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Study of Pleural Diseases in Urban Background in Gandhi Hospital

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Abstract: ***Objectives: To study type of pleural disease admitted at Gandhi Hospital. To study the various treatment options for admitted at GH for pleural problems. To study the complications/morbidity and mortality of pleural diseases. Materials and Methods: This study is based on 102 patients coming to Gandhi Hospital with pleural problems from june 2000 to August 2002. All the patients are investigated and treated at Gandhi Hospital. Conclusion: Majority of pleural diseases still are traumatic and most of the cases are Haemothorax followed by Pneumothorax, Empyema and pleura, tumors. Most of the pleural diseases can be evaluated, diagnosed and treated by simple and cheap techniques.***

Keywords: pleura, thoracotomy empyema

1. Introduction

Battle injuries over countries gave physicians the experience of the rapid lethal effects that ensued when a gaping hole on the chest collapsed the lung. In the past surgeons feared to enter the pleural cavity but in the early 20th Century this fear was dispelled by on understanding of how expansion of the lung could be maintained with an open chest. The increase in the knowledge of pulmonary, cardiac and esophageal physiology has lead to an appreciation of the important role of pleura and pleural space environment. Each lung is enclosed within the pleura and the pleural space is a closed invaginated serous sac. Mesothelium lined pleural space has two parts of the pleura. The outer parietal pleura that retains its original relationship to the thoracic wall and the visceral pleura that intimately invests the lungs. The parital pleura which lines the thoracic cavity is divided into four parts costal, diaphragmatic, Mediastinal and cervical. Parts of the parietal pleura are in contact beyond the lung margins until they are separated by the excursions of the lungs during deep inspiration. This potential space forms the cost-diaphragmatic sinus and the costo-median Mediastinal sinus. The arterial supply to the parietal pleura is from the branches of the posterior Intercostal, internal mammary, superior phernic and anterior Mediastinal arteries. The vein of the parietal pleura corresponds to these arteries. Visceral pleura is supplied by the radicular branches from bronchial and pulmonary arteries and veins which are the tributaries of pulmonary veins. No bronchial veins drain the visceral pleura. Central portions of Mediastinal pleura and diaphragmatic pleura are innervated by the phrenic nerve. Vagal and sympathetic twigs also reach the visceral pleura from pulmonary plexus. The costal and peripheral parts of the diaphragmatic pleura are innervated by Intercostal nerves. The lymphatic vessels of the pleura are located in the connective tissues beneath the mesothelial lining. The lymphatics of the visceral pleura combine with the superficial efferent lymphatic plexus of the lung to form an extension sub pleural plexus. Lymphatics from the sub pleural plexus drain into the Mediastinal nodes and those from the costal pleura drain into intercostal and substernal lymph nodes. Diaphragmatic pleura drains into the anterior and posterior Mediastinal nodes. From the cervical to the costal pleura a few supralateral lymphatic channels drain into the axillary nodes.

Diseases affecting the pleura

Traumatic
- Haemothorax
- Pneumothorax
- Chylothorax

Spontaneous
- Pneumothorax
- Haemothorax

Infective
- Pleural effusion
- Empyema
- Bronchopleural fistula
- Chronic infections like tuberculosis
- Pleural plaques

Pleural Tumors
- Benign
- Malignant
- Secondary pleural deposits.

Traumatic Haemothorax

This has been the most common pleural disease prelevnt at Gandhi Hospital during our study it has accounted for 40 of the 102 cases presented there.

Presences of blood in the pleural space is defined as Haemothorax. It is most commonly seen in the patients of blunt and penetrating chest trauma either alone or associated with Pneumothorax. In the patients Haemothorax of 500 to 1000ml physical findings may not be very sensitive and can be missed by an x-ray chest PA view. A very low threshold is maintained for the placement of chest tube in the above situations. Delay in the placement of chest tube allows the blood to clot and consolidate thereby increasing the risk of Empyema.

Initial treatment includes the placement of a tube thoracostomy. Definitive treatment of Significant Haemothorax which persists beyond several days should be a limited thoracotomy, evaluation of clot and removal of the organized peal that has developed on the pleural surface and

then the placement of new thoracotomy tube. Newer modalities like thoracoscopy have a limited role only in the early cases.

