

# Single Procedure Esophageal Bypass: A Valid Option In Delayed Surgical Intervention For Complicated Esophageal Perforation

W Butt, M Butt, W Chaudhry, A Maqbool, A Afzal, A Ahmed, K Azim

## Citation

W Butt, M Butt, W Chaudhry, A Maqbool, A Afzal, A Ahmed, K Azim. *Single Procedure Esophageal Bypass: A Valid Option In Delayed Surgical Intervention For Complicated Esophageal Perforation*. The Internet Journal of Surgery. 2009 Volume 23 Number 1.

## Abstract

We present a case report of Boerhaave syndrome or spontaneous post emetic rupture of esophagus complicated with esophagopleural fistula whose diagnosis was missed at the initial presentation in the emergency. Surgical intervention was delayed for more than two weeks until the esophageal perforation was recognized. The patient was optimized for surgery and a single stage esophageal bypass surgery was done where the esophagus was left in situ and the stomach was pulled up through the sub sternal route and a cervical esophagogastric anastomosis was made to restore the gastrointestinal continuity; thus avoiding the morbidity associated with an esophagostomy and a second procedure for delayed reconstruction.

## INTRODUCTION

Boerhaave's syndrome or post emetic rupture of esophagus described by Hermann Boerhaave in 1724<sup>1</sup> is a rare but serious entity that is difficult to diagnose because often no classical symptoms are present and delay in seeking medical care is common. Accurate diagnosis and effective treatment depend upon early recognition of clinical features and accurate interpretation of diagnostic imaging. Outcome is determined by the cause and location of the injury, the presence of concomitant esophageal disease, and the interval between perforation and initiation of therapy<sup>2</sup>.

## CASE REPORT

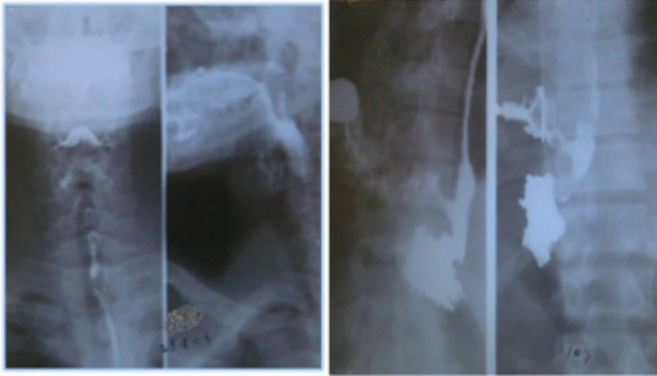
A 26 year old man presented to the medical emergency department of Mayo Hospital Lahore with complaint of severe chest pain for the last 12 hours. The patient after having a large meal about 12 hours before the onset of pain had had episodes of forceful vomiting one of which contained blood in it. On presentation the patient's pulse was 124/min, respiratory rate 38/min, and blood pressure of 90/50mmHg, with shifting of trachea to the right and absent breath sounds on the left side but no subcutaneous emphysema was appreciated. Arterial blood gas analysis showed oxygen saturation of 86% with decreased pO<sub>2</sub> levels. Full blood count showed leukocytosis with predominance of neutrophils and a normal platelet count; renal function tests,

liver function tests, serum electrolytes, blood glucose level, serum amylase and PT(INR)/APTT were all within normal range. Patient's EKG did not show any ischemic changes as well. However his chest radiograph showed hydropneumothorax with a collapsed lung on the left side. Urgent tube thoracostomy was done upon which about 500mL of yellowish fluid was revealed. The patient stabilized after the intubation with oxygen saturation returning to 97.3% with pO<sub>2</sub> 90.1 mm Hg. The pleural fluid examination revealed a leukocyte count of 52000/dL with 95% polymorphs and protein content of 3.4g/dL. The patient was given intravenous fluids and parenteral antibiotics which included ceftriaxone 2g along with 500mg of metronidazole and an infusion of omeprazole. After the initial resuscitative measures the patient was shifted to the medical ward and the empirical antibiotic regimen was continued. The patient remained vitally stable during the next week with occasional spikes of fever. The chest tube reveal however started turning turbid despite the antibiotic therapy which was modified according to the culture and sensitivity report. It was also noted that the color of the reveal changed when the patient took colored fluids. This finding prompted to get a gastrograffin study of the esophagus and make the patient NPO, after about two weeks of the initial presentation. The contrast study outlined a fistulous tract along the left lateral wall of the distal one third of the esophagus communicating with the left pleural cavity. The contrast however passed

freely into the stomach.

