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Effective Ways to Pop Your Ears When Pressure Builds

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STORY AT-A-GLANCE

- Pain and discomfort in your ear experienced during flying or scuba diving results from changes in external pressure, which must be equalized by changing pressure in your middle ear
- Your Eustachian tube opens during yawning and swallowing, allowing a small air bubble to reach your middle ear where it equalizes pressure with the outside; consider hard candy, gum or sipping on water to activate muscles that open your Eustachian tubes
- Flying while congested may increase your risk of ear pain and discomfort, which may be relieved by using essential oils to reduce congestion or a warm compress against your ear
- Reduce your risk of rupturing an eardrum by avoiding the Valsalva maneuver and never putting anything smaller than your finger into your ear

Editor's Note: This article is a reprint. It was originally published March 24, 2018.

Nearly 20% of Americans, or 48 million people, report having some degree of hearing loss.[1] It may be easy to take hearing for granted as it happens without any effort on your part. However it is a complex process, beginning with sound in your environment and ending in your brain. Unlike any other sense involving a chemical process, such as smell, taste or sight, hearing is strictly the result of physical movement.

This physical movement is dependent on specific factors in your ear canal and Eustachian tube working to equalize pressure between the outside of your eardrum and

inside your middle ear. This is one reason why people have difficulty flying when they are congested. But, before understanding how pressure affects your eardrum and hearing, it helps to understand the structure of your ear.

Hearing and Your Ear

Sound is created by vibrations caused in the air, which your ears capture. The structure of your outer ear helps you decipher the direction the sound originates from and helps direct the sound into the ear canal. As sound waves enter the canal, they vibrate the eardrum, the piece of thin skin sitting between your outer and middle ear.

Behind the eardrum sits the middle ear and a group of tiny bones called the malleus, incus and stapes. Collectively these are called the ossicles and are the smallest bones in your body.[2] As the eardrum vibrates it moves the ossicles to amplify the force of sound as it passes through the middle ear to the inner ear and the cochlea.

The cochlea looks like a large snail and is filled with fluid to conduct sound to the auditory nerve, which then translates the impulses to your brain for interpretation. While the concept of how hearing works is fairly straightforward, the specifics of how the small structures produce recognizable patterns of sound in your brain is complex.

Scientists are still learning how your brain interprets these electrical signals in the cerebral cortex, especially as it relates to prevention and treatment of hearing loss.

The structures behind your eardrum are in a closed system. In other words the eardrum maintains an airtight seal between your outer ear and your middle ear, which does not allow any movement or exchange of air.

This structural element becomes significant as you move from one area of air pressure to another, such as when you go scuba diving or ride in an airplane. Your middle ear is connected to the outside through your oral and nasal cavities and pharynx by your Eustachian tubes.

Why Does Pressure Build in Your Ears?

The surface of the earth is covered in a thick layer of molecules called the atmosphere. Although the atmosphere is only a fraction of the density of the ocean or the soil, the atmosphere behaves in much the same way. For instance, going deeper into a pool or lake, pressure becomes greater. The same is true with atmospheric pressure. The closer you get to sea level the greater the air pressure on your body.[3]

On the other hand, the higher above sea level you are, the less pressure is exerted. You experience the difference when you have difficulty exerting energy without losing your breath. At sea level, not as much hemoglobin is required to transport oxygen through your body.

However, at higher elevations lower atmospheric pressure reduces the partial pressure of inspired oxygen and the driving force for gas exchange in the lungs.[4] When you go to higher levels, it takes your body a week or two to acclimate and produce enough hemoglobin to transport adequate amounts of oxygen.

A similar event happens behind your eardrum. While your eardrum acts as a barrier to liquids, it requires air pressure on both sides of the eardrum to be roughly equal in order to allow vibration of the drum and hearing. Normally, equalizing this pressure is something your body does quite easily.[5] Inside your ear is a pocket of air normally the same pressure as what's found outside your ear. When the pressure around you changes the air pushes in on the eardrum.[6]

On the other side of the eardrum is the Eustachian tube, helping to equalize pressure between the inside and outside. It opens when you swallow so you may hear a small pop as the pressure is equalizing. This tube is more vertical in adults than in children. In small children the tube is more horizontal, allowing for fluid buildup and bacterial growth, which may lead to ear infections.

