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Role of Thoracoscopy in Diagnosis of Lymphocyte Predominant Pleural Effusions

Medical Science

KEYWORDS : Thoracoscopy, pleural fluid, Tuberculosis, lymphocyte count

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MATERIALS AND METHODS

All 25 Inpatients admitted in the wards of GHCCD (Government Hospital for Chest and Communicable Diseases) under the Department of Pulmonary Medicine in the period between October 2014to October 2015 with moderate to massive pleural effusion .

INCLUSION CRITERIA-

Moderate to massive pleural effusion based on confirmation by clinical examination and chest xray (pleural fluid up to fourth rib anteriorly)

Confirmation of presence of pleural fluid by diagnostic tap under ultrasound guidance.

All lymphocytic predominant (lymphocyte count >50%) effusions.

All suspected malignant pleural effusions due to inconclusive lab reports

All patients with lab reports in favour of tuberculosis but with history and features suggestive of high risk of malignancy.

Exclusion criteria :

Seropositive for HIV and HbsAg.

Transudative effusion

Non lymphocyte predominant exudative effusion

Bleeding diathesis

Anemia

Compromised cardiac status as evidenced by ejection fraction < 50% and/or evidence of Pulmonary hypertension or any ECG abnormality suggestive of a rhythm disorder.

Lung adherent to chest wall as confirmed by contrast enhanced computed tomogram.

Failure to give consent to thoracoscopy after furnishing complete information.

Presence of endobronchial pathology.

Investigations:

Sputum microscopy for acid fast bacillus by direct smear on two consecutive days.

Routine blood tests including – hemoglobin, total count, differential count, ESR, Random blood sugar, serum creatinine, blood urea, serum bilirubin, bleeding time and clotting time.

HIV and HbsAg serology

Chest xray P-A view.

ECG and 2D echo.

CECT chest

Pleural fluid analysis including total count, differential count, glucose levels, RBCs, total protein levels, smear and cluture for AFB, Gram staining and ADA levels, malignant cytology and cell block.

In cases of lymphadenopathy, fine needle aspiration cytology (FNAC) of the enlarged lymph node.

THORACOSCOPY

Local anaesthetic thoracoscopy was performed in the bronchoscopy suite.

A thoracoscopy table: A simple operating table with facilities for height adjustment.

Oxygen source and suction equipment. An entonox source can be used for intraoperative analgesia and Boyles apparatus.

Cardiorespiratory monitoring equipment: pulse oximetry, non – invasive blood pressure recording and ECG monitoring.

Full resuscitation facilities.

A trolley to hold all instruments.

X-ray lobby to display patient's radiographs.

The rigid thoracoscopy set (brand – karl Storz) along with two telepacks of the same brand and an additional two monitors and a connection to the desktop with a thoracoscopy software to aid in recording the procedure forms the thoracoscopy unit.

A non disposable rigid 30 degree oblique vision thoracoscopes of 11 mm and 5 mm. this instrument allows one to visualize the pleura and the thereby locate pleural abnormalities if any and further to decide the site of biopsy.

A conical tip rigid trocar and rigid canula of sizes 11mm, and 5mm. this is used to create a port for the thoracoscope after the skin incision. Its also used to direct the suction catheter during the procedure.

A conical tip rigid trocar and a flexible canula of size 5mm. this used for creation of the second port and tether the biopsy forceps while taking the biopsy.

A 3mm biopsy forceps to take parietal pleural biopsy under direct vision from the second port.

A light source – cum – monitor (telepack) with xenon light source with triple chip camera.

Video equipment – two SONY monitors and a desktop with the facility to record. (mediscape, True Solutions software) the entire thoracoscopic view of the procedure.

Electro coagulatory forceps and hook forceps that was used to lyse adhesions when present and interfered with the view and to control bleeding.

