

# Coincidence of Asthma and Bronchospasm during Anesthesia in Tympanomastoidectomy

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**Abstract-** High prevalence of asthma and bronchospasm was observed during induction of anesthesia in patients with chronic suppurative otitis media (CSOM) who underwent tympanomastoidectomy. Although several studies have proposed association of allergic diseases with CSOM but no consensus about it has been established. Current study was designed to determine the coincidence of asthma in CSOM patients. In a cross-sectional study, authors investigated medical records of 106 CSOM patients underwent tympanomastoidectomy, aged 15 to 65 years, and 95 controls, which were matched by age and sex. Participants were admitted to Valiasr Hospital, Tehran, Iran, from April of 2011 to March of 2013. Required information, such as demographic characteristics and history of allergic rhinitis (AR) and asthma were obtained from patients' medical records. The prevalence of AR in the CSOM group was higher than controls' group (19.8% and 15.8%, respectively) ( $P>0.05$ ). Asthma prevalence was significantly higher in patients with CSOM ( $P=0.03$ ) ( $OR=7.67$ , 95%  $CI$ : 0.9-62.5). No significant association was found between history of AR and chronic ear infections. However, asthma was significantly more common in CSOM patients. Current study indicates that asthma and risk of bronchospasm need particular attention in patients with CSOM underwent tympanomastoidectomy before and during anesthesia.

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## Introduction

Chronic suppurative otitis media (CSOM) is persistent inflammation of the middle ear and mastoid mucosa with tympanic membrane perforation and discharge. This disease is also one of the most common chronic infectious diseases worldwide, particularly affecting children in developing countries (1). Most of otolaryngologists consider conservative and antimicrobial therapy as the first step of treating CSOM. But many of the patients with CSOM remain symptomatic and should undergo tympanoplasty, with or without mastoidectomy, which seems to be curative (2,3).

The relatively high prevalence of asthma is reported in preoperative assessment of CSOM patients' who underwent tympanomastoidectomy in Valiasr hospital. Limited studies have investigated any possible association between asthma and CSOM. Alles *et al.*, (4)

reported a considerably higher prevalence of atopic disease, in people with otitis media with effusion (OME) than the general population. Allergic or atopic diseases are caused by type I hypersensitivity reactions and include a large variety of diseases such as asthma and allergic rhinitis (AR) (4). Eldeirawi *et al.*, (5) reported strong and significant association between history of asthma and wheezing with frequency of ear infections. Childhood infections are associated with a significant trend toward increased risk of asthma or atopic diseases (6,7). Major advances are achieved in current knowledge about management of asthmatics undergoing anesthesia and relatively low incidence of severe perioperative bronchospasm. Asthma during anesthesia may be life-threatening. The key to a safe anesthesia is an exact preoperative evaluation including medical history, examination and pulmonary function assessment. Thus, more evidences are still needed to investigate the association between asthma, AR and CSOM.

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## Coincidence of asthma in tympanomastoidectomy

We aimed to evaluate prevalence of AR and asthma in CSOM patients and compare it with the control group in Valiasr Hospital, Tehran, Iran.

### Materials and Methods

Research design and setting: This cross-sectional study was conducted in Imam Khomeini Hospital Complex, Valiasr Hospital, Tehran, Iran, from April 2011 to March 2013.

#### Sampling

We studied medical records of 106 CSOM patients referred to the ear, nose, and throat ward of the hospital for tympanomastoidectomy. For control group, we assessed medical records of another 95 patients diagnosed with inguinal and ventral hernia in the surgery ward of the same hospital. We matched the CSOM patients and their controls by age and sex.

#### Data collection

Demographic characteristics, history of AR, and any other necessary information were extracted from the patients' medical records and were registered in a questionnaire. Allergic rhinitis was characterized by pruritus, sneezing, rhinorrhea and nasal congestion. We excluded patients with incomplete medical records. To decrease the effect of confounding factors, patients aged 15- 65 years satisfying the American Society of Anesthesiologists (ASA) physical status classifications I and II were selected. The ASA physical status classification is a widely used grading system for the preoperative subjective health assessment of surgical patients based on six classes. Class I includes all healthy and fit patients, whereas patients with a mild systemic disease are categorized into class II [8]. In the hospital, suspected patients of asthma in their preoperative visit were routinely subjected to pulmonary specialist consultation and spirometry, which became the basis to confirm or refute the diagnosis. We checked the results in the medical records to find asthmatic patients.

#### Ethical consideration

This study and aspects of its research ethics were approved by the Institutional Review Board of the Tehran University of Medical Sciences. Patients' information during and after the study remained confidential.

#### Statistical analysis

Data were analyzed using SPSS 13 (SPSS Inc.,

Chicago, Illinois, United States of America). T-test was used to compare the mean age differences between the case and control groups. We used the  $\chi^2$ -test to compare the prevalence of AR and asthma in the CSOM and control groups. Multiple logistic regression analysis was used for additional analysis. A  $P$ -value<0.05 was considered statistically significant.