**Figure 1**

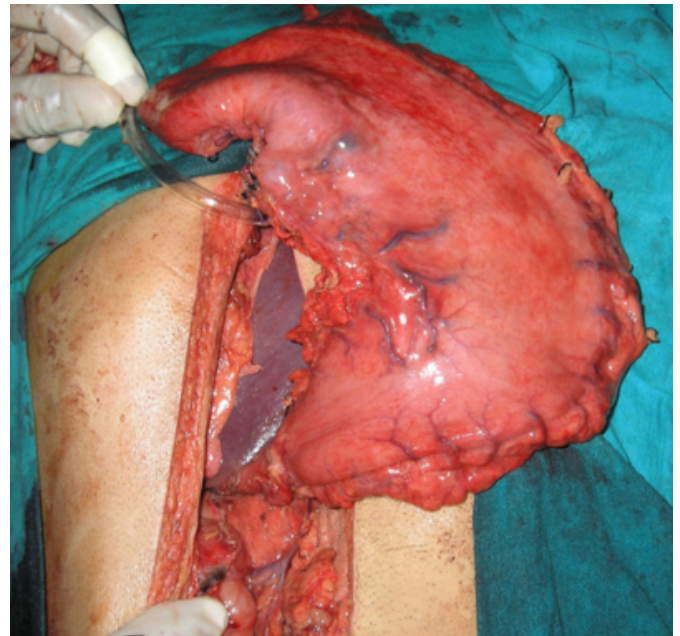
Contrast study shows leak of dye from the lower part of esophagus.



The patient was then shifted to the department of surgery with a diagnosis of lower esophagopleural fistula as a complication of post emetic spontaneous rupture of esophagus. The patient's NPO regimen was maintained, nasogastric tube was passed, keeping it above the perforation and he was given broad spectrum antibiotics, blood transfusions and total parenteral nutrition (with about 3500 Kcal and 8g of nitrogen per day) through a central line to improve his general condition. Within a week the patient was optimized and he underwent esophageal bypass surgery; a midline abdominal incision was made and the left lobe of liver and stomach was mobilized together with the esophagogastric junction after ligating the short gastric, left gastric and left gastroepiploic vessels. The stomach was divided from the abdominal esophagus and closed with vicryl 3/0 in two layers. The esophageal end was left open. Left sided oblique neck incision was made to expose the cervical part of esophagus. The esophagus was mobilized and stomach pulled up through the sub sternal route based on the right gastric and right gastroepiploic arteries. Cervical part of esophagus was divided and gastroesophageal anastomosis was done with prolene 4/0 interrupted sutures in single layer. Distal end of esophagus was left as such. A 32F tube drain was placed in the abdomen near the lower end of the esophagus and a suction drain was placed in the neck. The patient was mechanically ventilated for 7 days post operatively on SIMV mode, during which time he remained vitally stable.

