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"Role of medical thoracoscopy in diagnosis of pleuropulmonary lesions."

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Abstract:

Objectives: To assess the analytic utility and wellbeing of pleuroscopy in patients with pleuropulmonary diseases.

Patients and Methods: A retrospective and prospective observational clinical study including 179 patients divided into 2 groups; group 1 included 139 patients in Nagoya medical center and Toyota Kosei hospital, Japan with undiagnosed pleural effusions. Group 2 included 40 cases with diffuse parenchymal lung diseases (DPLD) of unknown etiology admitted in Kasr Alainy Hospital, Cairo University. All patients were exposed to clinical assesment, routine laboratory investigation, coagulation profile, arterial blood gases, collagen profile, chest X-ray and CT, pleural fluid analysis in cases with pleural effusion and Spirometry in DPLD.

Results: The final histopathological diagnosis in G1 revealed malignancy in 53.2% and benign diagnosis in 46.8% and in G2, hypersensitivity pneumonitis in 20%, UIP in 17.5%, NSIP in 15%, DIP in 10%, LAM in 10%, COP in 7.5%, alveolar proteinosis in 5%, sarcoidosis in 5%, invasive mucoid adenocarcinoma in 5%, Metastatic adenocarcinoma (gastric) in 2.5% and silicosis in 2.5%. Thoracoscopic complications; in G1, bronchopleural fistula in 10.8%, fever in 3.6%, HAI in 1.44%, lung laceration in 2.2% and Subcutaneous emphysema in 0.72% and in G 2; Pneumomediastinum in 2.5%, Surgical emphysema in 7.5%, bronchopleural fistula in 10%, Pneumothorax in 10% and Pulmonary embolism in 2.5%.

Conclusions: Medical thoracoscopy is a valuable method in the diagnosis of unexplained pleural lesions, management of empyema and malignant pleural effusion. It is a promising, inexpensive and safe technique in DPLD

Keywords: medical thoracoscopy- effusion –safety-complications- DPLD.

Abbreviations: DPLD, diffuse parenchymal lung disease; **UIP**, usual interstitial pneumonia; **NSIP**, non-specific interstitial pneumonia; **DIP**, Desquemative interstitial pneumonia; **LAM,** Lymphangioleiomyomatosis; **COP,** Cryptogenic Organizing Pneumonia and **HAI,** Hospital Acquired Infection.

Introduction:

Clinical thoracoscopy is utilized progressively by physicins and has become, after bronchoscopy, the second most significant endoscopic procedure [1]. It is viewed as one of the fundamental regions of interventional pulmonology [2] and a significant piece of an authority pleural sickness administration [3].

Considerably after noteworthy indicative work-up of the pleural fluid, etiology of some pleural effuse-ons remains dubious [4]. Blind needle biopsies may furthermore build up the investigation in some extra cases, explicitly in tuber-

culous pleurisy [5]. In a series [6], of 1000 patients with pleural effusions, 215 cases stayed un-discovered after repeated pleural fluid study and taking pleural biopsies. This is in concurrence with the results of different various creators who, without the utilization of thoracoscopy, record that at any rate 20–25% of pleural lesions stay undiscovered [7].

Thoracoscopy gives various focal points looked at thoracocentesis and closed pleural biopsy; it possibly endorses get passage to entire pleural cavity, takes into consideration on the double envisioned biopsies and control of hemorrhage [8].

Pleuroscopy can be utilized for treatment applications, such as division of adhesions and drainage of pleural fluid in cases of empyema, pleurodesis in cases with malignant pleural effu-sion and spontaneous pneumothorax [9].

Interstitial lung disease (ILD) in the immunocompetent patient is frequently a troublesome test for pulmonologists, particularly when no demonstrative informations are available after clinical appraisal, laboratory investigations includeeng serology for connective tiss-ue diseases, chest radiography, and HRCT. Bonchoalveolar lavage (BAL) and transbronchial biopsy (TBLB) are generally the following step [10].

