

PEP-spacer: an adaptation for administration of MDI to infants

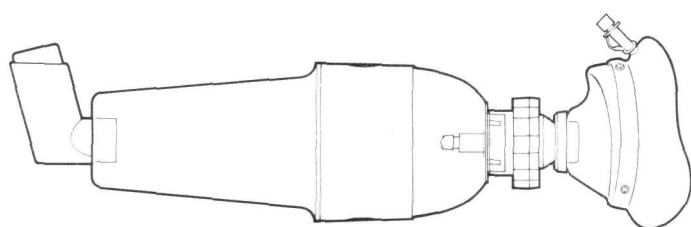
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Sir,

We have devised a new mode of administering metered-dose inhalers (MDI) to infants by adapting a face-mask to a spacer (Nebuhaler®, Astra) through a one-way valve with an adjustable expiratory flow resistance. The principle of administering pressurized aerosol via a spacer device is well recognized and increasingly used in older children and adults to obtain an improved ratio between deposition in the lung and upper airways. The aerodynamic property of an aerosol inhaled via a spacer device is improved with regard to lung deposition (1). This is due to sedimentation and impaction of the larger particles in the spacer. A one-way valve enables the 750 ml spacer device to be used as a holding chamber to contain the aerosol before inhalation. Compliance is greatly improved as coordination is not required. However, one has to breathe via the mouthpiece, which can hardly be taught to infants, inasmuch as they preferably breathe through the nose, and will seldom cooperate in this matter.

We have devised a new principle connecting the spacer to a face-mask (PEP/RMT-mask, Astra Meditec) (see Figure). The connection



PEP-spacer: A spacer is connected to a face-mask through a one-way valve with an adjustable expiratory flow resistance. This allows the administering of metered-dose inhalers to infants.

replaces the mouthpiece and is constructed to allow for stepwise adjustment of the expiratory flow resistance (Positive Expiratory Pressure, PEP). Proper function of the one-way valve can be ensured by increasing the resistance at the expiratory outlet, thereby building a sufficient pressure drop even at low air flow rates. Further, the internal dimensions of the connection have been minimized to reduce the dead space. The particle distribution from the PEP-spacer has been compared with the distribution from a standard Nebuhaler at flow rates of 30 l/min analysed by a cascade impactor. No differences in the particle distribution were detected.

The parent holds the face-mask tightly over the mouth of the child. They are instructed to adjust the expiratory resistance until the "click" from the valve can be heard for every expiration. Each dose from the MDI is administered by allowing 10 respiratory cycles.

We have used this device for administering beta₂-agonist aerosol to eight infants (aged 12-36 months) with clinical signs of obstructive lung function. They had previously demonstrated clinical improvement from nebulized beta₂-agonist. Terbutaline sulphate (Bricanyl®) was given as two separate puffs in the PEP-spacer. In all cases we were convinced of the clinical response, though this was not placebo controlled. All children quickly learned to accept the PEP-spacer, and seven of them are still satisfactorily relying on this way of administering beta₂-agonist.

The advantages of giving MDI aerosols via a PEP-spacer to infants is the reduced administration time, and the reduced drug load in the child compared with administration from nebu-

lized suspensions. The PEP-spacer allows the treatment with MDI beta₂-agonists and topical steroids given to older children to be extended to infants as well. A double-blind parallel placebo controlled study of the effect of MDI topical steroid given via the PEP-spacer on asthmatic bronchitis is in progress.

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REFERENCE

1. Newman, S. P., Millar, A. B., Lennard-Jones, T. R., Moren, F. & Clarke, S. W.: Improvement of pressurised aerosol deposition with Nebuhaler spacer device. *Thorax* 39, 935-941, 1984.

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