

PICO SEARCH ASSIGNMENT WORKSHEET

Brief description of patient problem/setting (summarize the case very briefly):

The patient is a 35-year-old male with history of polysubstance use disorder (heroin, Xanax, klonopin) who presented to ED 2 days ago with multiple episodes of non-bilious and non-bloody vomiting, abdominal pain, diarrhea, generalized body tremors and increasing anxiety such that he could not sleep or sit still. Patient also endorses shortness of breath, but denies chest pain, fever, chills, cough, recent trauma or sick contacts. In ED, assessment of the patient showed disheveled, tachypneic at 26 bpm, tachycardia at 129 bpm, 131/118 mmHg BP, and O2 sat at 88%. Labs show anion gap 32, elevated lactate, troponins, leukocytosis and sinus tachycardia on EKG. CXR revealed pneumomediastinum and CT w/o contrast showed a 3cm tear above the gastroesophageal junction. ED admitted patient to ICU and refer patient to general surgery for possible surgical consult. Currently, patient is on respiratory monitoring, sepsis workup, atypical pneumonia workup, Zofran PRN. Per general surgery team, they will follow up and perform surgery if indicated but for now just medical management (NPO, IVF, clear liquid diet, continue IV antibiotics, trend WBC.

Search question: Clearly state the question (including outcomes or criteria to be tracked)

In adults with spontaneous esophageal perforation (Boerhaave syndrome), does conservative/non-operative management compared with early surgical intervention improve survival and reduce complications?

Question type: What kind of question is this?

Prevalence

Screening

Diagnosis

Prognosis

Treatment

Harm

Assuming that the highest level of evidence to answer your question will be meta-analysis or systematic review, what other types of study might you include if these are not available (or if there is a much more current study of another type)? Please explain your choices.

If a systematic review or meta-analysis is unavailable or outdated, I would turn to prospective cohort studies, retrospective cohort studies, or large case series. Cohort studies are valuable for comparing treatment outcomes over time, helping to establish causality and track the long-term progression of a condition such as Boerhaave syndrome. Furthermore, because Boerhaave syndrome is a rare and emergent condition, large case series/reports are particularly useful for identifying risk factors and assessing the efficacy of different treatment plans.

PICO search terms:

P	I	C	O
Adult esophageal perforation	Conservative management	Early surgical repair	Mortality
Boerhaave syndrome	Medical management	Operative management	Complication rate
Spontaneous esophageal rupture	Delayed non-surgical management	Surgery	Length of hospital stay

Vomit-induced perforation	Supportive care	Surgical management	Survival
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Search tools and strategy used:

PubMed

Search terms: Boerhaave syndrome AND surgical AND conservative management AND mortality – 22 results

Filters applied (in sequential order):

Publication date: within 5 years – 10 results

Text availability: abstract – 10 results

Article type: case reports, comparative study, meta-analysis, randomized controlled trial, systematic review – 6 results

Language: English – 6 results

After applying the filters, I have narrowed down my search result to 6 articles. Of the 6 articles, I have chosen 2 article studies– a case report and systematic review and meta-analysis. I chose these two studies as they directly evaluate management strategies and compare the efficacy and safety of them in an esophageal perforation. The other studies only focused on either surgical or conservative management without details on management comparisons.

ScienceDirect

Search terms: esophageal perforation AND conservative management AND surgical management AND mortality – 4402 results

Filters applied (in sequential order):

Years: 2020-2026 – 993 results

Article type: research articles, case reports, practice guidelines – 314 results

Years: 2026 – 21 results

Search terms changes: esophageal perforation → Boerhaave syndrome → 7 results

After applying the filters and changing the search terms, I narrowed down my search results to 7 articles. I chose a retrospective article that evaluated efficacy and safety of non-operative management of esophageal perforations in comparison to traditional surgical approaches.

Trip database

Search terms: esophageal perforation, conservative, surgical, outcome - 16 results

Filters applied:

Years: 2020-2026 - 5 results

Results found:

Identify at least 3 articles (or other appropriate reputable sources) that answer your specific question with the highest available level of evidence (you will probably need to look at more than 3 articles to get the 3 most focused and highest-level articles to address your question). Please make sure that they are Medline indexed.

Article 1:

Citation:

Ribeiro, R., Cardoso, P., & Santos, F. (2024). A Conservative and Multidisciplinary Approach to Boerhaave Syndrome: A Case Report. *Cureus, 16(5)*, e59602.
<https://doi.org/10.7759/cureus.59602>

Type of article: Case report

Abstract:

Abstract

Boerhaave's syndrome is a life-threatening spontaneous esophageal rupture, usually in its distal part. It generally develops after situations that suddenly increase the intraesophageal pressure, such as, during or after persistent vomiting. Despite it being a rare condition in clinical practice, it has a high mortality rate (18–39%). Treatment can be approached conservatively, endoscopically, or surgically. The more invasive the treatment, the worse the prognosis. This paper presents a healthy 62-year-old man who resorted to the emergency department complaining of lower back and left scapular pain, after two non-bilious episodes of vomiting. There was no history of any trauma, vigorous physical exercise or previous similar episodes. He was alert, hemodynamically stable, and without any airway compromise or respiratory distress. At the physical exam, non-painful subcutaneous crepitations were palpable in the left cervical region without palpable masses. Chest examination finds reduced air entry on the left pulmonary base. Hence, Boerhaave's syndrome was suspected. CT scan revealed a pneumomediastinum and a left pulmonary collection. Oxygen therapy, blood cultures, empirical antibiotic therapy, and thoracic tube drainage were performed. The upper digestive endoscopy revealed the perforation in the distal esophagus, and an over-the-scope clip, a covered endoprosthesis and nasojejunal tube feeding were placed. The patient was admitted to the Intermediate Care Unit for stabilization. He was discharged home on the 33rd day and remains well at two months of follow-up. Delayed diagnosis and treatment are the principal causes of high mortality in Boerhaave's syndrome. There is no standard treatment option. In this case report, given the patient's stable clinical condition, the authors used a non-surgical conservative treatment, allowing for a delayed esophageal repair.

Key findings:

- High mortality rate but variable outcomes from management: Boerhaave syndrome a rare but life-threatening condition with a mortality rate estimated between 18-39%. There are no definitive guidelines for management, but options include conservative, endoscopic and surgical procedures. Survival rate varies by treatment: surgical (~83.5%), endoscopic (100%), conservative (~75%) according to a review this study cited in its study. This highlights that management choice influences outcome and highly depends on timing and clinical status.
- Conservative management can be successful: In the case report, conservative management including antibiotics, chest drainage, endoscopic clips/stent placement, NPO

status, and close monitoring resulted in full recovery and discharge on day 33 without invasive surgery.

- Patient selection is important: Conservative or endoscopic management can be successful in appropriate clinical setting and status. Patient who are stable, without sign of sepsis, contained small leak, and early in diagnosis may be considered for conservative management.

I chose this article because it analyzed management outcomes such as survival, complication rates, and timing of intervention in an esophageal perforation. The report outlined how early recognition, diagnosis and operative management influences morbidity and mortality while emphasized cases where non-operative management may be appropriate. This shows that management of Boerhaave syndrome is highly dependent on patient's status. Because Boerhaave syndrome is a rare but life-threatening condition, there are no definitive guidelines for management. Surgical or endoscopic management, according to a small series review in this study, seem to have higher survival rates. However, it is critical to acknowledge not all patients are candidates for operative management. This case report study highlights that conservative management can have similar or even better results compared to surgical. Therefore, conservative treatment should be considered if appropriate followed by surgical intervention if not successful.

Article 2

Citation:

Margaris, I., Triantafyllou, T., Sidiropoulos, T. A., Sideris, G., Theodorou, D., Arkadopoulos, N., & Michalopoulos, N. V. (2024). Efficacy of esophageal stents as a primary therapeutic option in spontaneous esophageal perforations: a systematic review and meta-analysis of observational studies. *Annals of gastroenterology*, 37(2), 156–171. <https://doi.org/10.20524/aog.2024.0857>

Type of article: systematic review and meta-analysis of observational studies

Abstract:

Abstract

Background: Spontaneous esophageal perforation traditionally mandates urgent surgical treatment. Lately, esophageal stents have been used to reduce the associated morbidity and mortality. The current systematic review aimed to assess the efficacy of stents as a primary treatment option in this scenario.

Methods: A systematic search was conducted in PubMed/MEDLINE, Scopus and the Cochrane Library for studies published in the English language between 2000 and 2023. We included observational studies reporting on the use of stents, alongside conservative measures and drainage procedures, in patients with spontaneous esophageal perforations. Primary outcomes were sealing rate (persistent leak occlusion) and failure rate (mortality or conversion to a major surgical operation). Secondary outcomes included patients' presentation, sepsis, drainage procedures, and reinterventions. Results for primary outcomes were presented as pooled rates with 95% confidence intervals (CIs), using a random-effects model. Methodological quality was assessed using the MINORS score.

Results: Eighteen studies involving 171 patients were included. Sealing rate was 86% (95%CI 77-93%) and failure rate was 14% (95%CI 7-22%). Weighted mortality rate was 6% (95%CI 2-13%), while conversion to surgical treatment was 2% (95%CI 0-9%). Late presentation was not related to a statistically significant increase in treatment failure (odds ratio 1.85, 95%CI 0.37-9.30; P=0.72). Drainage procedures were required for the majority of patients, with a high rate of surgical and endoscopic reinterventions.

Conclusions: Our results imply that stents may offer an effective and safe alternative treatment for patients with spontaneous esophageal perforations. Additional endoscopic and surgical drainage procedures are frequently needed.