Pneumothorax

The next most commonly encountered disease in our patients was Pneumothorax. It could be either spontaneous or that which follows a trauma. Traumatic Pneumothorax occurs commonly as a sequeal of a blunt or penetrating chest wall injury. Air can enter the pleural cavity either through an external wound in the chest-wall or a hole in the lung which is more common. It is frequency associated with blood in the pleural cavity. The lungs are often injured on their surface by the fragments of broken ribs or by compression of the chest against a closed glottis that can lead to a blow out of the lung. Sometimes air continues to accumulate in the pleural space with each inspiratory effort to produce a tension Pneumothorax. In such cases both the respiration and hemodynamic are impaired. There is a Mediastinal shift, Venous return impaired and decrease in the cardiac output. Physical findings are the same as spontaneous Pneumothorax but are more sever. CT Scan is more sensitive but majority of the cases are diagnosed by X-ray chest. Almost all the cases of Pneumothorax that are due to blunt injury should be trated with a chest tube.

Primary Spontaneous Pneumothorax

In 1803 Etard first used the term. Pneumothorax to describe a pathological entity and in 1826 Laennec described its clinical features. This was the first disorder know to affect the pleural space accounting to Linds Keg in 1957. Primary spontaneous Pneumothorax results from a rupture of a pleural bleb. Bleb is an air filled space between the parenchyma of the lung the visceral pleura that develops due to the pleural surface. Mechanical stresses caused by the weight of upright lungs are not distributed uniformly but are stronger at the apices of the lungs than an bases because of which the alveoli in the apical region over-expand and rupture.

The incidence of radio graphically demonstrable blebs is approximately 15%. They are always located at the apices of the upper lobes and occasionally along the fissures. Follow up studies show 20%-50% recurrent rate. Secondary spontaneous Pneumothorax can be related to either a generalized Underlying pulmonary disease.

The pulmonary pathologies are

- COPD
- Tuberculosis
- Malignant neoplasms

Complications of Pneumothorax include

a) The presences of pleural fluid in 20%cases.
b) Haemothorax in 3% cases.
c) Respiratory failure in COPD patients.
d) Empyema could associated to secondary Pneumothorax , lung abscess or tuberculosis.

Management of spontaneous Pneumothorax includes

- Simple observation -20% cases.
- Thoracocentesis-20%cases.
- Tube-thoracostomy-20%cases.
- Chemical pleurodesis
- Thoracoscopic surgery
- Blebectomy
- Pleurodesis

Pleural effusion

Pleural effusion is an accumulation of fluid in the pleural space due to excessive transudation or exudation of the interstitial fluid. Pleural effusion is not a disease entity but the sequelae of a systemic or pleural disease.

Symptoms include pleuritic chest pain and dyspnoea. Pleuritic chest pain is sharp stabbing sensation that may minimize with a quit respiration and intensify with a full inspiration. When effusion is due to the involvement of parietal pleural by a tumor the pain is usually constant, dull and independent of respiration.

Transudative pleural effusion is present in the patients of CCF, cirrhosis, nephritic syndrome, myxaedema, peritoneal disease, hypoprotinaemia, sarcoidosis, etc. These cases are referred to thoracic department by the physicians who commonly encounter these diseases.

Pleural fluid is considered as exudative

- When the protein level is > 3gms/100ml
- Specific gravity > 1.016.
- Pleural fluid protein/ serum protein >0.5
- Pleural fluid LDH/serum LDH > 0.6.

Diagnosis of pleural effusion

The presence of abnormal fluid in the pleural space is almost always diagnosed by X-ray chest erect, lateral decuitus views or a thoracic ultrasound that may help to establish the diagnosis. Other diagnosis modalities include analysis of the pleural fluid for biochemical, microbiological, cytology examinations and PH values. Pleural biopsy helps to identify tuberculosis and malignancy. Video-assisted thoracoscopy is extremely useful for increasing the diagnostic yield in patients of pleural effusion who remain undiagnosed even after the routine evaluation.

