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PERFORATED PEPTIC ULCER: SURGICAL APPROACH AND CURRENT MANAGEMENT STRATEGIES

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Abstract: Perforated peptic ulcer (PPU) is a serious complication of ulcer disease and a surgical emergency with high morbidity and mortality rates. Although the overall incidence of ulcers has decreased, perforation rates remain stable, often associated with *Helicobacter pylori* infection and NSAID use. The gold standard treatment is surgical intervention, with the laparoscopic approach recommended as the first line for stable patients, demonstrating advantages such as shorter hospital stays and lower postoperative morbidity rates compared to open surgery. The most common repair technique is simple suture with omentopexy. However, for giant perforations (> 2 cm), a significant surgical challenge, the *omental plugging* technique has proven superior, with a significant reduction in complications and mortality. In children, PPU is mostly linked to H. *pylori* infection. As minimally invasive surgery becomes more established, endoscopic repair techniques are emerging as future alternatives for selected cases.

Keywords: Perforated Peptic Ulcer; Surgical Approach; Laparoscopy; Omentopexy; Omental Tamponade; Peritonitis; Surgical Emergency.

INTRODUCTION

Perforated peptic ulcer (PPU) is a serious and potentially fatal complication of peptic ulcer disease, constituting one of the main causes of acute peritonitis and a frequent surgical emergency on a global scale (Costa et al., 2023; Krajnović et al., 2025). As this is a condition with high morbidity and mortality, early detection and timely intervention are important factors for a better outcome (Krajnović et al., 2025). Although the incidence of peptic ulcer disease has declined in recent decades, mainly attributed to the eradication of Helicobacter pylori and the widespread use of proton pump inhibitors, the perforation rate has remained relatively constant, accounting for a significant portion of ulcer-related mortality (Costa et al., 2023; Coco et al., 2022). The etiology of PPU is multifactorial, resulting from an imbalance between the protective mechanisms of the gastric mucosa (mucus and bicarbonate secretion), involving factors such as H. pylori infection, the use of nonsteroidal anti-inflammatory drugs (NSAIDs), smoking, and alcohol consumption (Coco et al., 2022; Krajnović et al., 2025). Although the occurrence of PPU is consistent throughout the year, studies suggest a potential seasonal pattern for symptomatic perforations, with some regions reporting a higher incidence in the winter months (Krajnović et al., 2025). The classic clinical picture is marked by the triad of sudden abdominal pain, tachycardia, and abdominal rigidity, and the best diagnostic modality is computed tomography (CT), with 98% accuracy (Coco et al., 2022). The standard treatment for PPU is surgical intervention, which has evolved from traditional open procedures to minimally invasive techniques, such as laparoscopy, which are gaining prominence for their potential benefits (Costa et al., 2023; Coco et al., 2022). The choice of approach and repair technique, however, is still a subject of debate, especially in cases of giant perforations (Tullavardhana et al., 2022).

METHODOLOGY

This research is a narrative review of the literature, conducted with the purpose of compiling and critically analyzing the most recent scientific evidence on the surgical approach and management strategies

for perforated peptic ulcers. The articles were retrieved from the PubMed database using the terms 'Peptic Ulcer Perforation', 'Treatment', and 'Surgery', combined using the Boolean operators AND and OR, according to the terminology of Medical Subject Headings (MeSH). The inclusion criteria selected publications from the last five years, available in full in Portuguese or English, that directly addressed the topic. Studies that did not align with the scope of the study, duplicate publications, narrative reviews with low methodological rigor, and non-indexed articles were excluded. The study selection process took place in two phases: an initial screening of titles and abstracts, followed by a complete evaluation of the texts to confirm their relevance. Relevant data were extracted and synthesized in a descriptive manner.

RESULTS AND DISCUSSION

A perforated peptic ulcer is a surgical emergency and, if not treated properly, can lead to a high mortality rate. The therapeutic approach begins with volume resuscitation measures, broad-spectrum antibiotic therapy, and the use of proton pump inhibitors (Coco et al., 2022). Although conservative treatment, known as the "Taylor method," is a viable option for a select group of clinically stable patients with blocked perforations, surgical intervention remains the gold standard, as delay in surgery is associated with a significant reduction in survival (Coco et al., 2022). In children, conservative treatment has been shown to be safe, although it results in a longer fasting time compared to surgical treatment (Shen et al., 2023).

