ACUTE ANGLE-CLOSURE GLAUCOMA RESULTING FROM TREATMENT WITH NEBULISED BRONCHODILATORS

BLOQUEO ANGULAR AGUDO TRAS BRONCODILATADORES NEBULIZADOS

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ABSTRACT

Case report: A 78-year-old woman, with an acute exacerbation of chronic obstructive airways disease, was treated with nebulised ipratropium bromide and salbutamol. Twenty hours after beginning this treatment, she developed acute angle-closure glaucoma (AACG) in her left eye which resolved rapidly with appropriate treatment.

Discussion: Nebulised ipratropium bromide and salbutamol increases the intraocular pressure and may cause an AACG in susceptible patients (those with a shallow anterior chamber, hypermetropia, or chronic angle-closure glaucoma). Increased vigilance in such patients treated with these bronchodilators may avoid this adverse effect. Ensuring the mask is correctly fitted, using a T-piece or unvented nebuliser and protective eye wear, are some of the many recommendations made to minimize the development of AACG in these patients (Arch Soc Esp Oftalmol 2006; 81: 657-660).

Key words: Acute glaucoma, angle-closure glaucoma, acute respiratory disease, ipratropium bromide, salbutamol.

RESUMEN

Caso clínico: Mujer de 78 años, con un cuadro de reagudización de enfermedad pulmonar obstructiva crónica tratada con bromuro de ipratropio y salbutamol nebulizados. Tras 20 horas desde el inicio del tratamiento, la paciente desarrolló un glaucoma agudo de ángulo cerrado (GACA) en el ojo izquierdo que respondió rápidamente al tratamiento médico adecuado.

Discusión: El bromuro de ipratropio y el salbutamol nebulizados, aumentan la presión intraocular y pueden desencadenar un GACA en pacientes pre-dispuestos (cámara anterior estrecha, hipermetropía, glaucoma crónico de ángulo estrecho). Una mayor precaución en los pacientes tratados con estos broncodilatadores, podría evitar este efecto adverso indeseable. Además, la correcta aplicación de la mascarilla facial, el uso de terminales en T y gafas de protección, son algunas medidas a tomar para prevenir un GACA en estos pacientes.

Palabras clave: Glaucoma agudo, glaucoma por cierre angular, insuficiencia respiratoria aguda, bromuro de ipratropio, salbutamol.
INTRODUCTION

Spray bronchial dilators (beta-agonists and anticholinergics) are highly efficient drugs for handling acute breathing insufficiency in patients with chronic obstructive pulmonary disease (COPD). This communication presents a case of acute glaucoma due to angular closure (AGAC) secondary to the administration of ipratropio bromide and salbutamol in spray.

CASE REPORT

A 78 year-old woman with COPD in treatment with 50 µg of salmeterol (Serevent accuhaler®, Glaxo Smith Kline, Madrid, Spain) inhaled at 12-hour intervals and 18 µg of monohydrate thitropio bromide (Spiriva®, Boehringer Ingelheim Inc, Barcelona, Spain) inhaled at 24-hour intervals, who went to the urgency section due to a worsening of her breathing pathology. After assessment in the short stay unit, she is diagnosed with acute breathing insufficiency secondary to pneumonia. Treatment was established with oxygen therapy, 250 µg of iproatropio bromide (Atrovent® single dose 250 µg; Boehringer Ingelheim Inc, Barcelona, Spain) and 2,5 mg of salbutamol (0,5 ml, Ventolin® solution for inhaler; Glaxo Smith Kline, Madrid, Spain) by means of facial spray device at 6-hour intervals, 6-metilprednisolone (Urbason® soluble; Aventis Pharma, Madrid, Spain) 20 mg at 8-hour intervals intravenous, imipenem 500 mg/8 hours IV and levofloxacine 500 mg/24hours IV.

Twenty hours after her admission, the ophthalmology section is asked for an assessment due to blurred vision, slight eye pain and non-reactive midriasis in the left eye (LE). The patient had no previous ophthalmological history. The exploration revealed a visual acuity of 0,6 RE and 0,25 LE, while the anterior pole biomicroscopy identified moderate conjunctival hyperemia, non-reactive midriasis, narrow anterior chamber with peripheral iridoendothelial contact and tyndall of 1+. The intraocular pressure (IOP) measured with applanation tonometer was of 65 mmHg. The iris-cornea angle of the contralateral eye was narrow (Vena 0.2 sign) and IOP was of 14 mmHg. Finally, the eye fundus exploration without dilatation did not exhibit significant alterations.

