

Original Article

Thoracentesis of Large Volume Tuberculous Pleural Effusions

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Abstract

Objective: To determine the safety of aspiration of large volume pleural effusion.

Study design: Prospective, observational, multicentre study.

Place and duration of study: Departments of Medicine Abbas Institute of Medical Sciences (AIMS) Muzaffarabad and District Head Quarter Hospital Mirpur Azad Jammu and Kashmir from January 2012 to October 2012

Material and Methods: The study was conducted in two teaching hospitals of AJK. During this study period thoracentesis of large volume pleura fluid was performed in 97 patients.

Results: During thoracentesis of more than 1 Litre pleural fluid, 95% patients remained asymptomatic and hemodynamically stable. One patient had a small asymptomatic pneumothorax. Three patients had mild chest pain which settled on termination of procedure.

Conclusion: Aspiration of large volume pleural fluid is a safe procedure.

Keywords: Pleura, tuberculosis, pleural effusion, thoracentesis

Introduction

Tuberculosis is a common infectious disease and pleura are involved in approximately 20 % of cases¹. It often presents with pleural effusion². Thoracentesis is a very common procedure routinely performed in medical units. However, very limited data is available on the safety of aspiration of large volume pleural effusions. Traditional recommendation is to aspirate less than 700 ml fluid at a single sitting to avoid re-expansion pulmonary oedema³. The aspiration of large volume provides significant clinical benefits⁴. It relieves dyspnoea in symptomatic patients at rest as well as on exertion⁵. It also prevents development of pleural thickening and restrictive lung function impairment in these patients⁶. This study was designed to evaluate the safety of aspiration of large volume tuberculous pleural effusions⁷.

Material and Methods

This was a multicentre, prospective, observational

study conducted in secondary care hospitals in two districts of Azad Kashmir.

Functional definitions for this study were as follows;

On Chest x-ray PA view: Obliteration of costophrenic angle= Small effusion, Obliteration of costophrenic and cardiophrenic angles= Moderate effusion, Fluid level at the hilum or above= Large effusion

Large volume aspiration: Aspiration of more than 1 L of pleural fluid.

All patients were admitted in hospital after initial evaluation. A specially designed study Proforma was used for record keeping and monitoring of patient during procedure of Thoracentesis.

Inclusion criteria: Patients with diagnosis of moderate or large tuberculous pleural effusions.

Exclusion criteria: Patient with co morbid conditions, congestive heart failure, Liver cirrhosis, chronic renal failure, nephrotic syndrome, malignant pleural effusions, empyema thoracic, immunocompromised and hemodynamically unstable patients were also excluded from the study.

Procedure

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Thoracentesis was performed with 24 G needles or I/V canula, attached with urine drainage bag through drip set under aseptic conditions. The most dependent part of effusion was selected for insertion of needle while patient was sitting in bed with both arms crossed and hands placed on opposite shoulders. The skin was prepared with 7.5 % povidine-iodine solution and methylated spirit. The vital signs of patient including Pulse, NIBP, Respiratory rate, O₂ saturation and ECG were monitored with Infinium medical Monitor (1340 Hamlet Ave. Clear Water, Florida 33756). The procedure was supervised by a doctor and staff nurse. As the free flow of fluid established after successful placement of needle in the pleural space patient was offered food trolley with a pillow to place arms over it for comfortable posture. A record of vital signs after every 15 minutes was maintained on flow chart. A record of all symptoms reported by the patient was also maintained.

Completion of procedure: when tap became dry and no more fluid could be drained.

Premature termination of procedure: Thoracentesis was stopped in case patient reported chest pain, dyspnoea or intolerance of procedure due to any other reason. Statistical analysis was performed by using SSPS software version 20 (IBM SSPS Statistic data editor-20).

Results

In 97 patients more than 1 litter of pleural fluid was aspirated (Table-1). In one patient there was small asymptomatic pneumothorax. Three patients (3%) had complaint of chest pain after 1 litter of drainage and procedure was terminated before dry tape. One patient (< 1 %) had sweating and hypotension. In 93 patients (95 %) Thoracentesis was completed without any symptoms. In all patients PO₂ saturation remained normal. There was no change in vital signs and pulse, blood pressure and respiratory rate remained normal in these patients. The average duration of procedure was 62 minutes. The mean volume aspirated was 1320 ml with standard deviation of 262 ml, minimum 1000 ml and maximum volume aspirated was 1800 ml (Table-2).

Discussion

Tuberculous pleural effusions are the most common cause of exudative effusions. The two other conditions responsible for these effusions are para pneumonic and malignant pleural effusions⁸. The treatment of underlying aetiology is the mainstay of management in these conditions⁹. As the treatable underlying con-

dition improves the associated effusion also resolves in the due course of time. However, large effusions of any aetiology can cause distressing symptoms¹⁰. The common clinical symptoms are cough, dyspnoea and chest pain. It can also cause atelectasis of underlying lung and give rise to poor gas exchange. The drainage of these effusions provides symptomatic relief and also prevents complications of chronic effusions¹¹.

