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EFFECT OF STREPTOKINASE IN THE MANAGEMENT OF COMPLICATED PARAPNEUMONIC EFFUSION WITH SEPTATION

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Abstract:

Background:
A Para pneumonic pleural effusion is a collection of exudative pleural fluid due to lung infection, which is pneumonia, defined bypH < 7.2, low pleural fluid glucose, and frank pus in the pleural cavity. The most common cause is bacterial infections. Parapneumonic effusion develops in about one-quarter of all pneumonia patients, and out of these, 15% get infected later, which has both morbidity and mortality. The primary treatment of complicated parapneumonic effusion is drainage of pleural fluid. Studies in the past with streptokinase have shown mixed results.
Materialand Method:

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The study was conducted on patients with complicated parapneumonic effusion admitted tothe chest department of SNMC (Sarojini Naidu Medical College) Agra from January 2014 – to December 2014. Based on drug administration, patients were divided into Group A (normal saline) and Group B (streptokinase).Group A patients got 250,000 IU of dissolved STK (Streptokinase) through a chest tube twice a day for five days, while Group B patients received normal saline through a chest tube twice a day for five days.

Results:

A total of 86 subjects were enrolled in our study. Of these,four could not be followed up. Only 82 completed the study. 21 out of 41 patients (51.21%) were cured in the regular saline group, and 31 out of 41 patients (75.60%) get cured in the streptokinase group.

Conclusion:

Our study concluded that streptokinase infusion through chest drain in complicated parapneumonic effusion should be tried before sending patients to surgical treatment. It is safe and cost-effective.

Keywords: Complicated pleural effusion,pneumonia, exudative pleural fluid, parapneumonic effusion, streptokinase.

Introduction:

A parapneumonic effusion means a collection of exudative pleural fluid due to a lung infection, which is pneumonia. The most common cause of parapneumonic effusionsis bacterial infections.[1] Parapneumonic effusion develops in about one-quarter of all pneumonia patients, and out of these, 15% get infected later.[2] It leads to severe morbidity and even mortality.[3]Fibrin deposition causes septation, which ultimately leads to complicated effusion[4], and it is defined by pH < 7.2, low pleural fluid glucose, and frank pus in the pleural cavity.[5–8]Evidence-based treatment of complicated parapneumonic effusion is intravenous antibiotics and complete drainage of the pleural cavity, to be done through either medical chest tube drainage or surgical drainage. Surgical thoracotomy or video-assisted thoracoscopic surgery (VATS) has given us the best results in complicated parapneumonic effusion, but it is not available everywhere; it is costly and has certain surgical complications.[9,10]

Several studies have shown that administration of streptokinase in effusion having septation resulted in better outcome.[11–14] But at the same time, many other studies have shown that there is no significant difference after infusion of streptokinase in pleural cavity[15,16]

This study has been done to find out intra pleural streptokinase in complicated pleural effusion having septation on USG chestfor better treatment management.

Aim and Objective:

To evaluate the efficacy of the intrapleural streptokinase in complicated parapneumonic effusion with septation.

Materialand Methods:

Study Place - SNMC (Sarojini Naidu Medical College), Agra, India

Study Design – Randomized control trial

Study period – January 2014 to December 2014

IEC Approval – SNMC/14/44831

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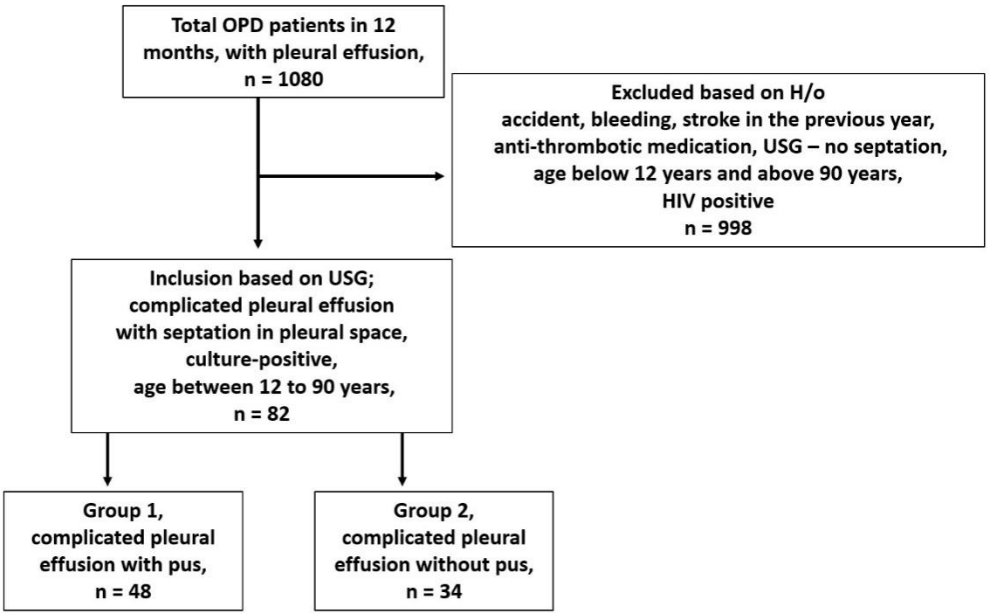
Inclusion Criteria:
1 – Complicated pleural effusion
2 – Septation in pleural space on USG Chest
3 – Clear indication of intervention (pus, culture-positive, pH < 7.2)
4- Age between12 to 90 years
Exclusion Criteria:
1 – Accident, bleeding, stroke in the previous year
2 – Subjects on anti-thrombotic medication
3- HIV positive
Data Collection:
Patients admitted tothe chest department of SNMC Agra from January 2014 to December 2014 had complicated pleural effusion (pH below 7.2, presence of septation on the chest radiograph USG, and positive fluid culture from pleural fluid) were considered in this study. The subject recruitment methodology is shown in figure 1. A complete history was taken in each case. All were subjected to the routine test, pleural fluid analysis, USG, Chest CXR (chest radiograph), coagulation profile test, and informed consent from each case.
Fig.1



