrop against which the notion of failure must be defined.

For uncomplicated disease, management is based on supportive care and, selectively, antibiotics, with growing evidence that antibiotics may be omitted in carefully chosen mild cases (STOLLMAN N, et al., 2015; HALL J, et al., 2020). For complicated disease with a contained abscess, the combination of broad-spectrum antibiotics and, when the collection is sufficiently large, image-guided percutaneous drainage allows a substantial proportion of patients to avoid emergency surgery (SARTELLI M, et al., 2020).

Current guidelines converge on the recommendation that hemodynamically stable patients with a diverticular abscess larger than approximately 3 to 4 centimetres should undergo percutaneous drainage in addition to antibiotic therapy, reserving operative intervention for those in whom this strategy is not feasible or does not succeed (HALL J, et al., 2020; SARTELLI M, et al., 2020). Smaller abscesses are frequently managed with antibiotics alone. This stepwise, organ-preserving philosophy reflects the broader shift towards less aggressive management that has characterised the field over the past two decades.

Against this background, clinical failure can be operationally understood as the situation in which non-operative management does not control the disease process. In practical terms, this includes persistent or worsening abdominal pain and signs of peritoneal irritation, clinical and laboratory evidence of uncontrolled sepsis, failure of an abscess to resolve or its recurrence after drainage, the appearance of free perforation with diffuse peritonitis, and the development of obstruction or fistula that does not respond to conservative measures (SARTELLI M, et al., 2020; DIAS AR, et al., 2009). The recognition that the disease is no longer being controlled, rather than the mere persistence of symptoms, is what converts a clinical problem into a surgical one.

It is important to note that the failure of clinical treatment is not a single event but a spectrum. At one extreme lies the catastrophic presentation of free faecal peritonitis with septic shock, in which surgery is mandatory and urgent. At the other lies the smouldering abscess that fails to fully resolve, in which the indication for surgery is relative and the timing can often be deliberated. Table 2 organises the principal scenarios that characterise the failure of clinical treatment and the corresponding surgical implication (Table 2).

Table 2 - Scenarios of clinical treatment failure and corresponding surgical implication.

Scenario	Clinical characteristics	Surgical implication
Free perforation with diffuse peritonitis	Diffuse abdominal rigidity, free air, sepsis	Urgent emergency operation
Uncontrolled sepsis / instability	Persistent fever, leukocytosis, haemodynamic instability	Early operation for source control
Abscess refractory to drainage	Collection that does not resolve or recurs after percutaneous drainage	Operative management; timing individualised
Abscess not amenable to drainage	Inaccessible or multiloculated collection	Operation if no clinical improvement
Obstruction or symptomatic fistula	Bowel obstruction or fistula refractory to conservative care	Elective or semi-elective resection

Fonte: SARTELLI M, et al., 2020; HALL J, et al., 2020; DIAS AR, et al., 2009.

Available scientific evidence on emergency surgical strategies

When clinical treatment fails and emergency surgery becomes necessary, the central technical question is how to achieve source control while minimising both immediate mortality and the long-term burden of a stoma. Three strategies dominate the contemporary debate: resection with end colostomy (Hartmann's procedure), resection with primary anastomosis (with or without a diverting stoma), and laparoscopic peritoneal lavage without resection. The last fifteen years have produced randomised evidence on all three, transforming what was once a largely dogmatic field.

Hartmann's procedure, consisting of sigmoid resection with creation of an end colostomy and closure of the rectal stump, was for decades the default operation for perforated diverticulitis with peritonitis because it removes the diseased segment and avoids an anastomosis in a contaminated field. Its principal drawback is that a considerable proportion of patients never undergo reversal of the colostomy, and reversal itself is a major operation with its own morbidity (DIAS AR, et al., 2009). This recognised limitation motivated the search for alternatives that could preserve intestinal continuity.

Resection with primary anastomosis, frequently protected by a diverting loop ileostomy, emerged as such an alternative for selected patients. The DIVERTI trial, a multicentre randomised study comparing primary anastomosis with Hartmann's procedure in generalised peritonitis, found similar mortality between the two arms but a significantly higher

rate of stoma reversal in the primary anastomosis group, supporting this approach in appropriately selected patients (BRIDOUX V, et al., 2017). Convergent findings had already been reported in an earlier randomised trial that was terminated prematurely but likewise favoured restoration of continuity (OBERKOFLER CE, et al., 2012).

