



DEFINITIVE SURGERY FOR SPONTANEOUS DELAYED MID ESOPHAGEAL PERFORATION

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Abstract :

Background Esophageal perforation, whether spontaneous or more commonly as a result of instrumentation, is a life-threatening condition and carries high mortality despite recent advances. Esophageal rupture may occur in all age groups, from neonates to elderly individuals, but is most frequent in middle-aged males. The esophagus lacks a serosal layer and the adventitia of the esophagus is contiguous with the connective tissue of the mediastinum. As a result, esophageal perforation allows the bacteria and digestive enzymes to enter the mediastinum and spread to the neck and the pleura. A timely diagnosis typically offers more options in management, so a high index of suspicion on the part of the primary treating physician is needed. Outcome is dependent on etiology, location of injury, and interval between perforation and initiation of therapy. Successful management of

esophageal perforation entails combination of (1) control of the leakage site either surgically or endoscopically to prevent further contamination, (2) drainage of contamination, and (3) appropriate antibiotics along with nutritional support. Methods We report a case of Spontaneous delayed mid-esophageal perforation. The perforation was successfully managed with single stage definitive repair by gastric tube passed through posterior mediastinum which controlled the leak and removed the pathological organ. Results Esophageal resection and single stage reconstruction, in a delayed spontaneous perforation with mediastinal contamination resulted in controlling of leak and treating the mediastinal contamination and ruled out the intrinsic disease. Conclusions Successful management of esophageal perforation depends on early diagnosis, control of site of leak, drainage of accompanying collections, and antibiotic and nutritional support. More accurate diagnosis and Aggressive

Operative therapy is required in patients with large uncontained perforations and extensive contamination to reduce morbidity and mortality.

Keyword :-Esophagus- perforation- leak- resection contamination- drainage-reconstruction

INTRODUCTION

Esophageal perforation may occur in all age groups in which spontaneous perforation is a serious type of injury. Structurally the esophagus lacks a serosal layer and the adventitia of the esophagus is contiguous with the connective tissue of the mediastinum. As a result, esophageal perforation allows the bacteria and digestive enzymes to enter the mediastinum resulting in fatal mediastinitis. High index of suspicion is needed to diagnose it early. First described in its spontaneous form by Boerhaave and Fryogle. Iatrogenic esophageal perforations have become more common due to rapid increase and development of upper gastrointestinal tract endoscopies and account for 63.9% of perforations. Spontaneous rupture –(Boerhaave's Syndrome) occur in only 5.5%.The incidence of esophageal perforation from rigid esophagoscopy is 0.11%, that associated with fiberoptic examination ranges from 0.018% to 0.03%.Therapeutic endoscopy-is associated with a much higher incidence of 1 to 10%. Barrett described the first successful surgical repair of the esophagus in 1947.

CASE REPORT:

50 years male admitted with Intermittent high fever , progressive breathlessness, dysphagia, vomiting of one month duration treated elsewhere.On evaluation x-ray chest and CT chest revealed a Right pyothorax with multiloculated collection for which an ICD was inserted . The ICD drained pus initially but was draining undigested food particles from the third day and the patient was referred to our department as delayed Esophageal perforation with Esophago pleural fistula. On examination patient was febrile ,tachypneic and

anemic. His vitals were stable. UGI Scopy and gastrografinstudy confirmed an esophageal perforation in the middle third of esophagus and a biopsy from perforation site showed nonspecific inflammatory changes.

Under fluoroscopic guidance a Ryles tube was inserted for nutritional support and aggressive chest physiotherapy started for optimisation prior to definitive surgery. The planned procedure was resection and reconstruction of the Esophagus in a single stage with the rationale of complete removal of pathology, associated intrinsic pathology of the esophagus, better sepsis control and anastomosis outside the contaminated area to decrease the morbidity as well as mortality. After opitmising the patient for surgery for 1 week, surgery was performed. The stomach was tubularized and brought to neck through the posterior mediastinum after Transhiatal Esophagectomy . Cervical Esophagogastrostomy was done in a single layer with interrupted 3-0 vicryl sutures. Histopathological exomaintenance revealed no evidence of Malignancy or Tuberculosis or other chronic inflammatory infiltration. Patient is followed on a monthly basis as outpatient for more than a year with clinical as well as endoscopic examination and is free of symptoms