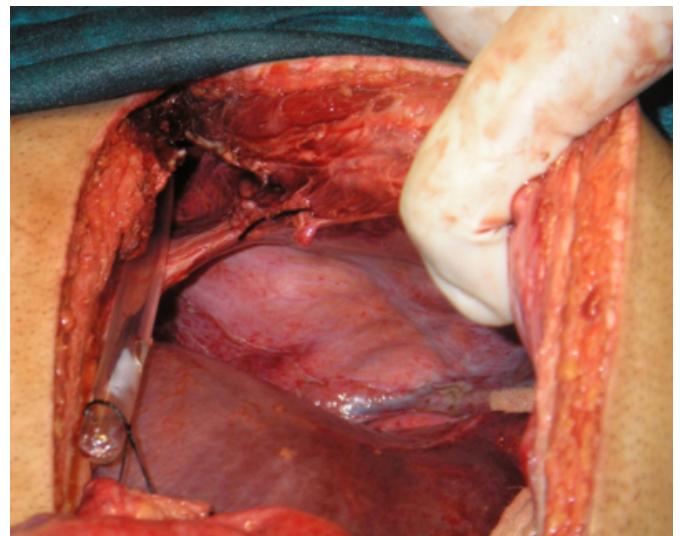
**Figure 2**

Picture 1: Stomach mobilized based upon the right gastric and right gastroepiploic arteries.



**Figure 3**

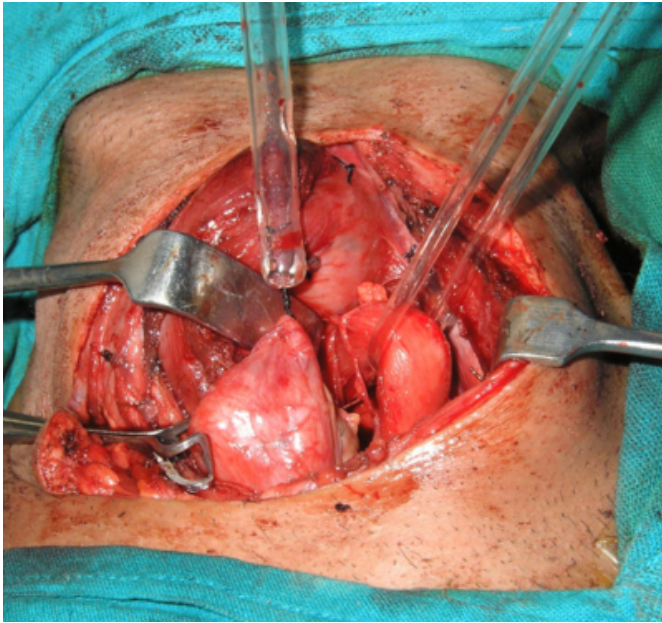
Picture 2: Space created in the sub-sternal plane.





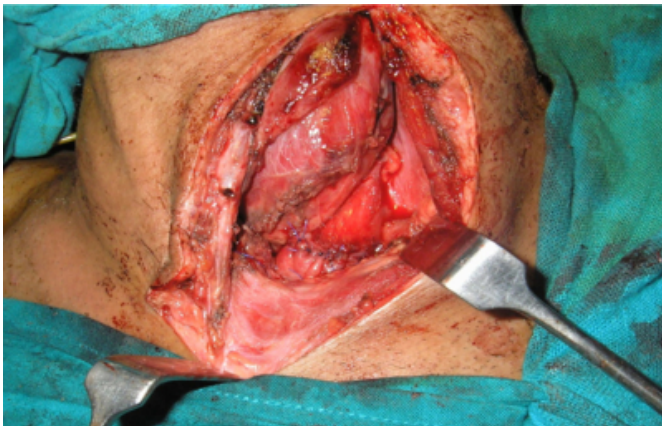
**Figure 4**

Picture 3: Stomach pulled up and cervical part of esophagus mobilized.



**Figure 5**

Picture 4: Esophagogastric anastomosis made in the neck with single layer prolene 4/0 sutures.



The patient was allowed oral fluids and subsequently solid food after being weaned off from ventilator. The patient's drains were taken out on the 7<sup>th</sup> post op day. His chest extubation was done on 15<sup>th</sup> day post op after the sepsis in pleural cavity had settled. Gastrograffin study performed two weeks later showed no extravasation of dye and a patent anastomosis with free passage into the stomach.

