American Journal of Biology and Natural Sciences
https://biojournals.us/index.php/AJBNS
ISSN: 2997-7185

Surgical Management of Perforated Duodenal Ulcers: A Clinical and Operative Outcome Analysis

Xayitov U. X
Samarkand State Medical University Pediatric Surgery No. 2.

Received: 2024, 15, May
Accepted: 2025, 21, Jun
Published: 2025, 14, Jul

Copyright © 2025 by author(s) and Scientific Research Publishing Inc. This work is licensed under the Creative Commons Attribution International License (CC BY 4.0).
Open Access
http://creativecommons.org/licenses/by/4.0/

Abstract: Perforated duodenal ulcer remains one of the most severe complications of peptic ulcer disease, often presenting as an acute surgical emergency associated with significant morbidity and mortality if not promptly diagnosed and treated. The standard approach to treatment has evolved over the decades, moving from open laparotomy to minimally invasive techniques such as laparoscopic repair. This study aims to evaluate the outcomes of surgical management of perforated duodenal ulcers, comparing open and laparoscopic techniques with respect to postoperative complications, hospital stay, recovery time, and mortality. A total of 94 patients admitted to Samarkand State Medical University Hospital between January 2022 and December 2023 with confirmed perforated duodenal ulcer were included in this prospective observational study. Patients were categorized into two groups: Group A underwent open Graham patch repair while Group B underwent laparoscopic repair. Clinical outcomes were analyzed and compared using standardized surgical metrics. Our findings suggest that laparoscopic surgery offers advantages in

terms of faster recovery, reduced postoperative pain, and shorter hospital stays, although open surgery remains a reliable option, especially in hemodynamically unstable patients. Perforations in the duodenal wall represent one of the most urgent and life-threatening gastrointestinal conditions, necessitating immediate surgical intervention to prevent systemic infection and death. As medical practice transitions from conventional open procedures to modern minimally invasive methods, evaluating the comparative success of these surgical techniques becomes essential. This clinical review examines surgical outcomes in patients treated for duodenal wall ruptures, analyzing the correlation between intervention types and recovery indicators. It identifies procedural strengths and limitations, offering evidence-based insights to support optimized decision-making in emergency abdominal surgery.

Keywords: perforated duodenal ulcer, laparoscopic repair, open surgery, peptic ulcer disease, peritonitis, surgical outcomes, minimally invasive surgery.

Introduction: Peptic ulcer disease continues to be a global health issue, with duodenal ulcers accounting for a significant proportion of cases. Among its complications, perforation is considered the most life-threatening, often leading to generalized peritonitis if not treated in time. The pathogenesis of duodenal ulcer perforation involves the erosion of the mucosal wall by gastric acid and pepsin, eventually breaching the serosal layer and causing a full-thickness defect. Risk factors include Helicobacter pylori infection, chronic NSAID use, smoking, and stress. Historically, perforated ulcers were managed by open laparotomy with omental patch repair, but advances in surgical technology have introduced laparoscopic techniques as a less invasive alternative. Despite these developments, the debate over the optimal surgical approach continues, especially in resource-limited settings or in patients with poor preoperative status. This study focuses on evaluating and comparing the outcomes of both surgical approaches at a tertiary referral center to guide clinical decision-making in the management of this critical condition.

Duodenal perforations, commonly stemming from chronic peptic ulcer disease, present as acute abdominal catastrophes. Their onset is often sudden, marked by severe epigastric pain, peritoneal signs, and hemodynamic instability. Although medical advances have enhanced diagnosis and stabilization protocols, definitive treatment remains surgical. Traditional approaches relied on open exploratory laparotomy and omental patch closure, a time-tested and effective method. However, with technological progress, laparoscopic alternatives have gained attention for their reduced invasiveness and faster postoperative recovery. Despite this, concerns remain regarding operative duration, skill requirements, and feasibility in septic patients. Given the potentially fatal course of untreated perforations, the selection of surgical method must be guided by both clinical urgency and predicted outcomes. This assessment aims to explore these factors through comparative analysis of procedural results in patients undergoing operative correction for duodenal rupture.

Materials and Methods: This was a prospective, comparative clinical study conducted at the Department of General Surgery, Samarkand State Medical University. A total of 94 patients diagnosed with perforated duodenal ulcers were enrolled between January 2022 and December 2023. Inclusion criteria included age 18–70, confirmed diagnosis by erect abdominal X-ray or CT showing free air under the diaphragm, and intraoperative confirmation of perforation. Exclusion criteria were gastric ulcers, malignancy, previous abdominal surgeries, and patients with septic shock. All patients underwent preoperative resuscitation with intravenous fluids, broad-spectrum antibiotics, nasogastric decompression, and urinary catheterization. Patients were then randomized into two groups: Group A (n=49) underwent open Graham omental patch repair through a right upper quadrant incision; Group B (n=45) underwent laparoscopic repair using three ports and intracorporeal suturing with omental patching. Intraoperative data, operative time, postoperative pain (VAS scale), duration of hospital stay, time to return of bowel function, and postoperative complications (e.g., wound infection, leakage, pulmonary complications) were recorded. Data were analyzed using SPSS version 26. A p-value < 0.05 was considered statistically significant.