Medical thoracoscopic lung biopsy (MTLB) in the finding of ILD can be viewed as a subsequent option after disappointment of BAL and TBLB to give the conclusion, and this method has a few focal points over surgical lung biopsy (SLB). The likelihood to take a few biopsies under visual direction and lower grimness are the most significant points of interest [11].

The objective of study: surveying the analytic utility and wellbeing of pleuroscopy in cases with pleuropulmonary diseases.

Patient and methods:

This retrospective and prospective observantional clinical study of 179 patients was conducted in Nagoya medical center and Toyota Kosei hospital in Japan and the Chest Department, Kasr Alainy Hospital, Cairo University after approval of the ethical committee and written consents were taken from the patients. The retrospective analysis included 94 patients during the period of 2007 to 2013 in Nagoya medical center and during the period of 2011 to 2013 in Toyota Kosei Hospital in Japan and prospective analysis included 45 patients during the period of June- 2016 to June -2018 for both. We performed a retrospective analysis of 40 patients with diffuse parenchymal lung illness (DPLD) who looked for clinical counsel at the Chest Division, Kasr Alainy Emergency clinic during the time of January-2019 to October-2019.

Consideration criteria were patients with undiscovered pleural effusion etiology and DPLD. Prohibition criteria were patients with uncorrectable bleeding diathesis, patients with uncontrolled heart co-morbidities like obstinate arrhythmia and patients analyzed by some other symptomatic methodlogy.

Patients were isolated into two gatherings, bunch one (G1) included139 patients with undiscovered exudative pleural effusion etiology, transudate pleural effusion impervious to clinical treatment, empyema, hemothorax, hemopneumothorax and bunch two (G2) included 40 patients with DPLD; all Patients were exposed to the accompanying: clinical evaluation; (Full history taking and clinical examination), routine laboratory investigation: (Complete blood count, liver & kidney function, bleeding profile) using

(Roche/Hitachi cobas c 311systen, Germany), arterial blood gases, the samples were analyzed using automated blood gases analyzer (GEM Premier 3000: Instrumentation Laboratory Inc. Lexington MA 02421, USA), collagen profile [rheumatoid factor (RF), antinuclear antibody (ANA), Cytoplasmic antineutrophil cytoplasmic antibodies (cANCA) and perinuclear anti-neutrophil cytoplasmic antibodies (pANCA)], Chest X-ray and CT, bed side chest sonography if needed for localization of best site for entry, pleural fluid aspiration for biochemical examination, AFB stain, total cell count, pleural fluid culture and sensitivity and cytological examination 3 samples, fibro-optic bronchoscopy and BAL for cytology, AFB stain and culture and ventilatory function tests (FEV1, FVC, FEV1/ FVC) with a spirometer of computer processing (Jaeger Master Screen Diffusion, Viasys Healthcare, Gmbh, Hochberg, Germany) in patients with DPLD.

In Japan, MT was performed via experienced doctors using Olympus LTF type 260 semi-rigid thoracoscopy. In Kasr Alainy Hospital, Rigid thoracoscope with a cold light source was used using a KARL-STORZ rigid thoracoscope from Tuttlingen (Germany). A solitary 7-mm port of passage and no subsequent section ports were utilized. The Patients were in the lateral position with local anesthesia and conscious sedation using midazolam and fentanyl in Nagoya medical center and Kasr Alainy Hospital but only local anesthesia in Toyota Kosei Hospital, with ECG and pulse oximetry monitoring throughout.

The process was undertaken in a tidied up endoscopy room stocked with the fundamental drugs and resuscitation equipment.

Patient was positioned in Lateral decubitus with the affected facet up. The patient was given midazolam 0.4 mg and fentanyl0.2 mg IV before or during the maneuver in prolonged ones. Induction of pneumothorax used to be administered in the interstitial lung disease and usually in the mid axillary line in safety triangle. Xyloc-aine is administered for local anesth-esia; a vertical incision was made in the skin and subcutaneous tis-sue fantastic to the dimension of the trocar to be used. Parietal pleural biop-sies in case of pleural effusion had been taken from suspicious areas and visceral and lung biopsies in instan-ces of parenchymal lung illnesse-s using cupped lung biopsy forceps with electrocautery.

