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Acute Angle-Closure Glaucoma Developing During the Treatment of an Asthma Attack: A Case Report

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Abstract | **Case Report**

Background: Acute angle-closure glaucoma [AACG] is a vision-threatening ophthalmologic emergency caused by rapid obstruction of aqueous humor outflow with sudden elevation of intraocular pressure [IOP]. Typical symptoms include severe ocular pain, red eye, blurred vision/halos, headache, and nausea/vomiting. [1–3] Although AACG is often related to anatomically narrow angles, it can also be precipitated by drugs, particularly agents capable of inducing mydriasis or affecting iris–lens dynamics in predisposed eyes. [4] Nebulized anticholinergic bronchodilators such as ipratropium bromide have been linked to rare cases of AACG, especially when aerosol medication contacts the ocular surface due to mask leakage. [5–8] ***Case Presentation:*** An 80-year-old female with asthma and hypertension presented with an asthma attack. Vital signs were stable [BP 160/70 mmHg, pulse 76/min, SpO_2 97%] with accessory muscle use and diffuse wheezing. Nebulized salbutamol and ipratropium bromide were administered via mask. During treatment, she developed acute right eye pain and blurred vision. Examination revealed conjunctival hyperemia and an irregular, non-reactive right pupil. Ophthalmologic consultation confirmed narrow angles with elevated IOP, consistent with AACG. The patient was referred for definitive ophthalmologic management. ***Conclusion:*** AACG is a rare but serious complication of nebulized bronchodilator therapy. Preventive measures such as ensuring a tight-fitting mask or using a mouthpiece can reduce ocular exposure. [6–9] Early recognition and urgent IOP-lowering management with ophthalmology involvement are essential to prevent permanent vision loss. [1–3,10]

Keywords: acute angle-closure glaucoma; asthma; ipratropium bromide; nebulizer; drug-induced glaucoma.

INTRODUCTİON

Acute angle-closure glaucoma [AACG] is an ophthalmologic emergency characterized by abrupt elevation of intraocular pressure [IOP] due to impaired aqueous humor drainage at the iridocorneal angle. [1–3] Patients typically present with acute ocular pain, conjunctival injection, blurred vision [often with halos], headache, nausea/vomiting, and a poorly reactive or mid-dilated pupil; corneal edema may be present. [1–3]

AACG most often occurs in anatomically predisposed eyes with narrow angles, a risk that increases with advanced age and certain ocular biometric features [e.g., shallow anterior chamber, thick/anterior lens]. [1,4] Importantly, AACG can also be drug-induced. Two broad mechanisms are described: [i] pupillary block-related angle closure triggered by mydriasis and iris configuration changes, and [ii] non–pupillary block mechanisms such as anterior displacement of the lens–iris diaphragm [e.g., uveal effusion in some drug classes]. [4]

In the emergency department, inhaled/nebulized bronchodilator therapy is a cornerstone of acute asthma management. Ipratropium bromide, an anticholinergic bronchodilator, is widely used and generally safe; however, rare cases of AACG have been reported following its administration, particularly when nebulized aerosol reaches the eyes because of an ill-fitting face mask. [5–8] We present an elderly patient who developed AACG during asthma treatment in the ED.

CASE PRESENTATİON

An 80-year-old female with a history of asthma and hypertension was brought to the emergency department with acute dyspnea consistent with an asthma attack. On arrival, she showed accessory respiratory muscle use. Lung auscultation demonstrated diffuse

wheezing. Vital signs were stable: blood pressure 160/70 mmHg, pulse 76/min, and SpO_2 97% on room air.

Treatment was initiated with nebulized salbutamol and ipratropium bromide delivered via face mask. During treatment, the patient complained of acute right eye pain and blurred vision, with symptom onset approximately one hour earlier and worsening during therapy. On focused ocular examination, conjunctival hyperemia and an irregular, non-reactive right pupil were noted [Figure 1].

Urgent ophthalmology consultation was obtained. The patient was diagnosed with narrow-angle glaucoma and increased intraocular pressure, consistent with acute angle-closure glaucoma. She was referred to a specialized ophthalmology clinic for definitive evaluation and management.

Figure 1: Nebulized Medication–Induced Acute Angle-Closure Glaucoma in an Elderly Patient

DISCUSSION

This case highlights a rare but high-stakes adverse event: AACG occurring during bronchodilator therapy. AACG can progress rapidly to optic nerve damage; therefore, prompt recognition and IOP-lowering treatment are critical. [1–3,10]

Proposed mechanism in bronchodilator-associated AACG

Anticholinergic agents can induce mydriasis if they contact the ocular surface. In eyes with narrow angles, mydriasis can precipitate pupillary block and sudden angle closure, leading to rapid IOP elevation. [4] Several case reports link nebulized ipratropium bromide—often combined with beta-agonists—to AACG, with a recurring theme: poor mask seal or aerosol leakage increases ocular exposure. [5–8] Hall *et al.,* also emphasized that the mechanism is likely local ocular absorption rather than systemic drug effect. [7]

Supporting literature and clinical relevance

Classic reports from 1992 described AACG associated with nebulized ipratropium bromide and salbutamol. [5,6] Subsequent emergency medicine literature further reinforced awareness of this complication, describing ED presentations and stressing prevention. [7] Additional commentary has drawn attention to "ocular hazards of nebulized bronchodilators," underlining the practical importance of delivery method and mask fit. [8]

ED recognition and management [general principles]

Emergency clinicians should suspect AACG when a patient receiving nebulized therapy reports acute unilateral eye pain, redness, blurred vision, halos, headache, or nausea/vomiting—especially in elderly patients or those known/suspected to have narrow angles. [1–3,4] Management priorities are rapid IOP reduction, symptom control, and urgent ophthalmology involvement, followed by definitive therapy [commonly laser peripheral iridotomy when pupillary block is the underlying mechanism]. [2,3,10]

Prevention

Prevention is practical and should be emphasized in ED protocols:

- Ensure a tight-fitting nebulizer mask; minimize leakage toward the eyes. [6,8,9]
- Use a mouthpiece when feasible [cooperative patients]. [8,9]
- Educate staff to promptly evaluate ocular complaints during bronchodilator therapy and to consult ophthalmology early. [7–9]

Limitations

This report would be strengthened by including: exact IOP values, gonioscopy findings, corneal status [edema], lens status [cataract], baseline refractive error/hyperopia, details of nebulizer interface and mask fit, and the acute IOP-lowering treatments administered before referral. [1–3,10]

CONCLUSİON

AACG is a rare but potentially blinding complication of nebulized bronchodilator therapy, particularly with ipratropium bromide when aerosol medication contacts the eyes due to mask leakage. [5–9] Emergency clinicians should recognize early symptoms and ensure preventive measures [mask fit/mouthpiece]. Prompt ophthalmology consultation and urgent IOP-lowering treatment are essential to prevent permanent vision loss. [1–3,10]

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