Common causes of exudative effusion

1) **Infectious diseases**
   - Bacterial pneumonia
   - Tuberculosis
   - Viral
   - Parasitic
2) **Pleural Tumors**
   - Lymphoma
   - Metastatic
   - Mesothelioma
   - Chest wall tumors
   - Meigs syndrome
3) **Gastrointestinal Diseases**
   - Pancreatitis
   - Esophageal rupture
   - Subphrenic abscess
   - Hepatic abscess
4) **Trauma**
   - Haemothorax

- Chylothorax

Management of pleural effusion
The effusion which is not due to malignancy usually responds to treatment of the underlying disease. Pleural effusions themselves require treatment when they cause respiratory dynamics.

Various modalities of treatment
- Thoracocentesis: It is used for the initial evaluation of fluid. Empyema Pneumothorax, broncho pleural fistula and loculation of fluid are its complications.
- Tube-thoracostomy and pleurodesis.
- Radiotherapy.
- Surgical pleurectomy: If the previous methods have failed to control the effusion open pleurectomy or pleural scarification can be done. If pleura is thickened or the lung is trapped a parietal pleurectomy with decortications can be attempted.
- Pleura-peritoneal shunt: denver' s pleura peritoneal shunt consists of a valved pumping chamber with the attached fenestrated silicone pleural and peritoneal catheters. Manual compression of pump transfers the fluid against normal abnormal pleural pressure gradient this is used for the patient of recurrent intractable effusion.

Empyema
It is accumulation off pus in the pleural space.

Hippocrates first described its symptoms and natural history. American thoracic society classified Empyema into three phases based on the natural history of the disease.
- Exudative phase or acute phase.
- Fibro-purulent phase
- Organizing or chronic phase.

Half of the Empyema are secondary to a primary pneumonic process. Other causes may be lung abscess, post-trauma, post-operative, extension of sub-phrenic abscess or a spontaneous Pneumothorax. Causative organisms are anaerobic bacteria, aerobic gram positive streptococcus pneumonia. Staphylococcus aurous, gram negative organisms like Ecoli and pseudomonas.

Diagnosis of Empyema is by aspiration of pus that is sent for gram stain; cultures, PH, LDH, glucose, protein and cytological analysis. Bronchoscopy is indicated to rule out intrabronchial tumors or an inhaled foreign body. Pleural Empyema must be differentiated from an intrapulmonary abcess. CT Scan of chest is valuable in these cases.

Management of an Empyema depends on its cause, whether it is acute or chronic, the state of underlying lung, presence of broncho-pleural fistula, the ability to obliterate the space and the patients clinical and nutritional status. Tube thoracostomy is helpful in acute and transitional; phase where as thoracotomy is indicated in the patient of multiple loculated Empyema and chronic phases of Empyema. Open drainage pf the cavity can also attempted.

Chronic Empyema is treated by an open drainage and debridement of the cavity usually with an open flap method. Decortications is other option. Attempt is made to remove the entire Empyema cavity that is called Empemectomy.

Pleural Tumors
Neoplastic involvement of the pleural may be found in 50% of the patient coming for diagnosis and treatment of pleural diseases. Primary pleural neoplasm's are rare compared to the metastatic lesions. Benign tumors of the pleura includes lipomas, endotheliomas, angiomas, cysts of pleura and the benign localized mesotheliomas.

Benign localized mesothelioma
These are also called as localized fibrous mesothelioma/ pleural fibromas. In contrast the diffuse variety benign localized mesothelioma are not associated to asbestos exposure. They are usually asymptomatic and diagnosed on routine x-rays. Extra-thoracic manifestations such as pulmonary osteoarthropathy, fever and hyperglycemia occur in one third of the patients. Most of the benign mesothelioma that arise from visceral pleura, are encapsulated and their surgical removal is curable.

Malignant localized mesothelioma
20% of the primary pleural tumors are localized> they present as symptomatic cases coming with chest pain, Cough, dyspnoea and fever. Osteoarthropathy never occurs. X-ray findings are similar to the benign from except the rib erosions may be seen in these patients. Differentiations between the malignant and the benign is only by histopathology. These histopathological forms can be identified as tubulopapillary, fibrous and biomorphic.

Wide excision of the pleura, lung and chest wall if necessary. Should be performed. If complete resection is not possible internal brachytherapy and external irradiation is indicated.

