



## A CASE REPORT OF A PATIENT OF BOERHAAVE SYNDROME MANAGED BY DELAYED PRIMARY CLOSURE

### Surgery

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### ABSTRACT

Boerhaave syndrome is a relatively rare cause of lower esophageal perforation post severe vomiting against a closed glottis, associated with high mortality and morbidity. The universally accepted protocol is to attempt primary closure if the patient presents within 24 hrs and to manage the patient conservatively upon delayed presentation. We here present our experiences in a patient managed successfully with delayed primary closure after 1 week.

### KEYWORDS

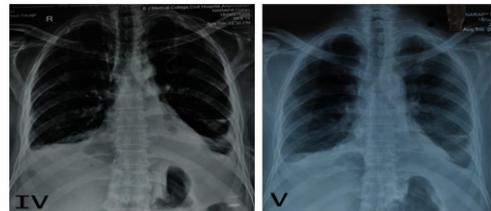
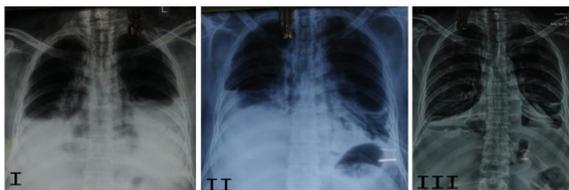
#### INTRODUCTION

Boerhaave syndrome is a term used for spontaneous, post emetic longitudinal, transmural rupture of the esophagus. It is named after a German doctor Dr. Hermann Boerhaave who described the syndrome in a grand admiral of the Dutch fleet who was a glutton and practiced auto emesis. It occurs when a person vomits against a closed glottis and the oesophagus ruptures at its weakest part; the lower one third, sending a stream of infective and acidic material in the mediastinum and often the pleura as well. It occurs in the lower third of the oesophagus, mostly on the posterolateral wall. It causes rapid chemical mediastinitis and pleurisy with secondary infection. It also occurs rarely on straining against a closed glottis eg during defecation, weight lifting or parturition.

#### CASE REPORT

This case describes a 45 yr old male patient who was a chronic opioid addict. Once after consumption of large amount of opium, he had multiple episodes of vomiting which were gastric in character and mixed with blood. This was followed by a sudden onset, sharp, stabbing pain in lower chest and upper abdomen which radiated to the back. This was associated with severe dyspnea. He was taken to a primary center where he was stabilised and a chest x-ray was done which was suggestive of bilateral hydropneumothorax. Left sided ICD was inserted from which the patient had 1 litre gastric output in 12 hrs. The next day a CECT was performed, which showed a 2 cm rent in left posterolateral oesophagus, approximately 3 cm above the hiatus. He was referred to us for further management.

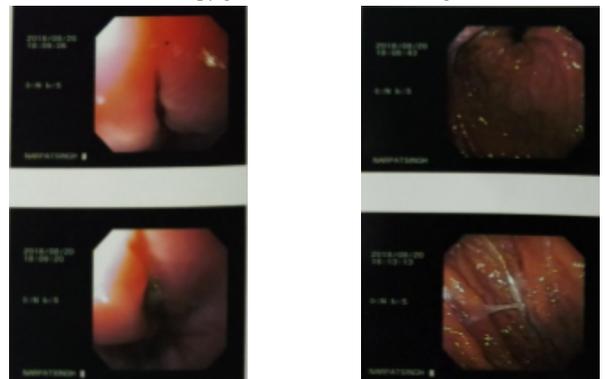
When he presented to our hospital, around 48hrs had passed since the initial episode. The patient was relatively stable with pulse 100 per minute and bp 128/74 mm of Hg. His per abdomen examination showed mild tenderness in upper part, without any guarding or rigidity and without any signs of free fluid. Upon auscultation, air entry was absent in both lower lung fields and he was maintaining an O<sub>2</sub> saturation of 85% on air and 90% on oxygen. A chest x-Ray was done which showed the ICD on the left side along with bilateral pleural effusion. An abdominothoracic ultrasound found moderate fluid with septations with few air foci in the right pleural cavity and moderate free fluid in left pleural cavity. No free fluid was present in the peritoneum. Due to the delayed presentation (>24hrs) and relatively stable vitals the patient was planned for a conservative management.



