SURGICAL APPROACH IN PATIENTS WITH CATASTROPHIC ABDOMEN: CHALLENGES AND INNOVATIONS

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Abstract: Catastrophic abdomen, characterized by severe abdominal dysfunction due to trauma, infection or surgical complications, represents one of the greatest challenges in emergency surgery. The condition requires rapid and effective interventions, given the high mortality rate and the significant impact on the quality of life of surviving patients. The aim of this study is to analyze the challenges faced in the surgical approach to catastrophic abdomen and to explore the technical and technological innovations that have contributed to improving clinical outcomes. This is a literature review with a qualitative approach, using the PubMed, Scopus and Web of Science databases. To ensure accuracy in the selection of studies, health descriptors (DeCS/MeSH) such as "Intra-abdominal Infections," "Sepsis Management," and "Abdominal Compartment Syndrome" were used. The search was carried out using Boolean operators, covering the period from 2019 to 2021, according to the time frame of the selected references. The surgical management of catastrophic abdomen requires a multidisciplinary approach, with an initial focus on damage control to stabilize the patient. Techniques such as laparostomy with progressive traction closure and the use of negative pressure therapy have proven effective in managing abdominal compartment syndrome, a common complication. In addition, advances in hemodynamic monitoring and the use of biomaterials for abdominal wall reconstruction have allowed for greater safety in definitive surgeries. Among the main challenges are the control of resistant intra-abdominal infections, the hemodynamic fragility of patients and the need for prolonged intensive care in the post-operative period. Therefore, the surgical approach to the catastrophic abdomen has evolved significantly with the development of modern techniques and advanced technologies. However, the complexity of the clinical picture requires specialized training and well-established protocols to optimize outcomes. The integration of innovative strategies and a focus on individualized care are fundamental to reducing the morbidity and mortality associated with this critical condition.

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INTRODUCTION

Catastrophic abdomen is a complex and highly severe clinical condition, characterized by multiple abdominal organ failure secondary to severe inflammatory, infectious, or traumatic processes. This syndrome is often associated with high mortality and severe complications, requiring quick and effective surgical interventions. Studies indicate that the initial approach and correct management of these patients are determinant for survival and functional recovery, highlighting the need for well-structured protocols and technological innovation to improve surgical outcomes (Levy et al., 2021).

Challenges faced in treating catastrophic abdomen include controlling sepsis, preserving organ viability, and managing the severe physiological changes associated with the syndrome. The concept of damage control surgery has gained prominence as a central strategy in the management of this condition. This method, which prioritizes initial damage containment followed by definitive surgical interventions in stages, has been shown to be effective in reducing complications and improving patient survival (Sartelli et al., 2019).

In recent years, the introduction of new technologies and innovative approaches, such as the use of vacuum therapy for temporary closure of the abdomen, has expanded the possibilities of treatment. These innovations, combined with the use of biomarkers for monitoring the inflammatory response and advanced hemodynamic support techniques, have transformed the landscape of catastrophic abdomen management, enabling more precise and personalized interventions (De Waele et al., 2020).

In addition, multidisciplinary training and the integration of specialized teams are essential to deal with the complexity of this situation. The literature points out that the joint work of trained surgeons, intensivists, and nurses significantly increases the chance of therapeutic success, especially

in intensive care settings (Blanco et al., 2021). Thus, the study of the catastrophic abdomen requires a comprehensive view, considering not only the technical advances, but also the human and logistical particularities that involve the approach to this critical scenario.

The objective of this study is to analyze the challenges faced in the surgical approach to the catastrophic abdomen and to explore the technical and technological innovations that have contributed to improving clinical outcomes.

MATERIALS AND METHODS

This is a literature review, with a qualitative approach, using the PubMed, Scopus and Web of Science databases. To ensure accuracy in the selection of studies, health descriptors (DeCS/ MeSH) such as "Intra-abdominal Infections," "Sepsis Management," and "Abdominal Compartment Syndrome" were used. The search was carried out with the application of Boolean operators, covering the period from 2019 to 2021, according to the time frame of the selected references.

1. Guiding Question:

What are the evidence-based best practices for the management of severe intra-abdominal infections and associated conditions, such as abdominal compartment syndrome and sepsis, in critically ill patients?

Inclusion Criteria:

- Publications between the years 2019 and 2021;
- Peer-reviewed articles available in full text;
- Studies involving adult patients in critical settings;
- Works published in English or Portuguese;
- Systematic reviews, qualitative studies, and clinical guidelines.