Treatment was initiated with topical pilocarpine 2% (Colicursi pilocarpina® 2%, Alcon Cusi SA, El Masnou, Barcelona, Spain) 1 drop every 5 minutes for 15 minutes, followed by 1 drop every 15 minutes for 1 hour and then 1 drop every 6 hours, brimonidine 0,2% (Alphagan®, Allergan SA, Tres Cantos, Madrid, Spain) 1 drop every 12 hours, dexametosone sodium phosphate 1 mg/ml (Colorcusi dexametazona®, Alcon Cusi, SA, El Masnou, Barcelona, Spain) 1 drop every 6 hours, acetazolamide 250 mg orally (Edemox®, Chiesi Wasserman, Barcelona, Spain) 250 mg every 8 hours and Boi-K aspartic orally (BLE Laboratorios, Mollet del Valles, Barcelona, Spain). Ipratropio bromide and salbutamol in spray were discontinued. The IOP went down to 24 mmHg six hours after beginning the therapeutic measure. After two peripheral iridotomies with laser Nd: YAG in the LE, the IOP was of 11 mmHg. In the opposite eye a prophylactic peripheral iridotomy was performed. Brimonidine 0,2% every 12 hours was maintained together with dexametosone every 6 hours, while the remaining topical and oral medication was dropped.

At 24 hours the anterior chamber of the LE exhibited a Vena sign of 0,4, corresponding to a grade II angle in gonioscopy. The iridotomies were permeable and tyndall negative. The IOP was of 11 mmHg RE and 8 mmHg LE.

DISCUSSION

COPD is a highly prevalent disease in our environment. Fortunately, AGAC which emerged as a result of the medication during the critical episodes of the patient is an infrequent complication. Table I shows the cases described in the literature.

Ipratropio bromide is an anticholinergic agent which induces midriasis. Its action mechanism at the ocular level is local, with deposits on the conjunctival and corneal surface of the sprayed drug, frequently due to a faulty placement of the inhalation mask. It seems that the systemic absorption of ipratropio bromide in the tracheal-bronchial tree is negligible. Salbutamol is a beta2-adrenergic agonist which, in addition to causing midriasis, increases the production of aqueous humor. At the eye level, its adverse effects are due to local and systemic absorption (1,2).

Midriasis and the increase of the aqueous humor in predisposed patients (narrow anterior chamber,
hypermetropy), can give rise to an acute angle closure due to pupil obstruction.

Most of the cases described in the literature did not exhibit glaucoma antecedents (Table I). The most important agent in this condition is ipratropio bromide, although AGAC cases have also been brought by salbutamol on its own. The incorrect application of the face mask and the high pharmacological dosages of these sprayed drugs facilitate the development of AGAC (1,2).

Karla and Bone described the effects of the joint administration of ipratropio bromide and salbutamol in patients with glaucoma and chronic bronchitis. IOP increased only in patients with GAE and, of these, half developed a temporary acute angular closure. The patients who received the combined medication and used swimming glasses as eye protection did not exhibit changes in IOP or angle. This proves that the action of the drug was due to direct deposit in the conjunctival sac and not to systemic absorption (3).

The development of AGAC is more frequent with the combination of ipratropio bromide and salbutamol versus individual administration. This combination is safe, it is utilized in 77% of patients with COPD episodes, although there are not studies suggesting its superiority vis-à-vis individual use (4).

When the treatment dosage prescribed nebulization with face mask, the latter must be fitted properly and swimming glasses can be utilized for protection in patients at risk. The use of T-shaped tube terminals reduces the exposure of the eyes to the drug. In some cases, as soon as the patient becomes stable, measured dosage inhalers with spacing chambers can be utilized (5).

An improved detection of patients at risk of developing angular obstruction would avoid this adverse effect. In addition, the adequate fitting of the face mask, the use of T-shaped terminals and dosage inhalers with spacing chambers also reduce eye exposure to the drug. Patients with greater risk of AGAC who require spray treatment could utilize swimming glasses by way of protection, together with preventive ocular pressure-reducing medication and/or iridotomy with YAG laser.

**REFERENCES**


<table>
<thead>
<tr>
<th># of cases</th>
<th>Drugs</th>
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<tr>
<td>Malani JT et al</td>
<td>2</td>
<td>BI*</td>
<td>24 hours</td>
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<tr>
<td>Holst PE et al</td>
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<td>BI</td>
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<tr>
<td>Packe GE et al</td>
<td>1</td>
<td>BI+S†</td>
<td>24 hours ± 78,5 hours</td>
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<td>Shah P et al</td>
<td>5</td>
<td>BI+S</td>
<td>24 hours ± 78,5 hours</td>
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<tr>
<td>Reuser T et al</td>
<td>2</td>
<td>BI+S</td>
<td>3 días ± 0,94 días</td>
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<td>3</td>
<td>2 BI+S</td>
<td>36 hours</td>
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<tr>
<td>1 BI (inhaled + sprayed)</td>
<td>6 days ± 0,94 days</td>
<td>BI (inhaled)+S</td>
<td>36 hours</td>
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<tr>
<td>Le Llouche N et al</td>
<td>1</td>
<td>BI+S</td>
<td>24 hours</td>
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<td>Rho DS et al</td>
<td>1</td>
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* BI: Ipratropio bromide; † S: salbutamol.