

## OUTCOME OF MANAGEMENT OF MALIGNANT PLEURAL EFFUSION BY TUBE THORACOSTOMY AND CHEMICAL PLEURODESIS – STUDY OF 282 CASES.

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### Abstract

#### Background

We have studied 282 cases of malignant pleural effusion in combined military hospital (CMH) Dhaka during the period of January 2006 to December 2011 (6 years). Our aim was to observe the outcome of tube thoracostomy and pleurodesis in cases of malignant pleural effusion (MPE). Carcinoma (Ca) lung was the most commonly encountered aetiology for malignant effusion, other causes included Ca Breast in female and Lymphoma, Gastrointestinal malignancy, Osteosarcoma, Genitourinary malignancy and Mesothelioma in both sex. Most of the cases presented clinically as Massive Pleural Effusions, others as recurrent pleural effusion, hydropneumothorax and pyopneumothorax.

#### Method

Tube thoracostomy was done in all cases, in 220 the pleural cavity were dried up and lung became reexpanded. These cases were subjected for pleurodesis. In all patients pleurodesis was done with Inj. Bleomycin except one in whom Inj. Tetracycline was used.

#### Results

There were 208 male and 74 female patients, age ranged from 23 to 79 years. In 191 cases pleurodesis was successful on 1st attempt, and in 5 cases 2nd attempt was required. Pleurodesis completely failed in 11 cases. One patient expired during the procedure, he had Brochopleural fistula and Inj Bleomycin was aspirated through it.

50 cases suffered from moderate to severe pain and respiratory distress. In 13 cases, attempt at pleurodesis resulted in multiloculations of pleural fluid.

#### Conclusion

This protocol of tube thoracostomy and chemical pleurodesis was almost always successful in giving symptomatic relief of respiratory distress for a considerable period of time. It also prevented life threatening complications like massive pleural effusion, tension pneumothorax etc. However chemical pleurodesis was not possible in a small number of cases for various reasons and it has got potential for some complications including death.

**Key-words:** malignant pleural effusion, carcinoma lung, tube thoracostomy

#### Introduction

The main objective of treatment in advanced cases of malignancies is to prevent or delay life threatening complications and to give, as far as possible, an acceptable quality of life. When we deal with inoperable advanced or recurrent cases of malignancies with malignant pleural effusion, these goals can be achieved by pleurodesis i.e. obliteration of intrapleural space. Pleurodesis help obviate the patients from developing massive pleural effusion, tension pneumothorax, empyema, pyopneumothorax etc<sup>1</sup>. Repeated attempts at needle aspiration are frequently unsuccessful in giving symptomatic relief for more than a very brief period. Many a times, needle aspiration convert a simple hydrothorax into hydropneumothorax or pyopneumothorax and significantly add to the suffering of the patients<sup>2</sup>.

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### Materials and Method

We have treated 280 cases of malignant pleural effusion during this study period from January 2006 to December 2011. In most of the cases emergency tube thoracostomy was performed to relieve respiratory distress for tension hydrothorax or hydropneumothorax. In some cases elective tube thoracostomy was done. Pleurodesis was performed when tube drainage reduced to 1 – 2 ml/kg body wt/day and there was adequate reexpansion of the lung.

Before pleurodesis, the patient was explained about the procedure, written consent was obtained, premedication with analgesic, sedative and nabilization - when required, was done. The pleural cavity was surface anesthetized with local anesthetic, Inj Bleomycin was instilled and the tube was withdrawn. We used .5 to 1 mg/kg body wt. Inj Bleomycin. In one case we had to use Inj. tetracycline instead of Bleomycin. The patients were followed up clinically and radiologically for 3 to 15 days. Results of pleurodesis were categorized as successful, partially successful or failed. The same procedure was repeated after 4 to 5 days when the 1st attempt was failed. The patients were then referred to oncologist for further therapy.

### Results

We encountered 282 cases of malignant pleural effusion during the study period. Tube thoracostomy was done in all cases and in 220, the pleural cavity were dried up and lung became reexpanded. These cases were subjected for pleurodesis. Table-I shows age – sex distribution of the cases, male outnumbered female in this study and the most common age group in male was 4th decade and in female was 5th decade.

