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DIAGNOSIS AND TREATMENT OF ESOPHAGIC TRAUMA IN A REFERENCE HOSPITAL.

Surgery

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ABSTRACT

Background. Penetrating lesions of the esophagus are more common than blunt injuries. The bullet wound (75%) is the main cause of these. In traumatic injuries, primary surgical repair is the standard of treatment.

Methods. Observational, Descriptive, cross-sectional, retrospective analysis of patients with esophageal trauma during January 2017 to December 2018.

Results. There were 4 male patients, average of hospital stay 37.4 days. The mechanism of injury was: 2 due to injury with a puncturing instrument, 1 due to a gunshot wound (HPAF) and another injury due to perforation with a foreign body. Surgical treatment was: 3 of 4 patients underwent esophageal raffia and one of them had a trachea raffia with a sternocleidomastoid flap. The complications were esophageal fistula and tracheal fistula.

Conclusions. These types of injuries are potentially fatal if there is a delay in diagnosis and treatment.

KEYWORDS

Esophageal perforation, blunt trauma, penetrating trauma, surgical closure.

BACKGROUND.

Esophageal lesions secondary to trauma are a relatively rare condition, even in urban trauma centers; This is due to the fact that most of this organ is located deep inside the rib cage. [1-3] As a region, it concerns - 10% of the trauma locations in general, especially the injuries that affect Zone II. [4] Therefore, the delay in diagnosis, the low index of suspicion, and the controversies that exist to evaluate and diagnose this type of injuries associated with injury to other organs are factors that contribute to the increase in mortality and morbidity. [1-3]

Epidemiology.

Esophageal perforation is a rare life-threatening condition,[5,6] its incidence ranges from 3.1. at 4.7 / 1,000,000 / year 6, they represent <0.5% of all admissions for trauma[7] is a rare but challenging clinical finding in the context of a trauma.[8] This is characterized by the transmural disruption of the esophagus leading to leakage of intraluminal contents of the surrounding spaces.[8,9] Mortality rates associated with esophageal lesions range between 10% and 40% and depend on several factors; cause of the perforation, the presence of any underlying pathology, location of the perforation, delay in diagnosis or treatment, treatment used and extension of the lesion, [8] the vast majority of these deaths occur within the first 24 hours and it is likely that not attributable to esophageal injury, but to associated serious injuries.[7,8]

In Mexico, accidents are reported as the fourth cause of mortality with a rate of 8% and aggression as the tenth with a rate of 2.3%. According to gender, accidents rank third in men with 11%, and aggressions in the eighth with 3.7%, while in women, accidents are the fifth cause of death with 4.3%, while aggressions do not appear within the top ten causes of mortality. These occur mostly in ages between 1 and 29 years. Injuries and poisonings are the second cause of hospital morbidity with 7.4%, being 15.2% and 3.9% for men and women respectively. Due to the scarcity of studies in our country it is not possible to determine the real incidence of esophageal lesions. However, being a rare event, in urban trauma centers an average of less than 5 esophageal lesions per year is observed, this is less than 1% [3] (some series report between two and nine patients per year). [1]

The etiology of esophageal perforation can be divided into iatrogenic, spontaneous and traumatic. Iatrogenic causes are the most common that represent up to 60% of cases, traumatic perforations are less common.[8,10] Patients with cervical perforations usually present with pain, dysphagia and subcutaneous emphysema. Pleural contamination induces chest pain and respiratory failure.[8,11]

The real incidence of traumatic esophageal lesions is difficult to estimate given the paucity of available studies, although some authors report an incidence of less than 10%, [11] most of the lesions occur in men [11,12,13] with an average age of 30 -35 years, most deaths occur during the first 24 h due to associated serious injuries.[11,12] Traumatic esophageal lesions are classified according to the mechanism of injury in: penetrating and closed traumatism. [11,13] And according to its anatomical location; in cervical (57%), thoracic (26%) and abdominal (17%). [11]

The most frequent mechanism of injury are penetrating injuries (50.6%) and by firearms (35.7%), these are usually located in the neck. [11,13] Blunt injury involves the transmission of energy by a non-contiguous force that indirectly damages the esophagus. [11,15] Esophageal lesions due to closed traumatism are more frequent in the neck and thorax, mainly in high-speed car accidents with horizontal deceleration that compresses the esophagus against the vertebral bodies.[11] The severity of the injury is classified by the Esophageal Injury Scale of the American Association for Trauma Surgery (AAST-OIS). [14] (**Table 1**).