Malignant diffuse mesothelioma
This can be originate from any part of the visceral or parietal pleura. On gross the tumors shows multiple flat nodules or sheets involving the pleural surface. The lower portion of the pleural space is generally involved. The tumors may spread to encase the lung as well as pericardium and extend to the contra lateral pleural space. On the parietal pleural surface the lesion may invade ribs and the chest wall. Extension through the diaphragm into the peritoneal cavity can also occur. Haematogenic and lymphatic spread occurs commonly.

They arise at the 5^{th} & 6^{th} decades of life and are three to five times more common in men. Insidious onsets of chest pain, shortness of breath are the common clinical features. Unilateral pleural effusion, Pleural thickening and modularity are seen on x-rays.

Diagnosis is made by a pleural biopsy. Presence of malignant cells in the pleural is seen in 75% cases. V.A.T.S and thoracotomy may be required for the diagnosis. The extent of disease can be determined by a CT scan of the chest.

Treatment may be a supportive care. Pleurectomy or radical extra-pleural pneumonectomy. As all the reported treatment

modalities are not very satisfactory supportive care remains the best modality of treatment. Treatment of the effusion component is by sclerosis.

2. Material and Methods

This study is based on 102 patients referred to the Dept of CT surgery Gandhi Hospital from May 2000 to August 2002. These patient were investigated. Evaluated and treated at Gandhi Hospital.

This study is based on incidence of the following variables:

Incidence related to age group and sex

Age group	Males	Females	No of patients
0-10	3	2	5
11-20	13	5	18
21-30	24	8	32
31-40	8	2	10
41-50	16	1	17
51-60	14	2	16
61-70	1	3	4
Total	79	23	102

Incidence related to A etiology

Type of Pleural Disease	Total	Right	Left	Bilateral
Haemothorax	41	20	20	1
Pneumothorax	27	10	14	1
Empyema	12	7	5	Nil
Tumour	2	1	1	Nil
Haemopneumothorax	9	2	7	Nil
Pleura Effusion	6	5	1	Nil
HIV	2	2	Nil	Nil
Hydropneumothorax	3	1	2	Nil
	102	48	50	4

Incidence related to smoking is 55/102 i.e. 53%.

Incidence related to signs and symptoms

Signs and symptoms	No of Patients	percentage
Breathlessness	100	98%
Chest pain	100	98%
Cough with expectoration	20	19.6%
Haemoptysis	2	1.96%
Shock	5	4.9%
Fever	15	14.7%
Shift of mediastinum	80	78.43%
Decreased Breath sounds	100	98%
Adventitious sounds Ronchi	10	9.8%
Adventitious sounds Crepts	20	20%

Diagnostic Technique	No of Patients	Total no of Patients	Percentage
x-ray chest PA view	102	102	100
CT scan	7	102	6.8
Diagnostic Bronchoscopy	3	102	2.94%

Operative approach was used for 10 of the 102 patients i.e. 9.8%.

Type of Disease	No of Patients subject to thoracotomy	Total no of patients	Percentage
Haemothorax	2	41	4.8%
Pneumothorax	0	27	
Pleural tumour	2	2	100%
Empyema	5	12	41.6%
Hydropneumothorax	1	3	33.3%

3. Results

102 Patients presented to the department of CT surgery Gandhi Hospital with traumatic and spontaneous pleural diseases. Of these 74 patients were male i.e.80% and 23 female's i.e.20%. Youngest patients were a 6 year old. Maximum incidence of pleural problems was at the age group 30-50 years i.e. 60%.The incidence was more on the left side as compared to the right side i.e. 50/102 vs 48/102.There were 4 patients with a bilateral disease i.e. 3.92%. Traumatic injuries in the form of blunt chest injury accounted for 50% of the pleural disease of which 80% cases were of Haemothorax. Only two patients required a thoracotomy for draining of Haemothorax and control of haemorrhage. All 41 patients were treated with tube thoracostomy only.

There were more cases of spontaneous Pneumothorax as compared to traumatic Pneumothorax 18:9 vs 2:1. Spontaneous Pneumothorax was more common on the left side (10/180) and traumatic Pneumothorax was more common on the right side (5/9) spontaneous Pneumothorax was related to smoking in 10 of the patient and tuberculosis in six of them. Empyema was the etiological cause in two of the patients.