**Figure 1** – Serial X-Rays. I – (Day 0) Immediately after perforation. II – (Day 2) At presentation to us with left ICD in situ. III – (Day 20) Post Op X-Ray with both ICD in situ. IV – (Day 30) Post removal of Right ICD. V – (Day 36) Post removal of both ICDs

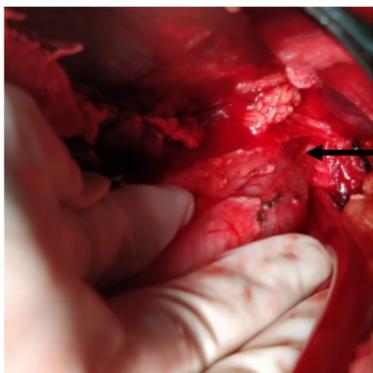
An ICD was inserted in the 5th intercostal space on the right side too, to manage the pleural effusion and low oxygen saturation. Upon insertion 200ml of turbid fluid was drained immediately from the drainage tube. 12 hrs after insertion, the output from the intercostal drains was 500ml of purulent fluid on the right side with a column movement of 10cm with air leak present and 1 litre of purulent fluid on the left side with a column movement of 8cm and air leak present. Simultaneously, the patient was made nil by mouth and IV fluids, analgesics and broad spectrum antibiotics were given. Regular chest physiotherapy was started and his vitals and respiratory status was closely monitored.

Over the next week, the ICD output came down to 250-300ml gastric from both ICDs with a column movement of 5-6cm bilaterally and occasional air leak. Total parenteral nutrition was also started in the meantime for nutritional supplementation. An upper GI scopy was done which visualised the rent 2 cm from oesophagogastric junction and found the remainder of the oesophagus normal. A nasogastric tube was inserted under scopy guidance in the same sitting.



**Figure 3** – Upper GI scopy showing rent in lower esophagus

When the output did not fall further, on day 8 post perforation, a decision was taken to explore the patient to attempt a definitive repair and enable enteral feeding. Intraoperatively, upon mobilising the fundus and pulling down the OG junction, we found a rent of approximately 3 cm, which was 2 cm proximal to the oesophagogastric junction. The surrounding wall was hyperaemic, but structurally intact. Primary definitive repair was attempted with silk 2-0 multiple interrupted sutures and Dor's fundoplication was done to buttress the suture line. Simultaneously a feeding jejunostomy was done for enteral feeding.



**Figure 2** – Intra-operative photograph of esophageal perforation (arrow). This was closed by primary closure with fundoplication.

Post operatively, the patient required ventilatory support for 3 days but was eventually shifted to ward. FJ feeding was started after 36 hrs. The ICD output fell to 50ml bilaterally with 1-2 cm column movement over the next 2 weeks. The patient was still kept NBM with Ryle's Tube in situ. In the meantime the patient had a few episodes of fever, which were managed by antipyretics and injectable antibiotics guided by culture and sensitivity reports of the ICD fluid. Other than this, the post operative course was uneventful.



**Figure 3** – Thin barium study done at discharge to confirm complete healing

The right sided ICD was removed after it had stopped draining on POD 26. Oral feeding was started after removing the Ryle's tube after 1 month post surgery. The left ICD was also finally removed on day 36.

## DISCUSSION

Esophageal perforation is a surgical emergency associated with high morbidity and mortality. Consensus regarding its appropriate management is lacking. The reported mortality from treated esophageal perforation is 10-25% when therapy is initiated within 24hrs of perforation and it increases to 40-60% when the treatment is delayed [1-5]. The reason for this manifold increase in mortality is due to the unique configuration and location of esophagus which allows bacteria and digestive enzymes an easy access to the mediastinum leading to development of severe mediastinitis, empyema, sepsis and multiple organ dysfunction syndrome [6]. Moreover the rarity of this condition and the nonspecific presentation leads to diagnostic and treatment delay in more than 50% of perforation [5]. When detected within 24 hrs, the treatment of choice is primary closure with wide drainage of mediastinum [1-13]. Treatment options for delayed or missed rupture are unclear and controversial [14-25].