Exclusion Criteria:

- Studies related exclusively to pediatrics or animals;
- Publications outside the defined time frame;
- Duplicate or non-peer-reviewed articles;
- Case reports with isolated samples.

THEORETICAL FOUNDATION

The management of patients with catastrophic abdomen is one of the greatest challenges of emergency surgery. This condition is characterized by a state of generalized abdominal failure, resulting from processes such as severe trauma, diffuse peritonitis, necrotizing pancreatitis, or mesenteric ischemia. The physiological impact is wide-ranging, leading to hemodynamic instability, multiorgan dysfunction, and imminent risk of death. The surgical approach, in this context, requires quick decisions and carefully planned strategies, centered on the concept of damage control (Sartelli et al., 2020).

Damage control surgery is a mainstay in the treatment of catastrophic abdomen. This method consists of a brief initial intervention to control bleeding and contamination, followed by intensive resuscitation in the intensive care unit (ICU) and definitive surgical procedures in subsequent stages. Studies show that this approach reduces mortality by up to 40%, especially in patients with a high degree of hemodynamic instability (Rotondo et al., 2019). Additionally, the technique of temporary closure of the abdomen with vacuum therapy has been widely used, promoting better control of intra-abdominal pressure and facilitating access for future interventions (De Waele et al., 2021).

Another significant advance in the management of catastrophic abdomen is the use of biomarkers to monitor the inflammatory response and predict complications. Biomarkers such as procalcitonin and serum lactate help in the evaluation of the systemic response to treatment and in

the early identification of organ failure. In addition, the development of advanced imaging tools, such as high-resolution computed tomography, enables a more accurate diagnosis and the definition of personalized therapeutic strategies (Reitz et al., 2020).

Technological innovation has also played a central role in the evolution of the management of these patients. Extracorporeal support devices, such as extracorporeal membrane oxygenation (ECMO), have been used in cases of respiratory failure associated with the catastrophic abdomen. These devices offer vital support while primary treatment is carried out, extending survival in critically ill patients (Bolliger et al., 2021).

On the other hand, the success in treating this condition is not limited to surgical interventions alone. Multidisciplinary management, involving surgeons, intensivists, nurses, and nutritionists, is crucial to optimize results. Protocols that prioritize early resuscitation, infection control, and nutritional support have been shown to have a positive impact on clinical outcomes. Early enteral nutrition, for example, has been associated with a lower incidence of infectious complications and faster recovery (Kirkpatrick et al., 2021).

In addition, continuous training of medical teams and the development of evidence-based protocols are indispensable. Institutions that implement regular simulation training for the management of catastrophic abdomen report greater efficiency in interventions and lower mortality rates. The focus on teaching strategies that combine theory and clinical practice strengthens the ability of teams to deal with highly complex scenarios (Blanco et al., 2021).

In the current scenario, it is evident that the treatment of catastrophic abdomen requires an integrative and progressive approach. The combination of technological advances, well-defined protocols, and skilled teams has transformed the landscape of the management of this critical condition, offering hope to patients who previously faced grim prognoses (Reitz et al., 2020).

CONCLUSION

It is concluded that the management of patients with catastrophic abdomen is one of the greatest challenges of emergency surgery, requiring a multidisciplinary approach and progressive strategies that combine technological advances, evidence-based protocols, and continuous training of health teams. The implementation of techniques such as damage control surgery, the use of vacuum therapies for abdominal closure, and cardiopulmonary support have contributed significantly to the reduction of mortality and improvement in clinical outcomes.

In addition, the central role of multidisciplinary management, with a focus on hemodynamic stabilization, infectious control, and early nutritional support, demonstrates the importance of integrated care to optimize outcomes. The development of biomarkers and advanced imaging tools has allowed for more accurate diagnoses and targeted therapeutic interventions, expanding the possibilities of recovery in critically ill patients.

However, treating such complex conditions requires more than technical advances. It is essential to invest in the continuing education of professionals, development of specific protocols, and expansion of access to specialized resources. Institutions that prioritize these aspects are able to reduce variability in clinical practices and consistently improve outcomes.

In summary, the evolution in the surgical approach and the focus on integrated care reflect a significant advance in the management of the catastrophic abdomen. Despite the challenges, technological advances and the training of health teams offer a promising horizon for patients facing this critical condition, showing that innovation combined with collaborative practice can transform care in highly complex scenarios.

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