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Mini Review

Nasal Water Wash as First-Line Treatment for Allergic Eustachian Tube Dysfunction with resolution of tinnitus: A Paradigm Shift Toward Allergen Removal

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Abstract

Eustachian tube dysfunction (ETD) in the context of allergic rhinitis represents a common, often debilitating condition characterised by aural fullness, tinnitus, and tympanic membrane retraction. Current first-line pharmacotherapy-including intranasal corticosteroids and oral antihistamines-addresses downstream inflammation without removing the inciting allergen from the nasal cavity. This mini review synthesises evidence from published clinical guidelines and a novel clinical case report to argue that nasal water irrigation should precede pharmacotherapy in adult allergic ETD. The proposed mechanism centers on physical allergen clearance from the nasopharynx and Eustachian tube orifice region. Available evidence, though largely based on analogous allergic rhinitis data, supports irrigation as a safe, low-cost, and mechanistically rational first-line intervention. Randomised controlled trials comparing irrigation to pharmacotherapy as primary treatment for adult allergic ETD are urgently needed.

Keywords: Eustachian tube dysfunction, Allergic rhinitis, Tinnitus, Nasal irrigation, Allergen removal, Pharmacotherapy

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Introduction

Eustachian tube dysfunction is defined as persistent failure of the Eustachian tube (ET) to adequately equalise middle ear pressure, ventilate the middle ear and clear secretions. In the allergic context, mucosal oedema driven by IgE-mediated and non-IgE-mediated mechanisms leads to functional obstruction of the ET orifice, resulting in negative middle ear pressure, effusion, and in severe cases, tympanic membrane (TM) retraction and tinnitus **[1,2].**

The global burden of allergic rhinitis, affecting an estimated 400 million individuals, makes ETD a highly prevalent comorbidity **[3].** Tinnitus associated with conductive ETD is particularly distressing, impairing sleep, occupational performance, and quality of life, and has been linked to depression and anxiety **[4].** Despite its prevalence, treatment guidelines have not changed substantially in decades and continue to prioritise pharmacological agents that modulate inflammatory responses without addressing the primary aetiological driver: the presence of allergen in the nasal cavity.

A 2024 case report by Philip and Jim published in the International Tinnitus Journal offers a compelling single-patient account of tinnitus and TM retraction secondary to high-load allergen exposure from a reused face mask, ultimately resolving with nasal water irrigation after cycles of recurrence on standard pharmacotherapy **[5].** This review contextualises that observation within the broader evidence base and proposes a revised management algorithm.

Pathophysiology of allergic ETD

Allergen deposition on the nasal mucosa triggers mast cell degranulation, releasing histamine, leukotrienes, and pro-inflammatory cytokines. This cascade produces mucosal oedema of the lateral nasal wall and nasopharynx, directly impairing mechanical ET opening during swallowing and yawning **[1].** Sustained inflammation impairs mucociliary clearance, allowing allergen-laden mucus and debris to accumulate adjacent to the ET orifice. This perpetuates the inflammatory cycle even after acute allergen exposure ceases, explaining the chronicity and recurrence typical of the condition **[2, 6].**

The consequent negative middle ear pressure leads to TM retraction and potential serous effusion (otitis media with effusion, OME). Conductive hearing loss and tinnitus arise as downstream sequelae. The key pathophysiological insight is that allergen persistence in the nasal cavity sustains this cascade; pharmacotherapy modifies the response but does not interrupt the stimulus.

Limitations of current first-line pharmacotherapy

Intranasal corticosteroids (INCS) are universally endorsed as first-line therapy for allergic rhinitis by international guidelines including AAO-HNS, ARIA, EAACI, and BSACI **[3,7].** They suppress eosinophilic inflammation and reduce nasal mucosal oedema. However, a double-blind RCT by Gluth, et al. (2011) specifically examining intranasal triamcinolone in adult ETD demonstrated no statistically significant improvement in ET function or symptom scores **[8].** Multiple systematic reviews corroborate the absence of robust evidence for INCS benefit in OME **[9].**

Oral antihistamines block H1 receptors and reduce rhinorrhoea but exert limited effect on nasal mucosal oedema and carry no proven efficacy in adult ETD specifically. A landmark RCT by Cantekin, et al. (1983), published in the New England Journal of Medicine, demonstrated lack of efficacy of a decongestant-antihistamine combination in childhood OME **[10].** No comparable adult ETD RCT exists to date. Furthermore, first-generation antihistamines carry sedation risks, and second-generation agents do not address the structural consequences of ET obstruction.