However, treatment should always be started as early as possible and should include intravenous fluid, nothing by mouth, broad spectrum antibiotics, narcotic analgesics, total parenteral nutrition, and decision

regarding surgical closure versus non operative management [1-9, 11, 13]. The criteria for nonoperative management was initially described by Cameron et al in 1979 and modified by Altorjay in 1997 [26, 27]. These include: early diagnosis or delayed diagnosis with contained leak, perforation not in the abdomen, contained perforation in the mediastinum, content of the perforation draining back to the esophagus, perforation does not involve neoplasm or obstruction of the esophagus, absence of sepsis, presence of experienced thoracic surgeon and contrast imaging in the hospital [26, 27]. Most of the late postmetec esophageal perforations are managed by nonoperative management [6, 24, 25].

Recently endoscopic placements of removable covered esophageal stents have been described in the care of patients with esophageal perforation with excellent results [30,32]. By using removable Polyflex esophageal stents both primary and secondary esophageal leaks are being treated with reduced hospital stay, fewer adjunctive procedures and early resumption of oral diet [31]. Stent migration is a problem and must be recognized because it may cause gastric outlet obstruction after lodgment at the pylorus. Fibrin sealant has also been used in treatment of esophageal perforation [19]. Successful endoscopic closure of esophageal perforation with metallic clips has been reported for perforations associated with instrumentation, foreign body ingestion and Boerhaave's syndrome. This mode of treatment is suitable only for selected patients with small ( $\leq 1.5$  cm) clean perforation and minimal symptoms of infection. Although the length of time between the occurrence and the diagnosis of perforation is an important prognostic factor, recent reports advocated clipping of mature perforation too in special circumstances [33, 34]. Repeated and regular contrast study should be utilized to ascertain the progress of the treatment. Any signs and symptoms of sepsis during the course of nonoperative management warrant immediate surgical intervention. Respiratory complications like pneumothorax, mediastinal emphysema, and respiratory failure are also indications for surgical intervention [26, 27]. The mortality for nonoperative management of esophageal perforations is 20 to 38% [1-9]. But in some centres with carefully selected patients the reported mortality from nonoperative management has been zero [10].

Even when surgery is planned, continued esophageal leakage occurs in 30% of patients and 40% of these patients will require additional procedures there by increasing the morbidity and duration of hospitalization [23-25]. Different procedures described for esophageal perforation include primary repair with or without reinforcement [1-9], simple drainage of the thoracic cavity [17], exclusion diversion operation [18], and single stage esophageal resection with or without primary reconstruction [6, 7, 20-22]. The fact that many procedures have been described in the literature is indicative that not a single surgical procedure could be considered a gold standard for the treatment of esophageal perforation [7].

Studies recommend that whenever it is possible, the esophageal defect should be closed by primary suture repair, preferably in 2-layer closure of mucosa and muscularis. If not feasible, a single layer closure should be done. Sometimes it is not possible to do a direct closure because of friability of the tissue. In these cases, the esophageal tear closure should be done by using flaps over the defects [15, 26-30]. Various local tissues at the site of perforation have been used to buttress the primary repair [35, 42]. Pleural flaps, omental flaps, intercostal muscle flaps and pericardial flaps have been described [36-40]. The diaphragm flap has also been used for buttressing the suture lines after primary closure [42]. Regardless of the technique chosen, the use of buttress techniques has definitely improved the outcome of the surgical treatment [35-42]. Reinforcement with vascularized tissue decreases the fistula formation (13%) and mortality (6%), compared to repair without reinforcement (39%) and (25%) [36, 37]. All esophageal repairs should be drained by a large bore intercostal chest tube. A feeding jejunostomy should be always added for nutrition. Patients diagnosed with late perforations can usually be repaired primarily with reinforced muscle or pleura [15, 35, 42]. If primary repair is not possible because of the local tissue friability or there is severe mediastinitis, esophageal resection or exclusion and diversion should be considered [17, 18]. Exclusion and diversion comprises of cervical esophagostomy (diversion of the cervical esophagus and creating a salivary fistula), gastric decompression with a gastrostomy, esophagogastric junction stapling and jejunostomy [43]. Diversion procedures are relatively easy and quick procedures and should be performed early in patients with persistent sepsis despite initial

surgical management, stenting as the initial step in patients unfit for a thoracotomy [43]. Drainage alone has been described for treatment of esophageal perforation, but it is still controversial [1]. Postoperative care should be in critical care setting with haemodynamic monitoring, cardiac and respiratory support. Broad spectrum antibiotic should be continued for 7 - 10 days [44]. Nasogastric decompression of the stomach until resolution of the postoperative ileus, after which enteral feeding should be started through a jejunostomy tube. Contrast study should be obtained on the 5th postoperative day to document the integrity of the repair [44]. Long-term surveillance for stricture formation, reflux or carcinoma is also recommended.

