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APPROACHES TO THE MANAGEMENT OF GASTRODUODENAL PERFORATIONS OF ULCER ETIOLOGY: A REVIEW OF EVIDENCE

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Abstract

Introduction. Gastroduodenal perforation (most commonly perforation of ulcer etiology) remains a clinically significant urgent pathology leading to peritonitis and characterized by variability of outcomes depending on time to intervention, age, comorbidity, and choice of treatment strategy.
Objective. To systematize modern approaches to early management, conservative and surgical treatment of gastroduodenal perforations with a critical appraisal of the evidence base.
Materials and Methods. A narrative critical review was performed. The search was conducted in PubMed/Scopus/Web of Science and Google Scholar using keywords related to perforated ulcer, laparoscopic repair, nonoperative treatment, H. pylori eradication, and risk scores; randomized controlled trials, meta-analyses, clinical guidelines/position papers, and large cohort studies were included; non–peer-reviewed and non-indexed sources were excluded.
Results. The prognostic significance of treatment delay and clinical risk stratification was emphasized. Conservative management (NOM) may be applicable in carefully selected clinically stable patients under strict monitoring; however, it is associated with a risk of failure and variability of effectiveness criteria. Surgical closure of the defect remains the cornerstone strategy; laparoscopic suturing, when expertise is available, is comparable to open intervention in key outcomes, although interpretation is limited by patient selection and intercenter heterogeneity of techniques.
Conclusion. Optimization of outcomes requires early diagnosis, stabilization, objective risk assessment, and an individualized choice of strategy. In the era of proton pump inhibitors (PPIs) and H. pylori eradication, simple closure of the perforation followed by anti-ulcer therapy and eradication reduces recurrence risk, decreasing the need for radical anti-ulcer surgery; antibiotic therapy and antisecretory support remain mandatory components of treatment.

Keywords: gastroduodenal perforation; perforated peptic ulcer; laparoscopic suturing; omentoplasty; nonoperative treatment; Helicobacter pylori; peritonitis.

Introduction

Gastroduodenal perforation is a full-thickness defect of the wall of the stomach or duodenum (DU) leading to the entry of gas and liquid contents into the abdominal cavity and the development of localized or diffuse peritonitis. Among the causes, perforation of peptic ulcer accounts for the majority, whereas perforations of tumor origin and iatrogenic perforations require separate analysis. (1)
PPU remains a clinically significant urgent problem with high variability of outcomes, which is due to delayed presentation, age and comorbidity, as well as heterogeneity of surgical tactics. (1)

Materials and Methods (Search and Selection of Sources)

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This review was conducted as a narrative critical review. Sources were selected from PubMed/Scopus/Web of Science databases and via Google Scholar using the keywords perforated peptic ulcer, gastric/duodenal perforation, laparoscopic repair, nonoperative management, Helicobacter pylori eradication, risk score. Randomized trials, meta-analyses, clinical guidelines/position papers, and large cohort studies were included. Non–peer-reviewed publications and materials without indexing/DOI were excluded.

1. Principles of Early Management: Time, Resuscitation, Risk Stratification

Impact of Treatment Delay

A consistent association between "time to intervention—outcome" is demonstrated: increased delay is associated with higher complication rates and mortality, especially in elderly patients. (2)
A methodologically important limitation of most studies addressing the time factor is their observational design and the risk of confounding: patients with more severe conditions may receive intervention earlier but have worse prognoses due to baseline severity.

Risk Stratification and Prognostication

Simple clinical predictors are widely used for clinical stratification: shock, severe comorbidity, and perforation duration >24 h. Their prognostic significance has been confirmed in prospective validation. (3)
At the same time, the applicability of results from "classical" scores to contemporary cohorts is limited by changes in population characteristics (aging, increasing proportion of NSAID-associated ulcers) as well as improvements in intensive care. (1)

2. Conservative Strategy: Indications, Effectiveness, Risks

Nonoperative management (NOM) for PPU usually includes decompression (nasogastric tube), infusion therapy, antisecretory drugs, antibiotics, and dynamic observation; the key prerequisite is clinical stability and signs of a "sealed"/contained perforation.
In a randomized study, NOM was feasible in carefully selected patients but was associated with a risk of failure and the need for "rescue" surgery; success strongly depended on strict selection criteria and intensive monitoring. (4)