RESULTS

AGE DISTRIBUTION AMONG LYMPHOCYTE PREDOMINANT EFFUSION

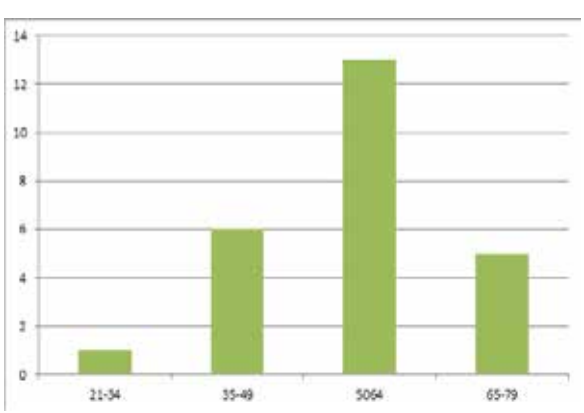
TABLE – 1:

RANGE	NUMBER OF PATIENTS (N=25)
21-34	1 (4%)
25-49	6 (24%)
50-64	13 (52%)
65-79	5 (20%)
TOTAL	25 (100%)

YOUNGEST OF THE GROUP :25 YEARS

OLDEST OF THE GROUP :70 YEARS

MEAN AGE OF THE STUDY POPULATION :53.9

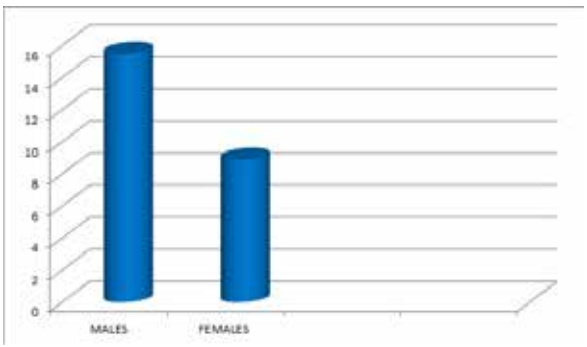


More than half (52%) of the patients belong to the 50-64 years age group. Lymphocyte predominant pleural effusion is least likely in the 21-34 years age group according to our study.

SEX DISTRIBUTION AMONG LYMPHOCYTIC PREDOMINANT PLEURAL EFFUSION

TABLE – 2 :

TOTAL	25
MALES	16 (64%)
FEMALES	9 (36%)



Only 36% of the study population comprised of females.

DIAGNOSIS MADE THROUGH THORACOSCOPY:

Total number of patients screened for evaluation : 45

Total number of patients included in the study : 25

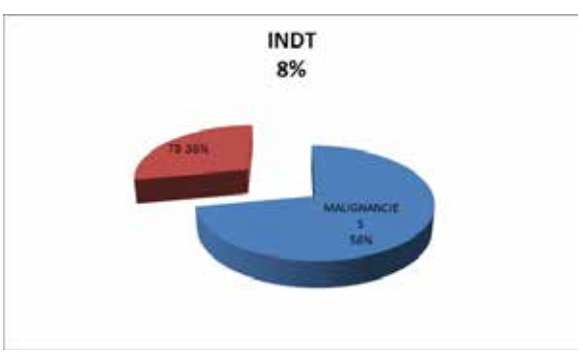
Total number of patients with malignancy : 14

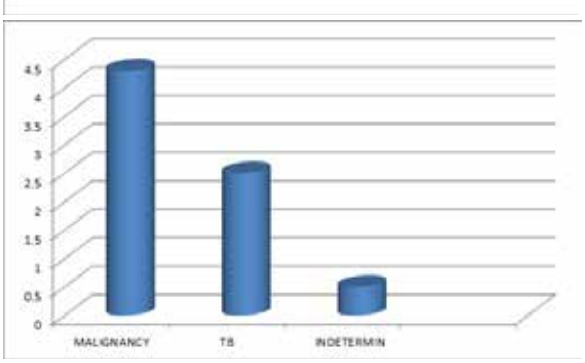
Total number of patients with tuberculosis : 9

Total number of patients with indeterminate diagnosis : 2

TABLE – 3:

MALIGNANCY	TUBERCULOSIS	INDETERMINATE
14	9	2
56%	36%	8%





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CORRELATION BETWEEN AGE GROUP AND FINAL DIAGNOSIS

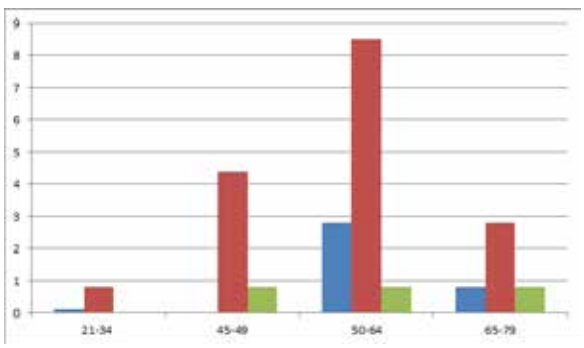
TABLE – 4:

RANGE	TB	MALIGNANCY	INDETERMINATE
21-34	0	1 (4%)	
35-49	5 (20%)	1 (4%)	
50-64	3 (12%)	9 (36%)	1 (4%)
65-79	1 (4%)	3 (12%)	1 (4%)
TOTAL	9 (36%)	14 (56%)	100%

56% of the study population was diagnosed with malignancy.