### Summary

Many modalities are available at our disposal for patients with boerhaave syndrome. The general consensus states that in patients presenting in the first 24 hours an immediate definitive repair should be planned but in the patients presenting late, who are vitally stable, a conservative approach may be tried. Here we present a third alternative where a primary repair was done after 1 week, in an optimised and stable patient which had just as successful an outcome and permitted early enteral feeding, a reduction in ICD outputs, a better control of infective complications and sepsis and an overall faster recovery in the patient.

Hence, we conclude that even in patients presenting late, a surgery should be planned as early as possible, for enabling enteral feeding after proper optimisation of the patient and in this setting, if at all possible, an operative repair of the rent must be attempted. Post operative leaks may be prevented by decompression using a nasogastric tube and keeping the patient nil by mouth while continuing feeding using a feeding jejunostomy for even as long as a month.

### REFERENCES

- Jones WG 2nd, Ginsberg RJ. Esophageal perforation: a continuing challenge. *Ann Thorac Surg.* 1992;53(3):534-543. doi: 10.1016/0003-4975(92)90294-E. [PubMed] [CrossRef]
- Skinner DB, Little AG, DeMeester TR. Management of esophageal perforation. *Am J Surg.* 1980;139(6):760-764. doi: 10.1016/0002-9610(80)90379-7. [PubMed] [CrossRef]
- Michel L, Grillo HC, Malt RA. Operative and nonoperative management of esophageal perforations. *Ann Surg.* 1981;194(1):57-63. doi: 10.1097/0000658-198107000-00010. [PMC free article] [PubMed] [CrossRef]
- Brewer LA 3rd, Carter R, Mulder GA, Stiles QR. Options in the management of perforations of the esophagus. *Am J Surg.* 1986;152(1):62-69. doi: 10.1016/0002-9610(86)90144-3. [PubMed] [CrossRef]
- Bladegroen MR, Lowe JE, Postlethwait RW. Diagnosis and recommended management of esophageal perforation and rupture. *Ann Thorac Surg.* 1986;42(3):235-239. doi: 10.1016/S0003-4975(10)62725-7. [PubMed] [CrossRef]
- Altorjay A, Kiss J, Voros A, Sziranyi E. The role of esophagectomy in the management of esophageal perforations. *Ann Thorac Surg.* 1998;65(5):1433-1436. doi: 10.1016/S0003-4975(98)00201-X. [PubMed] [CrossRef]
- Gupta NM, Kaman L. Personal management of 57 consecutive patients with esophageal perforation. *Am J Surg.* 2004;187(1):58-63. doi: 10.1016/j.amjsurg.2002.11.004. [PubMed] [CrossRef]
- Iannettoni MD, Vlessis AA, Whyte RI, Orringer MB. Functional outcome after surgical treatment of esophageal perforation. *Ann Thorac Surg.* 1997;64(6):1606-1609. doi: 10.1016/S0003-4975(97)01090-4. discussion 1609-1610. [PubMed] [CrossRef]
- Attar S, Hankins JR, Suter CM, Coughlin TR, Sequeira A, McLaughlin JS. Esophageal perforation: a therapeutic challenge. *Ann Thorac Surg.* 1990;50(1):45-49. discussion 50-41. [PubMed]
- Vial CM, Whyte RI. Boerhaave's syndrome: diagnosis and treatment. *Surg Clin North Am.* 2005;85(3):515-524. ix. [PubMed]
- Ochiai T, Hiranuma S, Takiguchi N, Ito K, Maruyama M, Nagahama T, Kawano T, et al. Treatment strategy for Boerhaave's syndrome. *Dis Esophagus.* 2004;17(1):98-103. doi: 10.1111/j.1442-2050.2004.00361.x. [PubMed] [CrossRef]