DISCUSSION

Surgery in esophageal perforation usually consists of initial rapid resuscitation followed by primary repair of the esophageal tear with interrupted resorbable sutures and reinforcement. Boerhaave's syndrome is thought to arise from a rapid

increase in intraluminal esophageal pressure through a patent lower esophageal sphincter with closed glottis during vomiting with resulting intransmural rupture of the esophageal wall in the left posterolateral wall of the lower third esophagus 2 cm to 3 cm proximal to the gastroesophageal junction. The clinical picture depends on the level of the perforation and the time interval from rupture to presentation. The mid esophagus lies next to the right pleura while the lower esophagus abuts the left pleura. Once a perforation occurs, saliva, retained gastric contents and bile and acid enter the mediastinum resulting in mediastinitis. The first sign is subcutaneous emphysema. Pneumomediastinum may cause a cracking sound upon chest auscultation (Hamman crunch). Other symptoms include dyspnoea, fever, and dysphagia. The Mackler triad is the classic presentation with vomiting, lower thoracic pain, and subcutaneous emphysema. In thoracic esophageal perforation, retrosternal or chest pain lateralizing to the side of perforation. With intra-abdominal esophageal perforation, dull epigastric pain radiating to the back may occur if the perforation is posterior and communicates with the lesser sac. More commonly, sharp, unrelenting, epigastric pain is often associated with anterior perforation with subsequent widespread peritoneal contamination. Tachycardia, diaphoresis, fever, and hypotension are common as the illness progresses. The left pleural space is usually involved with distal esophageal perforation and the right pleural space is commonly violated with proximal esophageal perforation. Prompt recognition of this potentially lethal condition is vital to ensure appropriate treatment. Mediastinitis, sepsis and shock frequently develop late in the course of the illness, which further confuses the diagnostic picture. Best outcomes are associated with early diagnosis and definitive surgical management within 12 hours of rupture.

INVESTIGATIONS

Esophageal perforation may also be identified by pleural fluid analysis. Diagnostic pleural fluid findings are food particles, a pH of less than 6.0, or the presence of an elevated amylase level. Posteroanterior and lateral upright chest radiographs are useful to identify any cervical or mediastinal emphysema, mediastinal widening, mediastinal air-fluid levels, pneumothorax, pneumopericardium, or pleural effusion, chest x-ray may be normal in 12 to 33%. Contrast esophagography is the study of choice for suspected esophageal perforation (overall false negative rate of 10%.) Water-soluble contrast agents- gastrograffin (meglumine sodium), recommended over barium sulfate as the contrast of choice. As the higher density and better mucosal adherence, Barium allows the detection of smaller esophageal perforation in doubtful cases. Chest computed tomography (CT-THORAX) is useful in diagnosing esophageal perforation. (In the settings of a negative esophagram). Typical CT findings includes mediastinal or extraluminal air, esophageal thickening, pneumomediastinum, esophagopleural fistula, pleural effusions, abscess cavities adjacent to the esophagus, and communication of an air-filled esophagus with an adjacent mediastinal air-fluid collection. Of these, extraluminal air is the most common CT finding associated with esophageal perforation, occurring in 92%. Endoscopy is not commonly used as a diagnostic aid. It carries the additional risks of increasing the size and extent of the original perforation and forcing air through the perforation into the mediastinum or pleural cavity.

MANAGEMENT.

Principles

· Elimination of septic focus & Provision of adequate drainage· Augmentation of host defences by antibiotics & Maintenance of adequate nutrition. Therapeutic interventions aimed to achieve these goals vary with the cause, location, and severity of the perforation, as well as the time interval between perforation and intervention. The overall health status and physiologic reserve of the patient, extent of associated injuries, and underlying esophageal pathologic findings are also the critical determinants of successful therapy. Drainage alone is less successful with thoracic or abdominal perforation because containment of contamination is difficult. Intrathoracic esophageal disruption requires aggressive mediastinal and pleural drainage

Nonoperative Treatment

Nonoperative approach for esophageal perforation is acceptable in selected patients with well-contained perforation and minimal mediastinal soilage, includes cessation of oral intake, broad-spectrum antibiotics, and parenteral nutritional support. Mediastinal or pleural fluid collections are drained with chest tubes. Cameron et al.¹ proposed the following criteria for nonoperative management: Disruption contained in the mediastinum or between the mediastinum and visceral lung pleura, Drainage of the cavity back into the esophagus, Minimal signs of clinical sepsis

Altorjay et al.² extended these criteria, including · The detection of early perforation, or a well-circumscribed late perforation · findings of esophageal tissue defect -not neoplastic, not in the abdominal cavity · not accompanied by simultaneous obstructive esophageal disease · Availability of imaging modalities and thoracic surgical expertise. Even with strict nonoperative treatment, up to 20% of patients managed

nonoperatively develop multiple complications within 24 hours and required surgical intervention which emphasises close monitoring during nonoperative treatment.

