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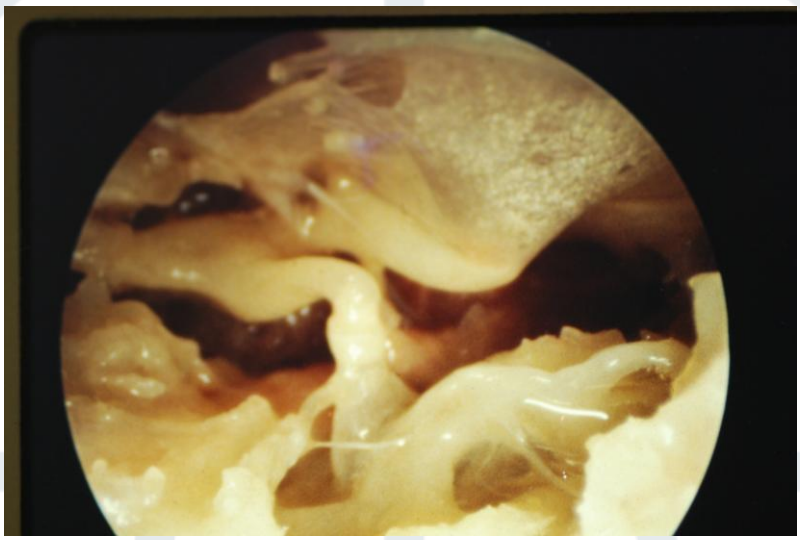
EUSTACHIAN TUBE DYSFUNCTION

The middle ear transmits sound from the drum to the inner ear though a series of three tiny bones that vibrate in mid air, passing sound waves, somewhat like the wheels of a clock. For them to vibrate freely, the middle ear is air-filled, but separated from the external canal by the drum, to avoid infection in the susceptible fine linings of the middle ear. The air is therefore derived from the rear of the nose via the Eustachian tube.



The Middle Ear: Aerated via the Eustachian tube

The tube is normally closed, to protect against infection and to prevent one from hearing one's own speech, breathing etc. During palatal actions (swallowing, yawning), the muscles of the palate pull the tube open, replacing the air that dissolves into the bloodstream. Opening occurs several hundred times daily, maintaining the middle ear pressure close to the external atmospheric levels.

The tube may fail to open adequately for a range of reasons. Congenital cleft palate causes chronic difficulties. Nasal infections, allergy, or senile degeneration of the tubal opening action also impede the air inflow. Persistent blockage may occur in children after acute bacterial middle ear infection, due to retained toxins causing persistent swelling of the tubal linings. Cancer in the post-nasal area notoriously obstructs the tube, especially in people of the southern China area ancestry. Also, numerous people suffer temporary occlusion in situations of rapidly increasing external pressure, such as in diving or aircraft descent.

Failure of tubal function manifests as temporary or chronic patterns. Acute temporary effects from pressure changes are often short lived or resolve spontaneously over several weeks. Other temporary problems may follow a similar course. Senile origin difficulties may last longer, or be more repetitive.

Chronic dysfunction, often dating from childhood, is more sinister, leading to long-term deafness and other more serious complications.

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Conversely, the tube may fail to remain closed in the absence of palatal muscular tension, causing a "patulous tube" phenomenon, in which the sufferer is troubled perpetually by innate bodily sounds and speech heard in the affected ear.

Characteristics:

When tubal occlusion occurs, the initial problem is drop in air pressure in the middle ear. This places tension on the drum, and then the middle ear fills with fluid drawn from the surrounding tissues, forming an effusion and causing an approximate 20% hearing loss. If this is not corrected, bleeding may occur (as in the acute diving/aircraft effects, or the fluid gradually thickens due to an increasing mucoid content, the latter gradually leading to further hearing loss, as the linings of the ear become more thickened.

With time, the tension on the drum slowly stretches the tissues, causing gradual collapse, followed by slow disintegration or scarring of the chain of hearing ossicles; further hearing loss is inevitable.

Finally, the weakened drum may rupture, causing ongoing infection as the middle ear is exposed to outer canal bacteria, or the stretched drum cannot continue its self-cleaning ability. Keratin (dead skin) accumulates in the collapsed area, which may gradually form an invagination (cholesteatoma) into the middle ear, infecting and eroding the contents and surrounding tissues. Major complications may follow, including abscesses, or brain infections.

Treatment:

Shorter-term dysfunction is often successfully managed by simple vent tube insertions, which stabilise the ear until the cause has resolved. Vent tubes do not cure the dysfunction itself. Tube insertion is particularly successful in the pressure-induced cases where the original cause is self-limiting. Other situations, such as childhood effusions, benefit by concurrent removal of the adenoids or treatment of other nasal disease causes, e.g. by drainage of sinusitis. However, long-term dysfunction can remain a problem, sometimes from birth, as in cleft palate situations. Surgery may be required to reinforce a collapsed/perforated drum, reconstruct broken ossicles, or to clear subsequent infection or cholesteatoma.

Chronic tubal failure as such cannot be successfully corrected by treatment at this time. Surgery may eliminate the risk of complications, but hearing will not be restored in these instances, necessitating the use of hearing aids, or active hearing implants if necessary.

More information:

Aetiology of Eustachian Insuffucuency

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