All these patients were treated with an Intercostal tube-thoracostomy but the average duration of thoracostomy was 2-3days in traumatic Pneumothorax and 6-10 days in spontaneous Pneumothorax.

The study of twelve cases of Empyema showed that the right side was more common.i.e.7/12.Empyema was tuberculosis in 5 of the patient and non-tuberculosis in 7 of them.

The incidence of organisms grown in 7 of these non-tuberculosis patients is shown in the following table:

Incidence related to causative organisms

Organisms	No of Patients
Pseudomonas	4
Klebsiella	2
Ecoli	1
Staphylococci	1

Hence the most common organism among the non-tuberculosis cases was pseudomas. Five of the patient who were initially treated by a tube thoracostomy ultimately required thoracotomy and decortications. There was no mortality in these patients.

Six patients pleural effusion were included in our study. Five of these patient had the effusion on the right side.

Tuberculosis was present in 5 of them. All these patients were treated with tube thoracostomy only.

There were 2 patents of HIV infection. One was a female who presented with right pleural effusion and the other was a male who presented with left hydropneumothorax. These patients were treated by a tube thoracostomy only. There were three patients of Hydropneumothorax. Two of them had the involvement on the left side .i.e. 66%. All the three were of tuberculosis origin. They were treated by a tube thoracostomy followed by anti-tuberculosis treatment. There were two patients who presented with pleural tumours. One patient had a pleural fibroma which was occupying the whole of the right side of thorax. This tumour was completely removed surgically. The other patient was a 50 year old female with a malignant mesothelioma of the left Mediastinal pleura. This tumour was unresectable so the patient was sent for radiotherapy post-operatively.

Haemothorax

Incidence related to Age Group in 50 patients

Age Group	No Patient
0-10	2
11-20	10
21-30	13
31-40	7
41-50	7
51-60	9
61-70	2
71-80	Nil

Incidence related to sex

Male	Female
37	13

Diagnosis	No of patients with right side involvement	No of Patients with left side involvement	No of patients Bilateral Involvement	Total No of Patients
Haemothorax	20	20	1	41
Haemo-pneumothorax	2	7	Nil	9

Incidence related to average base of Tube Thoracostomy

Days	No of patients
2	20
3	15
4	4
5	5
6	4
7	2

Traumatic Pneumothorax

Incidence related to Age Group in 8 Patients

Age Group	No of Patients
0-10	Nil
11-20	1
21-30	4
31-40	Nil
41-50	1
51-60	1
61-70	1

Incidence related to sex

Male	Female
6	2

Diagnosis	No of patients with right side involvement	No of patient with left side involvement	No of patients Bilateral involvement	Total no of patients
Traumatic Pneumothorax	4	3	1	8

Spontaneous Pneumo-thorax

Incidence related to Age Group in 22 patients

Age Group	No of Patients
0-10	Nil
11-20	3
21-30	9
31-40	2
41-50	4
51-60	4
61-70	Nil

Incidence Relate to Sex

Male	Female
20	2

Incidence related to duration of symptoms

Duration (Days)	No of patients with breathlessness	No of patients with Chest pain
0-2	11	11
2-4	4	4
4-6	3	3
6-8	2	2
8-10	2	Nil

Aetiology	No of Patients
COPD	14
Tuberculosis	8
Emphysemetous Bullae	4
HIV	1

Spontaneous Pneumothorax (%)	No of patients
30-40	2
41-50	6
51-60	7
61-70	7

Diagnosis	No of patients with right side involvement	No of patients with Left side involvement	No of patients with Bilateral Involvement	Total No of Patients
Spontaneous Pneumothorax	8	14	nil	22

Associated Hydro thorax

Minimum : 14
Moderate : 03
Severe : Nil

Duration of chest tube in situ (Days)	No of patients
0-5	6
5-10	12
10-15	2
15-20	2

Empyema

Incident related to Age Group in 12 patient.

