"MANAGEMENT OF ESOPHAGEAL TUBERCULOSIS : A SINGLE CENTER EXPERIENCE"

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CERTIFICATE

This is to certify that the dissertation titled **– 'Management of Esophageal Tuberculosis: A single Center experience'** submitted by **Dr. RAMESH .N** appearing for M.Ch. (Surgical Gastroenterology and Proctology) degree examination in August 2014, is a bonafide record of work done by him under my guidance and supervision in partial fulfillment of requirement of the Tamil Nadu Dr. M.G.R. Medical University, Chennai. I forward this to the Tamil Nadu Dr. M.G.R. Medical University, Chennai.

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DECLARATION

I solemnly declare that this dissertation titled - **"Management of Esophageal Tuberculosis : A single Center experience** " was prepared by me in the Department of Surgical Gastroenterology and Proctology, Center of Excellence for Upper Gastrointestinal Surgery, Madras Medical College & Rajiv Gandhi Government General Hospital, Chennai under the guidance and supervision of **Prof.S.M.Chandramohan, M.Ch, FACS,** Professor & Head of the Department of Surgical Gastroenterology and Proctology , Center of Excellence for Upper Gastrointestinal Surgery, Madras Medical College & Rajiv Gandhi Government General Hospital, Chennai. This dissertation is submitted to The Tamil Nadu Dr. MGR Medical University, Chennai in partial fulfillment of the university requirements for the award of the degree of M.Ch Surgical Gastroenterology and Proctology.

Place: Chennai

Date: **Dr.RAMESH.N**

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INDEX

“MANAGEMENT OF ESOPHAGEAL TUBERCULOSIS: A SINGLE CENTER EXPERIENCE”

INTRODUCTION

Even in countries with a high incidence of tuberculosis, esophageal tuberculosis is a rare diagnosis. Esophageal tuberculosis is considered primary when there is no other detectable tuberculous site and secondary when the esophagus is involved by spread from adjacent organs or by hematogenous spread from a distant site.

The natural history, clinical and endoscopic features, complications, and treatment of this condition is often unclear.

We present our experience with Esophageal tuberculosis encountered From Nov 2011 to March 2014 and highlight the tendency of esophageal tuberculosis to form an ulcerovegetative lesion thereby mimicking a neoplastic process. All the patients who were diagnosed and treated for esophageal tuberculosis who were on follow up in our study period were also included.

AIM OF THE STUDY

To study the demography, clinical features, endoscopic findings, radiographic abnormalities and outcome of antituberculous treatment with or with-out surgery for tuberculosis of the esophagus. To analyze the role of surgical therapy in managing this disease

METHODS

In our analyses, tuberculosis presenting with dysphagia can be broadly categorized into an ulcer group (UG, n=21) and an extrinsic compression group (n=10). The ulcerative form of ET which is often misdiagnosed as malignancy is reviewed.

History and physical findings were noted. Chest radiographs, Upper GI endoscopy (including biopsies of esophageal lesions), biopsies or FNA cytology of lymph nodes, bronchoscopy, contrast esophagogram, and thoracic CT were performed.

Diagnosis was made with histological proof of epithelioid cell granulomas with marginally polygonal Langhans-type giant cells and/or the presence of acid-fast bacilli.

OBSERVATION:

SPECTRUM OF PRESENTATION

Presentation	No of patients
TEF	7
TEF following Mediastinal drainage	1
Only Ulcer	5
Ulcer with military TB	1
Ulcer with contained perforation	1
Ulcer with esophago cervical fistula	1
Ulcer with cervical node	4
Ulcer with sub carinal node	1

CONCLUSION:

This study shows that esophageal involvement is not isolated in most patients. Dysphagia due to tuberculosis can be due to ulcerative lesions or extraluminal compression due to lymphadenopathy.

It is not uncommon to find esophageal tuberculosis misdiagnosed as malignancy during endoscopy.

Tuberculous involvement was confirmed by pathological examination in all patients.

Although antituberculous therapy is the mainstay of treatment, surgery is reserved for complications and persistent fistula despite adequate therapy.

Introduction

INTRODUCTION

Even in countries with a high incidence of tuberculosis, esophageal tuberculosis is a rare diagnosis. Esophageal tuberculosis is considered primary when there is no other detectable tuberculous site and secondary when the esophagus is involved by spread from adjacent organs or by hematogenous spread from a distant site.

The natural history, clinical and endoscopic features, complications, and treatment of this condition is often unclear.

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Esophageal Tuberculosis disease is complex and mandates critical preoperative evaluation for optimal management. We ventured to collect the data of all these patients and analyze them in detail for better understanding of this uncommon disease.

Aim

AIM OF THE STUDY

To study the demography, clinical features, endoscopic findings, radiographic abnormalities and outcome of antituberculous treatment with or with-out surgery for tuberculosis of the esophagus. To analyze the role of surgical therapy in managing this disease.

Review of Literature

REVIEW OF LITERATURE

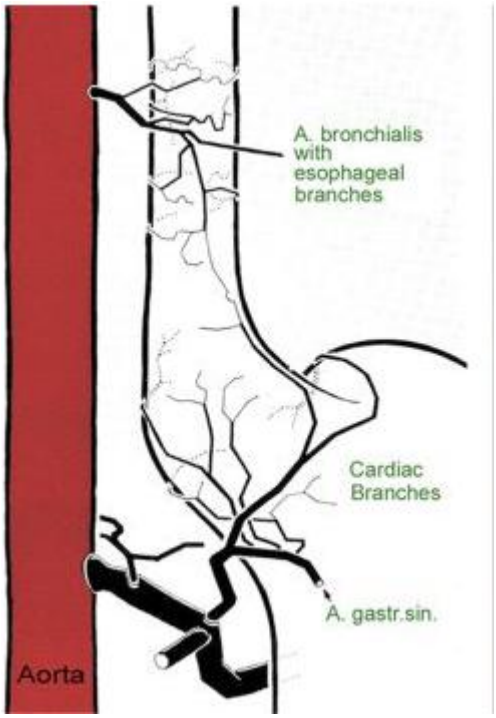
The esophagus is double –layered structure lined by mucosa that passes through the neck, chest, and abdomen .It starts at the base of the pharynx at C6 and ends in the abdomen, where it joins the cardia of the stomach at T11. It is about 25- to 30-cm and it finds its way through most vital structures in the mediastinum.

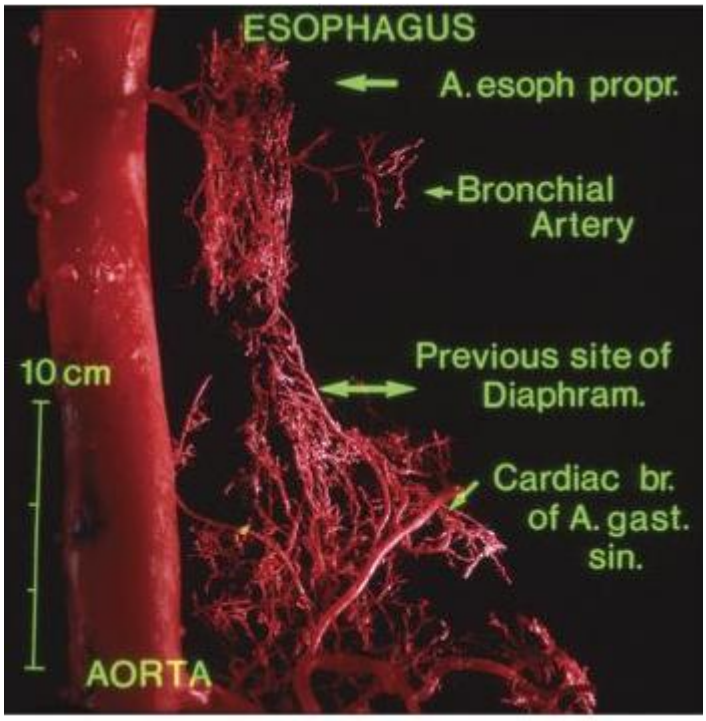
It descends in the mediastinum close to the left main stem bronchus and it gets deviated to left and enters the diaphragm through the esophageal hiatus at the level of the 11th thoracic vertebra. The narrowest point of the gastrointestinal tract is at the level of the cricopharyngeus muscle.It is the starting point of the esophagus. At the level of the carina, left mainstem bronchus and Aorta goes very close to esophagus & at the level of the fourth thoracic vertebra esophagus gets narrowed because of bronchoaortic constriction which measures 15 to 17 mm. At the end of esophagus is the diaphragmatic constriction, measuring 16 to 19 mm.

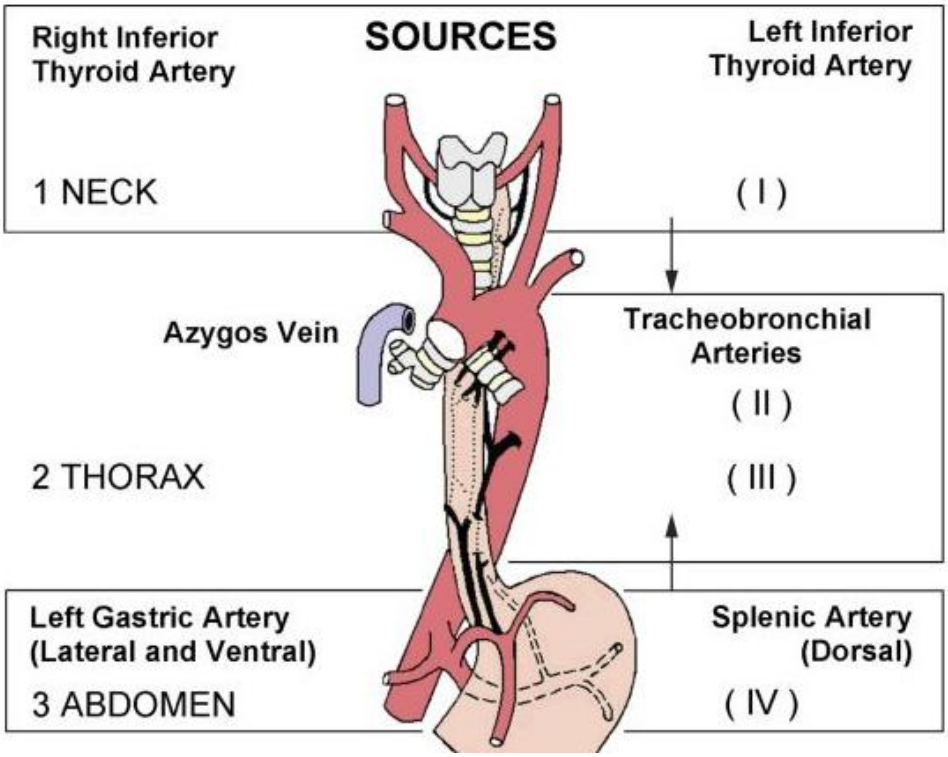
Esophagus have numerous interconnecting lymphatic plexuses arising from the sub mucosa and muscularis layers.

ARTERIAL SUPPLY

There are three principal arterial supply for esophagus. In the neck ,superior and the inferior thyroid arteries supply the cervical esophagus. TracheobronchIal arteries arise from arch of the aorta and supply the thoracic esophagus. Small proper esophageal arteries arise directly from the thoracic aorta and supply the thoracic esophagus. Lower part of esophagus is supplied by branches from left gastric arteries .About 11 branches arise from the left gastric arteries and supply the lower part of esophagus. Liebermann-Meffert said that all these arteries when they come near the esophagus they form minute branches and then enter the esophagus to supply the esophagus . After entering the esophageal wall they give vascular supply to the muscularis propria and then form a submucosal and mucosal vascular plexus.This helps surgeon to do Transhiatal esophagectomy safely with very minimal blood loss .


A. bronchialis
with
esophageal
branches
Cardiac
Branches
A. gastr.sin.
Aorta


ESOPHAGUS
A. esoph propr.
Bronchial
Artery
Previous site of
Diaphram.
10 cm
Cardiac br.
of A. gast.
sin.
AORTA


Right Inferior Thyroid Artery
SOURCES
Left Inferior Thyroid Artery
1 NECK
(I)
Azygos Vein
Tracheobronchial Arteries
(II)
2 THORAX
(III)
Left Gastric Artery (Lateral and Ventral)
Splenic Artery (Dorsal)
3 ABDOMEN
(IV)

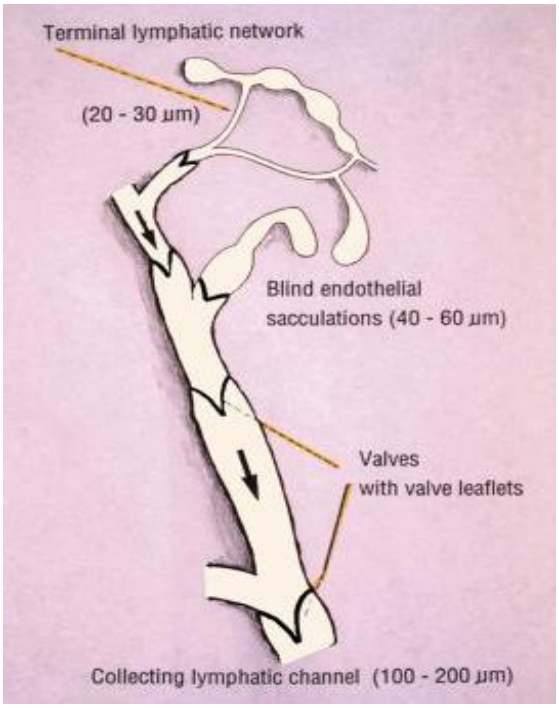
VENOUS SUPPLY

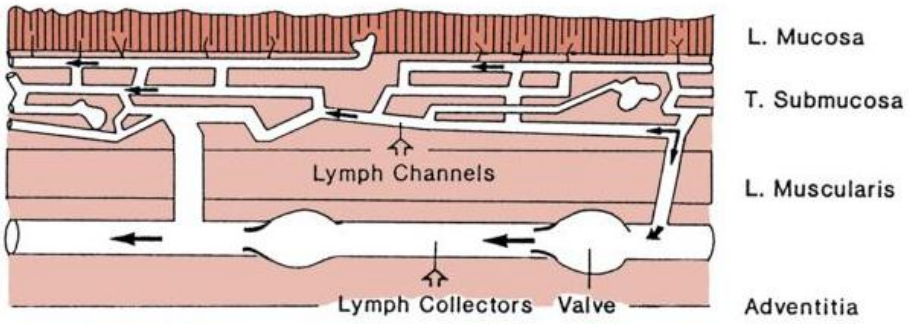
Venous supply of the esophagus can be divided into intrapairetal veins and plexus and extraparietal veins. Intrapairetal veins are intraesophageal and extra esophageal veins. Intra esophageal veins are the sub epithelial veins in the lamina propria of the mucosa and these veins cross the muscular layer and in the periesophageal area to form a plexus of extraesophageal wall veins .No valves are present in the esophageal venous circulatory system. Extrinsic veins drain into the locally corresponding large vessels: the inferior and superior thyroid veins, the azygos and hemiazygos veins, and the gastric and splenic veins.