Key findings

- Esophageal stents demonstrated high perforation sealing rates ~86%
- Mortality rate was low ~6%. Suggesting favorable survival outcomes for endoscopic stent placement in Boerhaave syndrome
- Majority of patient required adjunct drainage procedure (chest tube placement) in addition to stent placement
- Switch to surgical management was uncommon, indicating endoscopic stent placement was successful in most cases
- Delayed diagnosis/presentation of esophageal perforation did no significantly increase treatment failure rates. This suggest that stenting may still be effective beyond the early window in selected patients.
- Complication rates were comparable to reported surgical outcomes

I chose this article because it addresses my comparison in my PICO question, which is whether early surgical intervention improves survival and reduces complications compared with non-operative management in adults with Boerhaave syndrome. This article specifically evaluates esophageal stenting as a minimally invasive alternative to surgery, and reports comparable outcomes such as mortality, treatment success and need for conversion to surgical management. The study overall highlighted that stenting offers favorable survival outcomes and less rates of conversion to surgical intervention, indicating non-surgical management can be acceptable in most cases.

Article 3

Citation:

Vudatha, V., Bashian, E., Cholyway, R., Rollins, Z., Warren, L., Puig, C., Julliard, W., & Shah, R. D. (2025). Efficacy and outcomes of nitinol covered stents for management of acute iatrogenic and secondary esophageal perforation. *Journal of Surgical Research*, 315, 482–487.

<https://doi.org/10.1016/j.jss.2025.09.016>

Type of article: retrospective observational study

Abstract:

A B S T R A C T

Introduction: The objective of this study was to evaluate efficacy and safety of fully covered nitinol esophageal stent for esophageal perforations.

Methods: Patients who underwent esophageal stent placement for esophageal perforation between 2009 and 2021 at a tertiary care center were evaluated retrospectively. Patients requiring esophageal repair and/or mediastinal drainage were included. Stable patients with contained perforation were excluded. In each case, a fully covered esophageal stent was placed under fluoroscopic guidance. In most cases, video-assisted thoracoscopy was performed for mediastinal drainage. Leak occlusion and stent position were confirmed with esophagram postoperatively. Outcomes assessed include stent removal timing, successful healing of the leak, need for additional surgical intervention, and survival.

Results: A total of 54 patients underwent stent placement for perforation. The mean age was 63, with 63% (34/54) male preponderance. The most common presenting symptoms were chest pain (48%, 26/54), epigastric pain (20%, 11/54), and shortness of breath (15%, 8/54). Perforations ranged from 1 to 10 cm in length and usually occurred in the lower esophagus (67%, 36/54). Etiology included iatrogenic (44%, 24/54), Boerhaave's (15%, 8/54), oncologic (13%, 7/54), food-induced (11%, 6/54), anastomotic leak (9%, 5/54), and other (7%, 4/54). The majority had concurrent video-assisted thoracoscopy, laparoscopic, or open drainage of the mediastinum (36/54, 67%). 15% (8/54) of patients had stent placed secondarily for perforation/leak. 83% (45/54) of patients had their stents removed with an average removal time of 41 days. 13% (6/46) of patients treated initially with stent required additional surgical intervention. Postoperatively, 10.9% of patients treated primarily with stent (5/46) required an interventional radiology drain and 8.7% (4/46) had stent migration. One migration required a second stent placement, and another required repositioning. 17.3% (8/46) had persistent leak on upper GI study necessitating additional stent (4/8, 50%), percutaneous drainage (2/8, 25%), or resolved spontaneously (2/8, 25%). 95.6% (44/46) survived the hospitalization with median length of stay of 12 days (interquartile range 11).

Key findings:

- Stent placement was found to effectively seal the perforation site without need for immediate open surgical repair in many cases
- Many patients have significant improvement of symptoms after stent placement, indicating stenting can be an effective early management
- Low rates of major complications such as stent bleeding, migration, reopening of perforation
- Mortality rate was lower compared with historical estimate of surgical mortality

I chose this article because it reported data on efficacy, safety and patient outcomes after stent placement, a non-operative management plan, for iatrogenic and secondary esophageal perforation. Additionally, it informs whether early surgical repair truly improves survival and reduces complication compared to endoscopic or conservative treatment, even in patients with large perforations or even sepsis. Based on the study, it reports high rates of successful perforation sealing (93%), survival to hospital discharge (96%) and favorable long-term survival. Even more so, only a minority of patients required additional surgical intervention.

Clinical bottom line:

Boerhaave syndrome is a life-threatening emergency in which treatment outcomes depend heavily on early recognition and timely management. Evidence suggests that early surgical intervention remains the preferred approach for patients with sepsis, large tears, or overall clinical deterioration because it is associated with improved survival. Despite this, selective non-operative or conservative management, such as stenting, antibiotics, NPO status, and close monitoring, can achieve comparable outcomes in carefully chosen, hemodynamically stable patients. Regardless of the management strategy, rapid diagnosis, aggressive resuscitation, broad-spectrum antibiotics, and multidisciplinary surgical evaluation are essential to reducing morbidity and mortality. As a future clinician treating this condition, it is critical to utilize sound clinical judgment and tailor management decisions to the patient's overall clinical status.