36% of the study group were diagnosed with tuberculosis

8% remained undiagnosed.



- TB
- MALIGNANCY INDETERMINATE

64.2% of all malignancies come under the age range of 50 – 64 years. This comprises of 36% of total study population.

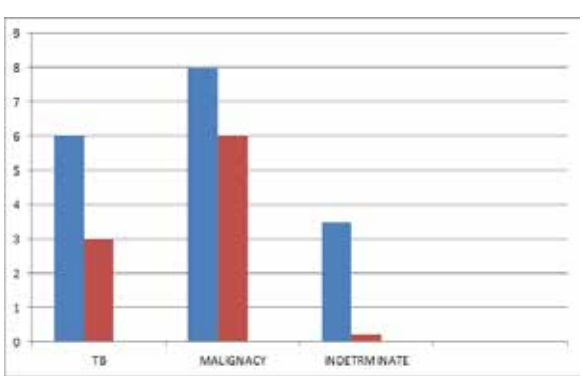
Tuberculosis is most common in the 35 – 49 years. This comprises of 36% of total study population.

CORRELATION BETWEEN GENDER AND FINAL DIAGNOSIS:
TABLE – 5 :

	TB	MALIGNANCY	INDETERMINATE
MALE	6	8	2
FEMALE	3	6	0

Out of 16 males: 6 (37%) had tuberculosis and 8 (50%) had malignancy and 2 (12.5%) were indeterminate.

Out of 9 females: 3 (33.3%) had tuberculosis and 6 (66.6%) had malignancy.

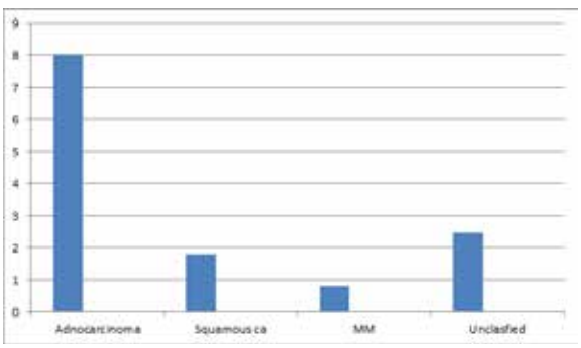


Males

Females

Types of malignancy diagnosed by thoracoscopy:
Total number of malignancy : 14
TABLE – 6 :

ADENOCARCINOMA	SQUAMOUS CELL CA	MALIGNANT MESOTHELIOMA	UNCLASSIFIED TYPE OF MALIGNANCY
8	2	1	3



Adenocarcinoma : 8 (57%)

Squamous cell carcinoma : 2 (14%)

Malignant mesothelioma : 1 (7%)

Unclassified type of malignancy : 3 (21%)

BER GRAPH
57% of the malignancies in our study are ADENOCARCINOMAS malignant mesothelioma was the least common malignancy in the study. A significant proportion (21%) of the study population could not be specifically classified under any single type of malignancy.

PRIMARY LUNG MALIGNANCY AND SECONDARIES TO THE LUNG :
Among the adenocarcinomas, 5 were detected to have primary focus in the lung itself . 3 patients, however had primary elsewhere.

TABLE – 7:

LUNG PRIMARY	7	TOTAL
SECONDARIES TO LUNG	3	10

TABLE – 8:

ADENOCARCINOMA PRIMARY	5
SQUAMOUS CELL CARCINOMA PRIMARY	2

MOST COMMON SITE OF PRIMARY IN SECONDARY ADENOCARCINOMA
Table – 9:

GIT	2
CERVIX	1

75% of the patients with secondary adenocarcinoma lung, had a primary in the GIT.