The choice of surgical approach, open or laparoscopic, has been a central point of discussion. Laparoscopy has emerged as a safe and effective alternative, being recommended as the first line for stable patients (Costa et al., 2023; Coco et al., 2022). An Italian cohort study with propensity scoring demonstrated that the laparoscopic approach is associated with a shorter hospital stay (10.3±11.4 days for laparoscopy vs. 13±12 days for open surgery, p=0.038) and a significantly lower overall postoperative morbidity rate (21.5% vs. 39.0%, p=0.002), especially for less severe complications (Clavien-Dindo 1-2) (Costa et al., 2023). The benefits of laparoscopy are well established, even in elderly patients, including less blood loss, better lung function, reduced postoperative pain, faster return of bowel function, and lower incidence of incisional hernia when compared to open surgery. Interestingly, in this study, the operative time was also shorter in the laparoscopic group (Costa et al., 2023). Mortality did not differ significantly between the approaches (10.5% for laparoscopy vs. 15.1% for open surgery, p=0.258), suggesting that this outcome is more related to patient comorbidities than to the surgical approach. Conversion t r open surgery may be necessary in cases of large perforations, hemodynamic instability, or difficulty in locating the defect (Costa et al., 2023; Coco et al., 2022).

As for the repair technique, simple suturing of the perforation, with or without the use of an omentum patch (omentopexy), is the most common procedure in both open and laparoscopic surgery (Shen et al., 2023; Costa et al., 2023). However, the management of giant perforations (defined as > 2 cm) is particularly challenging and associated with high morbidity and mortality rates (Tullavardhana et al., 2022). Giant perforations are considered a catastro-

phic complication, with morbidity rates reaching 60% and mortality rates of 48.2%. A recent meta-analysis comparing repair techniques for these injuries demonstrated that *omental plugging* is superior to conventional omentopexy. *Omental plugging* resulted in a significant reduction in overall postoperative complications (odds ratio [OR]=0.29) and biliary fistula rate (OR=0.18) (Tullavardhana et al., 2022), and consequently in postoperative mortality (Tullavardhana et al., 2022). In the pediatric population, the main etiology is H. *pylori* infection. In most cases, the diagnosis is made by abdominal ultrasound (due to the radiation risks of CT) and is treated with simple suture, either laparotomically or laparoscopically, with good results (Shen et al., 2023). A recent retrospective pediatric study revealed that *Helicobacter pylori* infection was confirmed in 78.1% of the cases tested, and most perforated patients (88.9%) were over 6 years of age (Shen et al., 2023).

Although surgery is the standard treatment, minimally invasive non-surgical techniques, such as endoscopic repair with clips or the use of hydrogels, are being investigated as low-risk strategies and potential options for viable cases, although their effectiveness compared to the surgical approach still needs to be better defined (Coco et al., 2022). Finally, regarding etiology, recent data suggest that perforation may show statistically significant seasonal variation, with peaks in incidence reported in the winter months (Krajnović et al., 2025).

CONCLUSION

Perforated peptic ulcer (PPU) remains a surgical emergency with high morbidity and mortality rates, with the current clinical picture being more severe due to the increased use of low-dose aspirin (LDA) and NSAIDs in the elderly, factors that increase the risk of perforation and worsening (Costa et al., 2023; Krajnović et al., 2025). The management of stable patients should prioritize the laparoscopic approach, which has been shown to be associated with shorter hospital stays and lower overall postoperative morbidity, especially in less severe complications (Clavien-Dindo 1-2) (Costa et al., 2023). For giant perforations (>2 cm), omental plugging has shown superior results compared to omentopexy, significantly reducing the rate of bile leakage and overall complications (Tullavardhana et al., 2022). In a subgroup of pediatric patients, H. pylori is the main etiology, with most cases occurring after the age of 6 (Shen et al., 2023). Finally, the development of minimally invasive non-surgical techniques, such as endoscopic repair with clips or hydrogels, points to future low-risk management alternatives (Coco et al., 2022).

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