IPRATROPIUM VS. ALBUTEROL MDI


There are three major classes of bronchodilators used to treat bronchoconstriction: β-agonists, anticholinergic and methylxanthines. Ipratropium is an anticholinergic while albutarol is a selective β2 agonist. The therapeutic aerosols may be administered either by a metered dose inhaler (MDI) or as wet aerosol from a nebulizer containing the medication.

IPRATROPIUM (Atrovent)

Ipratropium is a derivative of atropine with antimuscarinic effect. It is a quarternary ammonium compound and has essentially similar effects like atropine when administered parenterally but is poorly absorbed when delivered via inhalation. Its important therapeutic benefit is in asthma and bronchospastic disorders. There are very few extra pulmonary effects even when it is given in extremely large doses via inhalation route. Ninety percent of inhaled drug is swallowed but only 1% is absorbed systemically.

Ipratropium provides almost complete protection against bronchospasm induced by variety of agents. In general, its therapeutic effect is more pronounced in patients with chronic obstructive pulmonary disease than in asthmatic patients. In asthmatic patients, the results are variable. Methacoline and sulfur dioxide induced bronchospasm are completely blocked by it but not the leukotriene induced bronchoconstriction. There is considerable variation among general patients too.

The onset of action is slow and the maximal effect is less than that seen with β-agonists. Unlike atropine, ipratropium has no negative effect on ciliary clearance. It is supplied as a metered-dose inhaler supplying 18 µg per puff. Dosage is two puffs orally four times a day. Maximum bronchodilation occurs in 30 to 90 minutes but the duration may be 4 hours.

ALBUTEROL (Ventolin, proventil)

Albuterol is a short acting inhaled β2 adrenergic agonist used mainly for bronchodilation. It relaxes airway smooth muscle and promptly reduces airway resistance for 4 to 6 hours. Normally the balance between cAMP (produces bronchodilation) and cGMP (cause bronchoconstriction) determines the state of contraction of the bronchial smooth muscles. The effect of this agent is thought to be mediated by increasing cAMP from ATP by activating adenylate cyclase.

Albuterol MDI is the preferred formulation in most cases and contains 90 μg/puff and 200 puffs/canister. Recommended dose is 2 puffs every 4-6 hours as needed. Severe exacerbation may require up to 4 inhalations every few hours. It may be used with ipratropium to obtain better effect.

β2 selectivity is relative with most drugs and it may be lost at higher doses. The addition of bulky structure on the catecholamine amino group increases β2 selectivity, decreases affinity for alpha receptors and protects against metabolism by COMT. Inhalation aerosols are rapid in onset and have fewer side effects for reduced systemic absorption.

References:


2. Paul G. Barash, Bruce F. Cullen, Robert K. Stoelting; Clinical Anesthesia, 4th ed.: Lippincot Williams & Wilkins; 2001, p 817

3. Lawrence M. Tierney, Jr., Stephen J. McPhee, Maxine A. Papadakis; Current Medical Diagnosis & Treatment; 39th ed.: Lange; p 280 - 287.