After acquiring sufficient biopsies, the pleuroscope was

eliminated observed by way of the trocar and chest drain (28- 32F) related to beneath water seal used to be advanceed in the equal place. In Japan, pleural drainage with -15 cmH2O suction used to be maintained until the lung was on-ce thoroughly distended. A postproce-dure chest X-ray used to be done. The chest tube was once eliminated as fast as the lung is clinically and radiolo-gically re-extended with insignificant measure of pleural liquid waste (<150 ml/24 h)

IBM SPSS Statistics version 21 (IBM_ SPSS_ New York, U.S.A) was used to analyze the data. Categorical variables are expressed as numbers and percentages and continuous variables as mean± SD. Fisher exact test was used to detect a massive distinction between categorical variables. Differences in means were compared using a t-test. A p-value of <0.05 was viewed statistically significant.

Results:

We contemplated 179 patients isolated into two gatherings: group1 (G1) included 139 patients with mean age of 69.8 years and 110 (79.1%) were males. Group 2 (G2) included 40 patients with

mean age of 44.2 years and 27 (67.5%) were females.

Thoracoscopic findings in the studied patients in G1 were**;** extensive adhesions and pleural thickening in 47 (33.8%) cases; multiple pleural nodules in 47 (33.8%) cases, multiple white patches in 7 (5.03%) cases, Pleural plaque in 4 (2.9%) cases, Pleural polyp in 1 (0.7%) case, Pleural adhesions in 16 (11.5%) cases and non specific findings in 29 (20.9%) cases as illustrated in **table (1)**. In G 2; adhesions in 18 cases (45%), anthracosis of the visceral pleura in 7 cases (17.5%), lung nodules in 3 cases (7.5%)**,** pleural nodulesin 1 case (2.50%)**,** Pleural thickeningin 1 case (2.5%), left pleural effusion in 1 case (2.5%) and free Thoracoscopic examination of the lung and pleura in 18 cases (45%) as illustrated in **table (2)**.

The demonstrative yield of pleuroscopy was 98.6% in G1 and 100% in G2. Final histopathological diagnosis in G1 revealed malignancy in 53.2% (primary lung cancer 25.9%, metastasis 14.4% and mesothelioma in 12.9%) and benign diagnosis in 46.8% (TB in 10.8%, empyema in 7.2%, non-specific pleuritis in 24.5%, hypoalbuminaemia due to liver cirrhosis in 0.72%, uremic pleuritis in 1.4% with CRF on dialysis, drug induced pleuritis due to valproic acid in 0.7%, ruptured bulla in 0.7% and amyloidosis in 0.7% as illustrated in **(Fig.1**) while in G2,diagnosis was hypersensitivity pneumonitis in 20%, UIP in 17.5%, NSIP in 15%, DIP in 10%, LAM in 10%, COP in 7.5%, alveolar proteinosis in 5%,sarcoidosis in 5%, invasive mucoid adenocarcinoma in 5%, Metastatic adenocarcinoma (gastric) in 2.5% and Pneumoconiosis (silicosis) in 2.5% as illustrated in (**Fig.2)**

As regards thoracoscopic complications; in G1; bronchopleural fistula was detected in 10.8%, fever in 3.6%, HAI in 1.44%, lung laceration in 2.2% and Subcutaneous emphysema in 0.72% as illustrated in **(Fig.3)** and in G 2, Pneumomediastinum was found in 2.5%, Surgical emphysema in 7.5%, bronchopleural fistula in 10%, Pneumothorax in 10% and Pulmonary embolism in 2.5% as illustrated in (**Fig.4**) No mortality related to the procedure was recorded in both groups.

Variables	N (%)
Extensive adhesions and pleural thickening	47(33.8%)
Multiple pleural nodules	47(33.8%)
Multiple white patches	7(5.03%)
Non specific findings	29(20.9%)
Pleural plaque	4(2.9%)
Pleural polyp	1(0.7%)
Pleural adhesions	16 (11.5%)

Table (1): MT findings in the studied patients in G1.