Study methodology:
Patients were divided into Group A, NS (normal saline), Group B, and SK (streptokinase).Standard chest tubes were inserted into each individual. Patients in Group A got 250,000 IU of dissolved SK through a chest tube twice a day for five days in addition to standard care. At the same time, patients in Group B got NS through a chest tube twice a day for five days in addition to standard care. All workforce involved in treatment, data collection, and analysis of results were blinded about patients belonging to which group.
After starting treatment of both group patients, monitoring of total fluid drained, duration of fluid drainage, duration of hospital stays, septation by USG chest, CXR clearance, and

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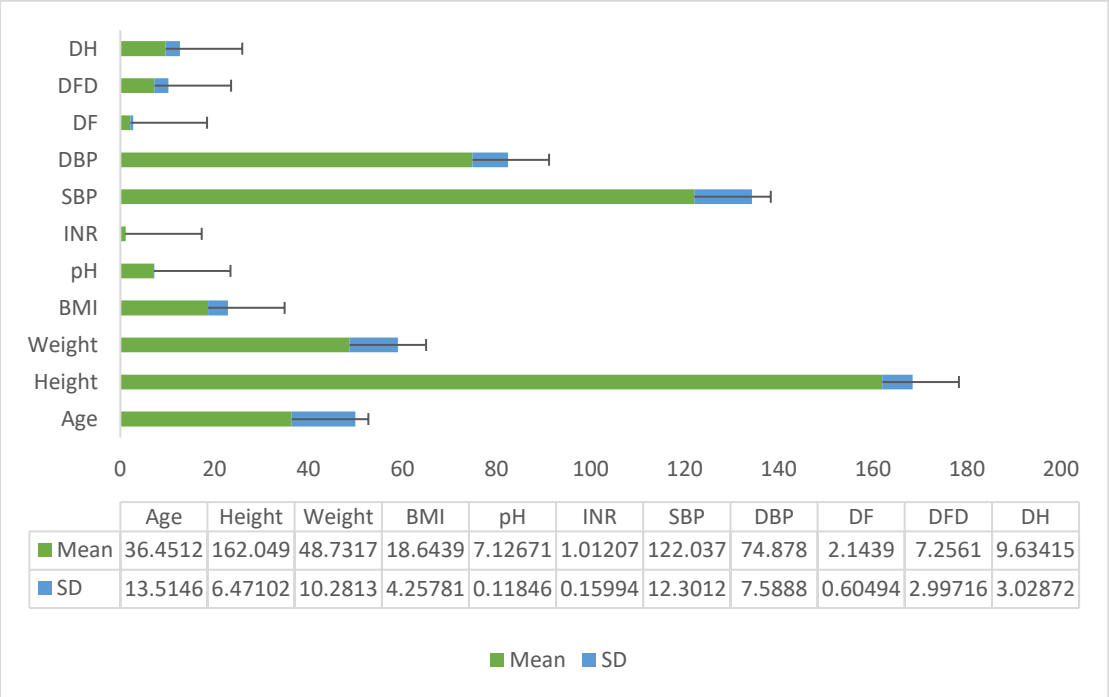
symptom control in each patient were performed. Treatment success was defined by complete clearance on CXR, or USG chest, no pus drainage, and less than 50 ml clear fluid drainage forthree consecutive days. Those who failed treatment were referred for definitive treatment by surgery atthe CTVS (Cardiothoracic surgery)centre.