Age Group	No of patients
0-10	3
11-20	3
21-30	4
31-40	1
41-50	Nil
51-60	1

Incidence related to sex

Male	Female
10	2

Diagnosis	No of Patients with left side involvement	No of Patient with right side involvement	Total No of Patients
Pleural effusion	1	5	6

Pleural Effusion

Incidence related to Age Group in 6 Patients

Age Group	No of Patients
0-10	Nil
11-20	Nil
21-30	2
31-40	3
41-50	1

Incidence related to sex

Male	Female
2	4

Diagnosis	No of Patients with left side involvement	No of Patients with right side involvement	Total No of Patients
Pleural effusion		5	6

Incidence related to Treatment Modalities

Treatment Modality	*No of Patients*	*Total no of Empyema Patients*
Aspiration	Nil	12
Tube thoracotomy	12	12
Thoracotomy	5	12

4. Discussion

Haemothorax

Of all the pleural diseases presented to Gandhi Hospital traumatic Haemothorax was the most common that accounted to 50% of the patients. There were forty one cases of Haemothorax and nine of haemopneumothorax. All these cases were post traumatic only. Of these fifty patients. Thirty seven were male and thirteen were female. Minimum age of involvement was six years the maximum was seventy. Increased incidence was in the age group of 18-40 years i.e. 60%.

Traumatic injuries leading to pleural diseases:

Haemothorax accounted for 50 of the 58 patients i.e. 80%. Most common presentation of these patients was

- Breathlessness on exertion i.e. 100%
- Chest pain i.e. 100%
- Presentation with shock i.e. 40%
- Shift of mediastinum in 32 patients I.e. 64%
- Decreased breath sounds in all the patients I.e. 100%
- All the patients were evaluated with x-ray chest PA view only
- Three of the patients had undergone CT scan i.e. 6%.

All the patients were treated by a tube thoracostomy and only two of them had to undergo thoracotomy and drainage because they had a clotted Haemothorax that was forming an Empyema. Tube thoracostomy was kept of 3-5 days on an average. The quantity of blood ranged from 200-1000ml.

Cases of massive Haemothorax of more than 1500ml were not encountered during this period because they must have succumbed before reaching the hospital due to delay in shifting from site of injury. Haemothorax had an equal incidence on both the sides of thorax. Haemopneumothorax was more common on the left side i.e. 77%. Thoracotomy was required for two of the 50 patient i.e. 4%. The incidence of Haemothorax was 26% in the study conducted by winterlude Ottawa Hospital in 1995 by J. huge Devid (Sunny brook health science centre University of Toranto) whereas the incidence in our study was 50% and 70% of the traumatic diseases affecting cases in USA according to Winterlude study coincides with our study. Incidence of the patients who reqired an operative intervention (Thoracotomy) constituted 24% of the above study whereas it was only 4% in our study. The reason may be due to the delay in transportation of the cases of massive Haemothorax from the site of injury to the Hospital. Ref---1.

Pneumothorax/hydropneumothorax

Of the 102 patients presented to CT surgery department 30 of them had Pneumothorax and hydropneumothorax. 19 of the 30 patients were of them had Pneumothorax and only eight of them were cases of traumatic Pneumothorax. Six of the eight patients had a traumatic Pneumothorax ...28 of them were males and two of them females. Of the eight patients four of them had a right Pneumothorax i.e. 50% and the other three had a left Pneumothorax (37.5%). One patient had Pneumothorax i.e.12.5%. All these patient had breathlessness of grade III and chest pain i.e. 100%. All the patients had a moderate to severe Pneumothorax. X-ray chest PA view was diagnostic in all the patients and all of them were treated by a tube thoracostomy. Average duration of tube thoracostomy was 2-3 days. None of them required an emergency thoracotomy. Of the remaining 22 patients, who presented with spontaneous Pneumothorax and three were hydropneumothorax. Of the patients 22 presented. 21 were male (95%) and I was a female 5%. Youngest of the patients was 18 year old and the oldest was of 60 years. Majority of the patients presented at the age group 20-45 years .i.e. 59%. 5 of the patient presented between 50-60 years,.i.e.22%. Of the 22 patients 14 of the them were smokers. None of these patients related a high risk behavior.

