

## ROLE OF MEDICAL THORACOSCOPY IN THE DIAGNOSIS OF PLEURAL EMPYEMA

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### ABSTRACT

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#### BACKGROUND

Medical thoracoscopy is a minimally invasive procedure that allows access to the pleural space using a combination of viewing and working instruments. The main diagnostic and therapeutic indications for Medical Thoracoscopy are difficult pleural effusions, empyemas and pneumothorax. It can also be effectively used in the diagnosis and management of early stages empyema.

#### OBJECTIVE

To know the role of medical thoracoscopy in the diagnosis of empyema.

#### METHODOLOGY

Total number of 20 patients with empyema (Exudative and fibrinopurulent or simple and loculated), who were admitted to Government General and Chest Hospital and Osmania General Hospital between October 2010 to August 2012 were taken in the study.

#### RESULTS

Thoracoscopy was performed on 20 patients with empyema. Definitive diagnosis was established in five patients. Of these 20 cases, one had adenocarcinoma, four had granulomatous inflammation of pleura and rest of 15 cases showed nonspecific inflammation of the pleura these cases responded well to antibiotic treatment.

#### CONCLUSION

Medical Thoracoscopy is a simple, safe, minimally invasive and less painful procedure efficient diagnostic procedure. It decreases the morbidity and length of hospitalization in loculated empyema.

#### KEYWORDS

Carcinoma, Empyema, Loculated, Thoracoscopy, Tuberculosis.

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#### INTRODUCTION

Medical thoracoscopy is a minimally invasive procedure that allows access to the pleural space using a combination of viewing and working instruments. Jacobaeus is considered the father of thoracoscopic surgery, because he was the first to describe and undertake the procedure of endoscopic exploration of the thorax. It also allows for basic diagnostic and therapeutic procedures to be performed safely.<sup>(1)</sup> The main diagnostic and therapeutic indications for Medical Thoracoscopy are difficult pleural effusions, empyemas and pneumothorax. In addition, Medical Thoracoscopy provides staging for lung cancer and diffuse malignant mesothelioma. Talc poudrage as the best conservative method for pleurodesis, can also be performed with medical thoracoscopy.

It can also be effectively used in the diagnosis and management of early stages empyema. Medical thoracoscopy is a safe procedure, which is even easier to learn than flexible bronchoscopy.

#### AIM OF THE STUDY

To know the role of medical thoracoscopy in the diagnosis of pleural empyema.

#### MATERIALS AND METHODS

Total number of 20 patients with empyema (Exudative and fibrinopurulent or simple and loculated), who were admitted to Government General and Chest Hospital and Osmania General Hospital between October 2010 to August 2012 were taken in the study.

#### Study Design

Prospective observational study.

#### Inclusion Criteria

All empyema patients who need ICD insertion.

#### Exclusion Criteria

1. Organized empyema.
2. Bleeding diathesis or anti-coagulation.

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Financial or Other, Competing Interest: None.

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3. Occluded pleural cavity.
4. Refractory cough.
5. Acute coronary syndrome or uncontrolled cardiac arrhythmias.
6. Hemodynamic instability.
7. Respiratory failure.
8. Unable to obtain informed consent.
9. Less than 20 years of age and more than 60 years.
10. Uncontrolled Diabetes or Hypertension.
11. Patients with COPD with acute exacerbation.

### Ethical Issues

The study has the approval of the Institutional ethical committee of Government General and Chest Hospital and Osmania General Hospital.

### Pre Thoracoscopic Evaluation

When thoracoscopy procedure is being performed electively the patients typically have to undergo routine prethoracoscopic evaluation. As a routinely, we performed chest radiograph, ultrasonography (USG) of chest and abdomen, frequently supplemented with computerized tomography (CT) scan of Chest in assessing the hemi thorax of interest. USG Chest and CT chest provides basis of determining the point of inserting of the thoracoscopy. Respiratory status is being evaluated with arterial blood gas analysis and spirometry. Complete blood picture with ESR and coagulation parameters, and ECG and 2D Echo were done.

The preanaesthetic check-up is routinely done by anaesthesiologist, and he interviews the patients and evaluate the patients' health status, during which he or she may advice the additional diagnostic or laboratory tests such as Blood grouping and typing and serum electrolytes etc. Anaesthesia care provider discusses the procedure from an anaesthesia perspective and then obtains well informed written consent for anaesthesia from the patient.

### Procedure

Single port technique with Karlstorz Thoracoscope, was used for thoracoscopy. Patient was placed in the lateral decubitus position with the healthy lung down. The arm on the side of the exploration is positioned above the patients head in order to widen the intercostal space.

After local anaesthesia with 2% lidocaine and sedation with midazolam drip, a small 14F caliber trocar was introduced in the intercostal space (5<sup>th</sup>/6<sup>th</sup>) after incising the chest wall. The suction catheter was introduced through the cannula, and pus is drained, allowing air to enter into the pleural cavity. After careful visualization of entire pleural cavity with thoracoscope, multiple biopsy bits were taken at multiple sites. In case of multiple loculations, the loculations was broken down to make a single pleural cavity. Anaesthesia care provider frequently monitored the patients i.e. cardiac monitoring with multi-channel ECG, O<sub>2</sub> saturation with pulse oximeter. Haemostasis was secured and intercostal chest drainage tube kept.

