

## EUSTACHIAN TUBE: ITS FUNCTIONS AND DYSFUNCTIONS IN RELATION TO THE PATHOGENESIS OF MIDDLE EAR

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**ABSTRACT:** Knowledge of developmental anatomy and physiology of Eustachian tube provides evidence that most infants and young children will have fewer episodes of otitis media as the age advances, thus aggressive measures are not warranted. The older children and adults who have persistent middle ear disease are most likely to have dysfunction of eustachian tube thus clinician should try to determine the most likely aetiology for dysfunction of Eustachian tube and direct the management.<sup>[1]</sup> Ventilation of middle ear is an essential predictor of the functional results of reconstructed middle ear.

**KEYWORDS:** Eustachian tube dysfunction, Otitis media.

**INTRODUCTION:** There are enough evidences to define abnormal structure and function of Eustachian tube and also its role in the pathogenesis of otitis media.<sup>[2]</sup>

Eustachian tube like a larynx is a part of connecting system. Belluci<sup>[3]</sup> included Eustachian tube function and pneumatisation of the mastoid as important predictor in the outcome of tympanoplasty.

Arora et al have strongly correlated mastoid pneumatization to Eustachian tube functional status whereas Sethi et al<sup>[4]</sup> suggest there is no correlation between the pneumatisation of the mastoid and Eustachian tube functional status.

### Anatomy:

The Eustachian tube is an organ consisting of a lumen with its mucosa, cartilage, bone surrounding soft tissue and peritubal muscles i.e. tensor velopalatini, levator veli palatine and tensor tympani<sup>[4]</sup>

The anterior end of the Eustachian tube is in continuity with nasopharynx; its posterior end is in continuity with the middle ear and mastoid air cells.

The Eustachian tube is 3.75cm in length having 1/3 of bone and 2/3 of cartilaginous part, isthmus being the narrowest part with 2mm diameter.<sup>[5]</sup>

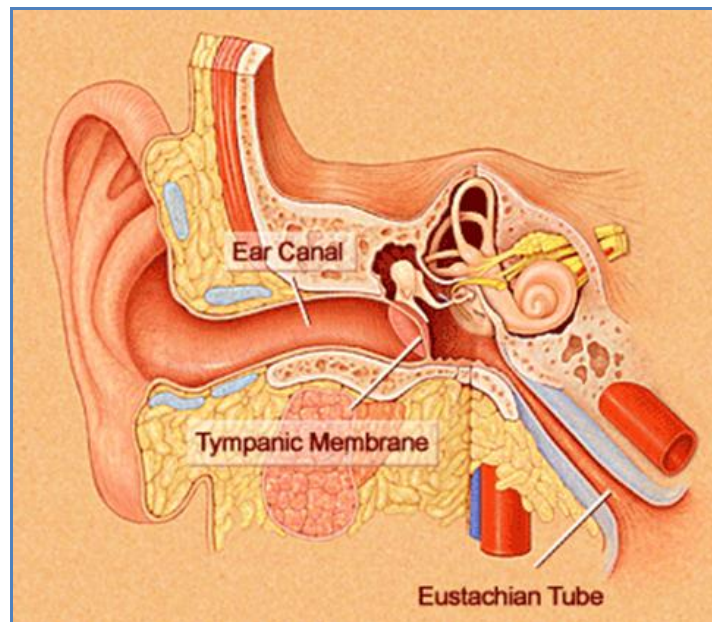
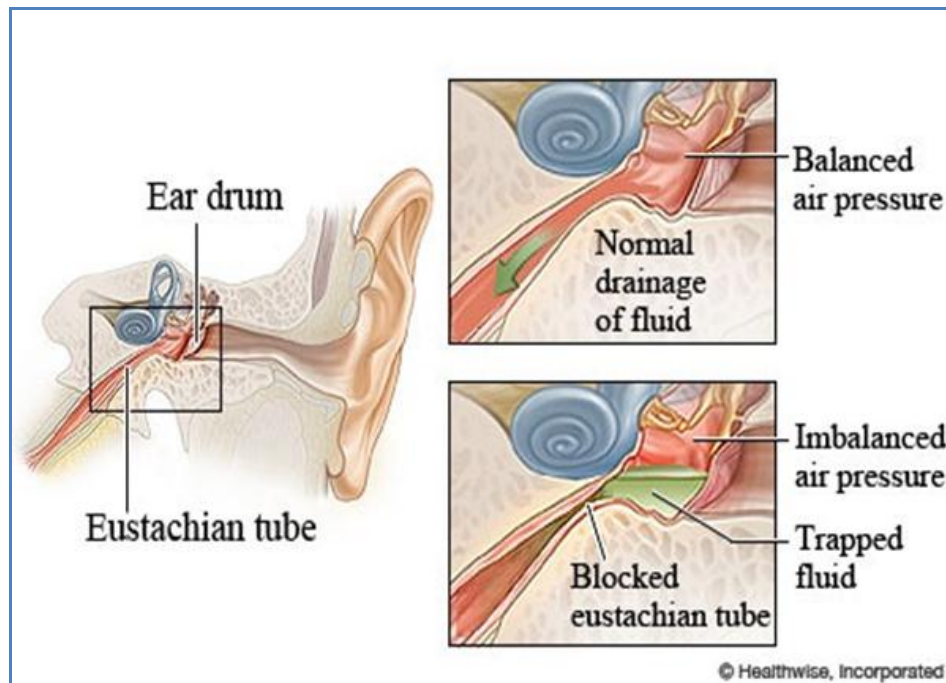
The developmental differences between infants and adults in the anatomy of the Eustachian tube.

