

COMPARISON BETWEEN BRONCHODILATOR EFFECTS OF INTRAVENOUS AMINOPHYLLINE Vs NEBULISED SALBUTAMOL IN ACUTE SEVERE ASTHMA

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ABSTRACT

Objective: To compare effects of and to compare iv aminophylline with Nebulized salbutamol in the management of acute attack of bronchial asthma.

Material and methods: This prospective study was done on a selected group of Ten patients who presented to the Pulmonology unit with acute attack of bronchial asthma. Both the drugs were tried on two different occasions and their efficacy in relieving the symptoms and on improving the pulmonary functions tests were studied

Results: Both the drugs were found to be effective in relieving the symptoms ($p < 0.05$). However nebulized salbutamol was found more effective than iv aminophylline ($p < 0.05$). salbutamol appears to be marginally better than Aminophyllin. A larger randomized study is needed to document this.

Conclusion: Because of its better efficacy and less toxicity nebulised salbutamol stays the drug and method of choice in the management of acute attack of bronchial asthma.

Key words: Nebulized Salbutamol, Intravenous Aminophylline, Bronchial asthma.

INTRODUCTION

Theophylline and its derivative aminopylline have been used extensively in the treatment of asthma since the drug was first described in 1937¹. Intravenous Aminopylline remained the mainstay of treatment of acute asthma for quite a long time. However its use started declining with the introduction of other safer alternative in the form of beta₂ stimulants in early 1970s. Because of its narrow therapeutic index and weak bronchodilator effect and the need to monitor its therapeutic serum levels during iv infusion² its role in the management of asthma remained controversial.

Internationally recommended first line management of acute attack of asthma is nebulised Salbutamol and systemic steroids³. In our country most commonly used drug is intravenous Aminopylline. The most probable reason is non availability of nebulisers and free availability of i/v Aminopylline. We conducted this study to compare iv Aminopylline with nebulised Salbutamol in the management of acute severe asthma.

MATERIAL AND METHODS

To find out whether iv Aminopylline is as effective as nebulised Salbutamol for emergency management of acute severe asthma ten patients were studied in a cross over design with the following inclusion and exclusion criteriae.

Inclusion criteria

1. All the patients below age 60 having acute asthma with FEV₁ less than 1.5 liter.
2. Patients of either sex and both atopic and non atopic asthmatic.

Exclusion criteria

1. Those who had received theophylline or β -agonist (oral) in the past 12 hours.
2. Those who had received inhaled β -agonist or inhaled steroids during 4 hours prior to the test.

Study Design

This study was conducted in the department of Pulmonology, Lady Reading Hospital, Postgraduate Medical Institute, Peshawar. Twenty patient (10 males and 10 females) who fulfilled selection criteria were enrolled in the study. Their base line Pulmonary Function Tests (PFTs) were recorded followed by administration of iv Aminopylline (6mg/Kg) diluted in 20 ml of normal saline given over 10 minutes. Their PFTs were recorded again after 30 minutes. Following recovery, these patients were sent home on routine treatment with the advice to report immediately to us in case of any future episodes of acute attack of asthma. Fifteen (9 males and 6 females) out of these twenty patients presented to us again, majority within 60 days of their initial recruitment. Their baseline PFTs were measured again and only those were selected whose baseline PFTs matched as closely as possible to their PFTs on initial recruitment. Only ten patients fulfilled this criteria. Following selection, they were given nebulized Sulbutamol (5mg) and their PFTs were repeated after 30 minutes and recorded. Post bronchodilator PFTs of both drugs were compared first with their baseline values and then with each other using Chi square test and P value was then calculated. Therefore ultimately we had ten patients in whom the efficacy of the two drugs was studied in a cross over fashion. This design eliminated the selection bias and to match them further, their baseline PFTs were also matched as closely as possible.

RESULTS

The patients were studied for their response of the two drugs for the relief of symptoms during acute attack of asthma. The selected group consisted of 10 patients, 6 males and 4 females ranging in age from 15-55 yrs with mean age of 41 (see table 1).

Their baseline and 30 minutes post-aminophylline FEV₁, FVC and PEFR values have been tabulated in Table 2.

The comparison between the pre- and post-aminophylline PFTs reveals that the drug had a significant bronchodilator effect (P=<0.01).

On their second presentation with an acute attack of their asthma, they were given nebulized salbutamol for the management. Their baseline and 30 minutes post-salbutamol nebulization PFTs (FEV₁, FVC and PEFR) can be seen in Table 3.