### Results

The CSOM group had 55 males (51.9%) and 51 females (48.1%), with mean age  $\pm$  SD of  $38.1 \pm 13.8$  years. The control group had 54 males (56.8%) and 41 females (43.2%), with mean age  $\pm$  SD of  $41.2 \pm 12.2$  years. No statistically significant difference was found between the groups ( $P>0.05$ ). A total of 140 patients were classified under ASA I (69.7%) and 61 patients under ASA II (30.3%). Results from the  $\chi^2$ -test showed that the difference between the groups was not significant ( $P=0.5$ ).

A total of 31 patients (29.3%) in the CSOM group had bilateral CSOM. Chief complaints of participants were hearing loss (90%) and otorrhea (79%). Eighteen patients with bilateral CSOM had a previous history of tympanomastoidectomy.

In the CSOM group, 21 patients (19.8%) had a history of AR. Fifteen patients (15.8%) in the control group also had a history of AR. No significant difference was found between the groups ( $P=0.5$ ). No difference in AR history was observed between bilateral and unilateral CSOM ( $P=0.5$ ), as well as between males and females, in the group with CSOM and controls ( $P>0.05$ ).

Among 201 patients, seven had a history of definite persistent asthma and had received long-term therapy. Six patients had suspicious symptoms of asthma, such as shortness of breath and cough, and they were subjected to spirometry and pulmonary specialist consultation in preoperative workup. Asthma diagnosis was confirmed for two of these patients. Of the nine asthmatic patients (4.47%), eight belonged to the CSOM group, and only one belonged to the control group. Data analysis showed a statistically significant difference between the two groups ( $P=0.03$ ) ( $OR=7.67$ , 95%  $CI$ : 0.9–62.5). No difference in asthma involvement was between bilateral and unilateral CSOM ( $P=0.3$ ) as well as between males and females ( $P>0.05$ ). Table 1 shows clinical and demographic characteristics of participants.

Logistic regression was used to control the effect of confounding factors. No significant association was found when AR history was considered a dependent

variable ( $P>0.05$ ). However, a significant association between asthma and CSOM was when asthma was

considered as a dependent variable ( $P=0.04$ ) (OR=10.08, 95% CI: 1.18–86.51).

**Table 1. Clinical and demographic characteristics of study population**

Characteristic	CSOM	Control	P-value
Age	38.1 ± 13.8 <sup>a</sup>	41.2 ± 12.2	0.09
Sex	Male: 55 (51.9%) Female: 51 (48.1%) Total: 106 (100%)	Male: 54 (56.8%) Female: 41 (43.2%) Total: 95 (100%)	0.5
ASA	I: 76 II: 30	I: 64 II: 31	0.5
AR	21 (19.8%)	15 (15.8%)	0.5
Asthma	8 (7.5%)	1 (1.1%)	0.03

a: Mean ± Standard Deviation

AR: Allergic Rhinitis

## Discussion

In present study, the authors evaluated association between AR and asthma with chronic otitis media. Although the prevalence of AR was higher in the CSOM group, no significant difference was between the groups. Findings of this are consistent with those found in several studies. Lasisi *et al.*, (9) assessed CSOM risk factors and reported that allergy is not a significant factor. Bakhshae *et al.*, (10) also found no significant difference in the prevalence of AR between CSOM patients and controls. In the present study, the patients' medical histories were investigated to determine the prevalence of AR; this method might have caused underestimation. A comprehensive questionnaire can better reflect the actual prevalence of AR.

In contrast to the current study, several studies have indicated an association between allergic disease and ear infections (11-13). Studies of the pathogenesis of otitis media have identified interactions among infection, allergic reactions and eustachian tube dysfunction (ETD) (14-16). Ojala *et al.*, (17) reported higher serum IgE levels and nasal eosinophils and basophils in CSOM patients than in the control population. Allergic secretions of nasopharynx can also reflux into the middle ear and mastoid fossa through the eustachian tube (18).

In the present study, asthma was statistically significantly more common in CSOM patients than in the control group. In an investigation among primary school children, 32.8%, 36.6%, and 24.0% had symptoms suggestive of OME, rhinitis, and asthma, respectively. A highly significant correlation was observed between otological and nasal symptoms and between otological and chest scores, suggesting asthma (19). Alles *et al.*, (4) found AR in 89% and asthma in 36% of the study population.

Numerous studies have proposed the "united airway

disease" hypothesis (20,21), which holds that upper and lower airway diseases are both manifestations of a single inflammatory process within the respiratory tract. Most asthmatic patients have AR, and also AR is a major independent risk factor for asthma (22). Trakultivakorn *et al.*, (23) reported that 55% -75% of asthmatic children have AR, whereas 13.9% to 25.0% of children with rhinitis have asthma.

Based on these findings, a significant co-occurrence may exist between otitis media and asthma symptoms. Nasal inflammation caused by allergens can result in ETD and subsequent otitis media. Such inflammation also leads to inflammation and hyper-responsiveness of lower respiratory tract and thus develops symptoms suggestive of asthma and vice versa.

