calf vein. In two cases the thermograms were positive by our criteria but DVT was not shown on the phlebograms. In one of the cases there was extensive superficial thrombophlebitis in the thermographically positive leg. In the other case we were unable to explain the discrepancy.

Comment

These results agree with those of Cooke and Pilcher.[1] We conclude that thermography is a simple, non-invasive method of investigating cases of acute DVT and that its diagnostic value is comparable to that of phlebography.

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Comparison of intravenous aminophylline and salbutamol in severe asthma

Bronchodilators are essential in the treatment of severe asthma because corticosteroids take several hours to produce an effect.[1] Aminophylline produces a number of undesirable side effects.[2] Intravenous salbutamol is an effective bronchodilator.[3] We report a double blind trial of intravenous aminophylline and salbutamol in the initial treatment of patients with life-threatening asthma.

Patients, methods, and results

Twenty hospital patients with severe asthma, with a pulse rate of >120/min, peak flow rate (PFR) <25% predicted, and Pao_2 <9·3 kPa (69·8 mm Hg) gave informed consent. All were given 1 g of hydrocortisone intravenously initially and oxygen by 28% Ventimask (except during the five minutes before each arterial puncture). Either aminophylline 0·5 g or salbutamol 500 μg was given intravenously over one hour by constant rate infusion pump. They were dispensed in identical ampoules, labelled by number, and allocated randomly and double blind. Response to treatment was measured by a Wright peak flow meter, the best of three readings taken 10 and 5 minutes before treatment and every 10 minutes during the infusion, and arterial gases (Astrup micro-method) at 0, 15, and 60 minutes. Pulse and blood pressure were recorded every 10 minutes and the electrocardiograph monitored continually. Patients given an intravenous bronchodilator within 3 hours before admission were excluded.

Results were analysed as the mean peak increase or decrease during drug administration and also as the average increase (or area under the curve), using a *t* test for unpaired samples. Eleven patients received salbutamol and 9 aminophylline. Both drugs produced a significant increase in PFR, greater after salbutamol, though the difference between the drugs was not statistically significant (see table).

Pulse rate fell after aminophylline but not after salbutamol, the difference between the two being significant. The diastolic blood pressure fell after salbutamol but not after aminophylline. No significant changes in blood gases occurred after either drug. Side effects occurred in 7 of the 9 patients given aminophylline and in 5 of the 11 given salbutamol. Two given aminophylline and 3 given salbutamol experienced headache. Three of the aminophylline group and 2 of the salbutamol group experienced tremor. Nausea (4 patients), vomiting (1 patient), and ventricular extrasystoles (4 patients) occurred only in those given aminophylline. In one patient, who also had mitral valve disease, the ventricular extrasystoles became fewer during the salbutamol infusion. No significant changes occurred in the serum potassium during the infusion in either group.

Discussion

The optimum dose and mode of administration of intravenous salbutamol in acute severe asthma are yet to be decided. Fitchett *et al*[3] gave it as a bolus injection over one minute and May *et al*[4] as an infusion in doses of 4 to 25 μg/min.[4] May *et al*, who were investigating patients recovering from an asthmatic attack, concluded that salbutamol infused at 4 μg/min provides adequate bronchodilatation with no cardiovascular side effects and a considerable safety margin. Because our patients were severely ill on admission we decided to give a larger dose as a continuous infusion over one hour. The dose of aminophylline corresponds to that recommended in a recent editorial.[2]

Salbutamol given in this manner produced in our patients a rapid and progressive rise in peak flow rate at least as effectively as aminophylline and with fewer side effects. Probably intravenous salbutamol will assume an important place in the management of patients severely ill with acute asthma, especially in the initial period before corticosteroids have had time to work.

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Comparative effects of aminophylline and salbutamol. Means (±SD) of findings in 20 patients with acute asthma

		Before treatment	Minutes after start of infusion						
			10	15	20	30	40	50	60
Peak flow rate (l/min)	A	90 (±20)	104 (±27)	—	109 (±34)	118 (±43)	122 (±50)	131 (±65)	134 (±64)
	S	75 (±15)	90 (±25)	—	114 (±27)	128 (±53)	140 (±55)	151 (±72)	161 (±85)
Pulse rate (min)	A	125 (±7)	116 (±14)	—	117 (±11)	115 (±15)	117 (±17)	118 (±11)	119 (±11)
	S	128 (±11)	128 (±14)	—	127 (±15)	126 (±14)	127 (±13)	126 (±13)	126 (±14)
Systolic BP (mm Hg)	A	157 (±20)	153 (±21)	—	152 (±21)	148 (±17)	149 (±23)	149 (±20)	142 (±15)
	S	139 (±17)	131 (±30)	—	130 (±18)	128 (±13)	128 (±11)	124 (±13)	126 (±12)
Diastolic BP (mm Hg)	A	91 (±9)	87 (±11)	—	90 (±13)	87 (±10)	87 (±13)	86 (±11)	84 (±10)
	S	87 (±9)	78 (±16)	—	76 (±12)	74 (±12)	70 (±11)	71 (±9)	73 (±7)
Pao_2 (kPa)	A	7·7 (±1·6)	—	7·5 (±1·3)	—	—	—	—	8·1 (±1·7)
	S	7·5 (±1·1)	—	8·4 (±2·0)	—	—	—	—	8·9 (±1·9)
$Paco_2$ (kPa)	A	5·3 (±1·6)	—	5·6 (±2·1)	—	—	—	—	5·1 (±2·0)
	S	5·6 (±1·2)	—	5·1 (±0·9)	—	—	—	—	5·2 (±0·9)

A = aminophylline 0·5 g (9 patients).
S = salbutamol 500 μg (11 patients).