- Nehra D, Beynon J, Pye JK. Spontaneous rupture of the oesophagus (Boerhaave's syndrome) *Postgrad Med J.* 1993;69(809):214-216. doi: 10.1136/pgmj.69.809.214. [PMC free article] [PubMed] [CrossRef]
- Goldstein LA, Thompson WR. Esophageal perforations: a 15 year experience. *Am J Surg.* 1982;143(4):495-503. doi: 10.1016/0002-9610(82)90202-1. [PubMed] [CrossRef]
- Nesbitt JC, Sawyers JL. Surgical management of esophageal perforation. *Am Surg.* 1987;53(4):183-191. [PubMed]
- Richardson JD, Tobin GR. Closure of esophageal defects with muscle flaps. *Arch Surg.* 1994;129(5):541-547. discussion 547-548. [PubMed]
- Salo JA, Isolauri JO, Heikkilä LJ, Markkula HT, Heikkinen LO, Kivilaakso EO, Mattila SP. Management of delayed esophageal perforation with mediastinal sepsis. Esophagectomy or primary repair? *J Thorac Cardiovasc Surg.* 1993;106(6):1088-1091. [PubMed]
- Flynn AE, Verrier ED, Way LW, Thomas AN, Pellegrini CA. Esophageal perforation. *Arch Surg.* 1989;124(10):1211-1214. discussion 1214-1215. [PubMed]
- Urschel HC Jr, Razzuk MA, Wood RE, Galbraith N, Pockey M, Paulson DL. Improved management of esophageal perforation: exclusion and diversion in continuity. *Ann Surg.* 1974;179(5):587-591. doi: 10.1097/0000658-197405000-00010. [PMC free article] [PubMed] [CrossRef]
- Harries K, Masoud A, Brown TH, Richards DG. Endoscopic placement of fibrin sealant as a treatment for a long-standing Boerhaave's fistula. *Dis Esophagus.* 2004;17(4):348-350. doi: 10.1111/j.1442-2050.2004.00421.x. [PubMed] [CrossRef]
- DeMeester TR. Perforation of the esophagus. *Ann Thorac Surg.* 1986;42(3):231-232. doi: 10.1016/S0003-4975(10)62723-3. [PubMed] [CrossRef]
- Orringer MB, Stirling MC. Esophagectomy for esophageal disruption. *Ann Thorac Surg.* 1990;49(1):35-42. discussion 42-33. [PubMed]
- Ozcelik C, Inci I, Ozgen G, Eren N. Near-total esophageal exclusion in the treatment of late-diagnosed esophageal perforation. *Scand J Thorac Cardiovasc Surg.* 1994;28(2):91-93. [PubMed]
- Burkin BL, Miller JJ Jr, Mansour KA. Esophageal perforation: emphasis on management. *Ann Thorac Surg.* 1996;61(5):1447-1451. discussion 1451-1442. [PubMed]
- Richardson JD, Martin LF, Borzotta AP, Polk HC Jr. Unifying concepts in treatment of esophageal leaks. *Am J Surg.* 1985;149(1):157-162. doi: 10.1016/S0002-9610(85)80026-X. [PubMed] [CrossRef]
- Brinster CJ, Singhal S, Lee L, Marshall MB, Kaiser LR, Kucharczuk JC. Evolving options in the management of esophageal perforation. *Ann Thorac Surg.* 2004;77(4):1475-1483. doi: 10.1016/j.athoracsur.2003.08.037. [PubMed] [CrossRef]
- Cameron JL, Kieffer RF, Hendrix TR, Mehigan DG, Baker RR. Selective nonoperative management of contained intrathoracic esophageal disruptions. *Ann Thorac Surg.* 1979;27(5):404-408. doi: 10.1016/S0003-4975(10)63335-8. [PubMed] [CrossRef]
- Altorjay A, Kiss J, Voros A, Bohak A. Nonoperative management of esophageal perforations. Is it justified? *Ann Surg.* 1997;225(4):415-421. doi: 10.1097/0000658-199704000-00011. [PMC free article] [PubMed] [CrossRef]
- Abbas G, Schuchert MJ, Pettiford BL, Pennathur A, Landreneau J, Luketich JD, Landreneau RJ. Contemporaneous management of esophageal perforation. *Surgery.* 2009;146(4):749-755. discussion 755-746. [PubMed]
- Griffin SM, Lamb PJ, Shenfine J, Richardson DL, Karat D, Hayes N. Spontaneous rupture of the oesophagus. *Br J Surg.* 2008;95(9):1115-1120. doi: 10.1002/bjs.6294. [PubMed] [CrossRef]
