

tive IgA deficiency, in genetically susceptible individuals, is a phenomenon common to agents possessing properties which modify rheumatoid disease.

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Rheumatology Unit, Queen Elizabeth Hospital, Birmingham B15 2TJ

J P DELAMERE, MB, MRCP, honorary senior registrar
M FARR, MB, clinical research fellow

Department of Medicine, Dudley Road Hospital, Birmingham
K A GRINDULIS, MB, MRCP, registrar

Correspondence to: Dr J P Delamere.

Pressurised aerosol with conical spacer is an effective alternative to nebuliser in chronic stable asthma

Aerosol treatment delivered by a 750 ml conical spacer attached to a pressurised aerosol (Nebuhaler, Astra Pharmaceuticals Ltd) is as effective as a simple nebuliser in acute severe asthma.¹ This may be due to improved deposition of the drug in the lungs because a dense, slowly moving cloud of small drug particles is produced and inhaled in a relatively large volume, over several breaths if necessary, through a one way valve.² Intermittent positive pressure breathing is widely used for severe asthma and may be marginally superior to simple nebuliser treatment.³ The relative value of these techniques has not been established in chronic stable asthma, although nebulisers are often used in preference to pressurised aerosols. We have therefore compared the bronchodilator responses of nine patients with chronic stable asthma to the beta₂ stimulant terbutaline administered in cumulative doubling doses by pressurised aerosol fitted with a conical spacer, Acorn nebuliser, and Bennett intermittent positive pressure breathing equipment.

Patients, methods, and results

We studied nine patients aged between 24 and 56 years with atopic asthma. All required regular bronchodilator treatment and none had needed a change in treatment for three months. Each patient gave informed consent and was studied at the same time of day on three separate days within one week. Sodium cromoglycate and bronchodilators were discontinued for at least 12 hours before the tests. On each occasion we asked the patients to inhale cumulative doubling doses of terbutaline (0.5+1.0+2.0+4.0 mg) at

30 minute intervals using each of the three techniques in random order. To determine the magnitude and site of drug action we measured forced expiratory volume in one second (FEV₁), forced vital capacity (FVC), and maximal expiratory flow at 30% FVC (V₃₀) as an indicator of peripheral airway calibre.⁴ We made measurements at 10 minute intervals throughout the studies and used the best of three measurements in analysis. A paired *t* test was used to compare the mean values obtained at each dose with each technique.

There was no significant difference in baseline FEV₁, FVC, or V₃₀ on each study day. The table shows the mean expiratory flow rates for each technique at cumulative doses of terbutaline. For both FEV₁ and FVC there were no statistically significant differences in the responses at any dose. At cumulative doses of 1.5 and 3.5 mg terbutaline the conical spacer produced a mean V₃₀ which was similar to that from the intermittent positive pressure breathing device and significantly greater than that from the nebuliser (*p*<0.05).

Comment

In these patients the conical spacer was as effective as the intermittent positive pressure breathing device and nebuliser in delivering an aerosol bronchodilator throughout the therapeutic dose range. In dosages higher than those conventionally used from pressurised aerosols, but often used from nebulisers, the conical spacer was significantly more effective than the nebuliser in improving flow rates at low lung volumes. These results support the theory that the technique enhances peripheral airway drug deposition and bronchodilatation by allowing evaporation of droplets of propellant and production of drug particles of smaller size which are inhaled in a large volume.²⁻⁵ There was no significant difference between the intermittent positive pressure breathing device and nebuliser at any dosage, although there was a trend in V₃₀ in favour of the former at higher doses. The conical spacer is more than 50 times cheaper than the least expensive nebuliser equipment. The device also removes the risk of failure to coordinate aerosol activation with inspiration, which is a frequent problem in bronchodilator administration.

We conclude that the use of a conical spacer with a pressurised aerosol is a simple, cheap, and effective alternative to a nebuliser or intermittent positive pressure breathing device for bronchodilator treatment in moderately severe chronic stable asthma and is therefore likely to be of great value for domiciliary use.

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Department of Respiratory Medicine, City Hospital, Edinburgh EH10 5SD

J F O'REILLY, MA, MRCP, medical registrar
D R BUCHANAN, MB, MRCP, medical registrar
M F SUDLOW, MB, MRCP, consultant physician

Correspondence to: Dr J F O'Reilly, Department of Respiratory Medicine, Bristol Royal Infirmary, Bristol BS2 8HW.

Mean (\pm SEM) changes in maximum expiratory flow rates after cumulative terbutaline inhalation by three techniques

Cumulative terbutaline dosage (mg)	FEV ₁ (l)			FVC (l)			V ₃₀ (l/s)		
	Aerosol and spacer	Nebuliser	IPPB	Aerosol and spacer	Nebuliser	IPPB	Aerosol and spacer	Nebuliser	IPPB
Baseline	2.39 \pm 0.37	2.36 \pm 0.38	2.25 \pm 0.34	3.56 \pm 0.41	3.68 \pm 0.38	3.53 \pm 0.33	1.64 \pm 0.29	1.54 \pm 0.32	1.71 \pm 0.33
0.5	2.67 \pm 0.38	2.68 \pm 0.37	2.60 \pm 0.37	3.86 \pm 0.47	4.05 \pm 0.41	3.88 \pm 0.39	2.15 \pm 0.33	2.13 \pm 0.34	2.03 \pm 0.40
1.5	2.82 \pm 0.40	2.74 \pm 0.37	2.72 \pm 0.38	3.96 \pm 0.47	4.22 \pm 0.41	4.05 \pm 0.37	2.47 \pm 0.36	1.93 \pm 0.38	2.33 \pm 0.50
3.5	2.80 \pm 0.42	2.86 \pm 0.40	2.82 \pm 0.38	4.01 \pm 0.45	4.34 \pm 0.43	4.25 \pm 0.37	2.32 \pm 0.41	1.89 \pm 0.35	2.42 \pm 0.53
7.5	2.85 \pm 0.41	2.90 \pm 0.40	2.85 \pm 0.37	4.21 \pm 0.41	4.29 \pm 0.46	4.19 \pm 0.37	2.39 \pm 0.46	2.00 \pm 0.31	2.32 \pm 0.50

IPPB = Intermittent positive pressure breathing device.