Therapeutic thoracentesis removes large amount of

Table-1 Volumes of pleural fluid aspiration in different patients n=97

Volume of pleural fluid (ml)	Number of patients
1000.00	25
1050.00	1
1100.00	7
1150.00	1
1200.00	10
1280.00	1
1300.00	1
1330.00	3
1350.00	1
1400.00	9
1450.00	6
1500.00	8
1550.00	1
1560.00	3
1600.00	7
1650.00	3
1700.00	4
1800.00	6
Total	97

Table-2 Summary of aspirated volumes of pleural effusions n=97

	Minimum	Maximum	Mean	Std. Deviation
Volume (mL)	1000.00	1800.00	1320.618	262.74122

Pleural fluid and provides symptomatic relief. However, large volume thoracentesis is associated with certain serious complication¹². There is risk of pneumothorax due to lung injury during procedure. This can be minimized by using especially designed catheters instead of sharp needles. There is availability of spring loaded blunt tip needles for thoracentesis to avoid lung injury. The other complication is the development of re expansion pulmonary oedema during procedure¹³. There is also risk of paradoxical hypoxemia during aspiration of large volume due to re expansion and changes in ventilation and perfusion of

the re expanding lung¹⁴. Therefore, the traditionally recommended safe volume for thoracentesis is 500-700 ml pleural fluid. In this study aspiration of more than 1000 ml fluid was safe in 95 % of cases with no complications or discomfort to the patient.

The aspiration of large volume pleural effusion is also helpful in preventing residual pleural thickening. The complete aspiration decreases the volume of inflammatory exudates in the pleural space and there is less fibrin formation and deposition¹⁵.

We also found small gauge needles are safe for thoracentesis. These needles come with I/V infusions sets and are easily available in all hospital setting of medical units. There is no extra cost involved for these needles.

The monitoring of vital signs during procedure showed no changes in pulse, Blood pressure, Respiratory rate and PO₂ saturation. Majority of Patients remained comfortable during procedure only three had mild chest pain. Only one patient had a small asymptomatic pneumothorax detected on post procedure chest radiograph. There was no case of significant pneumothorax or bleeding.

On the basis of results of this study we conclude that recommendations for aspiration of 700 ml pleural should be reconsidered and all pleural effusions should be drained completely. This procedure is safe and provides immediate symptomatic relief in large pleural effusions. There is supportive evidence from other studies for its role in prevention of restrictive lung function due to pleural thickening. The intolerance of procedure and chest discomfort during thoracentesis would be exceptions.

References

- 1- Dye C. Global epidemiology of tuberculosis. *Lancet*. 2006;367:938-40. [PubMed]
- 2- Valdes L, Pose A, San Jose E et al. Tuberculous pleural effusions. *Eur J Intern Med*. 2003;14:77-88. [PubMed]
- 3- Feller-Kopman D, Berkowitz D, Boiselle P, et al. Large volume thoracentesis and the risk of reexpansion pulmonary edema. *Ann Thorac Surg*. 2007;84:1656-61. [PubMed]
- 4- Morrone N, Lombardi MC, Machado O. Prevention of pleural thickening through pleural aspiration in patients with tuberculous effusion. *J Pneumol (Sao Paulo)* 1989;15:180-4.
- 5- Ana Maria C, Francisco SV, Joao MS, et al. Improvements in the 6-min walk test and spirometry following thoracentesis for symptomatic pleural effusions. *Chest*. 2011;139:1424-29.
- 6- Morrone N, Lombardi MC, Machado O. Prevention of pleural thickening through pleural aspiration in patients with tuberculous effusion. *J Pneumol (Sao Paulo)* 1989;15:180-4.
- 7- SourinBhuniya, Datta C. Arunabha et al. Role of therapeutic thoracentesis in tuberculous pleural effusion. *Ann Thorac Med*. 2012 Oct-Dec; 7(4): 215-219.
- 8- Fauci, Braunwald, Kasper et al. *Harrison's principles of Internal Medicine* (17th ed.). McGraw-Hill companies, Inc. pp 1658-1659.
- 9- Colice GL, Rubins JB. Practical management of pleural effusions. When and how should fluid accumulation be drained? *Postgrad Med*. 1999; 105:67-77. [PubMed]
- 10- Marcondes BF, Vargas F, Paschoal FH, et al. Sleep in patients with large pleural effusion: impact of thoracentesis. *Sleep Breath*. 2012 Jun;16(2):483-9.
- 11- Grodzin CJ, Balk RA. Indwelling small pleural catheter needle thoracentesis in the management of large pleural effusions. *Chest*. 1997 Apr; 111(4):981-8.
- 12- Light RW. Pleural effusion (clinical practice) *N Engl J Med*. 2002;346:1971-1977. doi: 10.1056/NEJMcp010731. [PubMed][Cross Ref]
- 13- Feller-Kopman D, Berkowitz D, Boiselle P, et al. Large-volume thoracentesis and the risk of reexpansion pulmonary edema. *Ann Thorac Surg*. 2007 Nov; 84(5):1656-61.
- 14- Kulgit Singh, Shi Loo, RinaldoBellomo. Pleural drainage using central venous catheters. *Crit Care*. 2003; 7(6): R191-R194.
- 15- Barbas CSV, Cukier A, de Varvalho CRR et al. The relationship between pleural fluid findings and the development of pleural thickening in patients with pleural tuberculosis. *Chest*. 1991; 100:1264-67. [PubMed]