OPERATIVE MANAGEMENT

Barrett described the first successful surgical repair of the esophagus in 1947 Operative therapy is more commonly required in free perforations with extensive mediastinal or pleural contamination. Boerhaave syndrome and larger iatrogenic perforations are most likely to benefit from operative intervention. Operative approach selected depends on the patient's hemodynamic stability, the presence of other pathology in esophagus and the suitability of the esophageal mucosa and muscular layers for primary repair. Richardson^{3,6} advocates buttressing the repair or site of perforation in all cases, even if primary repair was not possible as in a late presentation. Operative approaches include · Drainage alone · Decortication and drainage · Primary repair, with or without a tissue buttress · Repair over a T tube to establish a controlled fistula · Esophageal resection Primary repair is the preferred surgical treatment of choice in thoracic or abdominal esophageal perforation. A variety of vascularized autogenous tissues used to buttress the primary repair. Buttressing may decrease fistula formation and mortality. Postoperative esophageal leaks after reinforced primary repair can be as high as 83% in patients presenting after 24 hours. Elimination of obstruction distal to perforation site should be confirmed before attempting esophageal repair in perforation associated with strictures and achalasia. If primary repair is not possible at the time of initial surgery

because of severe mediastinitis or underlying esophageal pathologic findings, surgical options include esophageal resection with immediate or delayed reconstruction, or exclusion and diversion. Drainage alone used when the patient is unstable and elaborate operations not feasible or in patients presenting late-often after previous treatment, and when the perforation is inadequately drained. Decortication is often required in patients with extensive collapsed lung and intrapleural contamination. Primary repair^{7,8,12} should be performed in which there are a sizeable perforation and healthy esophageal tissue to hold the sutures. The size and location of the perforation dictate whether the approach is cervical, thoracic, or abdominal. Controlled fistula with a Ttube⁴¹ is desirable if the diagnosis has been delayed and repair is not feasible because of extensive damage to the esophageal mucosa and muscular wall.

Esophagectomy²⁶ can be considered for

Associated nondisseminated malignant lesion

Numerous benign strictures

Unrepairable esophageal injuries

Serious and inadequately drained mediastinitis

Primary repair site dehiscence

End stage Achalasia cardia

The decision to restore gastrointestinal continuity³⁷ after resection in a single stage must be made on an individual basis. Our patient was also managed with definitive repair following delayed midthoracic perforation in the presence of contaminated mediastinum, removing the presenting pathology as well as intrinsic pathology of esophagus, keeping the anastomosis in the neck and avoiding a second surgery in the presence of mediastinal contamination. If the underlying pathologic process is a localized resectable cancer, or an undilatable or malignant stricture, resection with immediate reconstruction can be attempted. Several investigators have also recommended cervical esophagogastric anastomosis during the primary operation in selected patients with intrathoracic perforation to restore gastrointestinal integrity. With this approach, the esophagogastric anastomosis³⁷ is performed outside the soiled mediastinal field, and postoperative anastomotic leak can be managed by cervical drainage. Exclusion and diversion techniques have been employed in patients with extensive mediastinal contamination, grossly devitalized esophagus or hemodynamic instability. Access to perforation in the middle third of the esophagus is through a right thoracotomy, lower third is best approached through a left. Intraoperative endoscopy-- can guide the surgeon to the specific site of perforation · guide the placement of surgical sutures · test the repair with insufflation when complete. Better done in the operating room after anesthesia induction but before positioning. Hybrid procedures - This procedure can take the form of endoscopic stenting done in conjunction with primary repair or open or thoracoscopic decortication. Nasomediastinal drain placement concurrent with open surgical drainage. Perforations at the gastroesophageal junction are more difficult to stent and if approached laparoscopically, may be closed directly and reinforced with a Dor or Toupet fundoplication.