When the Eustachian tube is unable to open, pressure in the middle ear decreases.[7] Thus, by opening the Eustachian tube and allowing the air bubble to move, the body

quickly equalizes pressure between the middle ear and the outside. This reduction in pressure often includes a reduction in pain and discomfort.

What Happens When Your Ears Pop?

Increasing or decreasing pressure usually has no effect on fluids or the solid part of your body. However, it has an effect on gas-filled cavities, such as your ear, as demonstrated in this short video.

The difference in altitude creating pressure between the external ear and the middle ear is one of the most common complaints from airline travelers. Often, it's a simple annoyance resulting in temporary pain or even temporary hearing loss. However, due to the difference in formation of the Eustachian tube in children, they may experience greater discomfort.

As an airplane takes off, the cabin pressure drops, as does the pressure on the outer ear. With this change, the eardrum becomes distorted until compensation occurs in the middle ear.[8]

If the pressure does not equalize between the outer and middle ear, the eardrum will bulge outward, causing pain and discomfort. A similar thing happens with pressure change as the plane descends, except in this case the eardrum bulges inward. As an airplane reaches cruising altitude, the cabin pressure normalizes so there is no difference in pressure between the inner ear and the outer ear.

If the eardrum remains deformed it causes physical discomfort but also decreases vibrations of the eardrum, making sound muffled.[9] The Eustachian tube, which connects the middle ear to the outside, is normally closed. However, with sufficient pressure difference between the middle ear and the pharynx, the Eustachian tube can open.

As the Eustachian tube opens, it lets pressure in the middle ear to equalize with the external pressure, allowing the eardrum to return to its normal shape.[10] The popping or clicking sound you hear as your ear pops is a small bubble of air entering the middle ear through the Eustachian tube to equalize pressure.[11]

Swallowing normally produces slight clicking noises as this bubble moves into the inner ear to equalize pressure. You may consider some of the strategies outlined below to help your Eustachian tube open and reduce the amount of discomfort you experience as you move to different air or water pressures.

Simple Strategies Reduce Ear Pressure

Muscles control the opening and closing of the Eustachian tube, which may be activated using these strategies.[12,13,14]

- **Yawning and swallowing —** These movements activate muscles to open the Eustachian tube. Try to force a yawn several times until your ears pop. Alternatively, sip water to help increase the need to swallow.
- **Toynbee maneuver —** For this technique, you'll pinch your nose closed with your fingers while swallowing at the same time. This technique may be as effective as the Valsalva maneuver (pinching your nose, closing your mouth and gently blowing out your nose) without the added associated risk of rupturing your eardrums.
- **Frenzel maneuver —** To do this, pinch your nose closed and use your tongue to make a clicking sound or a "k" sound.
- **Decongest your Eustachian tubes —** When your Eustachian tubes have difficulty opening because you're already congested from a cold, holding a warm washcloth or heating pad against the ear may help eliminate the congestion. This will help to open the Eustachian tube and allow pressure to equalize. Additional options to help reduce congestion prior to, while and after flying is to use essential oils, including bay oil, myrtle oil or amyris oil.

Since babies are not able to intentionally pop their ears, you can assist them by encouraging bottle-feeding, nursing or pacifiers during times when pressure changes are likely, such as during ascending and descending in an airplane. Do not allow a baby to sleep during descent as children are especially vulnerable to blockages since their Eustachian tubes are narrow and set at a different angle.[15]

While sleeping, they are unable to swallow or yawn, increasing the risk they'll develop severe discomfort or pain. If you can't get your ears unclogged or are experiencing pain days after riding in an airplane, it may be time to consult with your physician. Your doctor can help rule out any underlying medical condition extending your symptoms of discomfort and pain.

These conditions can include sinus or ear infection, ear wax buildup, temporomandibular joint disorder or enlarged adenoids.[16]

Using These Strategies May Cause Damage

Although commonly used, the Valsalva maneuver may cause your eardrum to rupture. While this may help to open the Eustachian tubes, if done with any force it may rupture your eardrum.[17]

Additionally, never put anything smaller than your finger in your ear to relieve pressure or reduce pain as it is easy to rupture the eardrum.[18] While your eardrum may rupture in flight if you are not able to equalize the pressure, it is unwise to do anything that may increase your risk. Complications from a ruptured eardrum may include some hearing loss, middle ear infection, or the development of a cholesteatoma (middle ear cyst) consisting of skin cells and debris.[19]

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