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Complications of therapeutic thoracocentisis with respect to time by using a unique and routine technique in a tertiary care centre

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ABSTRACT

Background: Pleural effusion is a common disease entity and therapeutic thoracocentesis is a common procedure to tap the pleural fluid. The routine method of pleural tapping is associated with some complications. This study was taken up to assess the rate of complications between the routine procedure and a unique procedure.

Materials and Methods: A randomized controlled trial was conducted in the department of Chest and TB in a tertiary care centre. About 30 patients had undergone therapeutic pleural tapping by the routine procedure and 30 patients had undergone tapping by unique procedure where the pleural fluid was allowed to flow through tube passively with gravity. The complications were compared between the two procedures.

Results: About 40% of the study subjects in routine procedure belonged to 31 – 40 years age group. About 60% of the patients in routine and 53.3% in the unique group were females. There was no difference in chest pain in both the groups. Dyspnea, cough and reduced blood pressure was higher in the routine procedure group than the Unique procedure group. The signs of reexpansion pulmonary edema were higher in the unique group. But these were statistically not significant for 0 – 30 minutes. After one hour of the procedure, dyspneoa, signs of reexpansion pulmonary edema, cough hematoma were higher in the routine group. After 48 hours of the procedure, chest pain was noted in 3.3% of the routine cases, dyspnoea in 3.3% of the cases and fever in 3.3% of the cases.

Conclusions: This study had shown that the needle catheter method was shown to be superior to the routine thoracocentesis.

1. Introduction

Pleural effusion is an important problem in TB and Chest outpatient and Inpatient department. Pleural effusion is said to be present when the fluid in the pleural space exceeds 10 – 20 ml resulting from excess fluid production or decreased absorption. The estimated prevalence of pleural effusion is 320 cases per 100,000 population in industrialized countries [1,2].

More than fifty diseases are known to cause pleural effusion as per the literature available. The pleural effusion result as an imbalance between the excessive pleural fluid formation (i.e., pleural inflammation) and pleural fluid absorption (i.e., obstruction of the lymphatic system). Congestive cardiac failure, cirrhosis, nephritic syndrome, constrictive pericarditis and meig's syndrome are the main causes of transudate pleural effusion. The exudates pleural effusion is mainly due to tuberculosis, AIDS, pneumonia, subphrenic abscess, metastasis, pancreatitis, uraemia, and SLE [3,4].

Thoracocentesis or pleural tap is an invasive procedure to remove the fluid or air from the pleural space for diagnostic and therapeutic purposes. Therapeutic thoracocentesis removes the larger amounts of pleural fluid to alleviate the dyspneoa and prevents inflammation and fibrosis in pleural effusions [5,6]. The therapeutic thoracocentesis is known to result in a number of complications including pneumothorax (20 - 39%), hemothorax (0.8%), laceration of liver or spleen

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(0.8%), diaphragmatic injury, sub cutaneous empyema, tumour seeding and re-expansion pulmonary oedema. Minor complications include pain (22%), dry tap (13%), cough (24%), shortness of breath (15%), subcutaneous haematoma (2%) and vasovagal syncope[7].

The studies of complications of therapeutic thoracocentesis are scant in India and hence it was decided to compare the complications between the routine and unique approach in therapeutic thoracocentesis.

2. Material and Methods

A randomized controlled trial was conducted in order achieve the study objectives. A total 60 patients attending department of chest and TB of Basaveshwara Medical College and Hospital, Chitradurga were recruited in two equal arms by using computer generated random numbers. Clearance from institutional ethics committee was obtained before the study was started and written informed consent was obtained from all the cases before they were included in to the study. The patients with chest X-ray features suggestive of pleural effusion and undergoing therapeutic thoracocentesis only were included in to the study. The patients not willing to take part in the study, patients of less than 5 years, known to have loculated effusion on ultrasonography and having bleeding diathesis were excluded from the study. All the patients were subjected for detailed clinical history and laboratory investigations including complete hemogram, blood sugar levels, chest X-ray, bleeding time and clotting time, ultrasonography screening for pleural effusion or loculations and contrast ./ non contrast computed tomography scan of chest were taken wherever applicable.

About 30 patients had undergone therapeutic pleural tapping by the routine procedure and 30 patients had undergone tapping by unique procedure where the pleural fluid was allowed to flow through tube passively with gravity.

3. Results

This study had shown that, about 40% of the study subjects in routine procedure belonged to 31 – 40 years age group and 33.3% of the study subjects in unique procedure group were aged between 21 – 30 years. About 60% of the patients in routine and 53.3% in the unique group were females.

About 40% of the cases in both the groups had chest pain within 0 – 30 minutes after the procedure. Sudden dyspnoea was noted in 20% with routine procedure and 6.7% in unique procedure. 3.3% in the routine and 6.7% in the unique group had pernicious cough and cough was noted in 13.3% of the routine group and 10% in the unique group. About 10% in the routine group and 6.7% in the unique group had reduced blood pressure. None of the parameters were statistically significant.