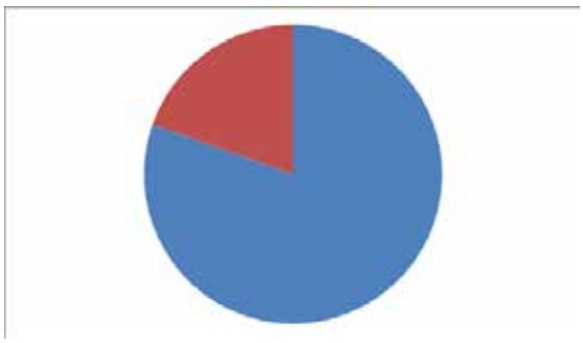
Correlation between pleural fluid culture positivity and tuberculosis

TABLE – 10:

TB CULTURE POSITIVE (PLEURAL FLUID)	2 (22%)

TB CULTURE NEGATIVE (PLEURAL FLUID)	7 (88%)

TOTAL NUMBER OF TUBERCULOSIS: 9 (36%)



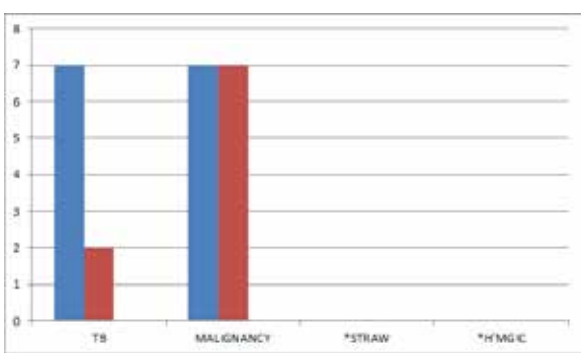
Number of pleural fluid culture positive: 2 (22.2%)

In our study, we found only about 20% positivity yield of culture for tubercle bacilli from pleural fluid.

CORRELATION BETWEEN DIAGNOSIS AND COLOR OF EFFUSION

TABLE – 11:

DIAGNOSIS	STRAW COLORED	HEMORRHAGIC
TB	7 (78%)	2 (22%)
MALIGNANCY	7 (50%)	7 (50%)

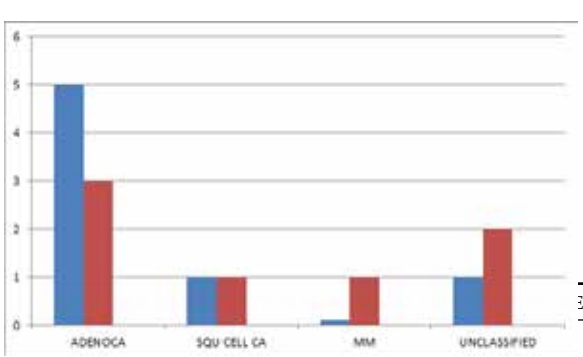


About 20% of tuberculous effusions in our study were hemorrhagic. Colour of effusion is very poorly correlated with malignancy as 50% presented as straw coloured and another 50% presented as hemorrhagic.

COLOUR OF EFFUSION IN DIFFERENT TYPES OF MALIGNANCY

TABLE – 12:

DIAGNOSIS	STRAW	HEMORRHAGIC
ADENOCARCINOMA	5	3
SQUAMOUS CELL CA	1	1
MALIGNANT MESOTHELIOMA	0	1
UNCLASSIFEID	1	2

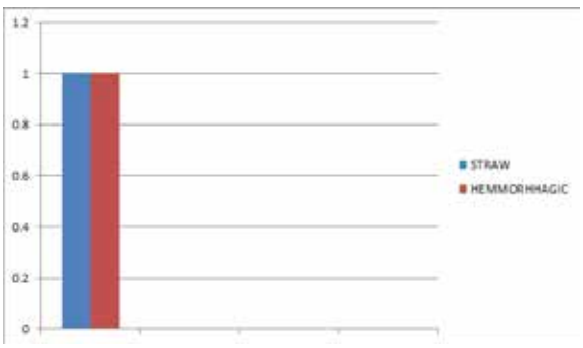


Most of the adenocarcinomas, about 60%, presented as straw coloured effusions. Malignant mesothelioma presented as hemorrhagic effusion 75% of the unclassified effusions presented as hemorrhagic effusion.