Results: The demographic characteristics of patients were comparable between the two groups, with a mean age of 47.3±12.6 years and a male-to-female ratio of 3:1. The average duration from perforation to surgery was 12.4 hours. The mean operative time was significantly shorter in the open surgery group (54±9 minutes) compared to the laparoscopic group (72±11 minutes, $p<0.01$). However, patients in the laparoscopic group experienced less postoperative pain as evidenced by lower VAS scores at 24 and 48 hours post-surgery ($p<0.01$). The mean hospital stay was 5.1±1.3 days in the laparoscopic group and 7.6±1.9 days in the open group ($p<0.001$). Return of bowel sounds and initiation of oral intake occurred earlier in Group B (laparoscopy). Postoperative complications were observed in 18% of open surgery patients (wound infection 8%, chest infection 6%, leakage 4%) compared to 7% in the laparoscopic group (minor port-site infections and ileus). There was one mortality in the open group due to septicemia; no deaths occurred in the laparoscopic group. Patients receiving laparoscopic repair consistently demonstrated quicker functional recovery and experienced lower levels of postoperative discomfort. On average, those undergoing minimally invasive procedures returned to oral intake earlier, mobilized sooner, and were discharged faster than those treated with conventional incisions. Quantitative measures such as pain scoring and inflammatory markers also favored laparoscopy, suggesting less tissue trauma. Moreover, the incidence of surgical site complications was significantly lower in the laparoscopy group. However, operative time tended to be longer, and conversions to open surgery were necessary in a small subset due to intraoperative difficulties. In contrast, while open repairs allowed rapid access and were often preferred in unstable patients, they were associated with increased morbidity, particularly infections and prolonged ileus. Mortality remained rare overall but occurred in cases with delayed presentation or comorbid systemic disease, emphasizing the importance of timely diagnosis and intervention.

Discussion: The findings of our study affirm the clinical benefits of laparoscopic repair in managing perforated duodenal ulcers in selected patients. While open surgery remains faster and

more feasible in unstable patients or when laparoscopic expertise is unavailable, minimally invasive surgery provides substantial advantages in terms of recovery, pain control, and reduced complications. Reduced hospital stay not only improves patient satisfaction but also lowers healthcare costs. Nevertheless, laparoscopic repair requires proper equipment and surgeon training, which may be limiting factors in rural or resource-constrained settings. Additionally, in cases with extensive peritonitis or delayed presentation, open surgery may provide better visualization and access for thorough peritoneal lavage. Our data also align with international literature suggesting a lower morbidity rate associated with laparoscopy in uncomplicated perforations. Future research may focus on long-term outcomes such as recurrence and quality of life measures post-surgery. The results underscore the superiority of laparoscopic intervention in hemodynamically stable individuals with early presentation. Reduced trauma, superior cosmesis, and enhanced patient satisfaction are clear advantages. Furthermore, hospital resource utilization is minimized due to shorter inpatient stays and fewer complications. However, open surgery retains a vital role, especially in cases where laparoscopic visualization is compromised or when peritonitis is extensive. This duality illustrates that no single surgical technique is universally optimal; rather, individualized care based on patient status, surgeon experience, and available infrastructure is essential. The analysis also highlights the growing need for laparoscopic skill development and institutional investment in equipment to broaden access to these improved outcomes.

Conclusion: Both open and laparoscopic approaches are effective in the surgical management of perforated duodenal ulcers. Laparoscopic repair, when feasible, offers superior short-term outcomes including less postoperative pain, earlier recovery, fewer complications, and shorter hospital stay. Open surgery remains indispensable in critical or complicated cases. Surgical decision-making should be individualized based on patient status, surgeon expertise, and institutional resources. Expanding laparoscopic capabilities and training in developing healthcare systems could improve the standard of care for patients presenting with this life-threatening condition. Efficient surgical handling of duodenal ruptures significantly influences patient prognosis and long-term digestive health. While modern minimally invasive approaches offer demonstrable benefits in selected cases, traditional methods continue to serve as the gold standard in critically ill or complex presentations. The integration of clinical judgment, operative proficiency, and timely decision-making forms the cornerstone of successful management. Investing in laparoscopic capabilities and fostering adaptive protocols across healthcare systems could lead to more consistent and favorable surgical results in gastrointestinal emergencies.

References:

1. Bertleff M.J.O.E., Lange J.F. (2010). "Perforated peptic ulcer disease: a review of history and treatment." Dig Surg; 27(3):161–169.
2. Siu W.T. et al. (2002). "Laparoscopic repair for perforated peptic ulcer: a randomized controlled trial." Ann Surg; 235(3):313–319.
3. Lau H., Wong C., Chu K. (2005). "Comparison of laparoscopic vs open repair of perforated duodenal ulcers." Arch Surg; 140(3):250–254.
4. Møller M.H. et al. (2009). "Risk factors in patients surgically treated for perforated peptic ulcer." Scand J Gastroenterol; 44(2):145–152.
5. Nathanson L.K., Easter D.W., Cuschieri A. (1990). "Laparoscopic repair of perforated duodenal ulcer." Surg Endosc; 4(4):232–233.