Table 1

Esophagus injury scale

Grade*	Description of injury
I	Contusion/hematoma Partial thickness laceration
II	Laceration <50% circumference
III	Laceration >50% circumference
IV	Segmental loss or devascularization <2cm
V	Segmental loss or devascularization >2cm

*Advance one grade for multiple lesions up to grade III.
From Moore et al [5]; with permission

Penetrating injuries, as well as closed esophageal lesions associated with major vascular lesions, have a very high mortality due to hemorrhage. [9,12] In the neck, associated serious injuries include injuries to the trachea and vascular structures. In the thorax, the associated lesions affect the lungs, the heart and / or the great vessels.[14-16]

Symptoms. The signs and symptoms that suggest vascular injury or damage to the Aerodigestive tract are: airway compromise, significant subcutaneous emphysema or air emanating from the wound in the neck, hemoptysis, active bleeding from the wound, expansive or pulsatile hematoma, hematemesis, dyspnea, odynophagia, among others. [17]

Diagnosis. Early diagnosis of traumatic esophageal lesions requires a high level of suspicion based on the mechanism of the lesion and the anatomical location.[11] The evolution of these lesions are usually rapid and atypical, a delay in diagnosis increases complications [11,16] in turn, it is associated with decreased survival rates even in high-volume centers.[10] There are radiological and invasive auxiliary methods to confirm the diagnosis of perforation, depending on its utility according to availability in each hospital care center.[4]

In general, it is reported that admission to the hospital before 24 hours after the onset of symptoms is the predominant prognostic factor. [5,9] The use of computerized axial tomography with contrast (CAT) is used to diagnose esophageal lesions after penetrating and blunt trauma in stable patients due to its high sensitivity as well as its ability to identify associated lesions.[11,15] demonstrated a sensitivity and specificity of 95% and 91% respectively, for the diagnosis of penetrating lesions of the upper digestive tract. The Western Trauma Association (WTA) recommends computed tomography in penetrating lesions in hemodynamically stable patients with nonspecific signs or symptoms in the cervical zones I and III. The findings of air or perisophageal fluid in a CT scan indicate an esophageal lesion.[17] The esophagogram has a sensitivity of 100% and a specificity of 96%, it provides information about the lesion, its location and the extent of the injury.[11] The standard technique of this study is to administer water-soluble contrast, since, if there is a leak, this is immediately absorbed in the mediastinum and does not cause mediastinitis. [17] Flexible endoscopy has a sensitivity of 100% and a specificity of 83%, [10,11] many authors recommend its use because it provides a direct visualization of the site of the lesion, [11,12,16] is a useful confirmation tool in patients with findings. of undetermined CT scans in the thoracic and cervical areas I and III. [11]

Treatment. The management of esophageal lesions begins with the principles of the ATLS and the American College of Surgeons protocol: the ABCD, ensure the airway, intravenous fluids and broad spectrum antibiotics and if necessary start parental nutrition, once the patient is stable defines the location and extent of the injury. [11,18] In general, unstable patients with penetrating chest trauma should be taken immediately to the operating room.[17] The definitive surgical treatment is considered as any surgical attempt to definitively repair esophageal perforation by means of primary suture repair with or without tissue reinforcement or esophagectomy with the intention of restoring intestinal continuity. Non-surgical treatment or endoscopic treatment (stent graft, endoscopic clipping, endoscopic drainage), surgical drainage or debridement, T-tube repair or any other tube, and esophageal exclusion are considered non-definitive treatments.[9] Patients with esophageal lesions can be offered non-surgical treatment if they meet the following criteria: Piercing detected early, or when it is detected late and circumscribed or the symptoms and signs of septicemia are absent.[11,19]