**Table-I:** Age-sex distribution in patients of operated group (n=282)

Age Group	Sex		Total	percentage
	M	F		
21 – 30 yrs	1	0	1	.35
31 – 40 yrs	29	8	37	13.12
41 – 50 yrs	80	12	92	32.62
51 – 60 yrs	52	34	86	30.49
61 – 70 yrs	28	15	43	15.25
71 – 80 yrs	18	5	23	8.16
TOTAL	208	74	282	

Carcinoma lung merits top of the list in men whereas Carcinoma Breast was twice as frequent as Carcinoma lung in women. Table-II shows various causes of malignant pleural effusion with their relative incidences.

**Table-II:** Causes of malignant pleural effusion (n=282)

Causes	Male	Female	Total	Percentage
Ca Lung	122	18	140	49.65
Ca Breast	0	36	36	12.77
Lymphoma	24	2	26	9.22
Gastrointestinal malignancy	48	4	52	18.44
Osteosarcoma	4	2	6	2.13
Genitourinary malignancy	8	11	19	6.74
Mesothelioma	2	1	3	1.06
	208	74	282	

Table-III: shows the clinical conditions with which patients presented to us, massive pleural effusion being the most presentation.

**Table-III:** Clinical presentation at the time of tube thoracostomy (n=282)

Presentations	Male	Female	Total	Percentage
Massive pleural effusion	72	48	120	42.55
Recurrent pleural effusion	36	26	62	21.99
Hydropneumothorax	35	24	59	20.92
Pyopneumothorax	18	23	41	14.54

Tube thoracostomy was done in all cases as a part of initial management. In most of the cases drainage gradually reduced and within 1 week pleural cavity become almost dried up. These cases were subjected for pleurodesis. The various outcome following tube thoracostomy are shown in (Table-IV).

**Table-IV:** Results of tube thoracostomy (n = 282)

Results	Male	Female	Total	Percentage
Pleural cavity dried up, lung reexpanded	112	108	220	78.01
Pleural cavity dried up, lung failed to reexpand	27	13	40	14.18
Patient was discharged before pleural cavity dried up	19	3	22	7.80

Table-V shows the agents used for chemical pleurodesis, Inj. Bleomycin was used in more than 99 % of the cases.

**Table-V:** Agents of pleurodesis (n = 220)

Agents	Male	Female	Total	Percentage
Inj. Bleomycin	111	107	218	99.09
Inj. Tetracycline	1	1	2	.91

**Table-VI:** Results of pleurodesis (n = 220)

Result	Male	Female	Total	Percentage
Successful at 1st attempt	99	92	191	86.82
Successful at 2nd attempt	2	3	5	2.27
Partially successful with multiloculations	6	7	13	5.91
Failed even after 2nd attempt	5	6	11	5

Pleurodesis was successful on 1st attempt in 86.82 % of cases. There was no evidence of intrapleural collection in the post procedural period. In 2.27 % of cases pleurodesis was successful after 2nd attempt. In rest of the cases the procedure failed.

**Table-VII:** Complications of chemical pleurodesis

complications	Male	Female	Total	Percentage
In hospital death	01	-	01	.45
Respiratory distress	30	35	65	29.5
Pleuritic chest pain	40	30	70	31.8
Failure of pleurodesis	5	6	11	5

## Discussion

Advanced malignancies are frequently complicated by malignant pleural effusions (MPEs). They present either synchronously or as recurrence after the completion of treatment of the primary malignancy. The pathogenesis of MPE is by hematogenous or lymphatic implantation of tumor cells or by direct extension of tumor cells from adjacent organs such as lung, breast, chest wall, or pleura<sup>3,4</sup>.

Neoplasms of lung, breast, ovary, and lymphomas constitute more than 75% of cases of MPE<sup>1-4</sup>. The most common cause in male is lung cancer and in female the breast cancer<sup>5,6</sup>.

The median survival following a diagnosis of malignant pleural effusion depends on the organ of origin of primary tumor, histological type and stage, and usually ranges from 3 to 12 months<sup>7,8</sup>. Lung cancer has the shortest, ovarian cancer has the longest, and cancer of unknown primary has an intermediate survival<sup>7-10</sup>.

The main symptom of MPE is chronic shortness of breath, although cough and chest pain can also be debilitating<sup>11-13</sup>. Chest radiographs confirm the size and location of the pleural collection. Thoracentesis is usually diagnostic and also therapeutic. Exudative and hemorrhagic collections should be considered metastatic until proved otherwise. Symptomatic relief is frequently attained by removing a large amount of fluid. Cytologically malignant cells are detected in approximately 50% of proven MPEs<sup>14-17</sup>. A CT scan may give information about loculations of MPE, the primary disease process, and anatomy of other organs in the thorax.

