

Continuous intravenous therapy with theophylline in a patient with brittle bronchial asthma

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ABSTRACT: Ambulant continuous intravenous theophylline therapy was used in a patient with frequent and severe asthmatic attacks. The patient could not tolerate oral theophylline preparations. We demonstrated a reduction in complaints and prednisone therapy. Activities of daily life improved, as did theophylline levels, lung function and peak-flow.

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Oral therapy with theophylline can prevent or relieve many asthmatic attacks [1]. However, some patients do not tolerate oral theophylline medication. Strangely enough, these patients often tolerate intravenous therapy with theophylline [2].

We describe an asthmatic patient with intolerance for oral theophylline preparations who benefits greatly from the use of a pump for continuous intravenous theophylline delivery.

Case report and methods

A 42-year-old female suffered from asthmatic attacks every day and night. The patient had a catheter in the left vena subclavia, through which she injected herself five times a day with 240 mg theophylline and two times a day with 50 mg prednisolone. She injected herself three times a day subcutaneously with 0.25 mg terbutaline. As inhalation medicines she used terbutaline 6 × 2 puffs, ipratropiumbromide 6 × 2 puffs and 1200 mcg budesonide dosis-aerosol a day. Despite this therapy, frequent hospital admissions were necessary.

The patient was treated over four weeks with a Pharmacia/Deltec^R CADD I-pump (fig. 1). The 100 ml reservoir was filled with theophylline at a concentration of 24 mg/ml and the pump rate was adjusted to 42 ml/24 h. Theophylline levels were determined before, and two weeks after the start of pump therapy. The patient filled in an asthma score which included daily activities, dyspnoea and wheezing during daytime and night, cough during daytime and night and sputum production. A high score (maximum 18) indicated many complaints. The asthma score was recorded before and two and four weeks after pump therapy. Lung function was carried out with the constant volume body plethysmograph (universal body test Jaeger) before and after four weeks of pump therapy. Peak-expiratory flow levels (PEF) were recorded with the Mini Wright Peak-flow



Fig. 1. The patient with the CADD I-pump on the left hip.

meter at 08.00, 12.00 and 20.00 h, one week before and two and four weeks after the start of pump therapy.

Results

From the start of the patient using continuous intravenous theophylline therapy (CITT) by means of

the ambulant CADD I-pump, no asthma attacks occurred. The prednisolone medication could be reduced from 100 mg a day to 25 mg a day. The patient had an improved quality of daily life. The theophylline levels determined at 07.00, 09.00, 11.00 and 13.00 h were 23.6, 8.7, 7.6 and 6.4 mg/l before CITT and 15.8, 15.3, 15.9 and 13.6 mg/l during CITT (therapeutic range 10–20 mg/l). Asthma symptoms decreased and peak-flow increased during CITT (table 1). The lung function showed an improvement (table 2). (Predicted values are given according to the European Community for Coal and Steel (ECCS) [3]).

Discussion

Continuous subcutaneous infusion with insulin has given advantages in the treatment of diabetes [4]. The reservoir of these pumps can be small, because insulin can be dissolved in a small volume (for instance 100 IE/ml); 240 mg of theophylline needs to be dissolved in 10 ml of liquid and large reservoirs are therefore required. In the past only reservoirs of about 40 ml were available. Pharmacia/Deltec^R developed a pump with a reservoir of 100 ml. The CADD I-pump has been tested in the treatment of cancer patients with intractable pain [5]. Narcotics can be easily given

Table 1. - Asthma score and PEF at 08.00, 12.00 and 20.00 h

	Asthma score	PEF 08.00h	PEF 12.00h	PEF 20.00h
Before	9.5±1.6	69±11	85±13	130±5
2 weeks after	7.4±1.7	81±18	116±10	160±16
4 weeks after	2.1±0.8	91±13	115±25	152±26

Table 2. - Lung function characteristics before and after four weeks of pump therapy.

	Pred.ECCS value	Before	After 4 weeks CITT
R _{tot} kPa·l ⁻¹ ·s ⁻¹	0.3	0.7	0.39
MEF ₅₀ l·s ⁻¹	4.03	0.93	1.58
VC l	3.17	3.15	3.52
RV l	1.57	2.25	1.86
FEV ₁ l	2.67	1.5	2.2

R_{tot}: total resistance; MEF₅₀: maximal mid-expiratory flow; VC: vital capacity; RV: residual volume; FEV₁: forced expiratory volume in one second; l: litre; ECCS: European Community for Coal and Steel; CITT: continuous intravenous theophylline therapy.

intravenously or through an epidural catheter. Some oncology centres have treated their patients with continuous intravenous or intra-arterial infusion of cytostatic agents.

CITT can be a resource for brittle asthmatic patients who can not tolerate oral theophylline preparations.

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