## DISCUSSION

Boerhaave syndrome is a rare spontaneous, transmural, post emetic perforation of the esophagus, although iatrogenic esophageal perforations during diagnostic or therapeutic

procedures are more common. Spontaneous rupture may also occur during childbirth<sup>3</sup>, defecation<sup>4</sup> seizures<sup>5</sup>, prolonged coughing or laughing or weightlifting<sup>6</sup>. This syndrome is postulated to be due to neuromuscular in-coordination resulting in failure of cricopharyngeus to relax against the sudden increase in intraluminal esophageal pressure during emesis. Spontaneous rupture is mostly located in the lower part of the esophagus on the posterolateral side next to the cardia and can reach upto 6 cm in length, this site has been implicated because of entry of nerves and vessels, lack of angulation of organ and absence of supporting tissue<sup>7,8</sup>.

The classical presentation of Boerhaave's syndrome constitutes Mackler's triad which includes vomiting, chest pain and subcutaneous emphysema<sup>9</sup>. There can however be variable presentation and these classical symptoms are sometimes not seen which can pose a diagnostic challenge<sup>6,10</sup>.

The management of esophageal perforation depends upon the delay in presentation and diagnosis, extent of perforation and overall medical condition of the patient. Non operative management of esophageal perforation is advisable in minority of cases and is exceedingly rare in Boerhaave syndrome. Criteria for nonoperative treatment includes the following: disruption contained in the mediastinum or between the mediastinum and visceral lung pleura; drainage of the cavity back into the esophagus; minimal symptoms; and minimal signs of clinical sepsis<sup>11</sup>. These patients can be managed sometimes just by oral hygiene, cessation of oral intake, antibiotics and nutritional support given parenterally or enterally distal to the site of injury<sup>12,13,14</sup>. Endoluminal esophageal stent placement with pleural drainage is also an effective treatment of spontaneous esophageal perforations<sup>15,16,17</sup>. These stents result in rapid leak occlusion, provide the opportunity for early oral nutrition, may significantly reduce hospital length of stay, are removable, and avoid the potential morbidities of operative repair<sup>18</sup>.

However the conservative mode of treatment is more applicable to esophageal perforations due to iatrogenic injuries<sup>19-23</sup>. Patients with Boerhaave syndrome often require surgical intervention. The aim of all surgical options to esophageal perforation is drainage of the infected mediastinum and elimination of the ongoing soilage<sup>24</sup>. Transthoracic primary repair is the gold standard if the patient is diagnosed within 24 hours of the spontaneous perforation<sup>25</sup>; it was however not recommended if this time limit exceeded<sup>26-29</sup>. With delayed diagnosis or presentation,

thorough evaluation of the rupture size, the amount of contamination, and the extent of necrosis and edema are essential in determining a therapeutic course<sup>30</sup>. Recent evidence shows that primary surgical repair with or without reinforcement is successful in treating esophageal perforation even after 24 hours<sup>28,29,31-38</sup>. In cases where primary repair is deemed not to be possible successful management with esophageal T tube has been advocated<sup>7,39-41</sup>. The patients who present or are diagnosed very late may have systemic sepsis with mediastinal contamination from esophageal secretions and gastro-esophageal reflux. Here, the esophageal tissue may be devitalised to the extent that repair is not possible. Several exclusion and diversion techniques have been reported for the treatment of esophageal perforation following late diagnosis and development of extensive contamination<sup>28,39,42-48</sup>.

The ongoing presence of the original septic focus and potentially incomplete control of soilage within the mediastinum have limited the success of exclusion and diversion techniques<sup>24</sup>. In such cases, either transthoracic and transhiatal esophagectomy or closure of the cardia with formation of cervical esophagostomy and delayed reconstruction have been advocated in various studies and reports<sup>49-57</sup>.

In our case the patient had presented very late with mediastinal sepsis and the formation of an esophagopleural fistula resulting in an empyema. Primary repair in this scenario was not possible. Intense sepsis and fibrosis in the esophageal bed did not allow for the esophagus to be mobilized and resected so it was left in situ and a surgical by pass was made by stomach pull up through the sub-sternal route and a cervical esophagogastric anastomosis. This avoided the morbidity associated with an esophagostomy and a two stage procedure with delayed reconstruction. Mediastinal sepsis and the empyema settled subsequently. The tailored surgical management for this patient proved to be a success as the patient recovered completely. We recommend this one stage procedure in cases where the presentation of esophageal perforation is very late prohibiting the popular course of treatment to be followed.