LYMPHATIC DRAINAGE OF ESOPHAGUS

Lymphatic of esophagus first starts in the submucosal level and then penetrate muscularis propria and drain into the plexus in the esophageal wall in the longitudinal direction, from here they egress and drain into the regional lymph nodes. Lymph capillaries start in the mucosa and then unite to form blind endothelial sacculations or channels. Lymphatics originate in-between mucosa and sub mucosa and they form collecting channels within the sub mucosa. These collecting channels run parallel to the organ axis. Lymph flows in cranial direction into the thoracic duct or subclavian lymph trunks from above the carina whereas

lymph flows mainly toward the cisterna chyli via the lower mediastinal, left gastric, and celiac lymph nodes from below the carina. Esophageal venous plexus don't have valves but the lymphatic channels in the esophagus have valves.





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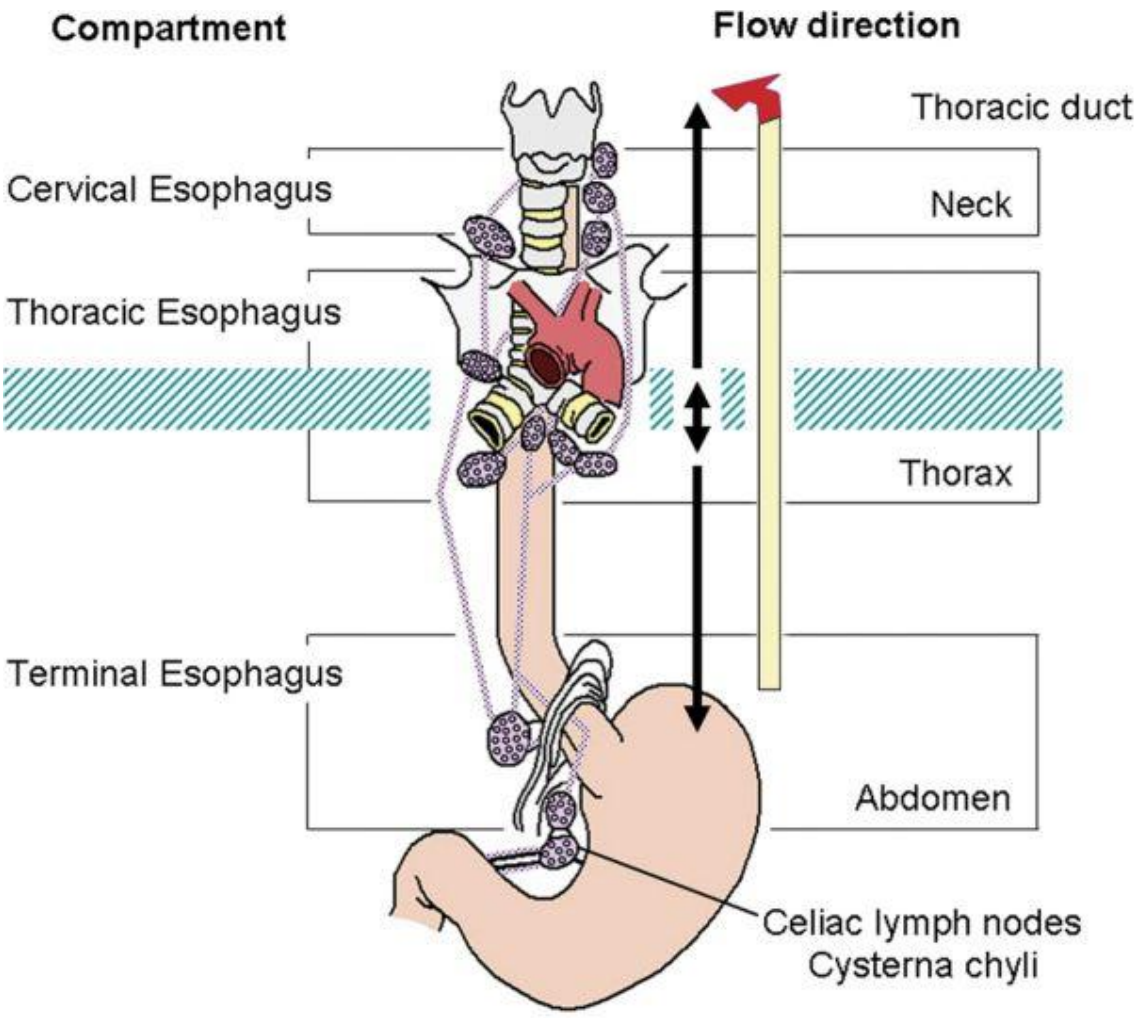

Compartment
Flow direction
Thoracic duct
Cervical Esophagus
Neck
Thoracic Esophagus
Thorax
Terminal Esophagus
Abdomen
Celiac lymph nodes
Cysterna chyli

TUBERCULOSIS OF THE ESOPHAGUS

Tuberculosis infection is caused by Mycobacterium tuberculosis complex .Transmission is through air borne spread of droplet nuclei from infected patients .Organism belongs to the family of Mycobacteriaceae and of Actinomycetales order .Among the pathogenic species ,human disease causing agent is Mycobacterium Tuberculosis .This non spore forming aerobic bacterium is neutral on gram's staining, classified as ACID FAST BACILLI because they cannot be decolorized by acid alcohol following gram's staining .This is due to the high content of mycolic acids ,long chained cross linked fatty acids and cell wall lipids . More than 90 % of cases are reported from developing countries. Most potent risk factor is HIV coinfection which tend to suppress cellular immunity. Following the acquisition of specific immunity and accumulation of numerous activated macrophages at the primary site (tubercles) granuloma are formed. Gastrointestinal tuberculosis accounts to only 3.5 % of extra pulmonary cases .Various routes of pathogenic spread are swallowing of sputum (direct) , hematogenous spread, consuming of milk from cows affected by bovine tuberculosis .Prevalent sites in GIT are terminal ileum and caecum.

Tuberculosis is systemic disease. Though it affects lungs most often it can affect other organs including esophagus. When it affects esophagus

it can be primary esophageal tuberculosis or it can affect esophagus secondary to pulmonary or miliary tuberculosis or secondary to cervical or mediastinal nodal disease because of tuberculosis .Esophageal tuberculosis consists of 0.3 % of gastrointestinal tuberculosis.[1]

Mycobacterium tuberculosis gains entry into the body through respiratory tract and can spread by hematogenous or lymphatics.

The Esophagus is a dynamic organ with coordinated peristalsis. When patients with pulmonary tuberculosis swallows infected sputum the exposure of the esophagus to tuberculous organism is limited because of easy clearance of tuberculous organism down to the stomach due to coordinated peristalsis along with good functioning lower esophageal sphincter and upright posture [2]. This is why esophageal tuberculosis is a rare entity. Clinical presentations are dysphagia, pain in retrosternal area, fever, weight loss, and cough with expectoration.[3, 4] The symptom which occurs most frequently in esophageal tuberculosis is dysphagia [3,4].

Infection spread to the esophagus by various mechanisms. It can be due to

1. Swallowed tuberculous sputum

2. Spread from pharyngeal or laryngeal lesion.

3. Spread from mediastinitis ,hilar lymph nodes, vertebrae[3] or lymphatic spread in retrograde manner [5].

4. In miliary tuberculosis by hematogenous spread [5].

Esophageal tuberculosis can have various presentations like ulcer in the esophagus or stricture or even tracheo esophageal fistulae [6].

Esophageal tuberculosis affects the mid esophagus commonly because of its contact with mediastinal lymph nodes near the carina [7]. In majority of patients with hilar and mediastinal lymph nodes, tuberculosis affects the esophagus by direct extension [8].Therefore the upper and middle third of esophagus is most commonly involved.

Mediastinal tuberculosis affecting adults is rare and presenting as dysphagia is even more uncommon. The usual presentation is an ulcer in esophagus, mucosal or sub mucosal mass with ulceration, fistula or sinus formation, extrinsic compression, or displacement of esophagus [9, 10, 11, 12,13.]

Esophageal tuberculosis can be divided into three distinct histomorphological types.

1. Most common is the ulcerative type:

The sub mucosa of the esophagus gets infected by mycobacteria, initially leading to tubercle formation. This tubercle progresses to nodule

formation followed by caseous necrosis leading to ulceration. This ulcer involves only the mucosa and sub mucosa and appears as an ulcer with a purulent base. The edges are irregular and usually superficial. This ulcer can penetrate deeper and produce complications like esophageal perforation, esophageal mediastinal/ cervical fistula or sinus, Esophagopleural fistula or even aorta esophageal fistula. Aortoesophageal fistula presents with massive hemorrhage and death .Esophageal sub mucosal ulcer has a capacity to heal by itself. The healing by fibrosis leads to a scar and in turn can produce an esophageal stricture.

2. Hyperplastic type

In esophageal tuberculosis, tuberculous granulation tissue formation is more profound along with fibrous tissue hyperplasia. Sometimes this massive hyperplasia can produce a tumor like mass giving a pseudotumour appearance resulting in luminal narrowing.

3. Granular esophageal tuberculosis is the least common type.

Esophageal tuberculosis can be diagnosed by various imaging modalities like chest radiograph, barium esophagogram, upper GI endoscopy, bronchoscopy, CECT chest /neck, MRI chest and Endoscopic ultrasound.

With the help of image guided biopsy or direct biopsy, diagnosis is confirmed by histopathological examination, identification of Acid fast bacilli, culturing of biopsy material or Polymerase chain reaction analysis of the sample specimens.

ENDOSCOPY IN ESOPHAGEAL TUBERCULOSIS

In the reported literature, the findings on endoscopy include a variety of lesions like midesophageal ulcer, sub mucosal tumor, midesophageal mass, sessile polyp with irregular surface, long narrow strictures due to mediastinal fibrosis, esophageal stenosis, traction diverticulum, sinus, and fistulous tracts to bronchus. Ulcerative lesion, typically have a shallow, smooth edges, granular appearance, with small mucosal miliary granulomas [14].

Plain chest radiograph

Chest radiograph was abnormal in 65% of people in one study. Although in most patients chest radiograph are inconclusive, characteristic lesions in lungs or spine suggestive of tuberculosis can be identified.

Other findings on a Chest radiograph include Para tracheal or mediastinal mass lesion, pleural effusion and old fibrosing pulmonary lesion.

CONTRAST ESOPHAGOGRAM

Esophageal tuberculosis usually affects the middle third of the esophagus. Barium esophagogram usually shows an external compression due to mass lesion in the mediastinum due to lymphadenopathy. Other findings which can be noted are mediastinal sinus, strictures, fistulous tract, kinking, pseudotumor mass, traction diverticulum, polypoid lesion, ulcers, and irregularity of mucosa.

Barium esophagogram usually performed in patients suspected to have tracheo-esophageal fistula. It shows filling of barium in the tracheobronchial tree. In cases where barium is aspirated into the respiratory tract, it will be seen filling the larynx and the entire tracheobronchial tree, a finding which helps in differentiation from Tracheo esophageal fistula (TEF). Of particular importance, it should be emphasized that gastrografin or high osmolar oral contrast agents should not be used in suspicious cases of TEF. If these agents are aspirated in the respiratory tract, they result in pulmonary congestion and necrotizing pneumonitis which may be life threatening.

ENDOSCOPIC ULTRASOUND (EUS)

EUS and EUS guided Fine-needle aspiration (FNA) is a good modality for evaluating the esophageal wall and adjacent mediastinal

lymph nodes. Mediastinal lymph nodes affected by tuberculosis appear matted, conglomerate and heterogeneous with hypo echoic center with intervening hyper echoic strands and foci. Mediastinal & Subcarinal region was the most common site of lymphadenopathy in esophageal tuberculosis. Esophageal endoscopic ultrasound can aid in the diagnosis and response to treatment. [15]

CONTRAST ENHANCED COMPUTERISED TOMOGRAPHY (CECT) OF THE CHEST AND NECK

Esophageal tuberculosis may show thickening of the mid esophagus with enlarged mediastinal lymph nodes in the subcarinal region and evidence of pleural effusion. Periesophageal lymph nodes and pulmonary lesions can be demonstrated on CT.

Mediastinal air and contrast leak can be appreciated in CT thorax suggestive of esophageal perforation or esophgomediastinal sinus. Tuberculous mediastinal lymphadenopathy shows characteristic hypo-dense center on CECT

CECT can demonstrate TEF. The present day multislice CT with 3D reconstruction can provide us with exquisite images of the fistula and its relation to surrounding structures, thereby aids in planning surgical treatment or stent deployment.

BRONCHOSCOPY

Tuberculous subcarinal lymph nodes enlargement produces tracheal splaying. The presence of mucosal and sub mucosal grey-white nodules in the trachea may suggest the granular form of esophageal tuberculosis. Ulcerative lesions are also identified in bronchoscopy. Even a small tracheoesophageal fistula or tracheobronchial fistula can be identified in bronchoscopy with the application of methylene dye into the esophagus; the dye can be demonstrated coming through the fistulous opening in the trachea or bronchi.[6]

TISSUE BIOPSY

Tissue biopsy to confirm tuberculosis is obtained by taking samples from the ulcer seen in endoscopy or via bronchoscopy. It can also be obtained by CT guided biopsy or taking biopsies directly from the nodal mass or from the diseased wall of the esophagus during open drainage of the mediastinum. In case of tuberculosis affecting the cervical esophagus FNAC or cervical node biopsy is done for confirmation of tuberculous etiology. EUS guided biopsy also helps to establish the diagnosis of tuberculosis.