COLOUR OF EFFUSION IN INDETERMINATE TYPE OF PLEUEAL EFFUSION

TABLE 13 :

STRAW	HEMMORHHAGIC
1	1



CORRELATION BETWEEN LEVEL OF ADA AND THE DIAGNOSIS

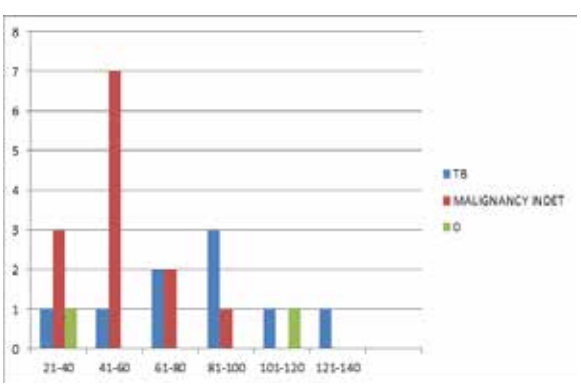
Lowest level of ADA : 29

Highest level of ADA : 143

Mean ADA level : 68.84.

TABLE 14 :

RANGE OF ADA	TB	MALIGNANCY	INDETERMINATE
21-40	1(11.1%)	3(21.4%)	1(50%)
41-60	1(11.1%)	7(50%)	0
61-80	2(22.2%)	2(14.2%)	0
81-100	3(33.3%)	1(7.14%)	0
101-120	1(11.1%)	0	1(50%)
121-140	1(11.1%)	0	0
141-160	0	1(7.14%)	0



33.33% of tubercluous effusions were in the ADA range of 81-100 units. 50% of malignant effusions were in the range of 41-60 units. ADA range of 61-80 is the most contentious with an equal number of tuberculous and malignant effusions falling in the same range.

Mean ADA level in TUBERCULOSIS: 81.55

Mean ADA level in malignancy: 60.78

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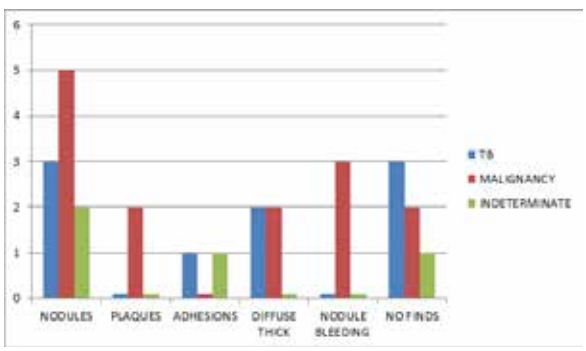
THORACOSCOPIC APPEARANCE AND ITS CORRELATION WITH DIAGNOSIS

TABLE 15 :

APPEARANCE	TOTAL NUMBER OF PATIENTS	TUBERCULOSIS	MALIGNANCY	INDETERMINATE
PLEURAL NODULES	8	3	5	0
PLEURAL PLAQUES	2	0	2	0
EXTENSIVE ADHESIONS	2	1	0	1
DIFFUSE THICKENING	4	2	2	0
NODULES BLEEDING ON TOUCH	3	0	3	0
NO FINDINGS	6	3	2	1

Two of the tuberculous patients showed sago grain like nodules.



33% OF TUBERRCULOUS effusions had pleural nodules and 33% had no findings. Only 11% of the lesions had adhesions.

About 36% of malignant effusions had pleural nodules.

About 21% of malignant effusion had nodules that would bleed on touch.

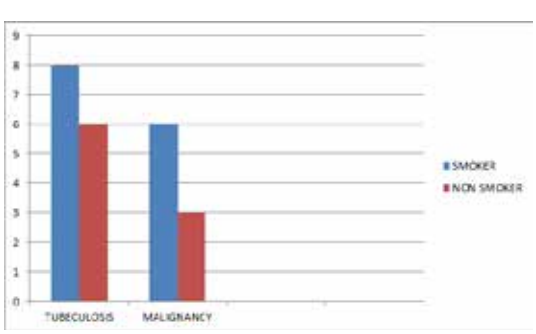
About 14% of malignant effusion had pleural plaques and another 14% showed no abnormality in the pleura.

50% of indeterminate lesions had adhesions in the pleura and another 50% had no findings.

CORRELATION BETWEEN SMOKING STATUS AND FINAL DIAGNOSIS

TABLE – 16:

DIAGNOSIS	SMOKERS	NON SMOKERS
Mailgnancy	8	6
Tuberculosis	6	3



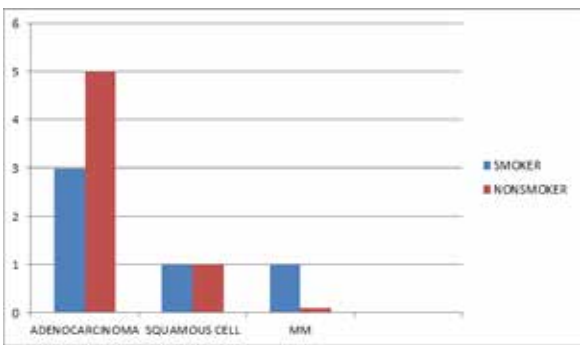
75% of tuberculosis patients were smokers

About 58% of malignancies were smokers.