## References

1. Derbes VJ, Mitchell RE Jr. Hermann Boerhaave's Atrocis, nec Descripti Prius, Morbi Historia, the first translation of the classic case report of rupture of the esophagus, with annotations. Bull Med Libr Assoc 1955;43:217.
2. Brinster CJ, Singhal S, Lee L, Marshall MB, Kaiser LR,

- Kucharczuk JC. Evolving options in the management of esophageal perforation. Ann Thorac Surg 2004;77:1475-1483.
3. Kennard MWII. Rupture of the oesophagus during childbirth. Br Med J 1950;1:417.
4. Hardy JD, Tompkins WC, Ching EC, Chavez CM. Esophageal perforations and fistulas. Ann Surg 1973;177:788-97.
5. Callaghan J. The Boerhaave syndrome (spontaneous rupture of the oesophagus). Br J Surg 1972;59:41-4.
6. Henderson JA, Peloquin AJ, Boerhaave revisited: spontaneous esophageal perforation as a diagnostic masquerade. Am J Med 1989;86:559-67.
7. Abbott OA, Mansur KA, Logan WD. A traumatic so called "spontaneous rupture of the esophagus". A review of 47 personal cases with comments on a new method of surgical therapy. J Thorac Cardiovasc Surg 1970;59:67-83.
8. Derbes VH, Mitchell RE. Rupture of the esophagus. Surgery 1956; 39:688-709.
9. Mackler SA. Spontaneous rupture of the esophagus. [168]Rev Gastroenterol 1952;19(7):550-4.
10. Haynes DE, Haynes BE, Yong YV. Esophageal rupture complicating Heimlich manoeuvre. Am J Emerg Med 1984; 2(6): 507-09.
11. Cameron JL, Kieffer RF, Hendrix TR, Mehigan DG, Baker RR. Selective nonoperative management of contained intrathoracic esophageal disruptions Ann Thorac Surg 1979;27:404-408.
12. Lawrence DR, Ohri SK, Moxon RE, et al. Iatrogenic oesophageal perforations: a clinical review. Ann R Coll Surg Engl 1998;80:115-8.
13. Lo AY, Surick B, Ghazi A. Nonoperative management of esophageal perforation secondary to balloon dilatation. Surg Endosc 1993;7:529-32.
14. Chiang TC, Kok VK, Wong YK. Boerhaave's syndrome-successful treatment of a late case. Zhonghua Yi Xue Za Zhi (Taipei). 1991 Jan;47(1):50-3.
15. Fischer A, Thomusch O, Benz S, von Dobschuetz E, Baier P, Hopt UT: Nonoperative treatment of 15 benign esophageal perforations with self-expandable covered metal stents. Ann Thorac Surg 2006;81:467-473.
16. Siersema PD, Homs MY, Haringsma J, Tilanus HW, Kuipers EJ: Use of large-diameter metallic stents to seal traumatic nonmalignant perforations of the oesophagus. Gastrointest Endosc 2003;58:356-361.
17. Chung MG, Kang DH, Park DK, Park JJ, Kim JH: Successful treatment of Boerhaave's syndrome with endoscopic insertion of a self-expandable metallic stent: report of three cases and a review of the literature. Endoscopy 2001;33:894-897.
18. Freeman RK, Woerkom JM, Vyverberg A, Ascoti AJ. Esophageal stent placement for the treatment of spontaneous esophageal perforations. Ann Thorac Surg 2009;88(1):194-8.
19. Hasan S, Jilaihawi AN, Prakash D. Conservative management of iatrogenic oesophageal perforations - a viable option. Eur J Cardiothorac Surg 2005;28(1):7-10.
20. Amir AI, van Dullemen H, Plukker JT. Selective approach in the treatment of esophageal perforations. Scand J Gastroenterol 2004;39(5):418-22.
21. Gupta NM, Kaman L. Personal management of 57 consecutive patients with esophageal perforation. Am J Surg 2004; 187(1):58-63.
22. Tomaselli F, Maier A, Pinter H, Smolle-Juttner F. Management of iatrogenous esophagus perforation. Thorac Cardiovasc Surg 2002; 50(3): 168-73.
23. Hill AG, Tiu AT, Martin IG. Boerhaave's syndrome: 10