Variable	Number (%)
Free	**18 (45.00%)**
Anthracosis	**7 (17.50%)**
Adhesions	**18 (45.00%)**
Lung nodules	**3 (7.50%)**
Pleural nodules	**1 (2.50%)**
Pleural thickening	**1 (2.50%)**
Lt Pleural effusion	**1 (2.50%)**

Table (2): MT Findings in 40 patients undergoing thoracoscopic lung biopsy

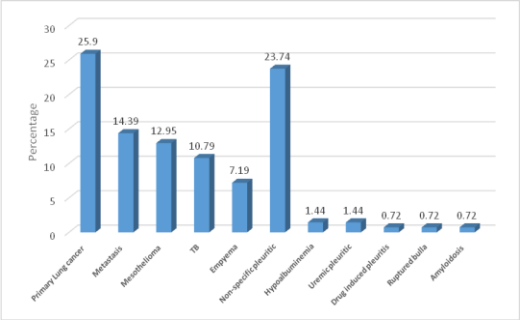

Fig.1: Diagnostic yield of MT in patients with pleural lesions.

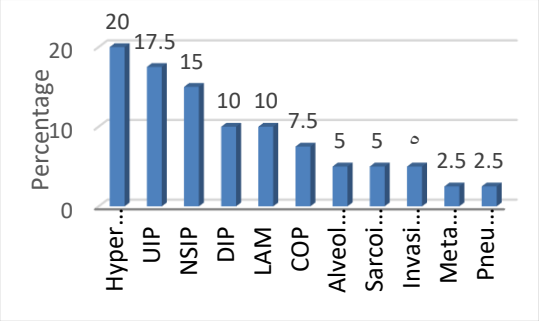

Fig.2: Histopathology of 40 patients with DPLD undergoing thoracoscopic lung biopsy

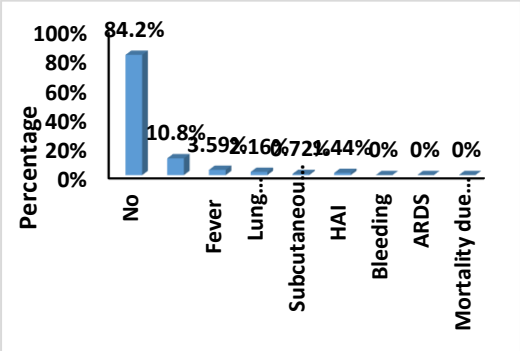

Fig.3: Complications of MT among 139 patients with pleural lesions

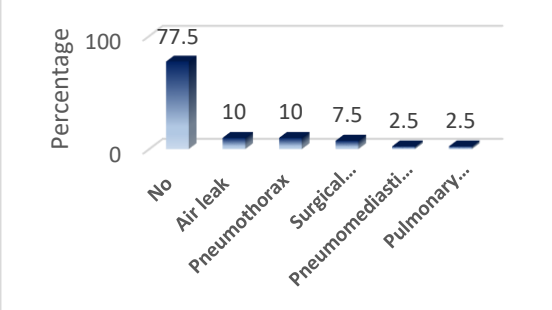

Fig.4: Complications of MT among 40 patients with DPLD undergoing thoracoscopic lung biopsy

Discussion:

We examined 179 Patients partitioned into two gatherings, bunch one (G1) included 139 patients with pleural lesions and gathering two (G2) included 40 patients with diffuse pneumonic shadows.

The demonstrative yield of pleuroscopy was 98.6% in G1 due to failure of diagnosis by medical thoracoscopy in 2 cases (the first case due to extensive adhesions which renders the passage of MT and the second due to rupture of emphysematous bulla resulting into active bleeding) and 100% in G2. The final diagnosis was as follow: in G1; malignancy in 53.2% (primary lung cancer in 25.9%, metastasis in 14.4% and mesothelioma in 12.9%) and benign diagnosis in 46.8% (TB in 10.8%, empyema in 7.2%, non-specific pleuritis in 24.5%, hypoalbuminaemia due to liver cirrhosis in 0.72%, uremic pleuritis in 1.4% with CRF on dialysis, drug induced pleuritis due to valproic acid in 0.7%, ruptured bulla in 0.7% and amyloidosis in 0.7%.

