

Outpatient pleuroscopy: report of an experience in a referral hospital

Pleuroscopie la pacienți ambulatori: raport al experienței unui centru de referință

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Abstract

Pleuroscopy is a safe diagnostic procedure for evaluation of pleural diseases, with minimum complications. This procedure has been recently conducted on outpatient basis. Results support its safety, especially in busy referral hospitals. We aimed to report our experience on performing outpatient pleuroscopy at Masih Daneshvari hospital; Tehran, Iran. All eligible patients referred to Masih Daneshvari Hospital for pleuroscopy between May 2015 and May 2016 were enrolled. Air evacuation was conducted in operating room though a thin Nelaton catheter attached to low pressure suction. Compression dressing using Vaseline gauze was done after air leak terminated. Patients were discharged if first chest x-ray was negative for pneumothorax and were advised to stay in touch and return 12 hours later for second chest radiograph. Baseline characteristics, radiographic and pathologic reports were reviewed. Outpatient pleuroscopy was conducted on 10 patients. Average procedure time was 22±9 minutes. All patients were discharged after 4 hours. Eight of the patients remained free of complications after 12 hours, and 2 patients presented with pneumothorax (both who had massive pleural effusion) and were successfully managed by our team. Considering pathologic diagnosis, pleural tuberculosis was as common diagnosis as malignancy in our patients (4 patients), adenocarcinoma was the most malignancy reported (3 out of 4 patients). Chronic nonspecific inflammation was reported by our pathologist in 2 cases. Outpatient pleuroscopy can be conducted safely and effectively, reducing the number of unnecessary hospitalizations in a referral center. Closed follow up, patient education and proper patient selection are necessary for minimizing complications.

Keywords: pleuroscopy, pleural tuberculosis, adenocarcinoma

Rezumat

Pleuroscopia este o metodă sigură, cu minim de complicații de diagnostic al patologiei pleurale. Această procedură este raportată din ce în ce mai des ca metodă de investigație la pacienții ambulatori. Scopul lucrării este de a raporta experiența centrului Masih Daneshvari din Teheran privind pleuroscopia ca metodă diagnostică ambulatorie. Au fost incluși toți pacienții la care s-a efectuat pleuroscopie în perioada Mai 2015-Mai 2016. Evacuarea aerului s-a realizat cu ajutorul unui cateter de Nelaton atașat la o presiune mică de aspirație. Pacienții au fost externați dacă radiografia de torace efectuată post procedură nu arăta pneumotorax. A doua radiografie s-a realizat la 12h post externare. Pleuroscopia ambulatorie s-a realizat pentru 10 pacienți. Durata procedurii a fost în medie de 22±9 minute. Toți pacienții au fost externați în 4 ore. Dintre aceștia 8 nu au prezentat nici o complicație, iar 2 au dezvoltat pneumotorax. Din punct de vedere al diagnosticului etiologic: pleurezia tuberculoasă a fost la fel de des identificată ca și pleurezia malignă (4 pacienți). Adenocarcinomul a fost forma de neoplazie cel mai des raportată (3 pacienți din 4). Alte 2 cazuri au fost diagnosticate cu inflamație cronică nespecifică. Pleuroscopia ambulatorie se dovedește o metodă sigură și eficientă de diagnostic al pleureziilor, cu scăderea spitalizărilor. Urmărirea și educarea pacienților contribuie la diminuarea posibilelor complicații.

Cuvinte-cheie: pleuroscopie ambulatorie, pleurezie tuberculoasă, adenocarcinom

Introduction

Medical thoracoscopy (pleuroscopy) is a valuable procedure used in pulmonology medicine for diagnosis and treatment of pleural diseases, which consist a quarter of diagnostic challenges faced by pulmonologists^(1,2,3,4,5).

After introduction of semi-rigid pleuroscopy, similar in properties to flexible bronchoscope, pleuroscopy replaced second attempt thoracentesis⁽³⁾. This procedure is considered safe diagnostic procedure with minimal complications^(1,2,6,7,8,9).

However pleuroscopy is not well known as an outpatient procedure due to anatomic region being manipulated and possible unpredictable fatal complications⁽⁷⁾ which is why patients are usually hospitalized and monitored after chest tube insertion⁽⁶⁾. Nevertheless, recent studies have directed attention toward performing pleuroscopy as an outpatient procedure using different types of catheters for air evacuation and reported outpatient pleuroscopy as a safe and convenient procedure. These studies suggested that this procedure was performed on an outpatient basis in well-equipped centers^(3,6,7).