The palliation of dyspnea in MPE is done by the removal of fluid from the pleural space by a least invasive procedure with minimal morbidity. The methods of removing fluid from the pleural space can be simple aspiration, tube thoracostomy, or video-assisted thoracoscopic evacuation. Tube thoracostomy and video assisted procedure can be followed by pleurodesis. The aggressiveness with which treatment is done depends mainly on two factors, i.e., the severity of symptoms caused by MPE and the performance status of the patient<sup>18,19</sup>.

Tube thoracostomy involves making a hole in the intercostal space into the pleural cavity (blindly or with image guidance) under aseptic precautions with placement of a secured tube for continuous drainage into a water-sealed container<sup>20</sup>. Either large-bore (28-36 F) or small-bore (7-16 F) chest tube can be used for reliable drainage and both have equivalent results. Thoracostomy tube should not be kept for a prolonged period for fear of infection, empyema, pneumothorax, etc. The recurrence of MPE is seen in around 80% of patients within 30 days after the removal of the tube<sup>17</sup>.

So, thoracostomy may be sufficiently therapeutic for patients with a short expected survival of 1–3 months<sup>18</sup>. For patients with greater survival, an alternative procedure has to be adopted to prevent reaccumulation.

Once the thoracostomy tube in the pleural space drains 150 ml per day and the lung is fully expanded which is confirmed on chest roentgenogram, the next aim is to prevent reaccumulation by pleurodesis<sup>21</sup>. Pleurodesis is the process by which the pleural space is obliterated by inflammation induced through chemical or mechanical means, to achieve definitive and long-standing pleural apposition with fibrosis. Most physicians consider an expected survival beyond 2–3 months necessary to justify the risks, discomforts, and cost of pleurodesis. So, all patients with symptomatic MPE who are with a life expectancy of 2–3 months or more should be evaluated for pleurodesis<sup>22,23</sup>.

Bleomycin is the most widely administered antineoplastic agent used for pleurodesis with a success rate of 60–80%<sup>24</sup>. Tetracycline, doxycycline and talk are also recommended pleurodesis agent. Emad A and Rezaian GR compared bleomycin with tetracycline and found that both have almost similar clinical success rates, but tetracycline is associated with intense pleuritic pain<sup>25</sup>. Martínez-Moragón E et al also found similar result<sup>26</sup>. Smythe WR and Bavaria JE used Talc powder which gives similar clinical result but is costlier<sup>27</sup>. Janssen JP and his coworkers evaluated talk and found similar result<sup>28</sup>.

The most difficult question to answer is the improvement of survival with pleurodesis. Several studies showed pleurodesis is purely a palliative procedure and it only decreases the mortality out of respiratory compromization and thus improving quality of life and survival<sup>29,30</sup>. Multiple clinical factors have been used to estimate survival after pleurodesis, including the organ of origin of malignancy, cell type (adenocarcinoma, squamous, small cell, etc.),

stage of the tumor, characteristics of the pleural fluid, and performance level<sup>31,32,33</sup>. The American Thoracic Society/European Respiratory Society guideline for the management of MPE recommends that pleurodesis should be limited to patients with pleural fluid pH values greater than 7.30, because of the direct correlation between low pH and poor short-term survival<sup>19,34,35</sup>. Among the criteria now in common use, performance status is the most important for estimating postpleurodesis survival<sup>34,35</sup>.

Thoracostomy with pleurectomy and decortication are effective means of pleurodesis. However, these operations have a mortality of 10% in excess and a high morbidity, especially prolonged air leaks<sup>35</sup>. It is performed only in some selected patients, with a high functional reserve and a trapped lung, that the operation may provide a benefit. We have no such experience of performing such operation for MPE<sup>36</sup>.

### Conclusion

Cases with MPE present usually in a disseminated and advanced stage of malignancy. Different methods exist for the palliation of dyspnea in these patients. Careful consideration of the patient's expected survival and quality of life is needed when deciding between simple thoracentesis, thoracostomy, or pleurodesis, owing to their limited survival and varying performance status.

The protocol followed in this study was almost always successful in relieving respiratory distress and preventing life threatening complication for a considerable period of time. However chemical pleurodesis has got a failure rate and risk of developing potentially life threatening complications.

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