Histological proof of epitheloid cell granuloma with marginally polygonal giant cells of langhans-type or the presence of acid fast bacilli

confirms the diagnosis.

AFB staining is done with ziehl neelsen staining.

Steps of the procedure

1. Carbol fuchsin Staining
2. Steam heat for 7 minutes-
3. Water wash
4. Decoloraization with 20% H_2SO_4-
5. 95% ethanol wash
6. Counterstained with loeffer`s methylene blue /1% picric acid /0.2 % malachite green.

Tubercle bacilli appear as bright red rods seen under oil emersion lens.

Only 35% of gastro intestinal tuberculosis shows positive in culture. It usually takes 8 weeks to get the results .Culture media used to grow tubercle bacteria is Lowenstein Jensen media.

TREATMENT

Antituberculous drugs for gastrointestinal tuberculosis recommended by WHO for

1. Uncomplicated Extrapulmonary case -4 drugs for 2 months and 2 drugs for 4 months.

2. Complicated Extrapulmonary cases -4 drugs for 2 months and 2 drugs for 7 months.

Many patients undergo one year treatment and this is advised to overcome the recurrent tuberculosis and the complications encountered in gastrointestinal tuberculosis.

First line drugs

Rifampicin -10mg/kg,

Ethambutol-15mg/kg,

Isoniazid -5mg/kg,

Pyrazinamide -25mg/kg.

Second line of drugs

Amikacin,

Kanamycin,

Para amino salicylic acid,

Ciprofloxacin,

Ofloxacin,

Clarithromycin,

Azithromycin,

Rifabutin.

Patients with esophageal tuberculosis on medical therapy are followed in regular intervals. Symptom improvement. (dysphagia improvement), body weight gaining , improvement in appetite, and absence of fever should be analyzed. Repeat endoscopy to appreciate the reduction in size of the esophageal ulcer and improvement in luminal narrowing.

Patients who are not responding to the medical treatment within 6 weeks should be reassessed to rule out drug resistance and associated diseases like malignancy, crohns disease and eosinophilic esophagitis.

SURGICAL MANAGEMENT

Following are the surgical management options :

Drainage

Cervical node suppuration-neck drainage.

Thorocotomy and drainage- mediastinal suppuration

Fistula repair – for tracheoesophageal fistula.

Surgical management is necessary by some patients who present with mediastinal collection or mediastinal lymphadenopathy and pleural effusion. In such conditions, open drainage is done by thoracotomy and wall biopsy taken from the esophagus or from the nodal mass in the mediastinum.

When the patient presents with suppurating neck abscess, it is usually drained under general anesthesia through a cervical incision in a nondependent site.

Patients with tracheoesophageal fistula in the middle third of the esophagus often require thoracotomy to repair the fistula. Right thoracotomy is usually done in fourth intercostal space. Patient is positioned in left lateral position and it is performed with single lung ventilation. When the thorax is opened, extensive adhesions are present which are carefully released to identify the fistulous tract. The esophageal and tracheal ends are dissected and the fistula is hooked around with umbilical tape. The fistulous tract is then excised. Tracheal defect closed with absorbable suture material like polyglactin 2-0 and the esophageal end by 3-0 vicryl. The procedure can be complicated by leaks, collection, sepsis, stricture or recurrent fistula formation.

Studies have reported that if a vasculised tissue is interposed between the fistulous repair site then the chance of complication and recurrence is less. Hence pedicled intercostal muscle flap or a pleural flap can be used between the fistulous repair sites.

. Camargo and colleagues have done study of Nonmalignant TEF surgical treatment. They performed the repair without the use of muscle interposition between the suture lines sixteen of his patients underwent tracheal resection. Vascularized flap interposition was not done reasoning that the risk of dysphagia and tracheal stenosis is avoided, caused by the interposed muscle pushing the membranous tracheal wall or the esophagus. Despite this study with impressive postoperative results, using vascularized tissue to separate tracheal and esophageal suture lines are recommended by many authors.

Patient who is presenting with mediastinal mass with suppuration of mediastinal lymph nodes and collection in the mediastinum is drained by thoracotomy and if necessary excision of nodal mass which produces obstruction to the esophageal lumen. All the patients who undergo surgical treatment are given antituberculous drugs for 6 months.

In some cases, Tracheal resection may be necessary to treat the tracheoesophageal fistula. If resection is done ,it is reconstructed primarily

with end to end anastomosis and postoperatively the neck is immobilized. If the fistula (TEF) is in the neck, after excision of the fistula the opening in the esophagus and the trachea should be closed seperately with a viable strap muscle or sternocleidomastoid muscle interposed in-between the two suture lines.

All the patients who undergo surgical intervention for tracheoesophageal fistula have bilateral chest drains and post-operative incentive spirometry advised to reduce the incidence of respiratory complications. If the patient develop complications like leak or abscess collection it should be immediately drained.

Stenting for Airway-esophageal fistulas

Before the advent of endoscopic metallic stent insertion, conventional esophageal prosthesis was used for stenting. Lux and Wilson initially reported the placement of Wilson-Cook prosthesis and achieved satisfactory results. However, these conventional prosthesis are known to migrate distally especially in a dilated esophagus and also does not prevent food spilling around the edges of the device and entering the respiratory tree, in a so-called, ‘funnel phenomenon’.

Complications of stent placement include perforation when placed in the cervical regions of the esophagus, stridor due to compression of major airways and stent migration. Incomplete closure of the fistula caused by spillage of material through a gap between the proximal stent margin and the esophageal wall can occur and result in persistence of contamination of respiratory passage. This can be managed by glue injection to seal the gap or by placement of additional stents.

Materials and Methods

MATERIALS AND METHODS

All patients with verified esophageal tuberculosis during the study period from November 2011 to March 2014 were included in the study. Eleven patients with esophageal tuberculosis were studied in this period. All the patients with confirmed esophageal tuberculosis since 1996 who were on follow up (called through phone and letters) in our study period were also included. Their previous case records were reviewed and the latest follow up data was updated in the study.

The patients' demographic data including Name, Age and Sex, were documented. An accurate history taking and clinical examination was done and recorded systematically. For review cases case records were well maintained and were used for analysis in our study.

The investigative modalities undergone by the patient was noted.

Chest radiographs, Upper GI endoscopy (including biopsies of esophageal lesions), bronchoscopy, contrast esophagogram, and CT thorax and neck were performed. Some patients needed direct thoracotomy and drainage and biopsy from the esophageal wall or from the nodes.

Diagnosis was made with histological proof of epithelioid cell granulomas with marginally polygonal Langhans-type giant cells and/or

the presence of acid-fast bacilli. Ziehl Neelsen technique is used to look for acid fast bacilli.

Tissues were taken by FNAC or biopsy from cervical nodes . CT guided biopsy is done to get the tissue from the mediastinal nodes, Similarly Endoscopic ultra sound guided biopsy or direct thoracotomy and biopsy was done to get the tissue from mediastinal nodes or from the esophageal wall. Endoscopic and bronchoscopic tissue biopsy was done for the lesion accessible through endoscopy or bronchoscope.

The etiology of the esophageal tuberculosis, and the treatment offered to each patient was noted. The patient's clinical course was closely monitored and recorded during every follow up visit.

In our analyses, tuberculosis presenting with dysphagia can be broadly categorized into an ulcer group (UG, n=21) and an extrinsic compression group (n=10).

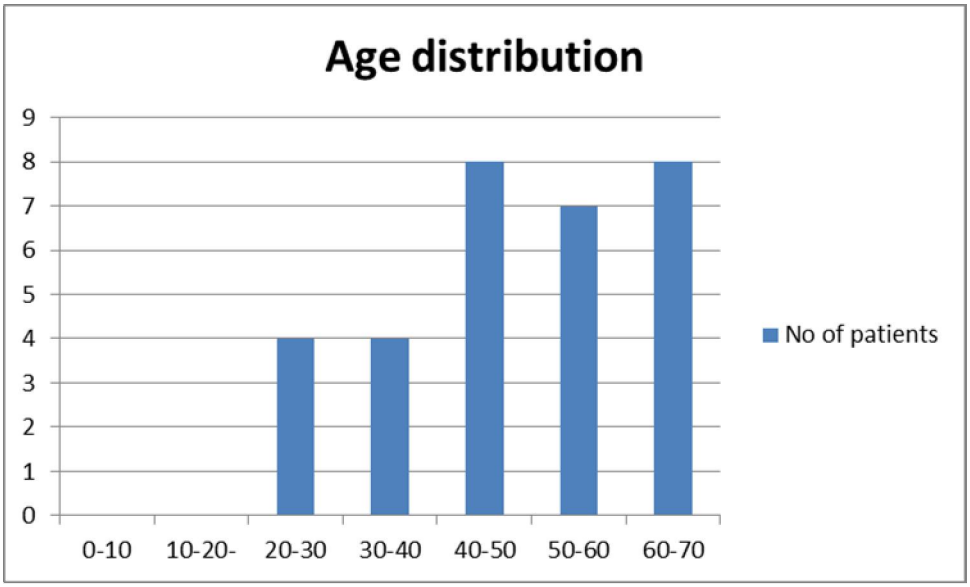
Results

RESULTS

DEMOGRAPHICS

The age distribution was between 20-70 yrs. There were 4 patients (20-30 years), 4 patients (30-40 years), 8 patients (40-50 years), 7 patients (50-60 years) and 8 patients (60-70 years). Most of the patients presented between 40 -70 years of age.

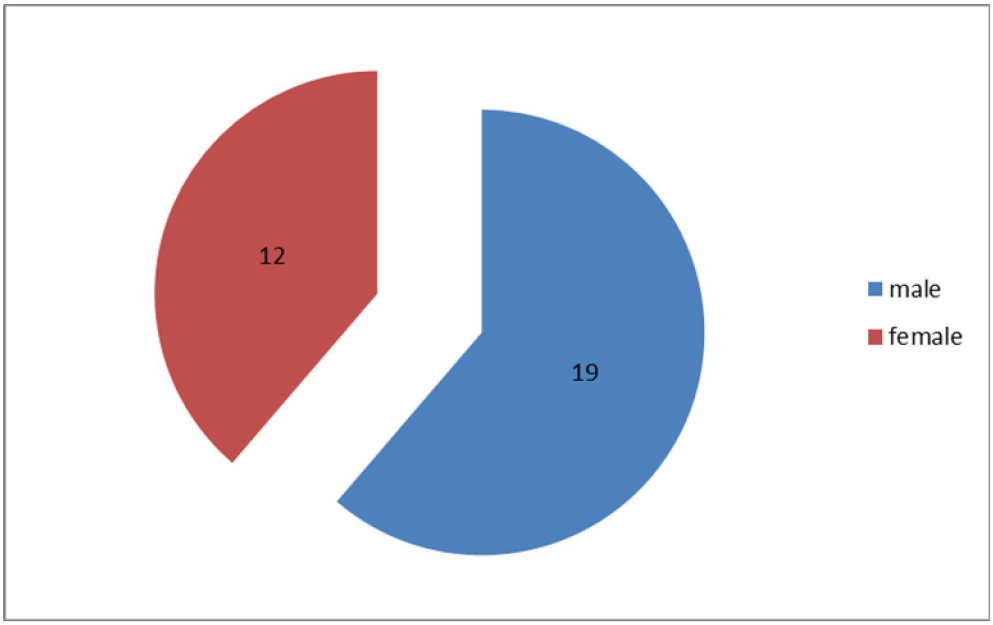
Age distribution	***No of patients***
0-10	*0*
10-20-	*0*
20-30	*4*
30-40	*4*
40-50	*8*
50-60	*7*
60-70	*8*



Sex distribution

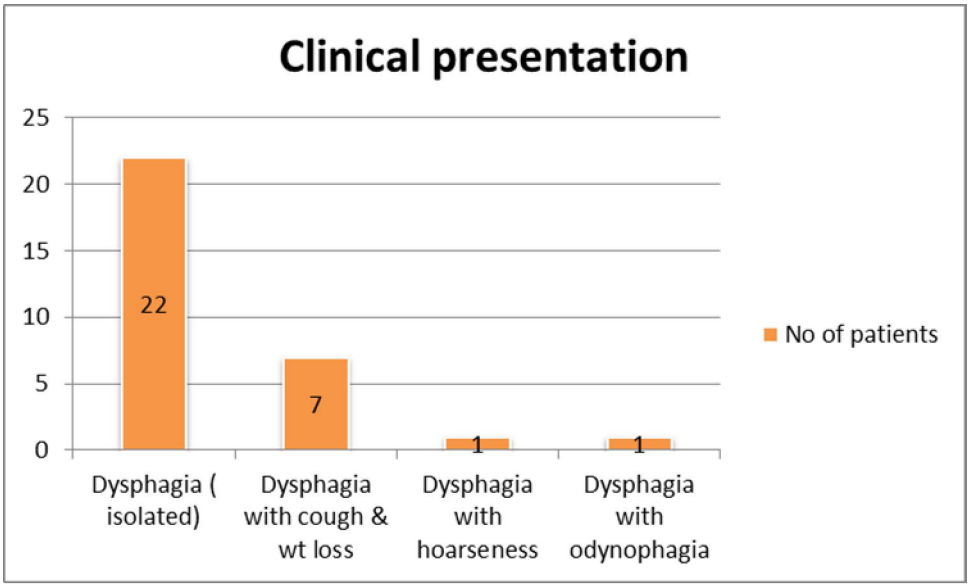
The Male to female ratio was 1.6:1 .

Male	***Female***
19	*12*



Duration of symptoms ranged between 4 months to 19 months. Symptoms ranged from dysphagia predominant (n=12) , dysphagia with cough, weight loss &fever(n=7),dysphagia with coarseness of voice (n=1) and odynophagia (n=3).