- years experience and review of the literature. *ANZ J Surg* 2003;73(12):1008-10.
24. Vial CM, Whyte RI. Boerhaave's syndrome: Diagnosis and treatment. *Surg Clin North Am* 2005;85(3):515-24.
25. Whyte RI, Iannettoni MD, Orringer MB. Intrathoracic esophageal perforation. The merit of primary repair. *J Thorac Cardiovasc Surg* 1995;109(1):140-6.
26. Skinner DB, Little AG, DeMeester TR. Management of esophageal perforation. *Am J Surg* 1980;139:760-4.
27. Fell SC. Esophageal perforation. In: Pearson FG, Cooper JD, Deslauriers J, et al, editors. *Esophageal surgery*. New York: Churchill Livingstone; 2002. p. 615-36.
28. 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):612-9.
29. Attar S, Hankins JR, Suter CM, Coughlin TR, Sequeira A, McLaughlin JS. Esophageal perforation: A therapeutic challenge. *Ann Thorac Surg* 1990;50(1):45-9.
30. Santos GH. Late management of esophageal perforation. *J Thorac Cardiovasc Surg* 1994;108:392-3.
31. Richardson JD, Martin LF, Borzotta AP, Polk HC Jr. Unifying concepts in treatment of esophageal leaks. *Am J Surg* 1985;149(1):157-62.
32. Grillo HC, Wilkins EW Jr. Esophageal repair following late diagnosis of intrathoracic perforation. *Ann Thorac Surg* 1975;20(4):387-99.
33. Jougon J, Mc Bride T, Delcambre F, Minniti A, Velly JF. Primary esophageal repair for Boerhaave's syndrome whatever the free interval between perforation and treatment. *Eur J Cardiothorac Surg* 2004;25(4):475-9.
34. Wright CD, Mathisen DJ, Wain JC, Moncure AC, Hilgenberg AD, Grillo HC. Reinforced primary repair of thoracic esophageal perforation. *Ann Thorac Surg* 1995;60(2):245-9.
35. Lawrence DR, Ohri SK, Moxon RE, Townsend ER, Fountain SW. Primary esophageal repair for Boerhaave's syndrome. *Ann Thorac Surg* 1999;67(3):818-20.
36. Kumar P, Sarkar PK. Late results of primary esophageal repair for spontaneous rupture of the esophagus (Boerhaave's syndrome). *Int Surg* 2004;89(1):15-20.
37. Wang N, Razzouk AJ, Safavi A, Gan K, Van Arsdell GS, Burton PM, et al. Delayed primary repair of intrathoracic esophageal perforation: Is it safe? *J Thorac Cardiovasc Surg* 1996;111(1):114-2.
38. Barkley C, Orringer MB, Iannettoni MD, Yee J. Challenges in reversing esophageal discontinuity operations. *Ann Thorac Surg* 2003;76(4):989-995.
39. Bufkin BL, Miller JI Jr, Mansour KA. Esophageal perforation: emphasis on management. *Ann Thorac Surg* 1996;61:1447-52.
40. Naylor AR, Walker WS, Dark J, Cameron EW. T tube intubation in the management of seriously ill patients with oesophagopleural fistulae. *Br J Surg* 1990;77:40-2.
41. Ojima H, Kuwano H, Sasaki S, Fujisawa T, Ishibashi Y. Successful late management of spontaneous esophageal rupture using T-tube mediastinoabdominal drainage. *Am J Surg* 2001;182:192-6.
42. Johnson J, Schwegman CW, Kirby CK. Esophageal exclusion for persistent fistula following spontaneous rupture of the esophagus. *J Thorac Surg* 1956;32:827-31.
43. 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;179:587-91.
44. Menguy R. Near-total esophageal exclusion by cervical esophagostomy and tube gastrostomy in the management of massive esophageal perforation: report of a case. *Ann Surg* 1971;173:613-6.