Intraoperative endoscopy to ensure that the extent of the perforation and completeness of esophageal repair.

ANASTHESIA

Rapid resuscitation & Induction should take into consideration the high risk for aspiration. Any increase in intraabdominal pressure should be avoided to prevent further contamination through the esophageal rupture & Insertion of a nasogastric tube is not recommended as any instrumentation can aggravate the injury to the esophagus, or pass through the hole. Special attention is required during retrosternal manipulation, because direct pressure on the heart may produce arrhythmias or hypotension.

NUTRITION.

Nutritional support is dictated by the individual scenario, but should be considered an early priority. Enteral tubes can safely be passed with fluoroscopy guidance. Gastrostomy, TPN, Oral feeds can be resumed after an esophagogram shows no further leak. By protecting the integrity of the gastrointestinal tract mucosa, the immune system is strengthened. In hospitalized patients, enteral nutrition is more economical than total parenteral nutrition

MINIMALLY INVASIVE TECHNIQUES

Video-Assisted Thoracoscopic Surgery

Minimally invasive thoracoscopic surgery offers a magnified view of the entire thoracic cavity and excellent access to all mediastinal compartments. The use of this technique in the setting of esophageal injury has been largely limited to instrumental or spontaneous esophageal perforation.²⁵ Intraoperative endoscopy is an invaluable

adjunct in identifying the site of perforation. The suspected region can be submerged under irrigation during endoscopic insufflation to precisely localize the site of perforation. Once identified, the devitalized margins of the perforation are debrided. If the defect is 1 cm surrounded by viable tissue, a primary closure can be performed with interrupted sutures. Endoscopic Stenting and Clipping can be applied for closure of perforation.^{13,18 27,40,31,19} Primary aim of esophageal stent placement is to cover the perforation site to prevent contamination and allow healing. In 1959, Celestin²⁷ described the palliation of esophageal malignancy with a plastic endoprosthesis introduced at laparotomy. In the 1970s, Atkinson and Ferguson²⁸ suggested that endoscopic placement of plastic prosthesis (Celestin tube) for inoperable esophagogastric neoplasms provided a simple and relative safe alternative of relieving dysphagia and improving nutrition. Tandem stent placement above the LES for mid-esophageal perforations should be considered as a viable alternative to primary surgical repair- novel approach of tandem metal stenting for midesophageal perforations to take advantage of the natural anchorage offered by the LES Endoscopic clipping^{17,30} has been historically used for the control of gastrointestinal bleeding. In 1995, Wewalka et al. described the treatment of esophageal perforation with endoscopic clipping after pneumatic dilation for achalasia. This mode of treatment is suitable only for selected patient -with small (1.5cm) clean perforation & minimal symptoms of infection.

MORTALITY

In the literature, the mortality rates have been reported as 0%–18% in early presentation and 7–37.5% in late presentation of the disease.^{10,15,3}

A longer interval between the trauma and the treatment is one of the criteria of poor prognosis. Ideally the repair should be attempted within 24 hours to keep the mortality minimum. If intervention is delayed longer than 24 hours, the mortality rate (even with surgical intervention) exceeds 50% and is 90% after 48 hours¹⁴. All these indicate Esophageal perforation is the most lethal perforation of alimentary tract.

CONCLUSION-

Esophageal perforation is a critical and potentially life threatening event with considerable morbidity and mortality. The management of esophageal perforation, although controversial, requires a thoughtful and individualized approach. When the diagnosis is made early, an unconfined esophageal leak is a surgical emergency, and surgery therapy is still considered the “gold standard”. The main principles of surgical intervention are rapid closure of the esophageal leak, drainage of mediastinal or pleural collections, and administration of parenteral nutrition and broad-spectrum antibiotics. However, there is no consensus in regard to the optimal therapy when the perforation is confined in the absence of systemic infection. Several treatment methodologies have evolved over the years, including non-operative treatment, minimally invasive thoracoscopic surgery, endoscopic stenting, and metallic endoclip application. Operative therapy is required in patients with large uncontained perforations and in extensive contamination and early surgery decreases the mortality.



Right Pyothorax with ICD



UGI scopy showing perforation



Tubularisation of Stomach Cervical Esophago-gastric Anastomosis Resected Esophagus



Post-operative contrast study

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