Clinical presentation	No of patients
Dysphagia (isolated)	22
Dysphagia with cough & wt. loss	7
Dysphagia with hoarseness	1
Dysphagia with odynophagia	1

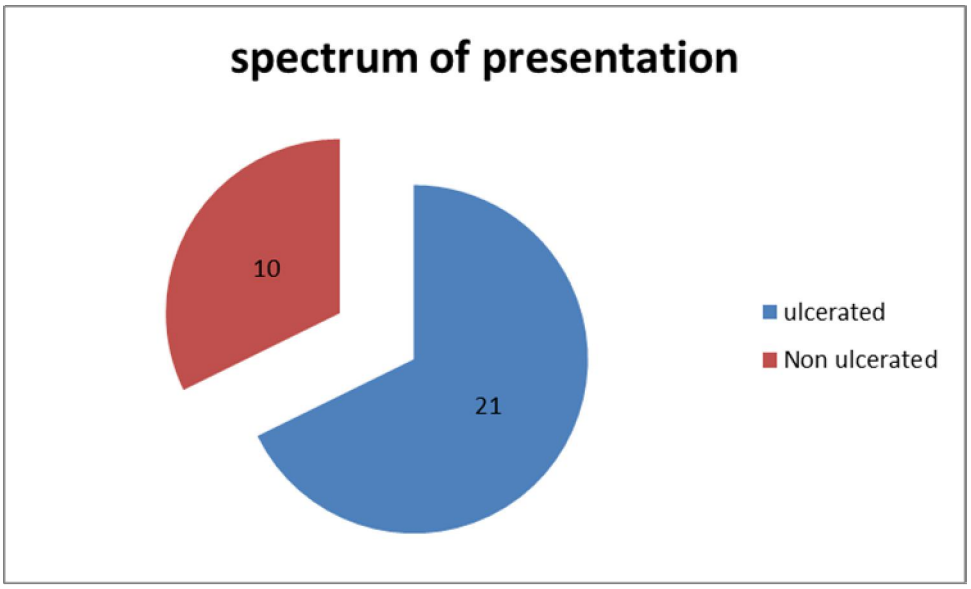


Co morbidities included, diabetes mellitus in 8 patients, obstructive airway disease in 4 patients, one patient with history of miliary

Tuberculosis and 3 patients with previous history of tuberculosis.

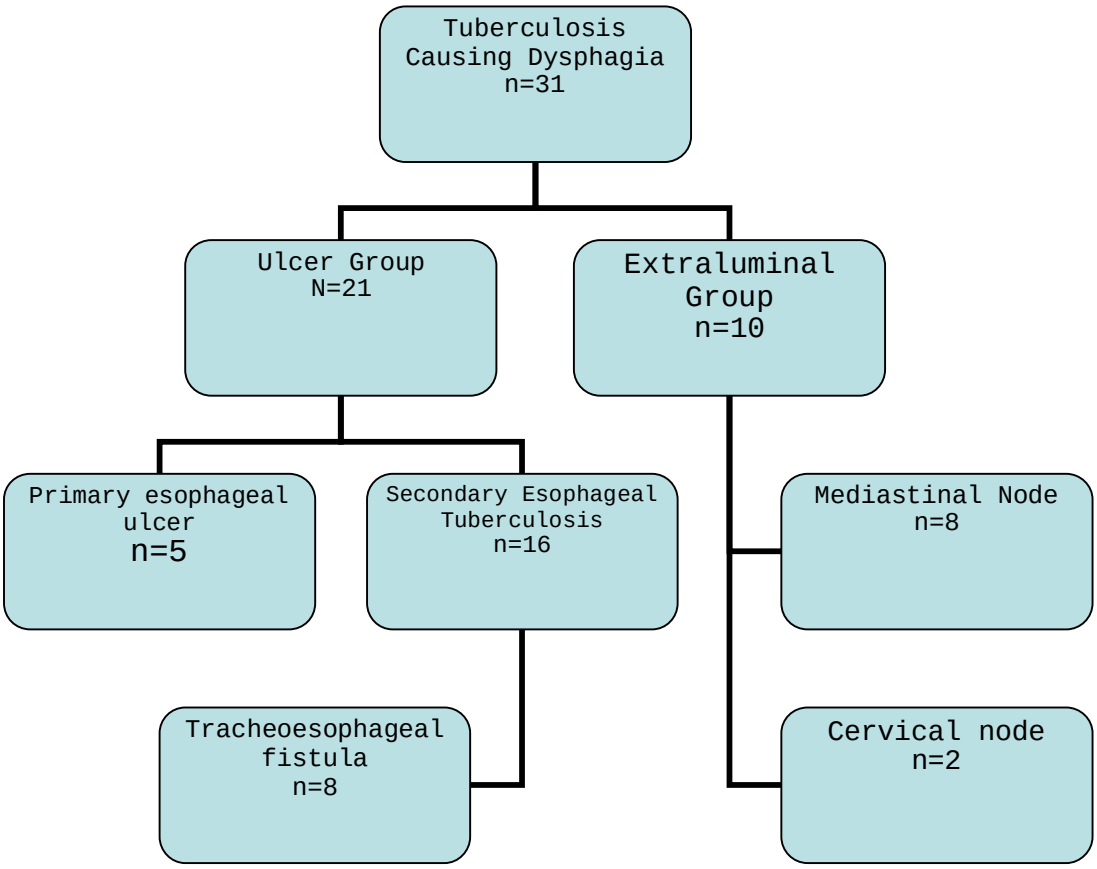
SPECTRUM OF PRESENTATION

Spectrum of presentation	No of patients
Ulcer Group	21
Extra luminal Group	10



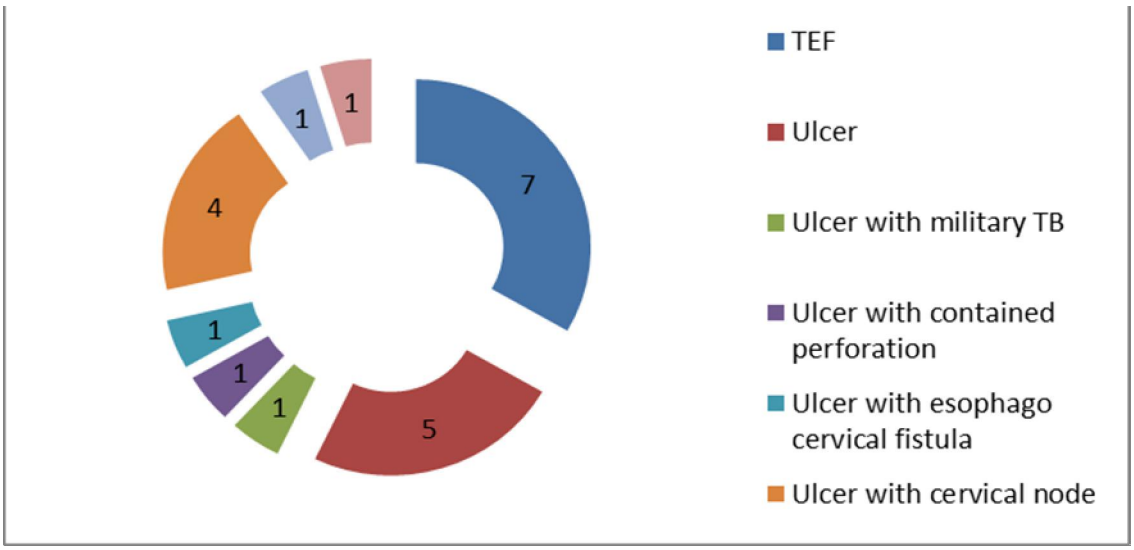
SPECTRUM OF PRESENTATION

FLOWCHART



ULCER GROUP

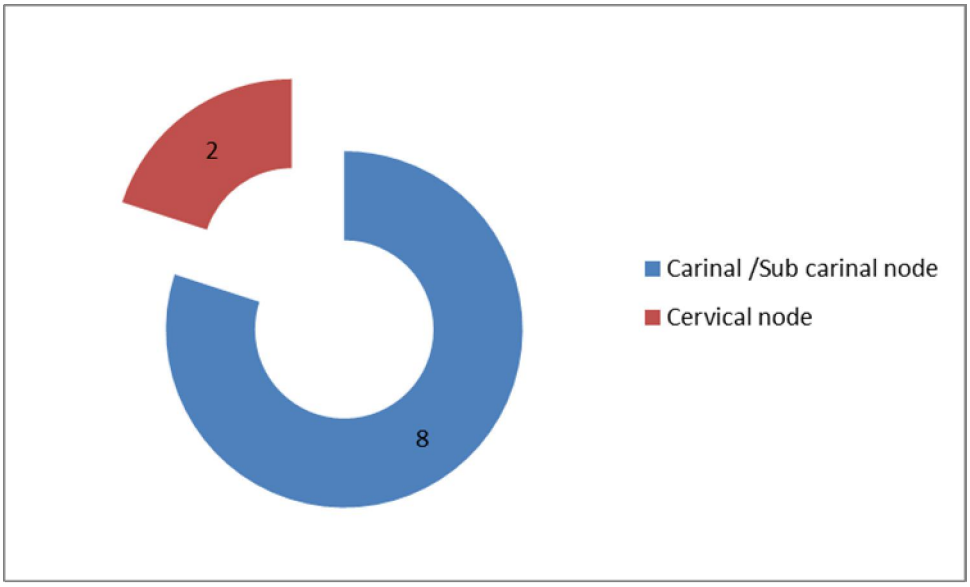
Presentation	No of patients
TEF	7
TEF following Mediastinal drainage	1
Only Ulcer	5
Ulcer with military TB	1
Ulcer with contained perforation	1
Ulcer with esophago cervical fistula	1
Ulcer with cervical node	4
Ulcer with sub carinal node	1



Ulcer Group : Spectrum of presentation

Extra luminal group -10

Carinal /Sub-carinal node	8
Cervical node	2



Extraluminal group : Spectrum of Presentation

Endoscopic findings (FIG-10 a,10b,10c):

In the ulcerative group

1. Middle third esophageal ulcers seen in 7 patients.

2. 6 patients had ulcers in upper third esophagus.

3. Trachea-esophageal fistulous openings in the esophagus was seen in 4 patients. However, the fistulous ends were not identified in 3 patients due to esophageal folds or granulation tissue

In the extraluminal group :

1. Extrinsic compression in the middle third of the esophagus seen in 6 patients.

2. Lower third esophageal compression seen in 2 patients and

3. Upper third esophageal extrinsic compression in 2 patients.

Findings	Number of cases
Middle third esophageal ulcer	7
Upper third esophageal ulcer	6
TEF opening	4
Extrinsic compression in the middle third	6
Lower third esophageal compression	2
Upper third esophageal extrinsic compression	2

RADIOLOGICAL FINDINGS

Radiography of chest (Fig-1) was abnormal in 11 patients

1. Two patients with tracheoesophageal fistula had evidence of Aspiration pneumonitis (one with bilateral infiltrates and other with Right basal infiltrates).
2. One patient with previous history of pulmonary tuberculosis had bilateral lower lobe infiltrates suggestive of pulmonary Tuberculosis.
3. Loss of paratracheal stipe was present in 5 patients and
4. Enlarged Soft tissue shadows suggestive of neck nodes in 3 Patients.

Barium esophagogram was done in 20 out of 31 patients in the study group . (Fig 2,3&4)

In the Ulcerative group , the findings were:

1. 6 patients demonstrated fistula between esophagus and trachea.
2. 1 patient developed TEF after mediastinal drainage for nodal suppuration
3. one (1) patient showed mid esophageal ulceration and luminal narrowing

4. one patient showed narrowing in upper third of esophagus
5. One patient showed normal study.

In Luminal compression group all the patient underwent barium esophagogram

1. Two patient showed luminal narrowing in upper third esophagus.
2. Three patients showed extrinsic compression in middle third of esophagus
3. Two patients showed extrinsic compression at subcarinal level.
4. Three patients showed a normal barium study.

CT Chest & Neck: (Fig5a, 5b, 6,7a,7b &8)

All patients underwent CECT Chest and Neck except 2 patients.

In the Ulcer Group

1. Fistula was appreciated in 4 patients out of 8 patients with tracheoesophageal fistula .In the remaining patients CT showed only narrowing and thickening of esophagus. TEF was diagnosed with barium or during bronchoscopy.

2. 4 patients showed lymphadenopathy of sizes from about 2cm to 5cm. mediastinal collection was seen in one patient.

3. 7 patients showed no abnormalities in CT scan.

4. In 2 patients CT demonstrated Esophageal narrowing in the upper Third.

5. CT was not done in 2 patients.

In the extrinsic compression group,

1. 6 patient showed mediastinal enlarged nodes and Evidence of suppuration in 1 patient
2. 1 patients showed cervical lymphadenopathy
3. 3 patients showed no abnormalities in CT scan.

CECT findings	**No of Cases**
Mediastinal Lymphadenopathy ± Suppuration	10
Cervical lymphadenopathy + suppuration	1
TEF	4
Esophageal Thickening	2
Esophageal stricture	2
Normal	10
Not Done	2

Bronchoscopy: (Fig-11)

Bronchoscopy was done in 10 of our patients. It showed ulcer with fistulous opening in 5 patients, ulcer alone in 2 patients, Carina lifting up in 2 patients and normal 1 patients.

Findings	number of cases
Ulcer with fistulous opening	5
Ulcer alone	2
Carina lifting up	2
Normal	1

Endoscopic ultrasound (EUS) (fig 9 a &b)

It was done in only two patients. Mediastinal lymphadenitis with esophageal wall thickening seen in the 2 patients and both of them underwent EUS guided biopsy.