The surgical approach is preferred by left cervicotomy due to the lateralization of the cervical esophagus. [4] The esophagus must move circumferentially avoiding excessive dissection to identify the lesion and facilitate repair. The principles of esophageal surgical repair include appropriate debridement of necrotic tissue, polluted site drilling to leave healthy tissue, followed by closure of the defect-free voltage, single or double layer, with absorbable sutures or nonabsorbable , as well as adequate drainage. To prevent possible tracheoesophageal fistula, or interruption or dehiscence, it is recommended to reinforce it with vascularized tissue, muscle esternocleidomastoideo.[17,19] commonly used in small esophageal perforations and stability of the patient can place a stent or clip to seal the injury. [17] In esophageal lesions involving more than 50% of the circumference of the esophagus that prevent primary repair, a lateral esophagectomy or a terminal cervical esophagectomy is performed. Lesions of thoracic esophageal stent and an esophageal chest tube is placed, the small holes can be addressed thoracoscopically debridement, repair and external drainage with enteral through a gastrostomy or jejunostomy nutrition. [21-23] If it is a lesion in the proximal esophagus, a right thoracotomy is recommended if left thoracotomy is distal. [22-24] Lesions of the abdominal esophagus are very infrequent, treated by exploratory laparotomy with debridement and primary surgical repair of the site of injury. [20] Five days after the primary closure, an esophagography is recommended to rule out a leak. [25] Patients with hemodynamic instability, sepsis or intrathoracic esophageal perforation detected late, should be immediately submitted to surgery, by performing an anterolateral thoracotomy due to the suspicion of association of lesions of other organs within the thorax. [17]

Mortality can be as high as 80%, there are complications and morbidities of up to 40-60%. [4,17]

MATERIALAND METHODS.

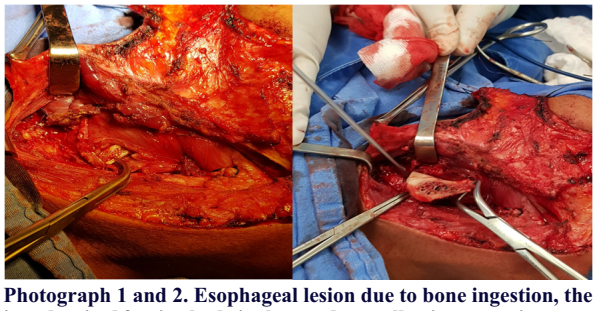
A descriptive study was carried out. For the continuous variables, the normality of the distribution was evaluated by the Shapiro-Wilk test, since it was a small sample; When the null hypothesis (Ho = Normal distribution) was not rejected, the mean and the standard deviation were used as summary measures. When the null hypothesis (Ha = Abnormal distribution) was rejected, the median and the interquartile range were used as summary measures. For the categorical variables: they were analyzed by absolute frequencies accompanied by their relative frequency.

Study design. The observational, descriptive, cross-sectional, retrospective and retrolective analysis of patients with esophageal trauma was carried out during the period from January 2017 to December 2018. The severity of the trauma was evaluated through the classification of the American Association for the Surgery of Trauma (AAST). The clinical records of patients with esophageal trauma who underwent medical and surgical treatment were used as primary source of data in the Regional Hospital of High Specialty Ixtapaluca, in Mexico. It was an investigation without risk for the patients.

RESULTS.

A total of 4 cases were attended, of which all were male, through descriptive statistics we obtain: an average age of 33.5 years, an average of hospital stay of 37.4 days, with a minimum of 13 days and a maximum of 103 days. In addition, 3 of 4 patients required a stay in intensive care, with an average of 4.0 days, a mime of 1 day and a maximum of 13 days.