Commercial nasal saline sprays deliver low volumes (typically 0.1-0.2 mL per actuation) that are insufficient to flush allergens from the posterior nasal cavity and ET orifice region. In the reported clinical case, saline spray paradoxically worsened tinnitus, possibly via hyperosmotic mucosal irritation or increased nasal pressure transmission to the middle ear **[5].** A 2014 systematic review by Llewellyn et al. for the UK Health Technology Assessment programme identified only very short-term improvements in middle ear function with topical decongestants, confirming the absence of durable pharmacological solutions **[9].**

The Rationale for nasal water irrigation as primary intervention

The central hypothesis advanced by Philip and Jim **[5]** is mechanistically straightforward: if the primary driver of allergic ETD is allergen deposition in the nasal cavity, then physical removal of that allergen should precede pharmacological suppression of its consequences. This reasoning aligns with the established principle of allergen avoidance in allergy management and with evidence from allergic rhinitis literature demonstrating that nasal saline irrigation reduces allergen and mediator load, decreases oral antihistamine use, and improves quality of life with a Grade A evidence level in the 2023 International Consensus Statement on Allergic Rhinitis **[3].**

The use of plain sterile or commercially packaged water (boiled and cooled if tap water is used) rather than saline is proposed on the basis that

- Higher volumes (10-20 mL per nostril) can be safely delivered, maximising mechanical flushing of the ET orifice area
- Brief hypotonic exposure of minutes duration does not cause clinically significant osmotic ciliary injury; and
- Water facilitates superior allergen removal at higher volumes compared to low-volume isotonic sprays **[5].**

The critical technique involves posterolateral head tilting to direct irrigation toward the lateral nasopharyngeal wall where the ET orifice is situated, a manoeuvre not employed with standard saline sprays.

In the clinical case, this approach produced an audible 'drain-opening' sensation within 2-3 days of irrigation, followed by TM repositioning and near-complete tinnitus resolution **[5].** This sensory feedback is consistent with re-establishment of middle ear pressure equalisation as ET patency was restored following allergen clearance. The absence of adverse effects and the rapid, reproducible response across recurrence episodes strengthen the biological plausibility of the mechanism.

Proposed management algorithm

Philip and Jim propose a stepwise algorithm for adult tinnitus and ETD of suspected allergic aetiology, after exclusion of drug-induced causes, acoustic trauma, infection, middle ear mass, and vascular tinnitus **[5].** Step 1 involves detailed allergen history-taking (dust, seasonal aeroallergens, occupational or mask-related exposures) followed by nasal water irrigation at 10-20 mL per nostril, three times daily for three days, using posterolateral head tilt. If symptoms resolve, allergen avoidance and nasal hygiene maintenance are recommended. If symptoms

persist, antihistamines and INCS are added as adjunctive therapy for two weeks. Failure to respond at this stage warrants ENT referral for consideration of balloon Eustachian tuboplasty, ventilation tube insertion, or formal allergy testing and immunotherapy.

This framework repositions nasal steroids and antihistamines as adjunctive rather than primary treatments. It also mandates allergen history-taking as a prerequisite for all adult ETD/tinnitus consultations, a step frequently omitted in current clinical practice.

Safety considerations

The principal safety concern with nasal water irrigation is the risk of Naegleria fowleri amoebic infection with non-sterile tap water, flagged in CDC advisories. This risk is effectively mitigated by use of commercially bottled, filtered, or boiled and cooled water. Standard irrigation guidelines from NICE (2018) for ear irrigation use warm water at 37°C; analogous temperature guidance applies to nasal use. The brief duration of contact, when using the high-volume flush technique described, does not produce clinically meaningful mucociliary impairment. Patients with known nasal polyps, recent nasal surgery, or active epistaxis should be assessed individually before irrigation is commenced.

Evidence gaps and future research

The current evidence base for this approach rests primarily on

- A single clinical case report
- Indirect evidence from allergic rhinitis irrigation trials; and
- Mechanistic plausibility derived from ET anatomy and allergy pathophysiology.

Discussion

This is insufficient to change practice guidelines but sufficient to justify prospective investigation. Randomised controlled trials comparing nasal water or saline irrigation against standard pharmacotherapy as first-line treatment for adult allergic ETD are urgently needed, with primary outcomes including tympanometric normalisation, validated tinnitus questionnaire scores (e.g., Tinnitus Handicap Inventory), and time to symptom resolution. Optimal irrigation volume, concentration, temperature, and frequency also require systematic evaluation.

Conclusion

Allergic ETD with associated tinnitus represents a common condition where current pharmacotherapy is mechanistically incomplete. By targeting inflammation rather than allergen load, standard treatments fail to interrupt the primary aetiological driver. Nasal water irrigation, performed with adequate volume and correct technique, offers a logical, low-cost, and safe first-line intervention that addresses root cause rather than downstream consequence. While evidence from RCTs in adult ETD is lacking, the converging signals from allergic rhinitis irrigation literature, mechanistic reasoning, and clinical observation provide compelling grounds for reconsidering the treatment hierarchy. Targeted allergen history-taking and allergen removal should be repositioned at the beginning of the management algorithm, with pharmacotherapy reserved for cases where physical clearance alone is insufficient.

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