Dyspnoea was noted in 3.3% of the unique group, pernicious cough was noted in 6.7% of the routine group, cough was noted in 3.3% of the routine and 3.3% of the unique group. Hematoma was noted in 6.7% of the routine group and reduced blood pressure was noted in 10% of the routine and 6.7% of the unique group.

After 48 hours of the procedure, chest pain was noted in 3.3% of the routine cases, dyspnoea in 3.3% of the cases and fever in 3.3% of the cases.

4. Discussion

This study was mainly undertaken to study the complications of the therapeutic thoracocentesis between the two procedures. In this study, about 40% of the study subjects in routine procedure belonged to 31 – 40 years age group and 33.3% of the study subjects in unique procedure group were aged between 21 – 30 years. About 60% of the patients in routine and 53.3% in the unique group were females.

In routine procedure, there was no difference in chest pain in both the groups. Dyspnea, cough and reduced blood pressure was higher in the routine procedure group than the unique procedure group. The signs of reexpansion pulmonary edema were higher in the unique group. But these were statistically not significant for 0–30 minutes. After one hour of the procedure, dyspneoa, signs of reexpansion pulmonary edema, cough hematoma were higher in the routine group. After 48 hours of the procedure, chest pain was noted in 3.3% of the routine cases, dyspnoea in 3.3% of the cases and fever in 3.3% of the cases.

A study by Seneff et al had shown that, the major complications occurred in 14% of the routine procedure cases and minor in 33% of the cases. The major complications included pneumothorax, splenic laceration and sheared off catheter. Minor included pain, signs of re-expansion pulmonary edema, dry taps and subcutaneous fluid collections[7]. In a study by Jones et al, the re-expansion edema was noted in 2 of 941 procedures[8]. Another study by Bass J et al had shown that, 7% had pneumothorax and 2% had hematoma in a group of patients with haematologic malignancy[9].

Collins TR et al[10] noted that site pain, pneumothorax and cough were the common complications of the thoracocentesis. A study by Grogan et al had reported that, the sonography guided method was associated with significantly with fewer serious complications (0 of 19) than the needle-catheter (9 of 18) or needle-only methods (5 of 15). The sonography-guided method was associated with fewer pneumothorax (0 of 19) than the needle-catheter (7 of 18) or needle-only methods (3 of 15). The difference between needle-catheter and needle-only methods was not significant[11].

Table 1: Socio demographic characteristics of the study subjects

Socio demographic characteristics		Routine N (%)	Unique N (%)
Age group	Less than 20 years	2 (6.7)	2 (6.7)
	21 – 30 years	2 (6.7)	10 (33.3)
	31 – 40 years	12 (40.0)	6 (20.0)
	41 – 50 years	7 (23.3)	1 (3.3)
	51 – 60 years	2 (6.7)	4 (13.3)
	More than 60 years	5 (16.7)	7 (23.3)
Sex	Male	12 (40.0)	14 (46.7)
	Female	18 (60.0)	16 (53.3)

Table 2: Complications of therapeutic thoracocentesis within 0 – 30 minutes

	Routine N (%)	Unique N (%)	χ^2 value	P value, Sig
Chest pain	12 (40.0)	12 (40.0)	0.00	1.0, NS
Sudden dyspnoea	6 (20.0)	2 (6.7)	2.308	0.129, NS
Pernicious cough, Chest tightness, Frothy pink sputum, Vomiting, dyspnea, Cyanosis	1 (3.3)	2 (6.7)	0.351	0.554, NS
Cough	4 (13.3)	3 (10.0)	0.162	0.688, NS
Elevated blood pressure	0	1 (3.3)	1.2	0.549, NS
Reduced blood pressure	3 (10.0)	2 (6.7)		
Pulse rate (Mean $\pm$ SD)	88.13 $\pm$ 12.14	89.87 $\pm$ 12.66	0.541	0.59, NS

Table 3: Complications of therapeutic thoracocentesis within 1 hour

	Routine N (%)	Unique N (%)	χ^2 value	P value, Sig
Chest pain	0	0		
Dyspnoea	0	1 (3.3)	1.017	0.313, NS
Pernicious cough, Chest tightness, Frothy pink sputum, Vomiting, dyspnea, Cyanosis	2 (6.7)	0	2.069	0.15, NS
Cough	1 (3.3)	1 (3.3)	0.0	1.0, NS
Hematoma	2 (6.7)	0	2.069	0.15, NS
Reduced blood pressure	3 (10.0)	2 (6.7)		

Table 4: Complications of therapeutic thoracocentesis after 48 hours

	Routine N (%)	Unique N (%)	χ^2 value	P value, Sig
Chest pain	1 (3.3)	0	1.017	0.313, NS
Dyspnoea	1 (3.3)	0	1.017	0.313, NS
Fever	1 (3.3)	0	1.017	0.313, NS

5. Conclusions

This study had shown that the needle catheter method was shown to be superior than the routine thoracocentesis. But the benefits of this method must be weighed before adopting the same in the clinical practice.

6. Acknowledgement

None.

7. Conflict of Interest

None.

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