From the clinical perspective, it's important to consider asthma as a possible diagnosis in CSOM patients with history of dyspnea, cough and wheezing. Therefore, complete evaluation should be performed in patients with CSOM to reduce risk of life-threatening complications during anesthesia.

In summary, no association between AR and chronic ear infections was found. However, asthma was significantly more common in CSOM patients. These findings suggest the need for particular attention to asthma history and symptoms in preoperative visit of CSOM patients. Considering this coincidence by anesthesiologists could be helpful in proper selection of anesthesia method and reducing risk of bronchospasm during anesthesia.

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## References

1. Verhoeff M, van der Veen EL, Rovers MM, et al. Chronic suppurative otitis media: a review. *Int J Pediatr Otorhinolaryngol* 2006;70(1):1-12.
2. Reiss M, Reiss G. Suppurative chronic otitis media: etiology, diagnosis and therapy. *Med Monatsschr Pharm* 2010;33(1):11-6.
3. Yoon TH, Park SK, Kim JY, et al. Tympanoplasty, with or without mastoidectomy, is highly effective for treatment of chronic otitis media in children. *Acta Otolaryngol Suppl* 2007;(558):44-48.
4. Alles R, Parikh A, Hawk L, et al. The prevalence of atopic disorders in children with chronic otitis media with effusion. *Pediatr Allergy Immunol* 2001;12(2):102-6.
5. Eldeirawi K, Persky VW. History of ear infections and prevalence of asthma in a national sample of children aged 2 to 11 years: the Third National Health and Nutrition Examination Survey, 1988 to 1994. *Chest* 2004;125(5):1685-92.
6. Bodner C, Godden D, Seaton A. Family size, childhood infections and atopic diseases. The Aberdeen WHEASE Group. *Thorax* 1998;53(1):28-32
7. Nystad W, Nafstad P, Jaakkola JJ. The effect of respiratory tract infections on reported asthma symptoms. *Scand J Public Health* 2002;30(1):70-5.
8. Daabiss M. American Society of Anaesthesiologists physical status classification. *Indian J Anaesth* 2011;55(2):111-5.
9. Lasisi AO, Olaniyan FA, Muibi SA, et al. Clinical and demographic risk factors associated with chronic suppurative otitis media. *Int J Pediatr Otorhinolaryngol* 2007;71(10):1549-54.
10. Bakhshae M, Rajati M, Fereidouni M, et al. Allergic rhinitis and chronic suppurative otitis media. *Eur Arch Otorhinolaryngol* 2011;268(1):87-91.
11. Alho OP, Koivu M, Sorri M, et al. Risk factors for recurrent acute otitis media and respiratory infection in infancy. *Int J Pediatr Otorhinolaryngol* 1990;19(2):151-61.
12. Caffarelli C, Savini E, Giordano S, et al. Atopy in children with otitis media with effusion. *Clin Exp Allergy* 1998;28(5):591-6.
13. Gorgulu O, Ozelci M, Ozdemir S, et al. The Role of Allergy in the Pathogenesis of Chronic Suppurative Otitis Media. *J Int Adv Otolaryngol* 2012;8(2):276-80.
14. Fireman P. Otitis media and eustachian tube dysfunction: connection to allergic rhinitis. *J Allergy Clin Immunol* 1997;99(2):S787-97.
15. Pelikan Z. Role of nasal allergy in chronic secretory otitis media. *Curr Allergy Asthma Rep* 2009;9(2):107-13.
16. Hardy SM, Heavner SB, White DR, et al. Late-phase allergy and eustachian tube dysfunction. *Otolaryngol Head Neck Surg* 2001;125(4):339-45.
17. Ojala K, Sipila P, Sorri M, et al. Role of atopic allergy in chronic otitis media. Evaluation based on serum IgE and nasal/aural cytologic findings in patients with operated chronic ears. *Acta Otolaryngol* 1982;93(1-2):55-60.
18. Bluestone CD. Epidemiology and pathogenesis of chronic suppurative otitis media: implications for prevention and treatment. *Int J Pediatr Otorhinolaryngol* 1998;42(3):207-23.
19. Umopathy D, Alles R, Scadding GK. A community based questionnaire study on the association between symptoms suggestive of otitis media with effusion, rhinitis and asthma in primary school children. *Int J Pediatr Otorhinolaryngol* 2007;71(5):705-12.
20. Ciprandi G, Caimmi D, Miraglia Del, et al. Recent developments in United airways disease. *Allergy Asthma Immunol Res* 2012;4(4):171-7.
21. Compalati E, Ridolo E, Passalacqua G, et al. The link between allergic rhinitis and asthma: the united airways disease. *Exp Rev Clin Immunol* 2010;6(3):413-23.
22. Togias A. Rhinitis and asthma: evidence for respiratory system integration. *J Allergy Clin Immunol* 2003;111(6):1171-83.
23. Trakultivakorn M, Sangsupawanich P, Vichyanond P. Time trends of the prevalence of asthma, rhinitis and eczema in Thai children-ISAAC (International Study of Asthma and Allergies in Childhood) Phase Three. *J Asthma* 2007;44(8):609-11.