On of the patients was HIV Positive. There was a history of tuberculosis in eight of the .ie. 36%. BCG scares were present in 16 of them .i.e. 72% all most all the patient presented with breathlessness of the duration ranging from 1-7 days. Chest pain was presented in 18 out of the 22 patient's .i.e. 81%. Four of these 22 patients had taken anti-tuberculosis treatment. Five of the patients had a clubbing.

i.e. 22.7%. Jugular venous pressure was raised in six of them.i.e.27%. Shift of mediastinum was present in 16 of them .i.e.72%. Respiratory signs of Pneumothorax and hydro Pneumothorax were present in all of the patients. X-ray chest pain was showing an evidence of Pneumothorax and hydropneumothorax in all the patients. Pneumothorax was severe degree in 14 of the 3 of 22 patients. i.e. 63. 63%. 14 of the patients had a minimum associated hydrothorax and three of them had a moderate hydro Pneumothorax that was significant. Five of the patients were having a plain Pneumothorax. 14 of the had the left side effected and 8 had the right side effected making the ratio 1.75:1. All the patients were treated by a tube thoracostomy under local anaesthesia and air leak continued for a week in 14 of the 22 patients i.e. 63.63%. in six of the patients air leak subsided in 2-3 days and in two of them it persisted for more than 15 days. There were 2 patients for whom tube thoracostomy was performed for recurrent Pneumothorax Monteux test was positive in 6 of the 22patients i.e. 27%. In five of the patients air leak stopped after starting anti-tuberculosis treatment. One of the patients of HIV infection presented with hydropneumothorax for whom tube thoracostomy was done and drain was removed after the lung expanded. Traumatic Pneumothorax accounted for 26% of all the patients of Pneumothorax admitted at the CT surgery department which nearly correlates with the findings of Winterlude study at Ottawa hospital in 1995 which was 30% Ref-1. According to Robin G Cohen et all-1998 (Ref. 2) primary spontaneous Pneumothorax is the most common disease of young adults Ranging from 20-40 years and 20% of these patients had an underlying secondary cause like COPD and emphysematous bullae, only 2-3% of these patients had tuberculosis whereas our present study showed COPD as the most common cause of spontaneous Pneumothorax which accounted for 59% of the cases followed by 27% cases of tuberculosis. Emphysematous bullae accounted for 18% that nearly correlates with the Winter lude study i.e. 15%. COPD and tuberculosis are the most common disease in our country because of the poor socioeconomic conditions and pollution.

20% of the patients of spontaneous Pneumothorax in Brook's study 1973 (Ref.3) were operated whereas only one of our patients was operated upon i.e. 4.5% and the rest of the patients were treated by tube thoracostomy only. According to Michael H Bauman MDFCCP (Ref.4) 14% of surveyed US physicians and British Society adopts simple aspiration for Pneumothorax which is more than 15%. In our study all the patients underwent tube thoracostomy because of high failure rate in the patients of aspiration. According to Schomenburg and collegues (Ref.5) air leak termination occurred within 48 hours in 80% of the patients and the recurrence rate was 34%. In our study the duration of tube thoracostomy was 5-10 days in 81% of patients and recurrence rate was only 9%. The reason for the above difference may be due to the increased incidence of secondary Pneumothorax in our patients as compared to primary spontaneous Pneumothorax. Also the treatment of primary causes like tuberculosis might have decreased the incidence of recurrence.

Empyema/Pleural Effusion

Of the 102 patients, 18 presented with Empyema and pleural effusion. Of the 18 patients 12 were presented with Empyema and 6 of them with pleural effusion. All the patients were ranging from 5-60 years age group. Male and female ratio among the patients of Empyema was 5:1. All these patients complained of breathlessness for 10-15 days. 10 patients were suffering from chest pain. 15 patients suffered from fever. 15 patients suffered cough with expectoration. Haemoptysis was present in one of the patients. One of the 18 patients was a smoker. 12 patients had right sided involvement and in pleural effusion 5 of 6 patients had right sided involvement. Breath sounds were decreased in all the patients and adventitious sounds were present in 8 patients of 18 patients in the from of crepitations. Diagnosis was made on pleura aspiration (thoracocentesis). CT scan was done in 5 of the 12 patients of Empyema. No patient of pleural effusion was subjected to CT scan. 5 of 12 patients of Empyema were tuberculosis I.e. 41.66%. 7 of them were Non-tuberculosis 58.33%. Of the 6 patients of pleural effusion, 5 were tuberculosis (83.33%) and 1 was non-tuberculosis. The organisms grown in the 7 patients were pseudomonas. Klebsiella was grown in 2 of the patients, ecoli in 1 and staphylococci in 1. According to Bartlett and Feingold study in 1974 of 83 patients of Empyema with positive pleural fluid cultures, 35% had only anaerobic organisms, and 41% had both. The incidence of effusion and its contamination with various organisms in the above study is mentioned below.