This agrees with a study by Elshamly. [12], as malignancy was diagnosed in 27 patients (61.4%) including epithelial mesothelioma in 16 (36.36%), Sarcomatous mesothelioma in 3 (6.81%), metastatic squamous cell carcinoma in 3 (6.81%) and NHL in 4 (9.5%) and benign lesion in 17 patients (38.6%) including TB in 2 patients (4.45%), non specific pleurisy in 6 patients (13.63%) and empyema in 3 patients (6.81%), Sabah and Marwa. [13], who detected malignancy in 74.4% including malignant pleural mesothelioma in 47.01%, metastatic adenocarcinoma in 22.2%, spindle cell carcinoma in 0.85% and lymphoma in 4.27% and benign lesions in 25.6% including tuberculous pleurisy in 4.27%, SLE in 0.85%, sarcoidosis in 1.71%, empyema in 5.13% and chronic non specific pleurisy in 13.7%, Jiang et al. [14] who reported malignancy in 56.2% [Pleural metastases in 37.8%, mesothelioma in 18.4%] and benign lesions in 43.8% [Tuberculous pleurisy in 21.6%, non specific inflammation in 9.5% & empyema in 8.0%, hepatic pleural

effusion in 1.5% and pleural effusion of unknown causes in 3.2% cases] and Wang et al. [15], who found malignancy in 55.5% (metastatic carcinoma in 44.4%, mesothelioma in 7.4% and 3.7% has NHL) and benign lesions in 44.4% including tuberculous pleurisy in 22% , nonspecific inflammation in 7% , empyema in 4% and normal pleura in 4% .

These findings disagree with a study by Elhadidy and Rezk. [16], who found malignancy in 44.8% (mesothelioma in 2.4%, NHL in 7.1% and metastatic adenocarcinoma in 35.3%) and benign lesion in 55.2% (parapneumonic in 44.6% and TB in 10.6%), and Agarwal et al. [17]**,** as malignancy was detected in 68.4% [adenocarcinoma 52.6%, poorly differentiated carcinoma 10.5% and mesothelioma in 5.3%] while other cases could not be diagnosed by medical thoracoscopy.

Our results also disagree with Prabhu and Narasimhan. [18], as malignancy was detected in 35.3% [22.1% had Metastatic adenocarcinoma, 34.4% had Mesothelioma, 4.4% had undifferentiated carcinoma, 1.5% had Lymphoma, 1.5% had Metastatic clear cell carcinoma and 1.5% had Metastatic squamous cell carcinoma], 32.4% had non-specific pleuritis, 23.5% had tuberculosis, 2.9% had empyema, 1.5% had sarcoidosis, 1.5% had normal pleura and it was non-diagnostic in 2.9%, Mootha et al. [19] who detected malignancy in 48.6% including 1 case of mesothelioma, and the rest were due to pleural metastasis. TB was diagnosed in 22.8% of patients and 2 cases of empyema were diagnosed and Laila et al. [20] as malignancy was diagnosed in 70% including mesothelioma in 53.6%, metastatic pleural malignancy in 46.4% and benign lesions in 25% including 2.5% with empyema and 22.5% with TB, it was non diagnostic in 5%.

Our result of the demonstrative yield in G1 patients agrees with all of the following studies**:** Prabhu and Narasimhan. [18], as the demonstrative yield was 97% (66 out of 68), Sabah and Marwa. [13], with a demonstrative yield of 96.6% (113/117), Jiang et al., [14], the demonstrative yield was 96.8% (2304/2380) and Laila et al. [20], with a demonstrative yield of 95% (38/40).