3. Surgical Treatment: "Defect Closure" as the Core Strategy

3.1. Open Surgery

Open closure of the perforation (simple closure) with or without Graham omentoplasty (Graham patch—covering the suture line with a tongue of greater omentum) remains a basic option, especially in severe peritonitis, shock, or in the absence of laparoscopic expertise. (5)

3.2. Laparoscopic Closure: Comparative Effectiveness

Laparoscopic repair of PPU is defined as defect closure using a laparoscopic approach, usually combined with abdominal cavity sanitation/lavage. A randomized study demonstrated comparability of key outcomes with open surgery, with potential advantages in postoperative parameters. (6)
A multicenter RCT also indicates comparable approaches, emphasizing the impact of patient selection and team experience. (7)
A pooled meta-analysis of RCTs shows that laparoscopy is generally comparable to laparotomy

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in “hard” outcomes, with more frequent advantages in pain and infectious complications; however, questions remain regarding statistical power and heterogeneity of included studies. (8)

Methodological Limitations of Comparative Studies

RCTs often exclude patients with shock, severe peritonitis, and late presentation—limiting external validity for the most severe group.

The “learning curve” effect may bias results against laparoscopy in low-volume centers, complicating interpretation amid intercenter variability. (11)

Techniques differ (simple closure vs closure + omentoplasty), as do the extent of sanitation, drainage approaches, and antibiotic protocols, generating clinical and statistical heterogeneity. (8)

3.3. Choice of Closure Technique and “Large Perforations”

Traditionally, omentoplasty is used to enhance sealing reliability; however, strict evidence for the superiority of “mandatory” omentoplasty over simple closure is limited by heterogeneous selection criteria and low study power. (11)
For large defects, severe edge inflammation, and late presentation, the choice of method (suturing, patching, resectional options) should consider the risk of leakage and overall prognosis; guidelines emphasize individualization and prioritization of source control. (5)

4. “Definitive” Operations in the Era of PPIs and H. pylori Eradication

Definitive anti-ulcer surgery (e.g., vagotomy with drainage procedures or resection) was historically considered a means to reduce ulcer recurrence after perforation repair. However, the transferability of older data to modern practice is limited by radical changes in medical therapy and epidemiology. (1)
A key shift is related to the role of Helicobacter pylori: a randomized study showed that H. pylori eradication after simple closure significantly reduces ulcer recurrence compared with antisecretory therapy alone, decreasing the need for immediate “acid-reducing” surgery. (9)
A similar concept (simple closure followed by eradication) is supported by clinical observations and reviews in the surgical literature. (10)

Controversial Issues. Not all cohorts demonstrate the same proportion of H. pylori–associated ulcers (impact of NSAIDs, age), so the universality of the strategy requires local validation. In addition, eradication regimens and confirmation of success vary across studies, affecting reproducibility of the clinical effect.

5. Antibiotic Therapy, Antisecretory Therapy, Intensive Support

Antibiotic therapy for PPU is considered a mandatory component due to bacterial contamination of the abdominal cavity in perforation and peritonitis; the WSES position paper emphasizes early initiation with subsequent adjustment based on clinical dynamics and microbiology data when available. (5)
Proton pump inhibitors (PPIs) are used as part of anti-ulcer therapy in the perioperative period and after perforation repair, especially in combination with H. pylori eradication in confirmed infection. (9)

Conclusion

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Gastroduodenal perforation remains a serious emergency requiring early diagnosis, stabilization, and assessment of complication risk. Conservative treatment is possible in clinically stable patients, but surgical closure of the defect remains the mainstay approach. Laparoscopy, with appropriate expertise, is comparable to open surgery, while the choice of suturing technique and the use of omentoplasty should consider defect size and patient condition. Simple closure followed by H. pylori eradication reduces ulcer recurrence, minimizing the need for radical anti-ulcer surgery. Antibiotic therapy, antisecretory support, and intensive care remain mandatory components of management.

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