Organism	Incidence of Effusion	Incidence of Infected Effusion (Empyema)
Anaerobic	35	90
Aerobic		
Gram-positive		
Streptococcus pneumonia	40-60	<5
Staphylococcus aureus (children)	70	80
S. aureus (adults)	40	20
Gram-negative		
Escherichia coli	50	90
Pseudomonas	50	90

5 patients of Empyema underwent surgery i.e. thoracotomy. Decortications was done in 3 of the patients and rib resection was done for 2 under GA. All the patients of Empyema were treated with tube thoracostomy initially. All the patients of effusion were also treated with tube thoracostomy. All the proved tuberculosis patients were treated with tube thoracostomy and anti-tuberculosis regime. 1 of the patients was having right pleural effusion and was HIV Positive. Patients was a female aged 38 years. She was treated with Tube thoracostomy and was discharged after the relief of symptoms and expansion of lungs. Empyema was more common in men and was more common in the younger age group. 10 of the 12 patients were within 30 years i.e. 83.33% and right side of the thorax was more commonly involved than the left side i.e. 7:5 Plural effusion was more common in females i.e. 4 females against 2 men and right side was again more common than the left side I.e. 5:1. Peak age group in pleural effusion was 30-40 years 50%.

According to Robbin's G Cohen study (Ref.2) malignancy is the most common disease accounting to 60% of patients

with pleural effusion. But our study shows tuberculosis as the most common cause according to 83%. One of the patients presented with HIV infection. All these patients were treated with thoracocentesis before being referred to CT surgery department. So they were again treated by tube thoracostomy. Sufficient information regarding our aetiologies was not possible as our study was limited to only 6 cases referred to our department. Our study correlates with the study by Barlett and fiengold of 1971 (Ref.6)regarding the type of organisms in non-tuberculosis Empyema but still tuberculosis is the major cause of Empyema in our study accounting to 41% of Empyema cases. Surgical management of Empyema is correlating with IPEG guidelines committee of October 2002 that comprises of thoracostomy, rid resection, open thoracotomy and decortications. (Ref.6).

Pleural Tumors

Of the 102 patients only them presented with pleural tumors. One was a male having benign pleural fibroma occupying whole the right hemothorax pushing the mediastinum to the left side. The other tumour was a malignant mesothelioma arising from the left visceral Mediastinal pleural. This patient's was a 55 year old female and was not operable as the tumour was very large and there were adhesions to the great vessels. Patient was sent for radiotherapy. Incidence of pleural tumors was 2/102 as compared to the incidence at mayo's clinic. Both these patients were having breathlessness and chest pain fir 2 months and were diagnosed with the help of x-ray chest and CT scan chest. For the patient with benign pleural fibroma chest tube was removed after 3 days but for the patients with malignant mesothelioma chest tube could not be removed and was discharged along with the chest tube for radiotherapy. Benign plural fibroma was completely resected and the patient's lung got completely expanded.

HIV

There were 2 patients with HIV infection i.e.1.96%. One of the patients presented with right hydropneumothorax and the other patient presented with right sided plural effusion. 1 was a male and the other was a female. Both the patients were aged between 30-40 years. Both these patients were treated with tube thoracostomy only.

5. Conclusion

This study of pleura diseases presented to the CT surgery department Gandhi Hospital proves that the majority of pleural diseases are still traumatic with Haemothorax as the leading disease followed by Pneumothorax, Empyema, pleural effusion and pleural tumours. Most of these patients can be evaluated, diagnosed and treated by simple means. Of the 102 patients of pleural diseases only 10 required thoracotomy i.e. 9.8 %. Rest of the patients was treated by tube thoracostomy only. Tuberculosis is still one of the leading causes in Empyema, spontaneous pneumothorax and hydropneumothorax. HIV infection is present in 1.96% of the pleural diseases. Surgical resection of the benign solitary fibrous is usually curative. Malignant solitary fibrous tumors generally carry a poor prognosis and are un-operable by the time they are diagnosed.

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