### Postoperative Care

After the thoracoscopy was completed, the patient was shifted to post anaesthesia care unit (PACU). The patient was monitored by the anaesthesia care provider and circulating nurse in PACU.

The PACU nurse observed the patient for physiological stability by monitoring and documenting vital signs, and the patient's pain level. The PACU doctor frequently examine the patient. PACU nurse checked the incision site and chest drain for bleeding or oozing. The patients were shifted to routine ward after 6 hours of careful observation. Patients were advised chest X-ray (CXR) PA view immediately next day. Extubating of intercostal chest drainage tube (ICDT) was done after full expansion of the lung and the drain < 50 ml per day. On an average patient was discharged after 8 days of procedure.

### RESULTS

Thoracoscopy was performed on 20 patients with pleural empyema. Median age of patients is 35 years (Range 21 to 57 years), 15 (75%) males and 5 (25%) females. Thoracoscopy guided pleural biopsy was done at multiple sites (4-6 bits) and the samples were subjected for histopathological examination and culture for Mycobacterium tuberculosis and pyogenic culture and drug sensitivity. Definitive diagnosis was established in five patients. None of the biopsy specimens showed any bacterial or tuberculosis culture positive.

Of these 20 cases, one had adenocarcinoma, four had granulomatous inflammation of pleura and rest of 15 cases showed nonspecific inflammation of the pleura. In the patient with adenocarcinoma, we are not suspicious of malignancy either clinically or radiologically, it was surprise to us to receive adenocarcinoma report. The ICDT was removed after 5 to 7 days. In one case (5%), the procedure was converted into the thoracotomy, because of poor visibility and dense adhesions of the pleura. The procedure completed with the help of Cardio-Thoracic surgeon. The mean length of post procedural hospital stay is 8 days.

### Complications

The complications observed in our study are negligible. One patient had acute abdominal pain on first post-operative day, which was relieved with conservative management. None of the patients had complications of subcutaneous emphysema, haemorrhage, arrhythmias. All patients complained of pain at site of ICDT which was relieved with analgesics. Fever was observed in 8 patients (40%), which was subsided with antipyretics for 24 to 48 hours.

### Statistical Analysis

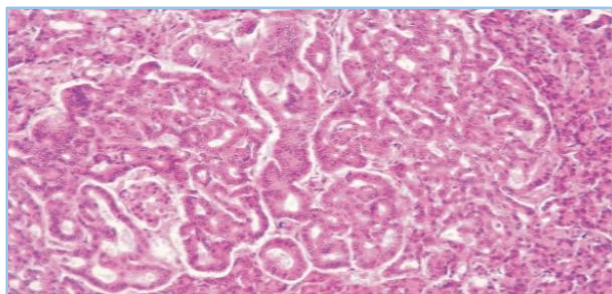
As the sample size of our study is small and is an observational study. Hence statistical analysis not done.

Age Distribution Age in years	Total	Sex Distribution	
		M	F
21-45	17	12	5
46-57	3	3	0
	20	15	5

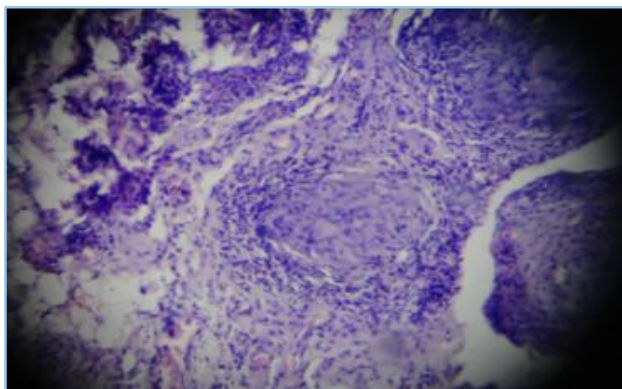
**Table 1: Age and Sex Distribution**

Type	Total No.	Prevalence (%)
A. Adenocarcinoma	1	5
B. Granulomatous Inflammation	4	20
C. Nonspecific Inflammation of Pleura	15	75

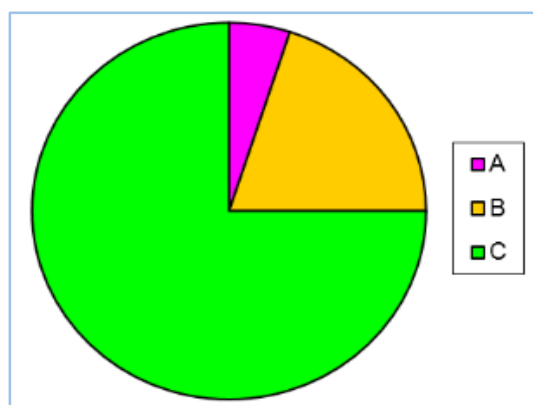
**Table 2: Histopathologic Diagnosis of Pleural Biopsy**