45. Lee YC, Lee ST, Chu SH. New technique of esophageal exclusion for chronic esophageal perforation. *Ann Thorac Surg* 1991;51:1020-2.
46. Bardini R, Bonavina L, Pavanella M, Asolati M, Peracchia A. Temporary double exclusion of the perforated esophagus using absorbable staples. *Ann Thorac Surg* 1992;54:1165-7.
47. Salo JA, Seppala KM, Pitkaranta PP, Kivilaakso EO. Spontaneous rupture and functional state of the esophagus. *Surgery* 1992;112(5):897-900.
48. Salo JA, Isolauri JO, Heikkila 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):1088-91.
49. Altortjay A, Kiss J, Voros A, Sziranyi E. The role of esophagectomy in the management of esophageal perforations. *Ann Thorac Surg* 1998;65(5):1433-6.
50. Chao YK, Liu YH, Ko PJ, Wu YC, Hsieh MJ, Liu HP, Lin PJ. Treatment of esophageal perforation in a referral centre in Taiwan. *Surg Today* 2005;35(10):828-32.
51. Richardson JD. Management of esophageal perforations: The value of aggressive surgical treatment. *Am J Surg* 2005;190(2):161-5.
52. Vogel SB, Rout WR, Martin TD, Abbitt PL. Esophageal perforation in adults: Aggressive, conservative treatment lowers morbidity and mortality. *Ann Surg* 2005;241(6):1016-21.
53. Cheynel N, Arnal E, Peschaud F, Rat P, Bernard A, Favre JP. Perforation and rupture of the oesophagus: Treatment and prognosis. *Ann Chir* 2003;128(3):163-6.
54. Port JL, Kent MS, Korst RJ, Bacchetta M, Altorki NK. Thoracic esophageal perforations: A decade of experience. *Ann Thorac Surg* 2003;75(4):1071-4.
55. Lundell L, Liedman B, Hytander A. Emergency oesophagectomy and proximal deviating oesophagostomy for fulminant mediastinal sepsis. *Eur J Surg* 2001;167(9):675-8.
56. DiPierro FV, Rice TW, DeCamp MM, Rybicki LA, Blackstone EH. Esophagectomy and staged reconstruction. *Eur J Cardiothorac Surg* 2000;17(6):702-09.
57. Ferguson MK. Esophageal perforation and caustic injury: Management of perforated esophageal cancer. *Dis Esophagus* 1997;10(2):90-4.

**Author Information**

**Waqas Tariq Butt, M.B.B.S.**

House Surgeon, East Surgical Ward, Department of Surgery, Mayo Hospital & King Edward Medical University Lahore

**Muhammad Umer Butt, M.B.B.S.**

House Surgeon, East Surgical Ward, Department of Surgery, Mayo Hospital & King Edward Medical University Lahore

**Wasif Majeed Chaudhry, M.B.B.S.**

Registrar, East Surgical Ward, Department of Surgery, Mayo Hospital & King Edward Medical University Lahore

**Asif Maqbool, FCPS**

Senior Registrar, East Surgical Ward, Department of Surgery, Mayo Hospital & King Edward Medical University Lahore

**Ameer Afzal, FCPS**

Senior Registrar, East Surgical Ward, Department of Surgery, Mayo Hospital & King Edward Medical University Lahore

**Ashfaq Ahmed, FCPS**

Associate Professor, East Surgical Ward, Department of Surgery, Mayo Hospital & King Edward Medical University Lahore

**Khawaja Muhammad Azim, FRCS**

Professor of Surgery, East Surgical Ward, Department of Surgery, Mayo Hospital & King Edward Medical University Lahore