The most influential evidence on this question comes from the LADIES trial. In its arm comparing Hartmann's procedure with sigmoidectomy and primary anastomosis for purulent or faecal peritonitis, stoma-free survival at twelve months was markedly superior after primary anastomosis (94.6%) than after Hartmann's procedure (71.7%), while overall morbidity was comparable between the groups (LAMBRICHTS DPV, et al., 2019). The authors concluded that, in haemodynamically stable and immunocompetent patients younger than 85 years, primary anastomosis is preferable to Hartmann's procedure. These results have been incorporated into contemporary guidelines, which now recommend considering primary anastomosis in stable patients rather than defaulting to Hartmann's procedure (HALL J, et al., 2020; SARTELLI M, et al., 2020).

Laparoscopic peritoneal lavage, in which the peritoneal cavity is irrigated and drained without resecting the colon, was proposed as an even less invasive option for purulent peritonitis (Hinchey III). The evidence, however, has been inconsistent. The DILALA trial reported that lavage was feasible and safe in the short term, with morbidity and mortality comparable to Hartmann's procedure and with shorter operating time, recovery and hospital stay (ANGENETE E, et al., 2016). In contrast, the SCANDIV trial found that lavage did not reduce severe postoperative complications and was associated with a higher reoperation rate than primary resection, leading its authors to advise against the technique (SCHULTZ JK, et al., 2015). The lavage arm of the LADIES trial was stopped early because of concerns about worse short-term outcomes in the lavage group (VENNIX S, et al., 2015).

Taken together, the randomised evidence shows that laparoscopic lavage can avoid a stoma and reduce operative invasiveness in carefully selected patients with purulent peritonitis, but at the cost of a higher risk of reintervention and persistent intra-abdominal infection, and it is not appropriate when faecal peritonitis (Hinchey IV) is present. Table 3 synthesises the comparative profile of the three principal emergency strategies (Table 3).

Table 3 - Comparison of the principal emergency surgical strategies for perforated diverticulitis.

Strategy	Main advantage	Main limitation	Preferential context
Hartmann's procedure	Avoids anastomosis in contaminated field	High rate of non-reversal of the stoma	Instability, faecal peritonitis, high risk
Primary anastomosis (± diverting ileostomy)	Higher stoma-free survival; restores continuity	Anastomotic risk in contaminated field	Stable, immunocompetent patients < 85 years
Laparoscopic peritoneal lavage	Less invasive; avoids resection and stoma	Higher reoperation; inconsistent evidence	Selected Hinchey III (purulent) peritonitis

Fonte: BRIDOUX V, et al., 2017; LAMBRICHTS DPV, et al., 2019; ANGENETE E, et al., 2016; SCHULTZ JK, et al., 2015; VENNIX S, et al., 2015.

Practical application: surgical indication and decision-making

Translating this evidence into bedside decisions requires an explicit hierarchy of priorities. The first and overriding objective in the patient who fails clinical treatment is source control of the septic focus; the choice of reconstructive technique is subordinate to this goal. Guidelines therefore frame the decision in terms of patient stability and the degree of peritoneal contamination rather than in terms of a fixed operation (SARTELLI M, et al., 2020; HALL J, et al., 2020).

For the haemodynamically unstable patient with diffuse peritonitis, particularly faecal peritonitis, prompt resection with the safest possible reconstruction is indicated, and Hartmann's procedure remains a legitimate and often prudent choice because it avoids the risk of anastomotic dehiscence in a grossly contaminated and physiologically deranged patient. For the stable, immunocompetent patient without faecal contamination, the accumulated randomised evidence supports resection with primary anastomosis, usually protected by a diverting ileostomy, as the strategy most likely to spare the patient a permanent stoma (LAMBRICHTS DPV, et al., 2019; BRIDOUX V, et al., 2017).

Laparoscopic lavage occupies a narrower and more contested niche. It may be considered in selected patients with purulent peritonitis and without faecal contamination, ideally where laparoscopic expertise is available, but the patient must be counselled about the increased likelihood of reintervention (SCHULTZ JK, et al., 2015; ANGENETE E, et al., 2016). In the setting of a contained abscess that has failed percutaneous drainage but without diffuse peritonitis, the urgency is lower and the operation can frequently be planned rather than performed as an emergency.

An additional practical dimension concerns the elective indication for surgery after recovery from complicated disease. Historical recommendations to resect electively after a fixed number of episodes have been abandoned in favour of an individualised decision that weighs the frequency and severity of episodes, the persistence of symptoms, the patient's comorbidities and preferences, and the operative risk (HALL J, et al., 2020; STRATE LL and MORRIS AM, 2019). The same individualisation applies with particular force to immunosuppressed patients, in whom both the risk of complicated recurrence and the operative risk are elevated.