**Fig. 1: Adenocarcinoma**



**Fig. 2: Granulomatous Inflammation of the Pleura**



**Fig. 3: The Pie Diagram showing Histopathological Result of Pleural biopsy in Empyemas**

## DISCUSSION

Empyema thoracis remains a significant cause of morbidity and even mortality, in modern thoracic practice. A Parapneumonic effusion will develop in up to 57% of patients hospitalized with bacterial pneumonia.<sup>(2)</sup> Purulent empyema thoracis will develop in up to 20%.<sup>(3)</sup> The diagnosis and management of thoracic empyema is often challenging, if it progresses to the fibro purulent or organized phases, with simple antibiotic and drainage. Surgical decortication usually becomes necessary.<sup>(4)</sup> The development of thoracoscopy has changed the approach to thoracic empyema.<sup>(5)</sup> Although thoracoscopy has proved useful in the treatment of infected pleural space, in particular in multiloculated empyema, where it allows recovery avoiding thoracotomy, even today its employment has not been justified by large controlled trials.<sup>(6,7)</sup> Moreover there are no prospective, controlled studies on the role of medical thoracoscopy in Parapneumonic effusions and empyemas.

In G.F. TASSI ET AL, they concluded that, medical thoracoscopy as a draining procedure intermediate between tube thoracotomy and thoracoscopic surgery.<sup>(8)</sup> It is essential that it is performed early in the course of empyema and it is particularly advisable for frail patients at high surgical risk.

Thoracoscopic examination yields better anatomical information about the stage and extent of the empyema, and guides us about the management plans. Debridement of the loculations and fibrinous debris in the pleural cavity allows us to re-establish the single pleural cavity, and chest tube placement under vision, in addition to the pleural biopsy for histopathological and microbiological examination. This procedure can be described as an excessive debridement (Not a Decortications), unless the parietal and visceral pleura removed completely.<sup>(5,8)</sup> Thoracoscopy came into wide spread use beginning in the early 1990's.

In India still it is not being used commonly, probably due to lack of familiarity with the instrument and experience in its usage. In our study, we subjected both simple and loculated empyemas, for medical thoracoscopy. In multiloculated empyemas, apart from pleural biopsy, we broken down the loculations and made it into a single pleural cavity, to ensure proper drainage of empyema. But in one patient (5%) it was converted to thoracotomy, because of poor visibility of pleural space and dense adhesions of the pleura. In Muharrem Celik et al, they performed 459 video-assisted thoracoscopic procedures, the overall conversion to thoracotomy was 12.6%.<sup>(9)</sup> The advantage of thoracoscopy over open surgical procedure is avoidance of surgical risk, general anaesthesia, muscle division and bone fractures that allows for diminished duration and intensity of pain and a shorten time to return to full activity. This study was undertaken to evaluate the diagnostic yield of thoracoscopy at our institution.

In our study out of 20 patients with empyema, a definite diagnosis was established in five patients using thoracoscopy, with diagnostic yield of 25%. In Muharrem Celik et al.<sup>(9)</sup> the success rate of nontuberculous thoracic empyema was 87.3%. Although the diagnostic yield is low, in addition to the pathological diagnosis, thoracoscopy reduced the morbidity in multiloculated empyemas by adhesiolysis. All cases showed good lung expansion. In P.D. Ridley et al, they conducted thoracoscopic debridement and pleural irrigation in empyema, showed complete resolution in 60% of cases.<sup>(10)</sup> Of these 20 cases, one had adenocarcinoma, four had granulomatous inflammation of pleura and rest of 15 cases showed nonspecific inflammation of the pleura these patients responded well to antibiotics and discharged. In the patient with adenocarcinoma, we are not suspicious of malignancy either clinically or radiologically, it was surprise to us to receive adenocarcinoma report. The ICDT was removed after 5 to 7 days.

In Paolo Claudio Cassina et al, they conducted video-assisted thoracoscopy in pleural empyema, the mean chest tube drainage was 7.1 days (4-140 days).<sup>(11)</sup> In Kent W. Kercher et al, they conducted thoracoscopic decortications in children, the average chest tube drainage was 12.3 days.<sup>(12)</sup> The average duration of post procedure hospital stay 7 to 9 days. In Philip Hornik et al, they conducted Video-thoracoscopy in the treatment of early empyema, the mean post-operative stay was 7.8 days.<sup>(13)</sup>

Overall the complications of thoracoscopy appears to be less, and it is very safe. No mortality was observed in the present study. According to Martin H et al, patients with multiloculated empyema, who was stratified by ultrasonography and treated with medical thoracoscopy shows that this approach is safe, minimally invasive and efficient in empyema patients.<sup>(14)</sup> In the study by Viskum K, Enk B., and Colt HG mortality rate associated with thoracoscopy ranges from 0.01 to 0.24%.<sup>(15,16)</sup>

### CONCLUSION

Medical Thoracoscopy is a simple, safe, minimally invasive and less painful procedure efficient diagnostic procedure. It decreases the morbidity and length of hospitalization in loculated empyema.

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