Recognizing outpatient pleuroscopy as a safe and minimally invasive procedure and considering high patient load, we aimed to initiate outpatient pleuroscopy in our center at Masih Daneshvari Hospital, a referral center for pulmonary diseases, using our particular method and reported its safety, complications and outcomes.

Material and Methods

Between May 2015 and May 2016, all patients referred to outpatient bronchoscopy unit at Masih Daneshvari Hospital for diagnostic pleuroscopy were evaluated by a pulmonologist. Pleural ultrasonography was conducted in all cases. Only patients with free pleural fluid (without fibrin strands) were considered eligible and were enrolled in this cross-sectional study after they agreed to proceed with outpatient pleuroscopy.

Contraindications were as follows: 1-absence of pleural space due to adhesions 2-visceral or parietal pleural thickening 3-hypoxemia 4-chronic hypercapnia 5-severe cough 6-hemodynamic instability 7-coagulopathies 8-inability to lie in desired position 9-allergy to medications.

Before conducting the procedure we consulted a team of thoracic surgeons and ensured the availability of an expert surgeon in case of complications needing immediate intervention.

Necessary pre-procedural evaluations included blood, haematologic, and biochemical studies. Chest radiograph, CT scan and thoracentesis had been conducted in all cases.

Procedure: All patients were placed in lateral decubitus position with the affected side up. Fentanyl and Midazolam were administered by dose of 1mg/kg and 0.02mg/kg respectively in order to induce sedation. Patients received Propofol with dose of 1mg/kg right before local anesthesia by Lidocaine 1%. Propofol administration continued at rate of 3-5mg/kg/h throughout the procedure. After proper sedation was provided, an incision was made in 6th-7th intercostal space at mid-axillary line. Pneumothorax was induced to collapse the lung away in order to make trocar insertion possible.

Following procedure completion, a thin 12F Nelaton catheter was introduced through trocar into pleural space and connected to continuous low pressure suction (20-50cmH₂O) for air evacuation. After air leak stopped and leak test turned negative, trocar was retracted gently while the Nelaton catheter was kept in place. The incision site was carefully sutured and a Vaseline gauze dressing was used to seal the remaining gap around the Nelaton catheter. The catheter was removed afterwards while holding the gauze tightly. Compression dressing was used to seal the incision site and prevent air leaks. All procedures were conducted by one interventional pulmonologist.

All patients were monitored in recovery room for 4 hours and chest x-ray was obtained afterwards. If x-ray was negative for pneumothorax, patients were dis-

charged home after reassuring they remain close enough to a well-equipped hospital for at least 12 hours.

Patients' contact information were taken as well and they were asked to return 12 hours later for performing second control chest x-ray.

This study obtained ethics approval from ethical committee of Masih Daneshvari Hospital, Tehran, Iran.

Quantitative and qualitative data were reported as mean±SD and percentage respectively.

Results

10 patients agreed to undergo outpatient pleuroscopy and fulfilled inclusion criteria. 6 patients (60%) were male and 4(40%) were female. Mean patients' age was 48.9±13.4 years. Patients had exudative pleural effusions and underwent pleuroscopy for diagnostic purpose. All had undergone chest CT scan prior to the procedure; 2 had hilar lymphadenopathy, 1 had subcarinal enlarged lymph node as well as pleural thickening. Other patients had no significant finding on chest CT scan except for pleural effusion, although 2 patients had massive pleural effusion (>3liters) (Table 1).

The average time of procedure was 22±9 minutes. No perioperative and early post-operative (after 4 hours) complications were observed regarding list of potential thoracoscopy complications described by Colt⁽¹⁰⁾.

First chest x-ray conducted after 4 hours and was negative in all patients; as a result, all patients were discharged safely and were followed up with by phone calls to return after 12 hours for visit and second chest radiography.

Eight patients (80%) remained free of complications. However, two presented with pneumothorax. One of them was a 53-year-old man who presented with dyspnea and pain and was diagnosed with tension pneumothorax requiring rapid evacuation and chest tube insertion. This patient had pleural effusion of 4 liters before procedure and refused to undergo second control chest radiography.

Another patient was a 60-year-old male who presented with mild dyspnea. A thin rim of pneumothorax was detected in first control chest x-ray which had expanded on second radiography. This patient was hospitalized and underwent chest tube insertion as well.

No other attributable complication was observed in current study.

Histologic evaluation of pleural biopsies was diagnostic in 8 patients (80%).

Four patients had caseous granuloma and elevated ADA level and were diagnosed with pleural tuberculosis.

Four patients had malignant pleural pathology; 3 of which were reported to have adenocarcinoma, and 1 had malignant mesothelioma.

Histologic evaluation was non-diagnostic in 2 cases and reported as chronic nonspecific inflammation (Table2).