- Tuebergen D, Rijcken E, Mennigen R, Hopkins AM, Senninger N, Bruewer M. Treatment of thoracic esophageal anastomotic leaks and esophageal perforations with endoluminal stents: efficacy and current limitations. *J Gastrointest Surg.* 2008;12(7):1168-1176. doi: 10.1007/s11605-008-0500-4. [PubMed] [CrossRef]
- White RE, Mungatana C, Topazian M. Expandable stents for iatrogenic perforation of esophageal malignancies. *J Gastrointest Surg.* 2003;7(6):715-719. doi: 10.1016/S1091-255X(03)00064-7. discussion 719-720. [PubMed] [CrossRef]
- Blocksom JM, Sugawa C, Tokioka S, Williams M. The Hemoclip: a novel approach to endoscopic therapy for esophageal perforation. *Dig Dis Sci.* 2004;49(7-8):1136-1138. doi: 10.1023/B:DDAS.0000037800.78510.0d. [PubMed] [CrossRef]
- Raymer GS, Sadana A, Campbell DB, Rowe WA. Endoscopic clip application as an adjunct to closure of mature esophageal perforation with fistulae. *Clin Gastroenterol Hepatol.* 2003;1(1):44-50. doi: 10.1053/j.gch.2003.50007. [PubMed] [CrossRef]
- Abe N, Sugiyama M, Hashimoto Y, Itoh N, Nakaura H, Izumisato Y, Matsuoka H, et al. Endoscopic nasomediastinal drainage followed by clip application for treatment of delayed esophageal perforation with mediastinitis. *Gastrointest Endosc.* 2001;54(5):646-648. doi: 10.1067/mge.2001.117155. [PubMed] [CrossRef]
- Ayed AK, Al-Din HJ, Asfar SK. Reinforced primary repair of early distal oesophageal perforation. *Eur J Surg.* 2000;166(12):938-941. doi: 10.1080/10241500447092. [PubMed] [CrossRef]
- Gouge TH, Depan HJ, Spencer FC. Experience with the Grillo pleural wrap procedure in 18 patients with perforation of the thoracic esophagus. *Ann Surg.* 1989;209(5):612-617. doi: 10.1097/0000658-198905000-00014. discussion 617-619. [PMC free article] [PubMed] [CrossRef]
- Grillo HC, Wilkins EW Jr. Esophageal repair following late diagnosis of intrathoracic perforation. *Ann Thorac Surg.* 1975;20(4):387-399. doi: 10.1016/S0003-4975(10)64235-X. [PubMed] [CrossRef]
- Dicks JR, Majeed AW, Stoddard CJ. Omental wrapping of perforated esophagus. *Dis Esophagus.* 1998;11(4):276-278. [PubMed]
- Lucas AE, Snow N, Tobin GR, Flint LM Jr. Use of the rhomboid major muscle flap for esophageal repair. *Ann Thorac Surg.* 1982;33(6):619-623. doi: 10.1016/S0003-4975(10)60823-5. [PubMed] [CrossRef]
- Millard AH. 'Spontaneous' perforation of the oesophagus treated by utilization of a pericardial flap. *Br J Surg.* 1971;58(1):70-72. doi: 10.1002/bjs.1800580115. [PubMed] [CrossRef]
- Bardaxoglou E, Manganas D, Meunier B, Landen S, Maddern GJ, Campion JP, Launois B. New approach to surgical management of early esophageal thoracic perforation: primary suture repair reinforced with absorbable mesh and fibrin glue. *World J Surg.* 1997;21(6):618-621. doi: 10.1007/s002689900282. [PubMed] [CrossRef]
- Jara FM. Diaphragmatic pedicle flap for the treatment of Boerhaave's syndrome. *J Thorac Cardiovasc Surg.* 1997;78:931-33. [PubMed]
- Rohatgi A, Papanikitas J, Sutcliffe R, Forshaw M, Mason R. The role of oesophageal diversion and exclusion in the management of oesophageal perforations. *Int J Surg.* 2009;7(2):142-144. doi: 10.1016/j.ijsu.2008.12.042. [PubMed] [CrossRef]
- Kaman L, Iqbal J, Kundil B, et al. Management of esophageal perforation in adults. *Gastroenterology Res.* 2010;3(6):235-44. [PMC free article] [PubMed]