SMOKING AND TYPE OF MALIGNANCY:

TABLE – 17:

MAILIGNANCY	SMOKER	NON SMOKER
ADENOCARCINOMA	3	5
SQUAMOUS CELL CARCINOMA	1	1
MALIGNANT MESOTHELIOMA	1	0



72% of adenocarcinomas were non smokers.

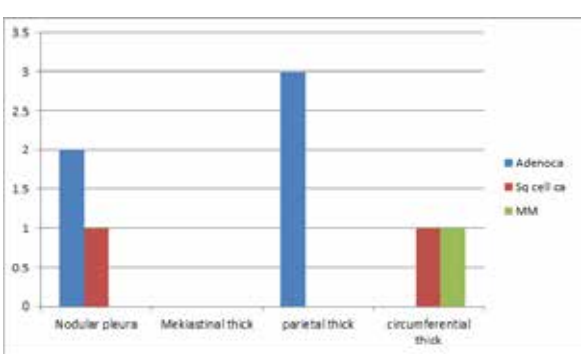
Most common malignancy among smokers was found to be adenocarcinoma.

CORRELATION BETWEEM CT FINDINGS:

According to Leung's criteria:

TABLE – 18:

Ct feature	Adenocarcinoma	Squamous cell ca	Malignant mesothelioma
Nodular pleural thickening	2	1	
Mediastinal pleural thickening			
Parietal pleural thickening	3		
Circumferential pleural thickening		1	1



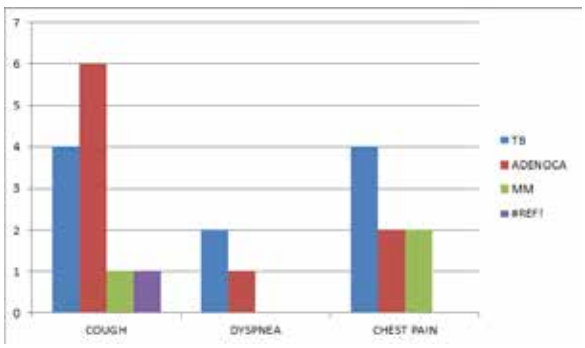
72% OF Adenocarcinomas showed ct findings consistent with malignancy.

60% of such adenocarcinomas presented with parietal pleural thickening.

CORRELATION OF CLINICAL SYMPTOMS WITH FINAL DIAGNOSIS

TABLE – 19:

Symptoms	tuberculosis	adenocarcinoma	Squamous cell carcinoma	Malignant mesothelioma
COUGH	4	6	1	1
DYSPNEA	2	1	0	0
CHEST PAIN	4	2	2	0



Cough is the most common symptom (>50%) in pleural effusions.

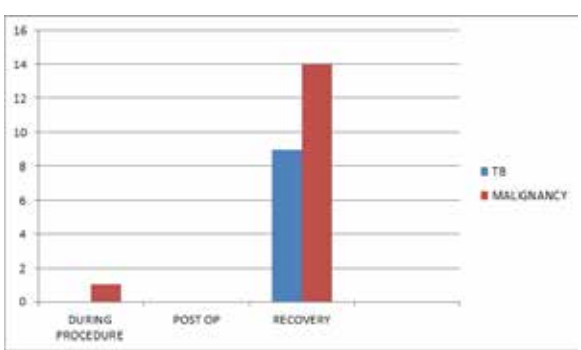
Adenocarcinomas present most commonly with cough.

Chest pain is most common in tuberculous pleural effusions.

COMPLICATION RATE IN THORACOSCOPY:

TABLE – 20:

COMPLICATIONS	TB	MALIGNANCY
DURING PROCEDURE PROCEDURE	0	1
POST OP	0	0
RECOVERY	9	14



Less than 5% patients suffered from intra operative complication. Only one patient suffered from bleeding during biopsy from site of biopsy. It was easily controlled by flushing with cold saline, which was later suctioned out.