Finally, the influence of institutional and surgeon-level factors should not be underestimated. Higher-volume teams tend to apply minimally invasive approaches more broadly, including in complicated cases, without an evident penalty in morbidity, which suggests that expertise and resources legitimately modulate the surgical indication in real-world practice (DIAS AR, et al., 2009).

Controversies, limitations and challenges

Several genuine controversies remain. The first concerns the reliability of preoperative staging. Because computed tomography does not always discriminate accurately between purulent and faecal peritonitis or between Hinchey stages, the very category on which the choice of operation depends may be uncertain until laparotomy or laparoscopy (KAISER AM, et al., 2005). This imperfect correspondence between radiological and intraoperative findings limits the precision with which strategies such as laparoscopic lavage can be allocated.

A second controversy relates to laparoscopic lavage itself. The discordance between the favourable short-term results of DILALA and the cautionary findings of SCANDIV and of the lavage arm of LADIES illustrates how trials addressing apparently the same question can reach divergent conclusions, owing to differences in patient selection, surgical technique and outcome definitions (ANGENETE E, et al., 2016; SCHULTZ JK, et al., 2015; VENNIX S, et al., 2015). Available evidence therefore supports caution rather than a uniform recommendation.

A third limitation is intrinsic to the body of evidence. Randomised trials in emergency surgery are difficult to conduct, frequently enrol modest numbers of patients, and sometimes terminate prematurely, which constrains the strength of the conclusions that can be drawn and the confidence with which they can be generalised to heterogeneous populations and resource settings (OBERKOFLER CE, et al., 2012; VENNIX S, et al., 2015). Most pivotal trials were

conducted in high-income countries, and their transferability to settings with different access to radiology, intensive care and laparoscopic expertise, such as parts of the Brazilian public health system, has not been formally established (DIAS AR, et al., 2009).

A final challenge is the risk of inappropriate interpretation. Equating the simple persistence of symptoms with clinical failure may lead to unnecessary operations, whereas an excessively conservative stance in the face of genuine sepsis may delay essential source control. The literature consistently favours a nuanced, individualised judgement over rigid algorithms.

Future perspectives

Future progress will likely depend on improving the precision of patient selection. The development and validation of classification systems that combine clinical, laboratory and radiological variables could refine the preoperative estimate of contamination and thereby better match each patient to the optimal strategy (KAISER AM, et al., 2005; SARTELLI M, et al., 2020). Larger pragmatic trials and well-conducted registries, including data from middle-income countries, would help clarify the role of laparoscopic lavage and the boundaries of primary anastomosis in real-world conditions.

There is also room for progress in standardising the operational definition of clinical failure, so that the decision to operate is triggered by reproducible criteria rather than by individual judgement alone. Finally, continued evaluation of organ-preserving and minimally invasive approaches, together with attention to patient-reported outcomes such as stoma-free survival and quality of life, is likely to shape the next generation of recommendations (LAMBRICHTS DPV, et al., 2019; STRATE LL and MORRIS AM, 2019).

CONCLUSION

This review set out to critically analyse the surgical indications for complicated acute diverticulitis when clinical treatment fails. The synthesis of current guidelines and randomised evidence indicates that the decision to operate is best understood not as the response to a single sign but as the recognition that non-operative management is no longer controlling the disease, a situation that ranges from the catastrophic free perforation with diffuse peritonitis to the indolent abscess refractory to drainage.

The main findings can be summarised as follows. Most complicated abscesses are managed successfully with antibiotics and image-guided percutaneous drainage, reserving

emergency surgery for diffuse peritonitis, uncontrolled sepsis and collections that cannot be drained or do not respond. When emergency resection is required, randomised evidence supports primary anastomosis over Hartmann's procedure in stable, immunocompetent patients, because it offers higher stoma-free survival with comparable morbidity, whereas Hartmann's procedure retains a role in unstable patients and in faecal peritonitis. Laparoscopic peritoneal lavage may benefit selected patients with purulent peritonitis but carries a higher risk of reintervention and remains contested.

The clinical and scientific relevance of these conclusions lies in their potential to reduce both unnecessary operations and harmful delays, and to limit the burden of permanent stomas. At the same time, the available literature has clear limitations, including the modest size and occasional premature termination of trials, the imperfect accuracy of preoperative staging, and the uncertain transferability of results to settings with heterogeneous resources. From a future perspective, refining patient selection through validated combined classifications, standardising the definition of clinical failure, and generating evidence applicable to middle-income contexts emerge as the priorities most likely to improve the care of these patients.

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