Results:

A total of 86 subjects were enrolled in this study. Of these fourthat could not be followed up, 82 completed the study. Data collected from these subjects are given below (Fig. 2).

Fig.2



	Age	Height	Weight	BMI	pH	INR	SBP	DBP	DF	DFD	DH
Mean	36.4512	162.049	48.7317	18.6439	7.12671	1.01207	122.037	74.878	2.1439	7.2561	9.63415
SD	13.5146	6.47102	10.2813	4.25781	0.11846	0.15994	12.3012	7.5888	0.60494	2.99716	3.02872

Fig.2 Shows the baseline characteristics of the 82 patients involved in the study.

BMI- Body mass index; INR- International normalised ratio; SBP- Systolic blood pressure; DBP- Diastolic blood pressure; DF- Drained pleural fluid (in litre); DFD- Duration of drained fluid (in days); DH- Duration of hospitalisation.

Table 1 shows the clinical variables like age, sex, weight, duration of symptom, nature of the fluid in pleural space, pH of the fluid in pleural space, and coagulation profile of patients in both groups.

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Table 1

Variable	Normal Saline	Streptokinase	p-value
Success	51.21% (21/41)	75.60% (31/41)	**<0.05**
Referred	48.78% (20/41)	24.39% (10/41)	**<0.05**
Fluid Drained (litre)	1.92 ± 0.508	2.39 ± 0.575	**<0.05**
Durationof Drainage (days)	5.75 ± 2.009	8.78 ± 3.078	**<0.05**
Duration of Hospitalisation (days)	8.05 ± 2.07	11.26 ± 2.96	**<0.05**
Adhesion on USG	51.21%(21/41)	21.95% (9/41)	**<0.05**
CXR Clearance	48.78% (20/41)	80.48% (33/41)	**<0.05**
Symptom Control	41.47 % (17/41)	82.92 %(34/41)	**<0.05**

Comparative results in the two groups, patients on streptokinase therapy and patients on regular saline therapy. A p-value less than 0.05 is considered statistically significant.

Depending upon the presence of pus in the pleural cavity, the patients were divided into two groups, Group 1 with septation with pus and Group 2 with septation without pus. The baseline characteristics and clinical variables were compared between the two groups (Table 2).

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Table 2

Characteristic	Group 1 (n=48)	Group 2 (n=34)	95% CI	p-value
Age (mean; SD)	33.77; 13.146	40.23; 13.303	0.571 – 12.357	**0.032**
Ht. (mean; SD)	162.083; 6.906	162; 5.903	-2.987 – 2.821	0.954
Wt. (mean; SD)	47.854; 9.146	49.97; 11.73	-2.479 – 6.707	0.361
BMI (mean; SD)	18.227; 3.657	19.161; 4.997	-1.016 – 2.785	0.357
pH (mean; SD)	7.136; 0.095	7.112; 0.145	-0.076 – 0.028	0.368
INR (mean; SD)	1.007; 0.158	1.019; 0.164	-0.059 – 0.083	0.739
SBP (mean; SD)	122.437; 12.591	121.47; 12.043	-6.484 – 4.55	0.728
DBP (mean; SD)	75.791; 7.808	73.588; 7.182	-5.574 – 1.167	0.197
DF (mean; SD)	2.147; 0.595	2.138; 0.626	-0.281 – 0.261	0.943
DFD (mean; SD)	6.875; 3	7.794; 2.951	-0.41 – 2.248	0.172
DH (mean; SD)	8.395; 2.833	10.323; 3.121	0.609 – 3.246	**0.004**

Calculation of the difference between the observed means in two independent samples. A significant (p-value) value and 95% Confidence Interval (CI) of the difference are reported. The p-value is the probability of obtaining the observed difference between the samples if the null hypothesis were true. The null hypothesis is the hypothesis that the difference is 0.

Receiver operating characteristics for determining the clinical sensitivity and specificity for every possible cut-off for a test or a combination of tests were calculated between the two groups, Group1 and Group 2 (Table 2),duringthe duration of hospitalisation. They drainedthe pleural fluid and thecourse of drained fluid (Fig.3 & 4).