DISCUSSION

Diagnosis of lymphocytic predominant pleural effusions especially in the elderly is challedging. At our institute, all such cases with a history of smoking or exposure to other carcinogens (eg:asbestos) and those with conflicting lab reports were subjected to rigid thoracoscopy.Closed pleural biopsy has a relatively low yield and is much more efficient under CT guideance. Hence, we carefully chose the patients who were fit to undergo thoracoscopy and subjected them to this investigation, which is considered the GOLD STANDARD in diagnosis of any pleural pathology.The Karl Storz thoracoscopy set along with the electrocautery enabled hook forceps and punch biopsy forceps along with a talc insufflators was used to obtain the best possible biopsies after thorough inspection of the pleura. The rigid thoracoscope has a bore diameter of 11mm and a 30 degree angle. This allowed us to inspect the entire pleura.We also performed adhesiolysis when feasible, which translated into better and faster recovery for the patient. The talc insufflators was also put to good use in patients with malignant pleural effusion.

In the present study, all the patients with hemorrhagic pleural effusion and or with ADA levels < 70 were chosen to undergo thoracoscopy. Those patients who had a smoking index of more than 100 or history of exposure to asbestor, even if they had straw coloured effusion, irrespective of the ADA levels were included in the study. All the patients pleural fluid were subjected to malignanct cytology and cell block on two separate days before being subject to thoracoscopy.CECT chest of many patients, by application of Leung criteria, made us suspect malignancy. This was confirmed by thoracoscopy.Our study population comprised of 16 males out of whom 6 (37%) had tubrrculosis and 8 (50%) had malignancy. Among the 9 females in our study group, 3 (33.3%) hed tugerculosis and 6 (66%) had malignancy.The mean ADA level in patients of tuberculosis was found to be 81.5 and that in malignancy was found to be 61.ADA range of 60-80 is where an equal number of tuberculosis and malignancies are found.According to the present study, the age group of 50-64 years is the most prone to malignancies. Tuberculosis, was found to be most common in 30-49 years age group.Among the malignancies ADENOCARCINOMA was found to be the most common. There were a total of 8 adenocarcinomas out of which 5 were from primaries within the lung and 3 were secondaries to the pleura. 2 were from GIT and 1 from cervix. Among the patients with tuberculosis only 22% were positive on pleural fluid culture for mycobacterium.On CECT chest, parietal pleural thickening was the most common finding followed by pleural modules in cases of malignancies. Only in two cases of malignancy did the lung parenchyma show any indications of a lesion. Eventually both the cases turned out to be adenocarcinomas primary to the lung.On thoracoscopy, most of the tuberculous effusions, 3 out of 9, (33%) showed sago nodules on the parietal pleura. Another 33% had no findings on pleural inspection. Two patients with tuberculosis had had extensive friable adhesions. There were lysed by using the hook forceps. One patient had a broncho pleural fistula prior to the procedure. This healed over 6 weeks after the patient was started on ATT and the ICT was left in situ.Most malignancies, on thoracoscopy revealed pleural nodules and about 30% were bleeding on touch. In the case of malignant mesothelioma, diffuse pleural plaques with dark pigments were noted. In our study the most common malignancy was adenocarcinoma in smokers as well as non smokers.The diagnostic accuracy of thoracoscopy according to our study is 96%. One case was diagnosed as mesothelial hyperplasia. Malignancy and tuberculosis were confidently ruled out in this case. Another case remained indeterminate due to the inadequate sample as the patient had only a moderate pleural effusion which allowed very less working space to take biopsies. There were a total of 9 cases of tuverculosis. All were proved by biopsy and two were culture positive. The sensitivity for detection of tuberculosis is 100%. The sensitivity for diagnosis of malignancy is 100% but sensitivity for classification of the type is 88%. The mortality rate for this procedure was 0%.It quickened the drainage of pleural effusion and in a few patients it was possible to perform therapeutic pleurodesis.

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CONCLUSION

Medical thoracoscopy is a safe, cost effective and time saving procedure that results in earlier diagnosis, hence, early initiation of treatment.It has very few complications and post operative recovery is uneventful. It is also possible to perform adhesiolysis and this helps in faster expansion of the lung. It also possible to perform talc pleurodesis, which is a useful palliation in cases of malignant effusions. This also helps in reducing the duration of hospital stay.Hence, we recommend the use of thoracoscopy as a routine procedure in all cases of undiagnosed pleural effusions.

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