CHEST X RAY

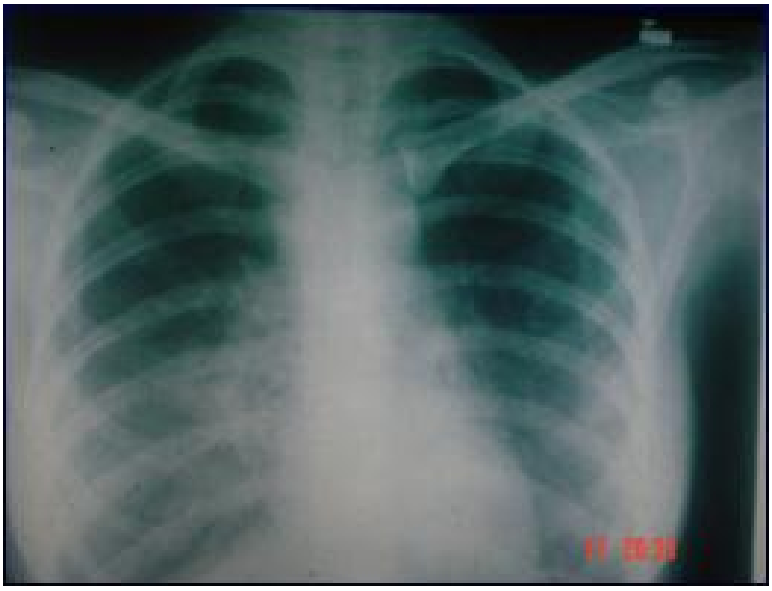


Fig 1

BARIUM STUDIES

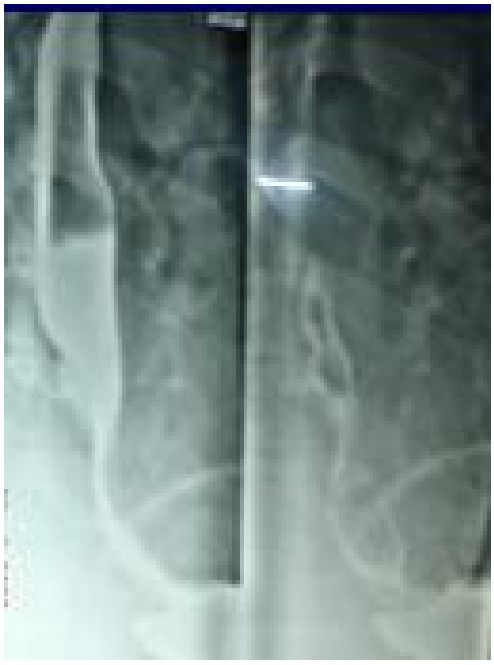


Fig -2

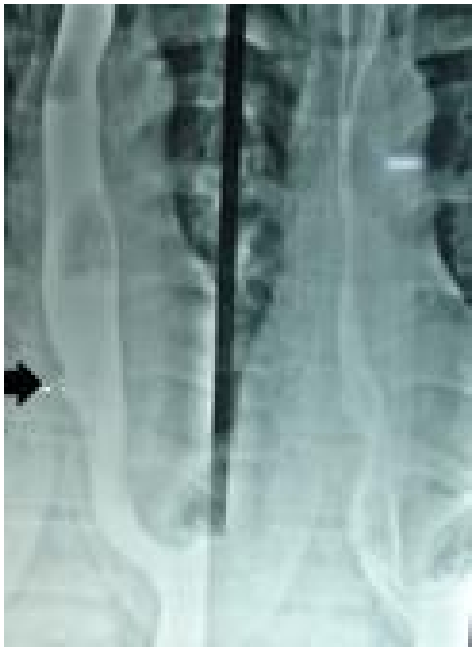


Fig -3

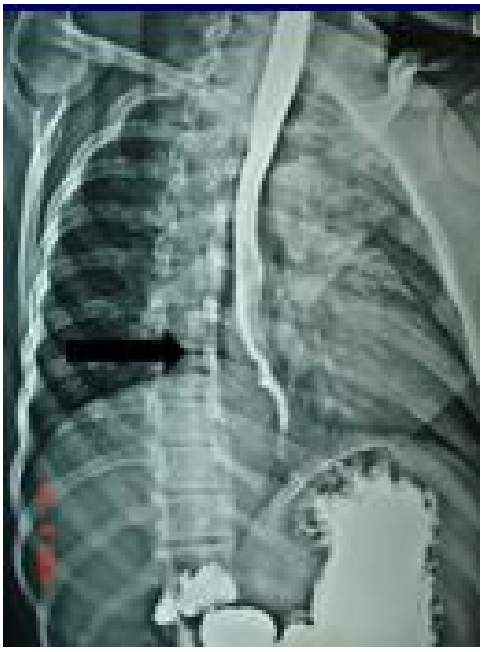


Fig 4

ULCERATIVE LESION IN THE ESOPHAGUS - LUMINAL NARROWING.

CERVICAL NODAL SUPPURATION

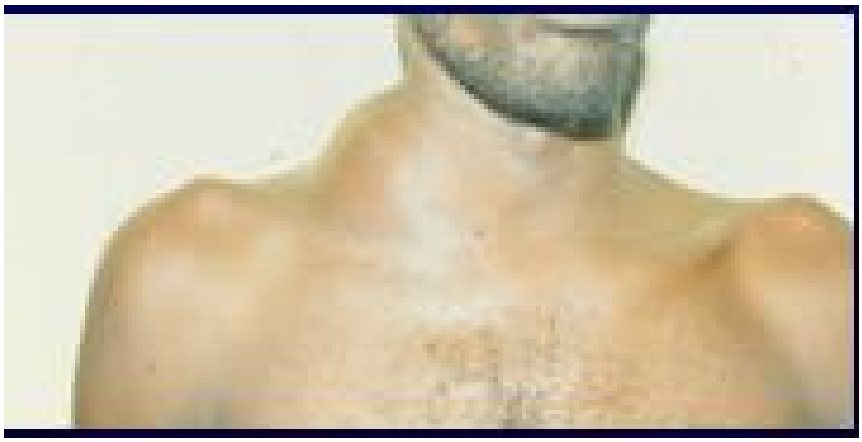


Fig 5a: Cervical Node Enlargement

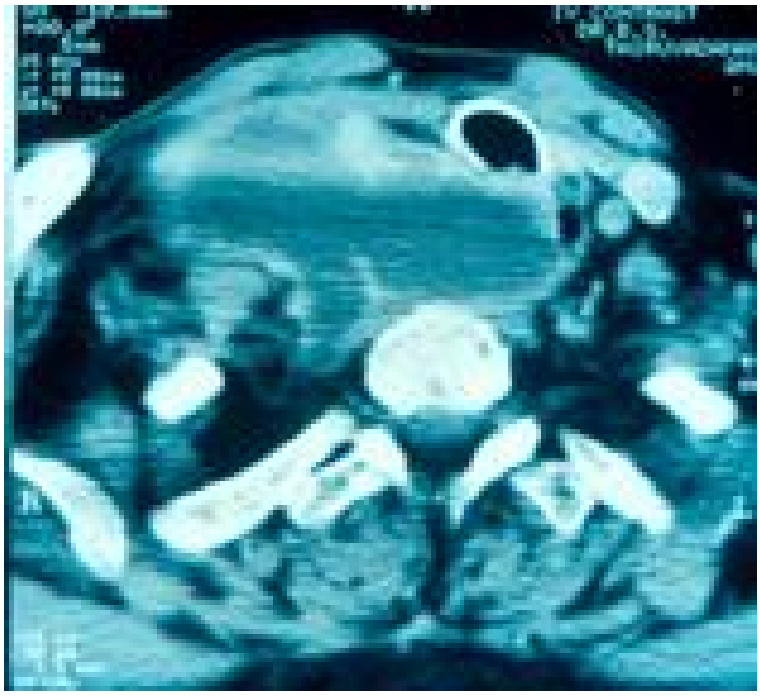


FIG – 5b : CT OF NODAL SUPPURATION,

FIG – 6 : MD CT OF NODAL SUPPURATION

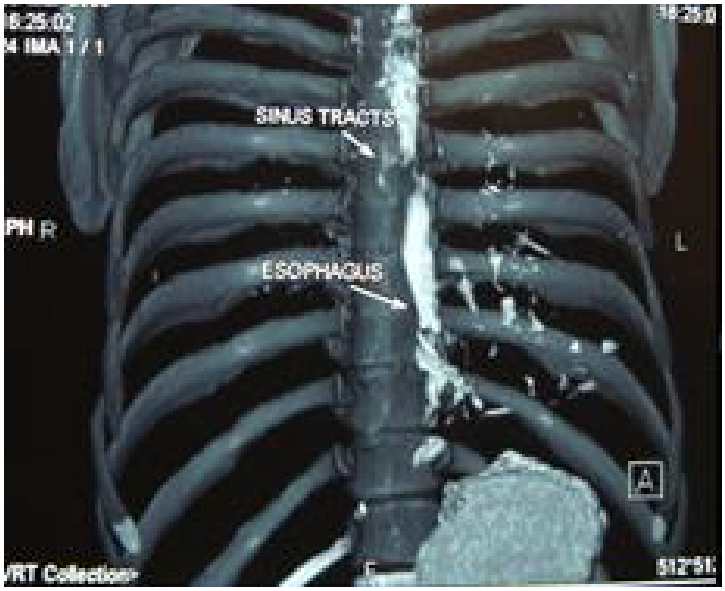


FIG 7 a: Reconstructed Image showing sinus Tracts

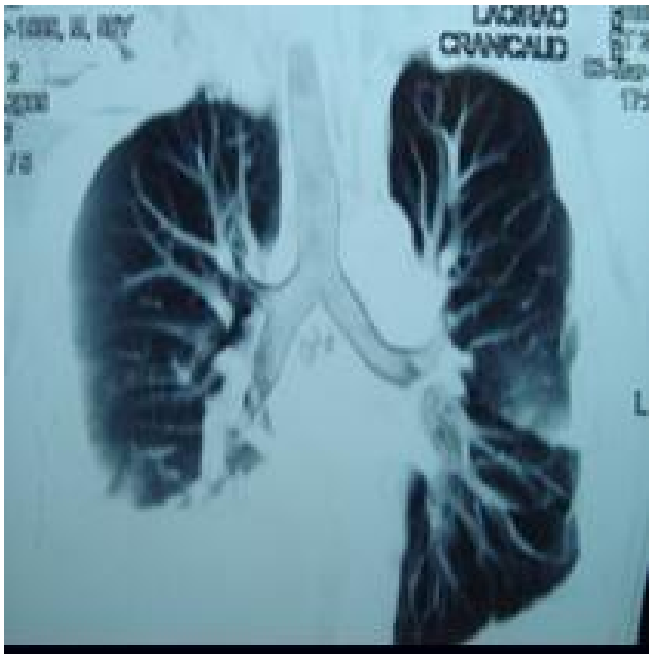
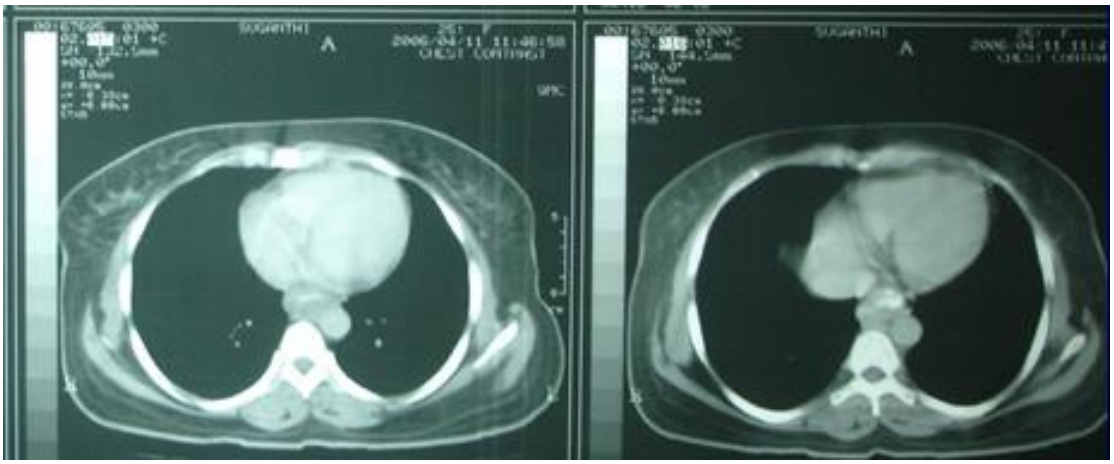