The comparison between the two again proves the efficacy of nebulized salbutamol as an effective bronchodilator (P=<0.01). In Table 4 the two groups have been compared at baseline (before receiving either of the drug).

It can be seen that there was significant difference in baseline FEV₁ between the groups only, while difference in FVC and PEFR was not significant i.e.; they were closely matched. Finally the PFTs of the two groups were compared 30 minutes after the administration of the two drugs (see Table 5).

DEMOGRAPHIC CHARACTERISTICS

Total Number of Cases	10
Male	6
Female	4
Age Range (Years)	15-55
Age Mean SEM (Years)	41 ± 3.9

TABLE - 1

BASELINE AND POST-AMINOPHYLLINE PFTs

	Before Drug Mean ± SEM	30 Minutes After Mean ±SEM	Value of P
FEV	0.76 ± 0.10	0.92 ± 0.10	P < 0.01
FVC	1.52 ± 0.13	1.62 ± 0.12	P < 0.01
PEFR	161 ± 21	179 ± 23	P < 0.01

TABLE - 2

It can be seen that nebulized salbutamol was far more effective in improving FEV₁ and FVC (P=<0.01) than PEFR showing it to be more effective than aminophylline as a bronchodilator in acute severe asthma.

DISCUSSION

International literature is full of controversies regarding the recommendations for the use of aminophylline. Between 1966 and 1986 many reports have been published comparing aminophylline therapy with a variety of bronchodilator treatment in asthma culminating in publication of meta-analysis of 13 of these papers chosen on the basis of scientifically acceptable criteria by Litterberg⁴. He concluded that these reports did not provide adequate evidence either to support or reject the use of aminophylline in acute severe asthma. Olsen stated that Theophylline had no additional bronchodilator effect when used with maximum dosage of beta 2 agonists and therefore had no place for treatment in asthma⁵. However

BASELINE AND POST-SALBUTAMOL NEBULIZATION PFTs

	Before Drug Mean ± SEM	30 Minutes After Mean ±SEM	Value of P
FEV ₁	0.85 0.10	1.06 0.10	P < 0.01
FVC	1.52 0.15	1.83 0.15	P < 0.01
PEFR	155.9 25	199.3 28	P < 0.01

TABLE - 3

COMPARISON OF THE PFTS OF THE TWO GROUPS BEFORE TREATMENT

	Nebulized salbutamol Mean \pm SEM	Aminophylline Mean \pm SEM	Value of P
FEV ₁	0.85 0.10	0.76 0.10	P < 0.01
FVC	1.52 0.15	1.52 0.13	N.S.
PEFR	155.9 25	161 21	N.S.

TABLE - 4

the question has been reopened by new studies^{6,7} conducted by various authors which suggested that aminophylline definitely improves FEV₁ in patients with acute attack of asthma. Wrenn et al suggested that using aminophylline might lead to improved airflow and reduced duration of treatment amongst patients with severe asthma⁸. Aminophylline also improves diaphragmatic contractility^{9,10} acts as a tracheal relaxant¹¹ and has immunomodulatory effect^{12,13}. The present study was conducted to evaluate the efficacy of aminophylline in patients with acute severe asthma presenting to our unit and to compare it with nebulized salbutamol. The clinical response of the patients which was observed in the form of pre and post bronchodilator pulmonary functions test showed that although aminophylline is an effective bronchodilator as shown by increase in FEV₁ (P=<0.01) increase in FVC (P=<0.01) and increase in PEFR (P=<0.01) yet nebulized salbutamol is a superior

bronchodilator in attacks of acute severe asthma as proven by comparative analysis of the two drugs in our study (P=<0.01). So we recommend nebulized salbutamol as the agent of first choice in the treatment of severe acute asthma although we cannot disregard aminophylline completely which can be used in case of nonavailability of the former.

This study has various limitation, this is not a double blind randomized cross over study and the population is very small. The results need to be confirmed in a larger population, study.

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COMPARISON OF THE PFTS OF THE TWO GROUPS AFTER TREATMENT

	Nebulized salbutamol Mean \pm SEM	Aminophylline Mean \pm SEM	Value of P
FEV ₁	1.06 0.10	0.92 0.10	P < 0.01
FVC	1.83 0.155	1.62 0.123	P < 0.01
PEFR	199.3 28	179 23	N.S.

TABLE - 5

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