Our results disagree with, Elhadidy and Rezk. [16], with a demonstrative yield of 100%, Shaheen et al. [21], who studied 40 patients with undiagnosed pleural effusion, rigid and flexible thoracoscopy was carried out using a fiberoptic bronchoscope as a flexible thoracoscope and observed that the demonstrative yield of flexible thoracoscope and that of rigid thoracoscope was 80% (32/40) and 95% (38/40), respectively, Agarwal et al. [17]**,** with a demonstrative yield of 69% (13/19**,** Wang et al. [15], the demonstrative yield was 93% (25/27), Elshamly;[12], the demonstrative yield was 86.4% (38/44), Huang et al. [22], the demonstrative yield was 93.6% (44/47), Thangakunam et al. [23], the demonstrative yield was 66.7% (12 of the18 patients) and Ng et al. [24], who achieved demonstrative yield of 45.5% (10 of 22 patients).

In G2; the demonstrative yield was 100% and a similar demonstrative yield was reported by Omar et al. [25], Elhadidy et al. [26], Elhadidy and Rezk. [16] and Boutin et al. [27]. A lower demonstrative yield was reported by Dijkman et al. [28] and Vansteenkiste et al. [11] who reported a demonstrative yield of 90% and 75% respectively. Rodgers et al. [29] reported demonstrative yield of 98%. Elnady et al. [30] (87%) and Kapsenberg. [31] (94%).

In our study, the final histopathological diagnosis was hypersensitivity pneumonitis in 20%, UIP in 17.5%, NSIP in

15%, DIP in 10%, LAM in 10%, COP in 7.5%, alveolar proteinosis in 5%, sarcoidosis in 5%, invasive mucoid adenocarcinoma in 5%, Metastatic adenocarcinoma (gastric) in 2.5% and Pneumoconiosis (silicosis) in 2.5%. In comparison to a study done by Omar et al. [25] the commonest histopathological diagnosis was extrinsic allergic alveolitis (40%), malignancy (33.3%), IIPS (13.3%), sarcoidosis (6.7%) and tuberculosis (6.7%). Our results disagree with a study done by Elhadidy et al. [26], in which the commonest histopathological diagnosis was UIP pattern (38.9%), followed by adenocarcinoma (22.2%), NSIP (11.1%), and BOOP, silicosis, lymphoma, RB-ILD, and TB (5.6% each) and disagree with a study done by Elhadidy and Rezk. [16], in which the final histopathological diagnosis was as follow: 20% was malignant (13.3% bonchoalveolar carcinoma and 6.7% metastasis) and 80% was benign lesion (46.7% UIP, 13.3 NSIP, 6.7% to each of the following LIP, TB, and silicosis).

Talc poudrage was performed in 33 cases (32.7%) including 30 cases of malignant pleural effusion, 2 cases of non specific pleuritis and 1 case of transudate pleural effusion due to hypoalbuminaemia in patient with liver cirrhosis resistant to medical treatment.

In our examination there were 10 instances of multiloculated empyema with difficult drainage due to adhesions, thoracoscopy with performing mechanical adhesiolysis, slicing of septa and drainage of pleural fluid resulted in marked clinical and radiological enhancement in lung expansion. Wakabayashi [32] stated 20 patients who performed debridement of chronic empyema by thoracoscopy, the lungs re expanded in 18 patients (90%). The lung could not re expand in two patients, due to empyema for more than 4 months duration. Ridley and Braimbridge. [33], reported marked improvement of empyema in 18 of 30 (60%) selected cases despite of performance of the procedure in many cases at a late stage after failure of initial medical treatment. In 8 (66%) of 12 cases who did not have marked improvement after thoracoscopy, the empyema improved after surgery.

Thoracoscopic debridement may give sufficient time to improve the clinical state of weakened patients until they can endure progressively forceful procedures. With thoracoscopy, the loculations in the pleural space can be disturbed, the pleural space can be totally depleted, and the chest tube can be ideally set [34]. Early management of cases with multiloculated empyema show that this methodology is protected, negligibly obtrusive, and effective in these patients with diminished mortality [35].