Fig-7b. Sinus tract with pleural effusion

Fig 8: CT showing Subcarinal lymphadenopathy



Endoscopic ultrasound

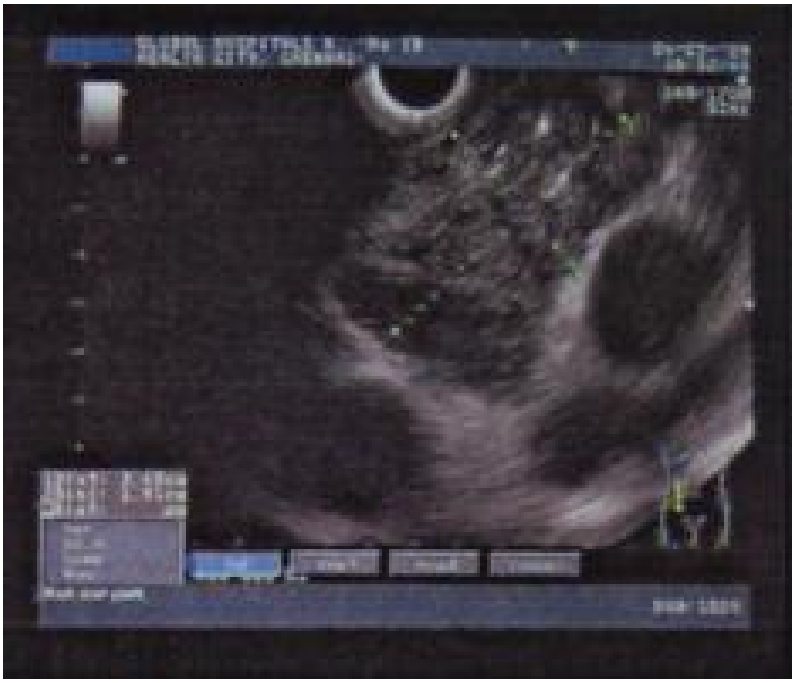


Fig 9 a

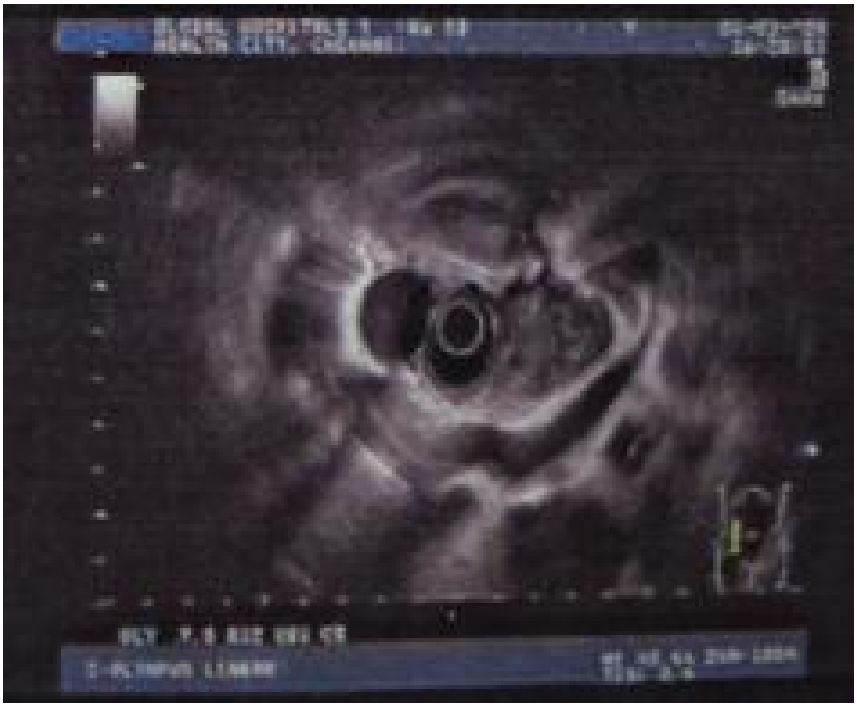
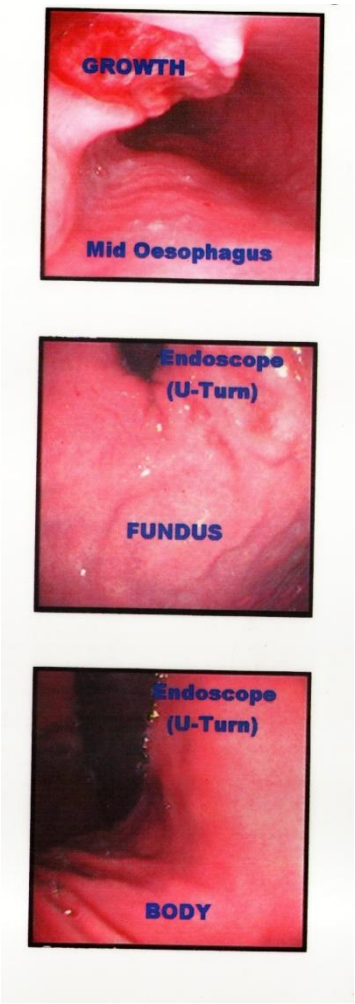


Fig 9 b

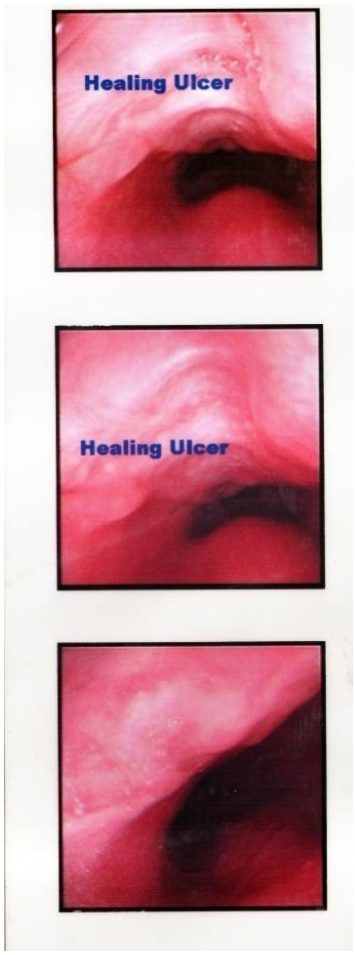
ENDOSCOPY- ESOPHAGEAL TUBERCULOSIS

Fig 10



a. ON DIAGNOSIS

Fig 10a



b.3 MONTHS AFTER ATT

fig 10 b

c.HEALED SCAR ON COMPLETION OF ATT

fig 10c

BRONCHOSCOPY-ULCERATIVE LESION

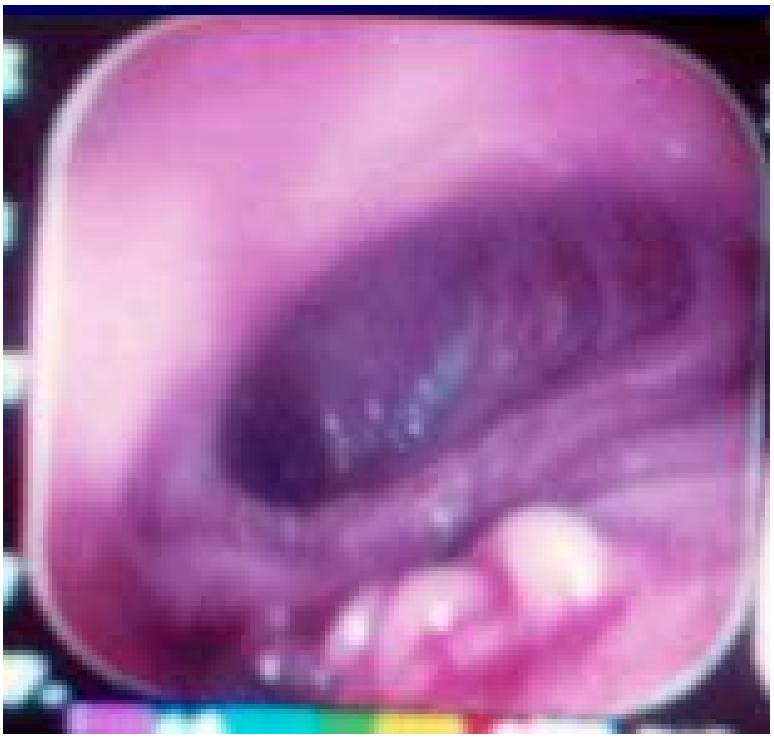
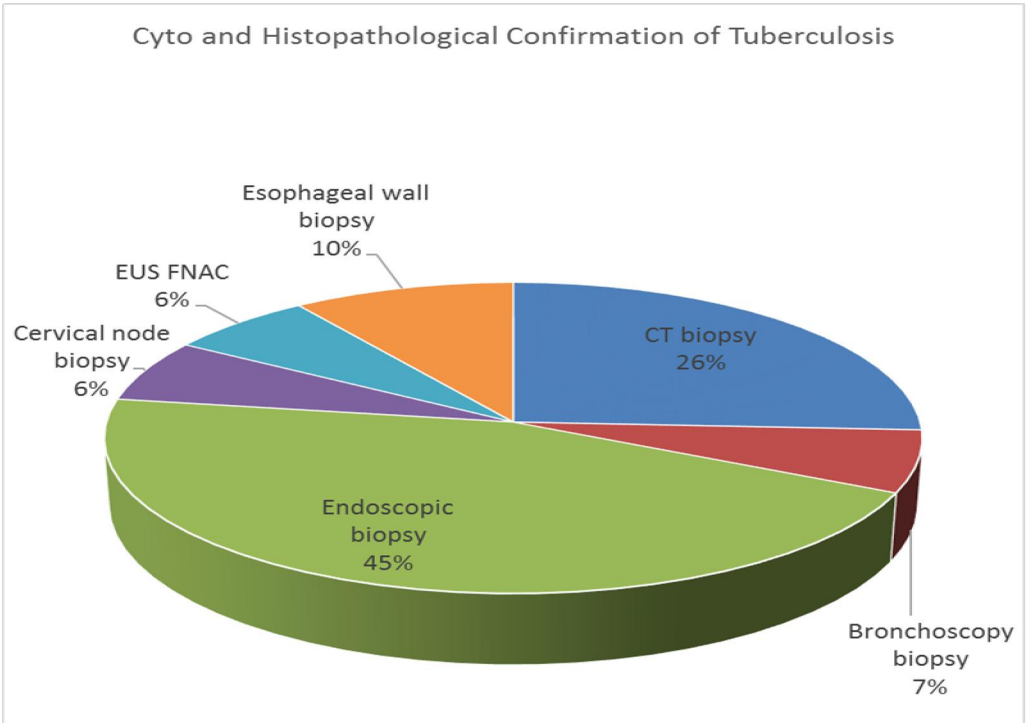


Fig -11

HISTOPATHOLOGY & CYTOLOGICAL FINDINGS

Esophageal tuberculosis was confirmed with histopathological examination in 28 patients, and with FNAC in 4 patients.

Methods of diagnosis	No of cases	Granulomatous Lesions	AFB positive at Ziehl neelsen
CT biopsy	8	8	
Bronchoscopy biopsy	2	2	
Endoscopic biopsy	14	13	1
Cervical node biopsy	2	1	1
EUS FNAC	2	0	2
Esophageal wall biopsy	3	3	



TREATMENT

All the patients were treated with antituberculous treatment of Isoniazid Rifampicin ,Ethambutol and Pyrazinamide for 3 months followed by Isoniazid and Pyrazinamide.for the next 6 months.

TRACHEOESOPHAGEAL FISTULA REPAIR

In the Ulcer group there were 8 patients with tracheoesophageal fistula (TEF). One patient presented with TEF following mediastinal drainage for nodal suppuration . Of these,4 patients have undergone surgical treatment.

OPERATIVE PROCEDURE

The surgical treatment involved trachea esophageal fistula excision and repair via Trans thoracic approach. All the procedures were done under General anesthesia, with single lung ventilation and double lumen endotracheal tube. With the patient in left lateral position postrolateral thoracotomy was done through fourth intercostal space. The adhesions between lungs and the fistulous tract area were released. The esophagus near the fistulous site was mobilized. The fistula was dissected and hooked around with umbilical tape. Similarly the intrathroacic trachea was dissected and the fistulous tract (fig 12) was separately hooked out with

umbilical tape. The fistulous tract was excised and the tracheal defect was closed with absorbable suture material (2-0 Vicryl). The esophageal defect was sutured with 3-0 Vicryl in two layers.(fig-13). A pedicled interposition intercostal muscle flap was placed for 3 patients in between the repaired ends. In one patient a pleural flap (fig -14) was interposed between the suture lines. After repair air leak was checked in the tracheal side. And a Ryle's tube was passed across the repair for temporary feeding.

Fig-12: Isolation of fistula

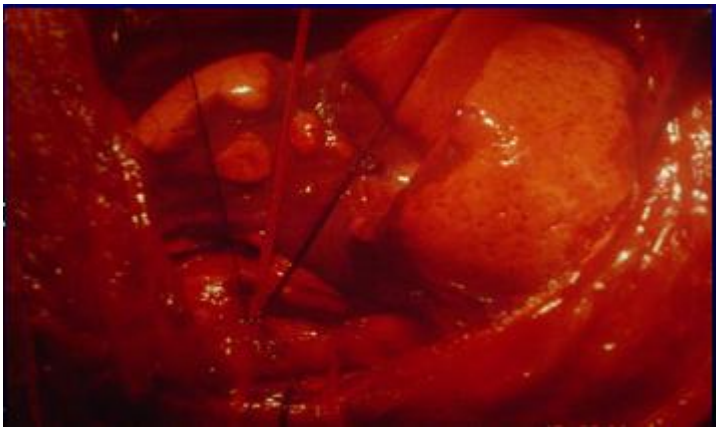


fig-13:Repair of fistula

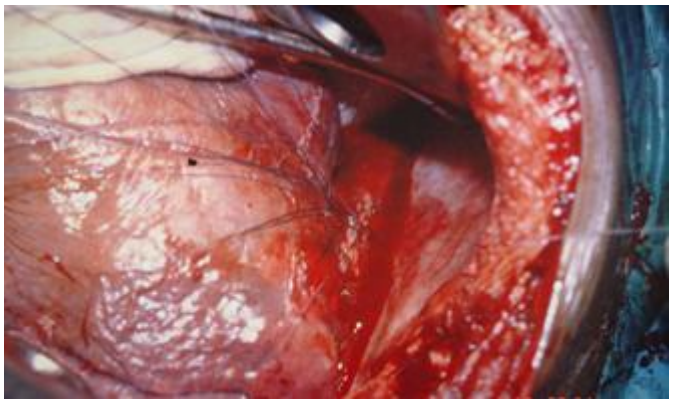
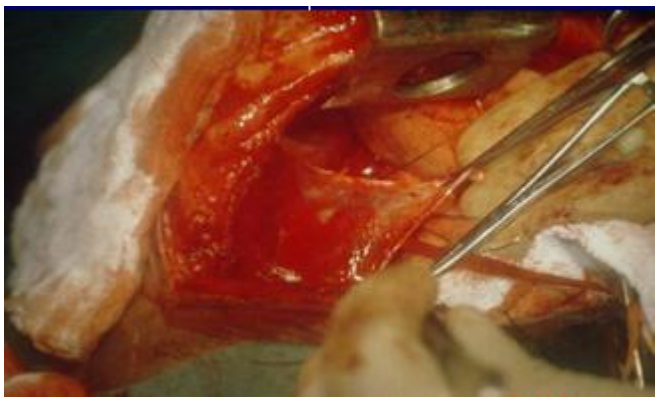


fig 14:Pleural Interposition



OPEN MEDIASTINAL DRAINAGE

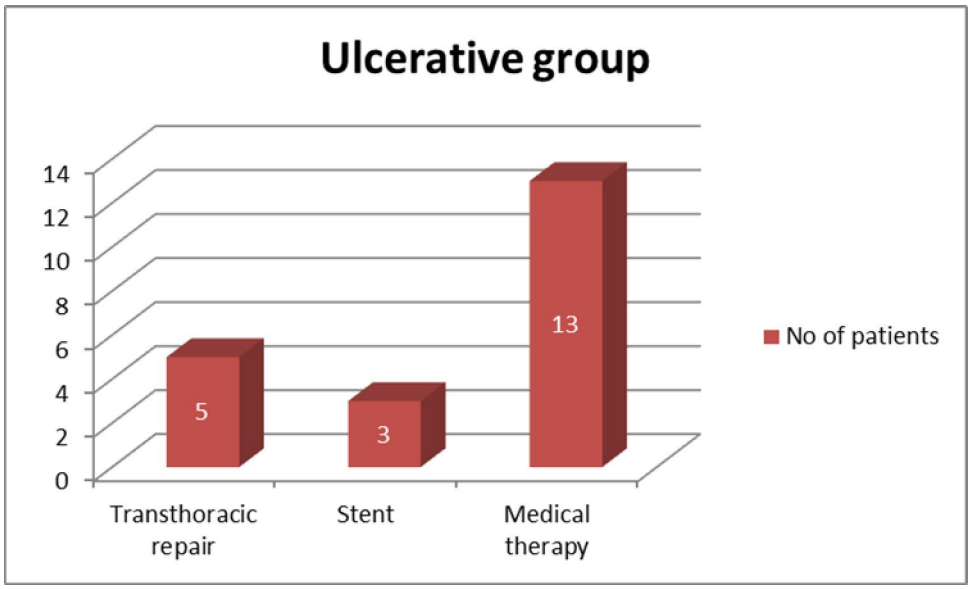
Three patients had caseous mediastinal lymph nodes with abscess formation inside the mediastinum .They were managed by open drainage through a right thoracotomy. Chest drain was kept bilaterally. Post operatively under cover of antituberculous drugs the 3 patients recovered completely.