Fig. 3 Pleural effusion with septation, with pus

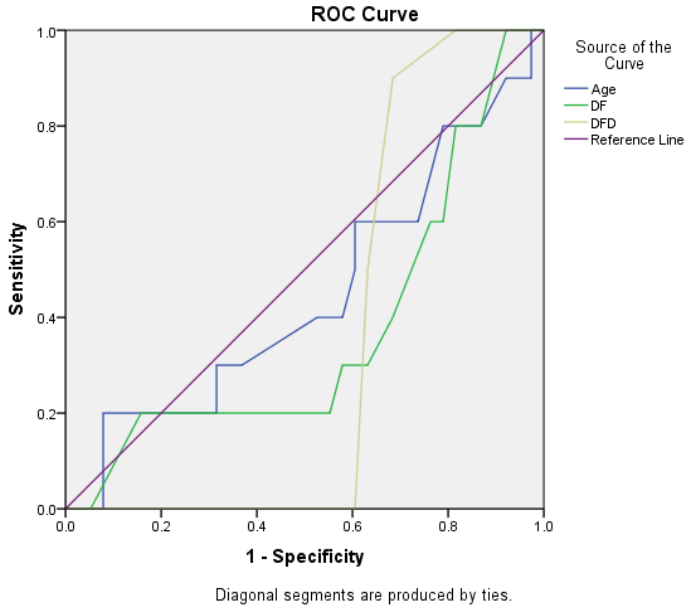

Fig. 4 Pleural effusion with septation, without pus

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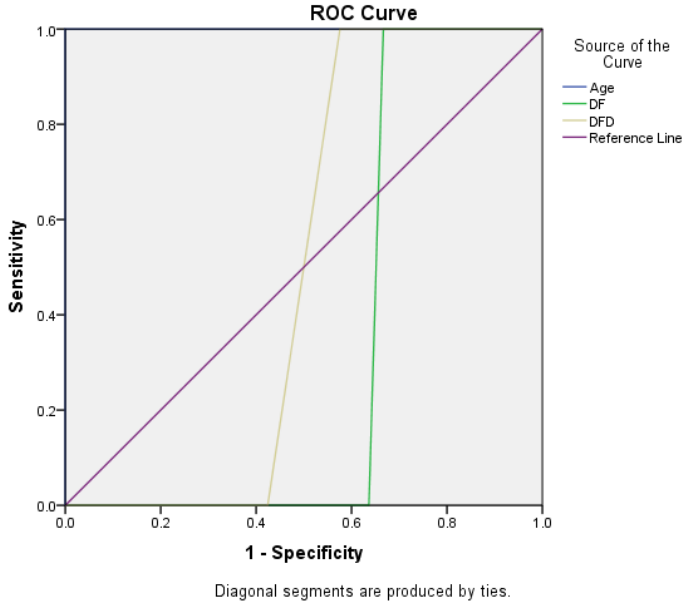

Discussion:

In this study, 21 out of 41 patients (51.21%) were cured in the regular saline group, whereas 31 out of 41 patients (75.60%) got cured in the streptokinase group. 20 out of 41 patients (48.78%) were referred to other modalities in the normal saline group, whereas only 10 out of 41 patients (24.39%) were referred to the streptokinase group.

An average of 1.92 ± 0.508 litres of pleural fluid were drained from normal saline group patients, while 2.39 ± 0.575 litres of pleural fluid were drained from the streptokinase group at the end of the treatment. Total days of drainage were 5.75 ± 2.009 in the normal saline group while 8.78 ± 3.078 days in the streptokinase group. The average day of hospitalisation was 8.05 ± 2.07 in the normal saline group while 11.26 ± 2.96 in the streptokinase group. 21 out of 41 patients (51.21%) had adhesion after treatment in the normal saline group, while only 9 out of 41 patients (21.95%) showed adhesion on USG after therapy in the streptokinase group. 20 out of 41 patients (48.78%) had clear chest X-rays after treatment in the normal saline group, while 33 out of 41 patients (80.48%) had clear x-ray chest after treatment in the streptokinase group. 17 out of 41 patients (41.47 %) reported symptomatic improvement after treatment in the normal saline group, while 34 out of 41 patients (82.92 %) had improved symptoms in the streptokinase group.

Significant side effects have not been documented in this study. Some reported mild chest pain, which improved with NSAIDs (Non-steroidal anti-inflammatory drugs).

Age, DF, and DFD test result variables have at least one tie between the positive actual state group and the negative actual state group. Fig. 3 shows the higher clinical sensitivity and specificity in the ROC curve analysis, pleural effusion with septation and pus compared to pleural effusion with septation and without pus.

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Conclusion:

Classically parapneumonic effusion accelerates the morbidity and mortality of pneumonia associated patients. The management of complicated parapneumonic pleural effusion and empyema targets infection control, prevention of persistent and recurrent disease of the pleural space, and prevention of late pulmonary restriction due to entrapment of the lung. Identifying patients at risk of complicated parapneumonic effusion or empyema could improve clinical outcomes by allowing early pleural space drainage. There are several clinical features, such as chest radiography and CT findings and pleural fluid characteristics, which diagnose complicated parapneumonic effusion or empyema.

This study concludes that streptokinase infusion through chest drain in complicated parapneumonic effusion should be tried before posting patients for surgical treatment. It is safe and cost-effective.

Limitation:

The studyhas been performed at a single tertiary care centre; results have not been replicated.

Conflict of interest:

None declared.

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