Patients with massive effusion had histologic findings compatible with malignancy, one had adenocarci-

Table 1 Characteristics of patients

Characteristic	N=10
Age, y	48.9±13.4
Sex	
female	6
male	4
CT imaging	
Pleural thickening	1
lymphadenopathy	2
only pleural fluid	8

Table 2 Pathologic results of patients

Result	N=10
Malignant mesothelioma	1
Adenocarcinoma	3
Tuberculosis	4
Chronic nonspecific inflammation	2

noma and the other patient was diagnosed with malignant mesothelioma.

One of the patients with a diagnosis of pleural tuberculosis underwent high resolution CT scan one week after the procedure, as her physician had prescribed, in which mild “Tree in bud” appearance was observed.

Discussion

Results of current study are compatible with previous studies on safety and diagnostic yield of pleuroscopy^(1,2,6,8,9). Our data is also consistent with studies on outpatient pleuroscopy, such as a recent large study by Zachary S. DePew et al., which released preliminary data on safety of outpatient pleuroscopy^(6,7). However, our method is unique and different from other studies on outpatient pleuroscopy^(6,11).

Pleuroscopy is commonly conducted for evaluation of idiopathic exudative pleural effusion⁽⁸⁾. Malignancy is reported as the most common histologic diagnosis according to a number of previously published studies, although some other cohorts report Non Specific Pathology to be the dominant histologic report^(12,13,14). The Zachary S. DePew study reported malignancy in 47.1% of their patients. Among our patients pleural tuberculosis was reported as common as malignancy (40%). This is not unexpected however, considering the fact that Iran is an endemic country for TB and our hospital is a referral center for tuberculosis and lung diseases.

Reviewing previous studies reveals high diagnostic yield for pleuroscopy guided biopsies which has been reported to be 94% in a prospective study from Germany while another study from South Africa, another endemic country for tuberculosis, reports pleuroscopy biopsies to have a 98% percent diagnostic yield^(15,16) according to high diagnostic yield of pleuroscopy for TB in endemic

countries. This procedure was suggested as first intervention in countries with a high disease burden such as ours as it can provide enough specimen for culture. Complete drainage of effusion can also provide symptom relief⁽¹⁷⁾.

Metastatic adenocarcinoma was the most common malignancy in this study (3 patients of 4 diagnosed with malignancy) followed by malignant mesothelioma reported in one patient. This is also in contrast to the results of Zachary S. DePew study which reported mesothelioma as the most common malignancy among their patients (27.5%)⁽⁶⁾.

Nonspecific chronic inflammation was reported in 2 of our patients warranting further evaluation. Zachary S. DePew et al. reported nonspecific pleuritis (NSP) as the second most common report among their patients⁽⁶⁾.

In chest CT scan review 2 patients with hilar lymphadenopathy had metastatic adenocarcinoma. The patient with subcarinal lymphadenopathy and pleural thickness was finally diagnosed by malignant mesothelioma. One of patients with pleural TB diagnosis had “Tree in bud” appearance on subsequent chest HRCT. Putting these findings together we can state that chest CT scan findings in patients with undiagnosed pleural effusions may be highly beneficial for a clinician and pathologist in making an ultimate diagnosis.

Our study differs from previously published works on outpatient pleuroscopy in terms of method. Zachary S. DePew and colleagues used either TIPC or Pigtail catheter for air evacuation which was kept in place after procedure and subsequently removed if first chest x-ray confirmed lung expansion⁽⁶⁾.

Michael Zgoda and colleagues inserted single chest tube (28fr or 14fr) and removed catheters at first opportunity after control radiographs confirmed lung expansion⁽¹¹⁾.

We did air evacuation with a simple convenient approach using available instruments; a thin Nelaton catheter was inserted through trocar, soon after trocar was removed Nelaton catheter provided remaining air evacuation and was subsequently removed in operating room if air leak stopped completely, proper dressing was conducted afterwards. Our patients were discharged immediately after first chest radiograph was normal, which reduced their hospital stay.

Like other relevant studies we had few reports of complications^(2,6,7,12,18). 80% of our patients remained free of complications. However, 2 presented with pneumothorax, and both patients had massive pleural effusion (more than 3 liters) suggesting that massive effusion may increase the risk of post procedural pneumothorax.

On the other hand one of the patients with pneumothorax had pleural thickening on chest CT scan. This makes us think that patients with pleural thickening may need longer monitoring and may not benefit outpatient pleuroscopy.