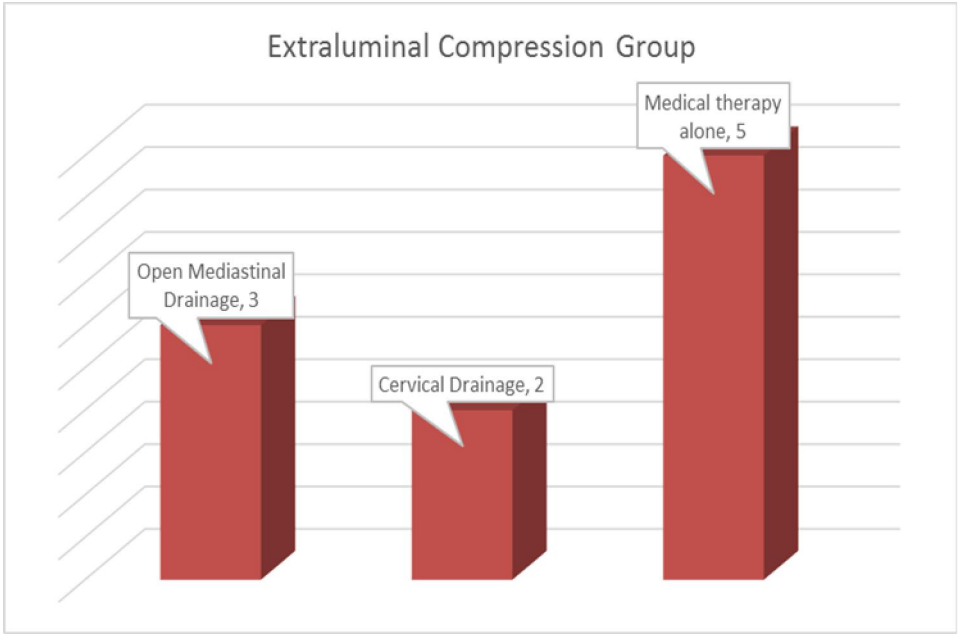
CERVICAL DRAINAGE

One patient with large suppurated cervical adenopathy required open drainage under anesthesia.

STENTING

In 3 patients temporary stenting of Tracheoesopheageal was done in patients considered unfit for surgery, while being treated medically with ATT. Stent placement was successful in all three patients. The Fistulas remained sealed with no stent migration. The stents were removed after ATT Completion and there were no residual lesions or fistula in all three patients. The stents were easily removed after therapy (mean duration of 6 months after completing ATT).

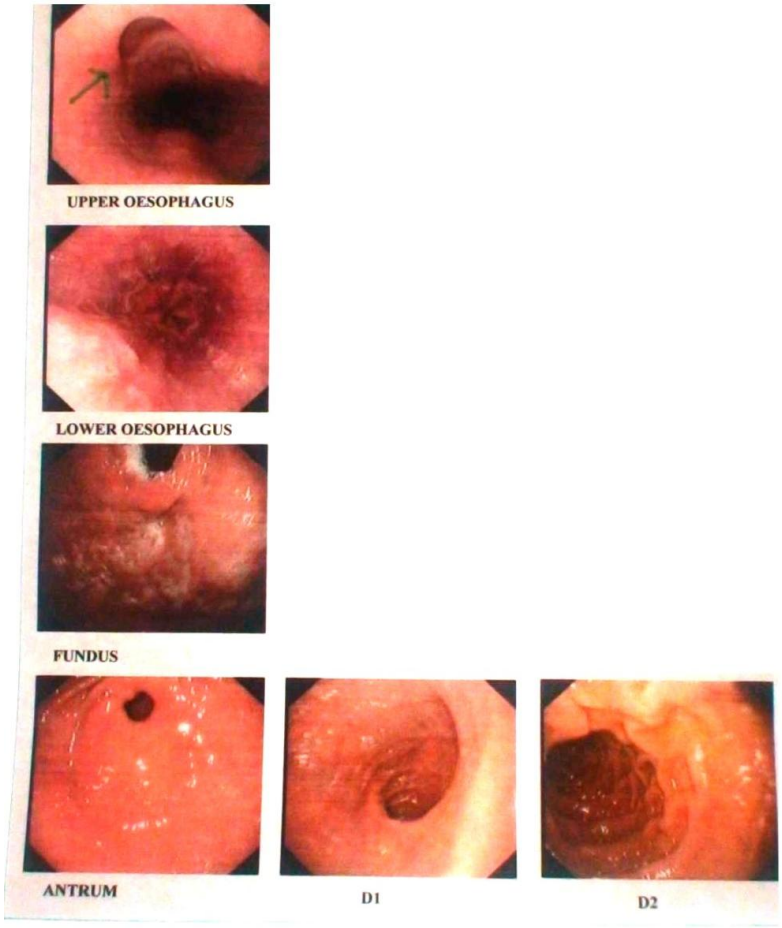




Mode of treatment	No of patients
Transthoracic TEF repair	5
Open Mediastinal Drainage	3
Cervical Drainage	2
Stent	3
Medical therapy alone	18

OUTCOME

Patients were followed up for a median duration of 2 years (range 3 months to 6 years). All patients had complete healing of the lesions except in 1 patient who had a residual diverticulum . Relief of Dysphagia was present in all patients and there was no mortality during the follow –up period .



Follow up OGD after 5 years

Discussion

DISCUSSION

Esophageal tuberculosis is a very rare disease and the incidence is about 0.15 % of those who die of tuberculosis[3]. Even though primary tuberculosis is rare we have reported 5 cases in our series (16.1%) without any evidence of tuberculosis elsewhere.

Secondary form of Esophageal tuberculosis is due to extension of the disease from adjacent organs or by hematogenous spread from a distant site. [22] Secondary form of esophageal Tuberculosis was the most common in our series with an incidence 83.9% (n=26).

In these patients , the mediastinal or Cervical Tuberculous lymphadenopathy mass may compress the esophagus and produce dysphagia.(n=10, 33.8%) [6]

When these nodes suppurate , the abscess can rupture into the esophagus to produce ulceration or sinus formation. This disease process may lead to a fistula when the trachea is also involved. Esophageal tuberculosis producing Tracheaoesopheal fistula was present in 8 patients (25.8%)

Esophageal tuberculosis most commonly presented with dysphagia (n=31, 100%). In addition, few patients presented with fever (n=11,

35.5%) and weight loss (n=11, 35.5%) . The patients who have cough with aspiration were diagnosed with tracheoesophageal fistula.(n=8,25.8%) [5] .

Endoscopy may show ulceroproliferative growth mimicking a neoplastic process . When biopsy from these lesion shows chronic inflammation and caseating or non caseating granuloma then we should suspect tuberculosis[16,17]. In our series, endoscopy showed a ulcerovegetative lesion 13 patients (41.9%) distributed in the Upper Third (n=6) and middle third esophagus (n=7). Extrinsic compression was noted in 10 patients (n=10, 32.2%) most commonly in the middle third due to mediastinal lymphadenopathy (n=6).

Barium esophagogram showed extrinsic compression, traction diverticula, stricture, sinus/fistulous tracts and kinking .

TEF was identified in 8 patients in our series. Of the four imaging studies used to demonstrate a Tracheoesophageal fistula (Barium, Endoscopy , CECT, Bronschoscopy) ,the fistula was demonstrated in

1. six out of 8 patients in barium Esophagogram
2. five out of 8 patients in bronchoscopy
3. four out of 8 patients in Upper GI endoscopy
4. four out of 8 patients on CECT Chest/Neck

In our review of literature, barium esophagogram can define the fistula even if it is small in size. TEF can also be demonstrated by bronchoscopy by identifying the methylene blue dye coming out through the fistulous opening which is injected in the esophagus [18]. Endoscopy can overlook the fistulous opening in the esophagus due to the presence of folds.

The most common finding on CECT chest/neck was enlarged lymohadenopathy with or without suppuration in 11 patients (35.5%). In addition CECT can demonstrate a fistula, esophageal thickening and narrowing. However CECT was normal in 10 patients (32.2%).

There is no specific characteristic features of esophageal tuberculosis in endoscopy ,chest Xray ,bronchoscopy or CT chest. The lesions may mimic esophageal carcinoma,therefore we should consider tuberculosis as a differential diagnosis in developing countries like India .

Histological proof is necessary to prove extrapulmonary tuberculosis before starting medical therapy . Patients in our series, diagnosis was confirmed most commonly by Endoscopic biospsy (n=14, 45.2%) and CT guided Biopsies (n=10, 25.8%) . The presence of epitheloid cell granuloma with surrounding langhans giant cells with or without caseation was

diagnostic of tuberculosis. Acid fast bacilli could be demonstrated in only four patients (0.13%).

MANGEMENT

Although Literature review shows that Tuberculous TEF can be managed by medical therapy alone [19,20] ,in our series, Surgery was required in 5 out of 8 patients with TEF, while 3 patients were managed with temporary stenting. The extended duration of medical therapy required for healing tuberculous lesions and the acute morbidity and risk of mortality caused by a TEF may necessitate surgical intervention when esophageal tuberculosis is complicated by TEF.

Surgical Management includes simple division and closure of the fistula or tracheal resection and reconstruction.[20] All our cases were managed by fistulous tract resection and closing the esophageal and the tracheal opening separately with absorbable suture material (polyglactin). A Vascularized flap is kept in-between the suture lines using intercostal muscle or a thick pleural flap. [20] A stent can also be used as a temporizing measure when comorbidity precludes surgical therapy – as demonstrated in 3 patients in our series (9.7%). Nodal suppuration may require drainage to relieve the dysphagia. (n=5, 16.12%)

With standard antituberculous treatment patients showed excellent response with complete healing of the lesions (n=31, 96.7%) . No deaths have been recorded in the follow up. The relief of dysphagia was 100% and there was no recurrence of the fistula.

Conclusion

CONCLUSION

This study shows that esophageal involvement is not isolated in most patients. Dysphagia due to tuberculosis can be due to ulcerative lesions or extraluminal compression due to lymphadenopathy.

Certain endoscopic features, such as deep and large vegetative esophageal ulcers, tracheoesophageal fistula, and nonhealing ulcers, are suggestive of tuberculous esophageal lesions and can morphologically resemble malignant lesions.

Barium study has a greater sensitivity to demonstrate the TEF in our patients.

Diagnosis by histopathological evidence of granuloma with or without caseous necrosis is reliable in endemic areas because lesions have very low yield for AFB.

Although antituberculous therapy is the mainstay of treatment, surgical intervention is the rule in those with serious complications.

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Appendix

Name Age/Sex

Presenting Complaints

Pressure Symptoms:

Pain		
Satiety/vomiting		
Breathlessness		
Pedal edema		
Cough		
Dyaphgia		
Chest pain		
Hemopstyisis		
Wheeze		
Odynophagia		
Hoarseness of voice		

Incidental finding upon evaluation for other causes

PAST HISTORY:

Tuberculosis		
Drug intake		
Medical illness		

Physical findings:

Anaemia

Lymphadenopathy Chest signs

Investigation

Hb	
Platelet count	
Bilirubin	

Imaging

- *Chest skiagram*
- *Barium Swallow*
- *Esophagoscopy with Endoscopic ultrasound*
- *Fiberoptic Bronchoscopy*
- *CT Chest*

Management

Surgery

Stent:

Medical Therapy

சுய ஒப்புதல் படிவம்

ஆய்வு செய்யப்படும் தலைப்பு

"உணவு குழாய் காசநோய்" சிகிச்சை முறைகள் பற்றிய ஆய்வு.

இராஜீவ் காந்தி அரசு பொது மருத்துவமன மற்றும் சென்னை மருத்துவக்கல்லூரி,

சென்னை – 600 003.

பங்கு பெறுபவரின் பெயர்: **உறவு முறை:**

பங்கு பெறுபவரின் எண்:

பங்கு பெறுபவர் இதனை (√) குறிக்கவும்

மேலே குறிப்பிட்டுள்ள மருத்துவ ஆய்வின் விவரங்கள் எனக்கு விளக்கப்பட்டது. என்னுடைய சந்தேகங்களைக் கேட்கவும், அதற்கான தகுந்த விளக்கங்களைப் பெறவும் வாய்ப்பளிக்கப்பட்டது. ☐

நான் இவ்வாய்வில் தன்னிச்சையாகத்தான் பங்கேற்கிறேன். எந்தக் காரணத்தினாலோ எந்தக் கட்டத்திலும் எந்த சட்ட சிக்கலுக்கும் உட்படாமல் நான் இவ்வாய்வில் இருந்து விலகிக் கொள்ளலாம் என்றும் அறிந்து கொண்டேன். ☐

இந்த ஆய்வு சம்மந்தமாகவும், மேலும் இது சார்ந்தஆய்வு மேற்கொள்ளும்போதும், இந்த ஆய்வில் பங்குபெறும் மருத்துவர் என்னுடைய மருத்துவ அறிக்கைகளைப் பார்ப்பதற்கு என் அனுமதி தேவையில்லை என அறிந்துகொள்கிறேன். நான் ஆய்வில் இருந்து விலகிக் கொண்டாலும் இது பொருந்தும் என அறிகிறேன். ☐

இந்த ஆய்வின் மூலம் கிடைக்கும் தகவல்களையும், பரிசோதனை முடிவுகளையும் மற்றும் சிகிச்சை தொடர்பான தகவல்களையும் மருத்துவர் மேற்கொள்ளும் ஆய்வில் பயன்படுத்திக் கொள்ளவும், அதைப் பிரசுரிக்கவும் என் முழு மனதுடன் சம்மதிக்கிறேன். ☐

இந்த ஆய்வில் பங்கு கொள்ள ஒப்புக்கொள்கிறேன். எனக்குக் கொடுக்கப்பட்ட அறிவுரைகளின் படி நடந்துகொள்வதுடன், இந்த ஆய்வை மேற்கொள்ளும் மருத்துவ அணிக்கு உண்மையுடன் இருப்பேன் என்றும் உறுதியளிக்கிறேன். என் உடல் நலம் பாதிக்கப்பட்டாலோ அல்லது எதிர்பாராத வழக்கத்திற்கு மாறாக நோய்க்குறி தென்பட்டாலோ உடனே அதை மருத்துவ அணியிடம் தெரிவிப்பேன் என உறுதி அளிக்கிறேன். ☐

இந்த ஆய்வில் எனக்கு மருத்துவப் பரிசோதனை, ரத்தப் பரிசேதானை ஸ்கேன் பரிசோதனைகள் செய்து கொள்ளவும் இதற்கு பின்பாக புற்று நோய்கு அறுவைசிகிச்சை செய்து கொள்ளவும் நான் முழு மனதுடன் சம்மதிக்கிறேன். ☐

பங்கேற்பவரின் கையொப்பம் ..... இடம் ..... தேதி .....