Following Medical Thoracoscopy no significant complexities were experienced. In G1; bronchopleural fistula was detected in 10.8%, fever in 3.6%, HAI in 1.44, lung laceration in 2.2% and Subcutaneous emphysema in 0.72. No bleeding, no ARDS or mortality due to procedure. In G2; Pneumomediastinum was found in 1 (2.5%) case, surgical emphysema in 3 (7.5%) cases, bronchopleural fistula in 4 (10%) cases, Pneumothorax in 4 (10%) cases and pulmonary embolism in 1 (2.5%) case. lung laceration occurred in 3 cases during passing trocar and not surpassed 1.5 cm in length as outlined in **(Fig.5**). Two of them were overseen during the technique by calling the cardiothoracic specialist but the third case was neglected during the pleuroscopy resulting in air leak and subcutaneous emphysema later on which increaseed and indicated urgent surgical intervention to close the laceration.

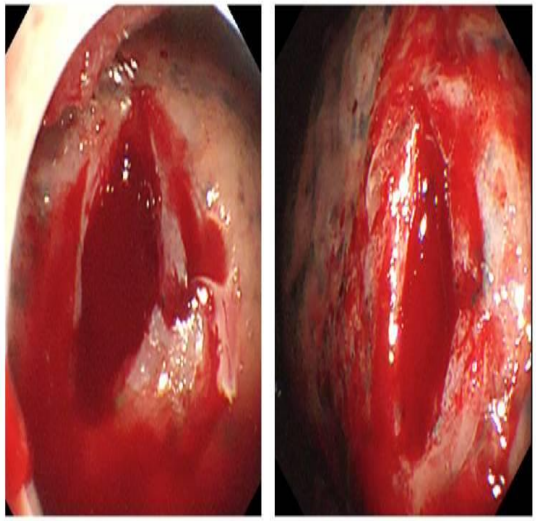

Fig.5: Lung laceration during pleuroscopy in one of the cases in Nagoya medical center, Japan.

In comparison to a study done by Elshamly. [12], thoracoscopic complications were; 1 patient complicated with hemorrhage needed receiving blood, surgical emphysema was detected in 3 patients and 1 patient developed hypotension. There is no deaths and issues had been statistically non significant. Our results disagree with a study by Elhadidy and Rezk. [16], as empyema was detected in 3 cases (3.5%) and subcutaneous emphysema in 5 cases (5.9%), Prabhu and Narasimha. [18], reported subcutaneous emphysema in 3 patients and extended air leak in 1 patient and Sabah and Marwa. [14], who stated 6 patients (5%) with minor issues like extended air leak (1 patient), subcutaneous emphysema (2 patients), wound infection (1 patient) and empyema (2 patients).

As regard to complications in patients of G2, our results disagree with Elhadidy and Rezk. [16] who encountered air leak in 26.7% (4 out of 15) of patients, Elnady et al. [30] who stated continual air leak for 5 and 7 days, pneumothorax after removal of the intercostal tube, ache and minor bleeding in 20%, 20%, 60% and 10% of cases individually, Nitin. [36], who encountered air leak in 26% (8 out of 30) of patients ,Boutin et al. [27], who reported continual air-leak in 15% (3 out of 20) of cases, Vansteenkiste et al. [11], who reported air leak in 27% (7 out of 24) of patients, Omar et al. [25], who reported no cases of air leak more than 24 hours and Elhadidy et al. [26], who encountered air leak for about 7 days in 5.6% (1 out of 18) of cases.

In our study, 3 (7.5%) patien-ts developed surgical emphysema which may resulted from large pleural opening and had resolved completely with high flow oxygen. This result disagree with a study by Omar et al. [25], who reported surgical emphy-sema in 20% (3 out of 15), Elhadidy et al. [26], who reported surgical emphy-sema in 27.3% (5 out of 18), Hatata et al. [37] and Elhadidy and Rezk; [16], who reported surgical emphysema in 6.7% (1 out of 15).