Regarding the mechanism of injury, this was: of two patients due to injury with a puncture instrument, one patient due to a gunshot wound and another patient due to perforation with a foreign body (bone), (**Photograph 1 and 2**). Four patients underwent neck CT and facial mass as part of the diagnostic protocol. The location of the lesion was in the cervical esophagus in the four patients. The severity of the esophageal trauma was one patient with grade I injury, two patients with grade III injury and one patient with grade V injury.



Photograph 1 and 2. Esophageal lesion due to bone ingestion, the intraluminal foreign body is observed, as well as its extraction.

Regarding surgical treatment: one patient underwent immediate surgical treatment (Day 0), two patients the next day (Day 1) and one on Day 4. Also, three of four underwent esophageal raphy, one of them to trachea raffia and the other was subjected to a sternocleidomastoid flap; two of four underwent an esophagostoma (**Photographs 3**), and one of them also underwent a gastrostomy. Two of them were left with open drains and two others with closed drainages.

Photograph 3. Preparation of the esophagostoma by skin cover calibration and final result with the integrated esophagostoma.

The patient with an gunshot wound lesion was reoperated 3 times, due to esophageal raffia dehiscence, esophagostoma was performed, and he also presented surgical site infection. Two of the four patients underwent tracheostomy. Regarding the beginning of the oral route after surgical treatment, the average was 11.61 days. One of them had as complication the presence of an esophageal fistula and another with tracheal fistula. No death occurred. (**Table 2**).

Table 2. Characteristics of the Studied Population.

Px	Sex	Age	IS	Injury Mechanism	Degree of injury	Associated injury	Dx	ITU	Surgical Treatment	Complicaciones	Infección	NPT	SOR
1	M	44	13	cutting wound	I	Tracheal	CACT	Not	ER + TT	Not	Not	Not	11
2	M	45	103	WPF	III	Spinal cord	CACT	13	ER + EG + TT	Tracheal Fistula	Yes	Yes	10
3	M	24	14	Strange body	V	Not	CACT	1	EG + GT	Not	Not	Not	1
4	M	21	28	cutting wound	III	Not	CACT	3	ER + REF	Esophageal fistula	Not	Yes	25

PX. Patient, IS. intrahospital stay, M. Male, WPF. Wounded by projectile with firearm, CACT. Computed Axial CT scan of the neck, ITU. Intensive therapy unit, DX. Diagnosis, ER. Esophageal raffia, TT.Tracheostomy, REF. Rotation Esternocleidomastoideo flap, EG. Esophagostoma, GT. Gastrostomy, TPN. Total Parenteral Nutrition, SOR. Start of oral route

DISCUSSION.

Nonetheless, to be a regional reference hospital center and to be located in a metropolitan area of the metropolitan area of Mexico City with high rates of violence and car accidents; These types of injuries are not as frequent. But it is very true that the essential and essential step in esophageal lesions is to make a quick diagnosis and, if possible, perform primary repair. Through this study we intend to present the surgical experience in this type of injuries during a period of 2 years within the General Surgery service of a third level hospital of care in Mexico

CONCLUSIONS.

Traumatic esophageal lesions are very rare, both nationally and internationally, however, they have a high mortality potential. Its etiology can be divided into iatrogenic, spontaneous and traumatic, with iatrogenic causes being the most common and traumatic perforations less common. With regard to the treatment of these, as in any patient in a state of trauma, the initial part of the treatment includes obtaining a permeable airway, with control of the cervical spine, ensuring breathing and ventilation and maintaining circulation with control of hemorrhage (ABC) as stipulated in the ATLS. The specific therapeutic approach depends on the location and size of the wound, the mechanism of injury, the hemodynamic state of the patient, the concomitant injuries and the time of evolution. The surgical approach in cervical esophagus lesions (more frequent localization), can be via a collar-like incision or along the sternocleidomastoid muscle. In case of more complex injuries it may be necessary to resect the esophagus or esophagostomy. In case of lesions of the thoracic esophagus, it is necessary to perform primary closure

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