The length of the tube is shorter in infants than adults and reaches its adult length by age of seven years.

- 1) Angle of tube to horizontal plane-10 degree in infants and 45 degrees in adult.
- 2) Tube is not angulated at the isthmus but merely narrowed in infant.
- 3) The angular relationship between the tensor veli palatine and cartilage varies in infants but stable in adults.
- 4) Cartilage cell density greater whereas elasticity is less in infant.

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- 5) Ostmann's pad of fat is less in volume in infants but width is similar in all age groups.
- 6) There are more mucosal folds in the lumen of the tube in infants.



**Functions:** There are 3 physiological functions;

1. Pressure regulation
2. Protection
3. Mucociliary clearance

## Dysfunctions:

1. Impairment of pressure regulation: due to anatomical obstruction or due to functional obstruction.
2. Loss of protective function: abnormal patency, short tube, abnormal pressure changes, perforation of tympanic membrane.
3. Impairment of mucociliary clearance: due to allergy and infection.

The hall mark of Eustachian tube obstruction is middle ear effusion. The child may remain asymptomatic. The common causes being upper respiratory infection, allergy, sinusitis and barotraumas, hypertrophic adenoids, nasopharyngeal tumors and masses, deviated nasal septum, nasal polyps. Sometimes functional obstruction due to increased cartilage compliance and poor function of tensor veli palatine as in cleft palate, submucous cleft palate and Down syndrome.<sup>[6]</sup>

Symptoms and signs of tubal occlusion;

\*Otalgia, hearing loss, tinnitus, vertigo, retraction of tympanic membrane, hearing loss and in severe cases of barotraumas even perforations of tympanic membrane occurs.

Treatment options include use of topical and systemic decongestants with the treatment of the primary cause's forms the mainstay. In chronic cases measures like weight gain, oral administration of potassium iodide, cauterization of tubes, and insertion of ventilation tubes is advocated.

To statistically put 50% of children get three or more episodes of otitis media and 25% of them have six or more episodes secondary to Eustachian tube dysfunction.<sup>[7]</sup> The highest prevalence occurs in the first 2 years of life and decreases thereafter. It is also more common in winter months.

**CONCLUSION:** The Eustachian tube plays important role in the development of otitis media.

The pre-existing Eustachian tube dysfunction appears to be a critical risk factor in the development of otitis media with effusion.

This pathology may be associated with viral upper respiratory tract infection.

Thus we can tackle the pathology of the middle ear along with the primary etiology and that being the Eustachian tube dysfunction.

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