The frequency of surgical emphysema was accounted for following thoracoscopy in preceding researches ranging from 1.5% [44], 2% [6], 4% [39], 5.3% [40], 7% [41], 7.1% [42], 7.01% [43], 8% [8], 8.33% [7], 10% [21], 20% [44] to 23.33% [45] cases. This qualification in the rate of surgical emphysema can likewise be related to measurement of the injury, immovability of the sutures and the physicin abilities. It is regularly negli-gible in sum and self restricting. Once more, it is one of the minor issues which ought to be easily overlooked by the physicin [46].

Pain occurred in all patients, and it was mild to moderate and was controlled by NSAID medications. This is of the same opinion of Elhadidy et al. [26] and Omar et al. [25]

In the present study, 4 (10%) cases were complicated with pneumothorax following elimination of the chest tube but it improved by supplementary high-flow O2 without the need for

reinsertion of another ICT. This agrees with Boutin et al. [27] who reported pneumothorax in 10.6% of patients (8 out of 75) but disagrees with Omar et al. [25], who reported pneumothorax in 6.7%, of patients (1 out of 15) and it resolved by supplementary high-flow oxygen and needed ICT insertion and Elnady et al. [30], who reported pneumothorax in 20% of patients (2 out of 10); this pneumothorax resolved by supplementary high-flow oxygen without the need for reinsertion of another ICT.

In our study, no significant bleeding had occurred. This result agrees with Elnady et al. [30] who founded that bleeding was negligible (occurred in only one patient and it was about 20 ml) and Omar et al. [25] but disagrees with Elhadidy et al. [26] who reported minor bleeding in 50% of patients.

No local wound infection occurred in patients after insertion of ICT and this disagrees with Hatata et al. [37] who detected it in one case (6.7%) and was managed by local medical treatment. No cases of empyema after ICT insertion was reported in our study and this agrees with Omar et al. [25] however disagrees with Xaubet et al. [47] and Elhadidy et al. [26] who reported empyema in solely one case (5.6%) and was managed by antibiotics.

The expressed rate of empyema in the previous thoracoscopic inquires about extents from 0% in numerous looks into [21][44] **,** 0.5% (5 of 1145cases**)** [47]**,** 0.6% (1 of 147 cases) [46]**,** 1% (6 of 556 cases**)** [43]**,** 2% (4 of 182 cases) [8]**,** 2.5% (9 of 360 cases**)** [48]**,** 4% (6 of 149 cases**)** [40]**,** 4.8% **(**2 of42 cases**)** [42] to10%(3 of 30cases) [45]**.** The distinction in rate of empyema in different researches might be identified with the quantity of cases in each research (for the most part noticed that higher rate of empyema was recorded with considers performed on a less number of cases), the ampleness of purification of the field of the method, the fundamental reason for pleural effusion, the accessibility of sufficient anti-microbial for a satisfactory span and the health state of the patients.

In our study, no patients needed ICU admission and there was no short-term mortality (30 days post procedure). Absence of mortality in this study is in simultaneousness with the outcomes acquired by Omar et al. [25], Elhadidy et al. [26], Hatata et al. [37], and Vansteenkiste et al. [11] where there were no deaths in these series.

The mean length of hospital stay in cases of G1 was 11.3± 8.12 days and the median was 9 (2 - 49) days. The longest length of hospitalization was recorded in cases with malignant pleural effusion and empyema. The mean length of ICT drainage in cases of G1 was 9.6 ± 7.89 days and the median was 7 (2 – 47) while in patients of G2, the mean was 3.23 ± 1.73 days and the median was 3 (2 – 10), so the duration of ICT drainage in patients of G1 was longer than patients of G2. This disagrees with a study done by Elhadidy and Rezk. [16], which included 100 cases with unexplained pleural effusion (G1) and ILD (G2), the duration was longer in G2 patients. This may be explained by older age, bad general condition due to malignancy and empyema and the presence of co morbidities which affect the healing in our study population.

We concluded that Medical thoracoscopy is a valuable method in the diagnosis of unexplained pleural lesions, management of empyema and malignant pleural effusion. It is a promising, inexpensive and safe technique in DPLD

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Conflicts of interest
No.

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