கட்டைவிரல் ரேகை:

பங்கேற்பவரின் பெயர் மற்றும் விலாசம் .....

ஆய்வாளரின் கையொப்பம் ..... இடம் .....தேதி .....

ஆய்வாளரின் பெயர் .....

INFORMED CONSENT FORM

Title of the study -**" Management of Esophageal Tuberculosis : A Single Center Experience"**

Name of the participant: _____

Name of the Principal/Co-Investigator: _____

Name of the Institution: Department of surgical gastroenterology, Madras Medical College and Rajiv Gandhi government general hospital, Chennai

I,_____(name of participant), have read the information in this form (or it has been read to me). I was Free to ask any questions and they have been answered. I am over 18 years of age and, exercising my free power of choice, hereby give my consent to be included as a participant in ___ " (title of the study)

(1) I have read and understood this consent form and the information provided to me.

(2) I have had the consent document explained to me.

(3) I have been explained about the nature of the study.

(4) I have been explained about my rights and responsibilities by the investigator.

(5) I have informed the investigator of all the treatments I am taking or have taken in the past _____ months including any native (alternative) treatments.

(6) I have been advised about the risks associated with my participation in the study.

(7) I agree to cooperate with the investigator and I will inform him/her immediately if I suffer unusual symptoms.

(8) I have not participated in any research study within the past _____ month(s).

(9) [I have not donated blood within the past _____months

(10) I am aware of the fact that I can opt out of the study at any time without having to give any reason and this will not affect my future treatment in the hospital

(11) I am also aware that the investigators may terminate my participation in the study at any time, for any reason, without my consent.

(12) I hereby give permission to the investigators to release the information obtained from me as result of participation in this study to the sponsors, regulatory authorities, Government agencies, and ethics committee. I understand that they may inspect my original records.

(13) I understand that my identity will be kept confidential if my data are publicly presented.

(14) I have had my questions answered to my satisfaction.

(15) I consent voluntarily to participate as a participant in the research study.

I am aware, that if I have any questions during this study, I should contact the investigators. By signing this consent from, I attest that the information given in this document has been clearly explained to me and understood by me. I will be given a copy of this consent document.

For adult participants

Name and signature / thumb impression of the participant (or legal representative if participant incompetent):

(Name) _____(Signature)_____ Date: _____

Name and signature of impartial witness (required for illiterate patients):

(Name) _____ (Signature)_____ Date:_____

Address and contact number of the impartial witness: _____

Name and signature of the Investigator or his representative obtaining consent:

(Name) _____ (Signature)_____ (Date)_____

For children being enrolled in research

Whether child's assent was asked: Yes/ No

[If the answer to the above question is Yes, write the following phrase:

You agree with the manner in which assent was asked for from your child and given by your child.

You agree to have your child take part in this study.]

[If answer to the above question is No, give reason(s):_____

Although your child did not or could not give his or her assent, you agree to your child's participation in this study.]

Name and signature / thumb impression of the participant's parent(s) (or legal representative):

(Name) _____ (Signature)_____ Date: _____

(Name) _____ (Signature)_____ Date: _____

Name and signature of impartial witness (required if parents of participant child illiterate):

(Name) _____ (Signature)_____ Date:_____

Address and contact number of the impartial witness: _____

_____

Name and signature of the Investigator or his representative obtaining consent:

(Name) _____ (Signature)_____ (Date)_____

MASTER CHART

	AGE	SEX	MAIN PRESENTATIONS	ENDOSCOPY	X RAY CHEST	ESOPHAGOGRAM
1	28	M	dysphagia/cough/wt loss/fever.	TEF opening seen	normal	demonstrating fistula
2	41	M	dysphagia with fever	Normal	normal	normal
3	30	M	dyaphagia/cough/wt loss/fever	TEF opening seen	rt basal pneumonitis	narrowing with middle third fistula
4	37	F	dysphagia \ with cough	Normal	normal	normal
5	64	F	dysphagia with cough	Luminal narrowing /2C 24cm	bil/basal /pneumonitis	fistula demonstrated
6	57	M	dysphagia with cough	Normal	normal	fistula demonstrated
7	41	F	dysphagia with cough	nodular lesion 20 cm/opening	normal	fistula demonstrated
8	56	M	dysphagia	ulerative growth 27 cm	normal	normal
9	46	M	dysphagia/ wt loss/fever	ulcerative lesion 25cm	normal	normal
10	51	F	dysphagia/wt loss/fever	normal	normal	normal
11	40	M	dysphagia	ulcerative l lesion 28	normal	normal
12	36	M	dysphagia	normal	normal	mid esopgeal ulceration/luminal narrow
13	47	F	dysphagia	ulcerative lesion 17cm	normal	narrowing
14	27	F	dysphagia/wt loss/fever	ulcerative lesion 25cm	apical lobe scar	narrowing
15	28	M	dysphagia	ulcerative lesion 28 cm	normal	normal
16	45	M	dysphagia/wt loss/fever	ulcerative lesion 17cm	normal	normal
17	60	F	dysphagia	ulcerative lesion 18cm/narrowing	normal	narrowing upper third esophagus
18	63	M	dysphagia	ulcerative lesion 28/narrowing	bil/lower lobe infiltraes	normal
19	61	M	dysphagia l hoarsness	ulcerative lesion 17cm/narrowing	normal	normal
20	69	F	dysphagia	ulcerative lesion 18cm/narrowing	normal	normal
21	54	M	dyphagia	TEF opening seen /Ulceration 24 cm	normal	fistula demonstrated
22	39	M	dysphagia/odynophagia	normal	enalrged neck nodes	luminal narrowing cervical esophagus
23	28	F	dysphagia	luminal narrowing/18cm	enalrged neck nodes	? Growth /irregularity/cervical esophagus
24	40	M	dysphagia/wt loss/fever	normal	normal	luminal narrowing middle third esophagus
25	48	F	dysphagia	extrinsic compression middle third	loss of paratracheal stripe	extrinsic compression middle third
26	50	M	dysphagia	extrinsic compression lower third	loss of paratracheal stripe	normal
27	61	M	dysphagia	extrinsic compression middle third	loss of paratracheal stripe	extrinsic compression middle third
28	62	F	dysphagia/wt loss/fever	extrinsic compression middle third	normal	normal
29	58	F	dysphagia /fever	extrinsic compression middle third	loss of paratracheal stripe	extrinsic compression middle third
30	59	M	dysphagia /fever	extrinsic compression middle third	loss of paratracheal stripe	extrinsic compression middle third
31	65	M	dysphagia /fever	extrinsic compression lower third	normal	normal

EUS	HISOPATHOLOGY	BRONCHOSCOPY	CECT CHEST	PROCEDURE
	granulomotous lesion	TEF fistulous opening seen	not done	trans thoracic repair
	granulomotous lesion	TEF fistulous opening seen	fistulous tract seen	trans thoracic repair
	granulomotous lesion	TEF fistulous opening seen	fistulous tract /lymhadenopathy	trans thoracic repair
	granulomotous lesion	TEF fistulous opening seen	fistulous tract /lymhadenopathy	trans thoracic repair
	granulomotous lesion	TEF fistulous opening seen	esophageal thickening	stent
	granulomotous lesion		not done	stent
	granulomotous lesion		esophageal thickening	stent
	granulomotous lesion		normal	medical therapy
	granulomotous lesion	ulcer demonstrated	normal	medical therapy
	granulomotous lesion	ulcer demonstrated	esophageal thickening,lymphadenopathy	medical therapy
	granulomotous lesion		normal	medical therapy
	granulomotous lesion		esophageal thickening /narrowing	medical therapy
	granulomotous lesion	normal	normal	medical therapy
	granulomotous lesion		esophageal thickening	medical therapy
	granulomotous lesion		esophageal thickening	medical therapy
	granulomotous lesion		normal	medical therapy
	AFB positive		normal	medical therapy
	granulomotous lesion		normal	medical therapy
	granulomotous lesion		narrowing upper third	medical therapy
	granulomotous lesion		narrowing upper third	medical therapy
	granulomotous lesion		fistulous tract seen	trans thoracic repair
	AFB positive		normal	cervical node drainage
	granulomotous lesion		cervical lymphadenopathy	cervical node drainage
	granulomotous lesion		noadal mass(2x3cm) paratracheal region	medical therapy
nodal mass middle third/FNA	AFB positive		normal	medical therapy
mediastinal lymphadenopathy	AFB positive		mass /extrinsic compression/middle third	medical therapy
	granulomotous lesion		normal	medical therapy
	granulomotous lesion		mediastinal mass middle third	open drainage esophageal wall Bx
	granulomotous lesion		mass subcarinal 3.5 cm	medical therapy
	granulomotous lesion	carina lifted up	mass subcarinal 3.5 cm	open drainage esophageal wall Bx
	granulomotous lesion	carina lifted up	mass subcarinal 3.5 cm/cervical nodes	open drainage esophageal wall Bx

INSTITUTIONAL ETHICS COMMITTEE
MADRAS MEDICAL COLLEGE, CHENNAI-3

EC Reg No.ECR/270/Inst./TN/2013
Telephone No : 044 25305301
Fax : 044 25363970

CERTIFICATE OF APPROVAL

To
Dr. N. Ramesh,
PG in Surgical Gastroenterology,
Department of Surgical Gastroenterology,
Madras Medical College, Chennai-3.

Dear Dr. N. Ramesh,

The Institutional Ethics Committee of Madras Medical College, reviewed and discussed your application for approval of the proposal entitled **"Management of Esophageal Tuberculosis – Single Centre Experience"** No.45032014

The following members of Ethics Committee were present in the meeting held on 11.03.2014 conducted at Madras Medical College, Chennai-3.

1.	Dr. C. Rajendran, M.D.	-- Chairperson
2.	Prof. Kalaiselvi, MD Vice-Principal, MMC, Ch-3	-- Member Secretary
3.	Prof. Nandhini, M.D. Inst. of Pharmacology, MMC, Ch-3.	-- Member
4.	Prof. Bhavani Shankar, M.S. Prof & HOD of General Surgery, MMC, Ch-3.	-- Member
5.	Prof. V. Padmavathi, M.D. I/c Directory of Pathology, MMC, Ch-3.	-- Member
6.	Thiru. S. Govindasamy, BABL	-- Lawyer
7.	Tmt. Arnold Saulina, MA MSW	-- Social Scientist

We approve the proposal to be conducted in its presented form.

Sd/Chairman & Other Members

The Institutional Ethics Committee expects to be informed about the progress of the study, and SAE occurring in the course of the study, any changes in the protocol and patients information / informed consent and asks to be provided a copy of the final report.

12/3/14

MEMBER SECRETARY
INSTITUTIONAL ETHICS COMMITTEE
MADRAS MEDICAL COLLEGE

Member Secretary, Ethics Committee

12/3/14

INTRODUCTION

Even in countries with a high incidence of tuberculosis, esophageal tuberculosis is a rare diagnosis. Esophageal tuberculosis is considered primary when there is no other detectable tuberculous site and secondary when the esophagus is involved by spread from adjacent organs or by hematogenous spread from a distant site.

The natural history, clinical and endoscopic features, complications, and treatment of this condition is often unclear.

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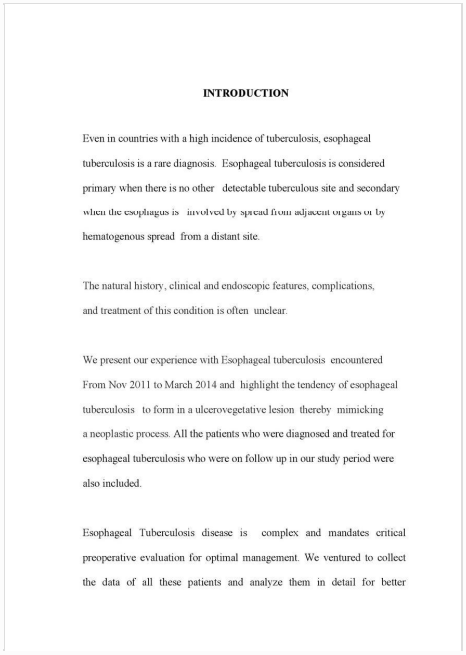

INTRODUCTION

Even in countries with a high incidence of tuberculosis, esophageal tuberculosis is a rare diagnosis. Esophageal tuberculosis is considered primary when there is no other detectable tuberculous site and secondary when the esophagus is involved by spread from adjacent organs or by hematogenous spread from a distant site.

The natural history, clinical and endoscopic features, complications, and treatment of this condition is often unclear.

We present our experience with Esophageal tuberculosis encountered From Nov 2011 to March 2014 and highlight the tendency of esophageal tuberculosis to form in a ulcerovegetative lesion thereby mimicking a neoplastic process. All the patients who were diagnosed and treated for esophageal tuberculosis who were on follow up in our study period were also included.

Esophageal Tuberculosis disease is complex and mandates critical preoperative evaluation for optimal management. We ventured to collect the data of all these patients and analyze them in detail for better