One of the advantages of the current study is short procedural time (22±9 minutes) in comparison with another study on outpatient pleuroscopy by Zachary S. DePew et al. (40.2±12.4)⁽⁶⁾. This provides patient convenience because considering procedural and recovery time our patients spent less than 6 hours in hospital.

Appropriate cooperation between pulmonologist and thoracic surgeon and proper management of complications as well as introducing new method for air evacua-

tion were the other strengths of present study. The main limitation of the current study is limited number of patients. We explained the whole procedure, requirement and possible complications to all candidates for pleuroscopy.

As pleuroscopy is routinely conducted as an “inpatient” procedure in Iran, only 10 patients agreed to undergo outpatient pleuroscopy and to return after 12 hours for control visit. This may have affected our results significantly, but our results add to the data on advantages of outpatient pleuroscopy.

Another limitation is lack of follow up, especially to confirm the final diagnosis of cases without a final definite diagnosis. As our hospital is a busy referral center-accepting patients from all over the country and because most patients will return to their hometown and are reluctant to attend to our hospital for follow up, we failed to follow-up with our patients properly.

Conclusion

Outpatient pleuroscopy is a safe, convenient and diagnostic approach with potential financial benefits for patients and the health care system and should be conducted by an experienced cooperative team.

Appropriate and exact patient selection is an issue of significant importance to reduce undesired complications.

Patient education and close follow-up post procedure are key factors and may reduce the number of complications. ■

References

- Kiani A, Abedini A, Karimi M, Samadi K, Sheikhy K, Farzanegan B, et al. Diagnostic Yield of Medical Thoracoscopy in Undiagnosed Pleural Effusion. *Tanaffos*. 2015;14(4):227.
- Lee P, Colt HG. Pleuroscopy in 2013. *Clinics in chest medicine*. 2013;34(1):81-91.
- Lee P, Colt HG. State of the art: pleuroscopy. *Journal of Thoracic Oncology*. 2007;2(7):663-70.
- Lee P, Colt HG. Rigid and semirigid pleuroscopy: the future is bright. *Respirology*. 2005;10(4):418-25.
- Light R. Clinical practice. Pleural effusion. *The New England journal of medicine*. 2002;346(25):1971-7.
- DePew ZS, Wigle D, Mullon JJ, Nichols FC, Deschamps C, Maldonado F. Feasibility and safety of outpatient medical thoracoscopy at a large tertiary medical center: a collaborative medical-surgical initiative. *CHEST*. 2014;146(2):398-405.
- Kern RM, DePew ZS, Maldonado F. Outpatient thoracoscopy: safety and practical considerations. *Current opinion in pulmonary medicine*. 2015;21(4):357-62.
- Agarwal R, Aggarwal AN, Gupta D. Diagnostic accuracy and safety of semirigid thoracoscopy in exudative pleural effusions: a meta-analysis. *CHEST*. 2013;144(6):1857-67.
- WILSHER ML, VEALE AG. Medical thoracoscopy in the diagnosis of unexplained pleural effusion. *Respirology*. 1998;3(2):77-80.
- Colt HG. Thoracoscopy: a prospective study of safety and outcome. *CHEST*. 1995;108(2):324-9.
- Zgoda M, Singh J. Safety of Outpatient Same-Day Pleuroscopy. *CHEST*. 2011;140(4_MeetingAbstracts):998A-A.
- Hansen M, Faurshou P, Clementsen P. Medical thoracoscopy, results and complications in 146 patients: a retrospective study. *Respiratory medicine*. 1998;92(2):228-32.
- Menzies R, Charbonneau M. Thoracoscopy for the diagnosis of pleural disease. *Annals of internal medicine*. 1991;114(4):271-6.
- Kendall S, Bryan A, Large S, Wells F. Pleural effusions: is thoracoscopy a reliable investigation? A retrospective review. *Respiratory medicine*. 1992;86(5):437-40.
- Loddenkemper R, Mai J, Scheffler N, Brandt H. Prospective individual comparison of blind needle biopsy and of thoracoscopy in the diagnosis and differential diagnosis of tuberculous pleurisy. *Scandinavian journal of respiratory diseases*. 1978;102S:196.
- Walzl G, Wyser C, Smedema J, Corbett C, Van de Wal B. Comparing the diagnostic yield of Abrams needle pleural biopsy and thoracoscopy. *Am J Respir Crit Care Med*. 1996;153:A460.
- Panjwani A, Rizvi N. Medical Thoracoscopy. *Pakistan Journal of Chest Medicine*. 2015;20(1).
- Lee P, Hsu A, Lo C, Colt HG. Prospective evaluation of flex-rigid pleuroscopy for indeterminate pleural effusion: Accuracy, safety and outcome. *Respirology*. 2007;12(6):881-6.