

## Eardrum—Perforated

A ruptured eardrum — or perforated tympanic membrane as it's medically known — is a hole or tear in your eardrum, the thin drum-like tissue that separates your ear canal from your middle ear.

A ruptured eardrum can result in hearing loss and make your middle ear vulnerable to infections or other injury.

A ruptured eardrum usually heals within a few weeks without treatment. Sometimes, you may need a procedure to promote healing of a ruptured eardrum or need surgical repair for a ruptured eardrum.

### Causes

Your eardrum (tympanic membrane) has two primary roles:

- **Hearing.** When sound waves strike it, your eardrum vibrates — the first step by which structures of your middle and inner ears translate sound waves into nerve impulses.
- **Protection.** Your eardrum also acts as a barrier protecting your middle ear from water, bacteria and other foreign substances.

Causes of a ruptured, or perforated, eardrum may include:

- **Middle ear infection (otitis media).** A middle ear infection often results in the accumulation of fluids in your middle ear. Pressure from these fluids can cause the eardrum to rupture.
- **Barotrauma.** Barotrauma is stress exerted on your eardrum when the air pressure in your middle ear and the air pressure in the environment are out of balance. If the pressure is severe, your eardrum can rupture. Barotrauma is also called airplane ear, because it's most often caused by air pressure changes associated with air travel. Other events that can cause sudden changes in pressure — and possibly a ruptured eardrum — include scuba diving and a direct blow to the ear, such as the impact of an automobile air bag.

- **Loud sounds or blasts (acoustic trauma).** A loud sound or blast, as from an explosion or gunshot - essentially an overpowering sound wave — can cause a tear in your eardrum.
- **Foreign objects in your ear.** Small objects such as a cotton swab or bobby pin can puncture or tear the eardrum.
- **Severe head trauma.** Severe injury, such as skull fracture, may cause the dislocation or damage to inner ear structures, including your eardrum.

## Complications

Complications can occur while your eardrum is healing or if it fails to heal. Possible complications include:

- **Hearing loss.** Usually, hearing loss is temporary, lasting only until the tear or hole in your eardrum has healed. The size and location of the tear can affect the degree of hearing loss.
- **Middle ear infection (otitis media).** A perforated eardrum can allow bacteria to enter your ear. If a perforated eardrum doesn't heal or isn't repaired, you may be vulnerable to ongoing (chronic) infections that can cause permanent hearing loss.
- **Middle ear cyst (cholesteatoma).** A cholesteatoma is a cyst in your middle ear composed of skin cells, your ear canal's normal waxy discharge (cerumen) and other debris. This debris normally migrates to your outer ear in the form of earwax. If your eardrum is ruptured, the debris can pass into your middle ear and form a cyst. A cholesteatoma provides a friendly environment for bacteria and contains proteins that can damage bones of your middle ear.

## Testing

Your family doctor or ENT specialist can often determine if you have a perforated eardrum with a visual inspection using a lighted instrument (otoscope).

He or she may conduct or order additional tests to determine the cause of the rupture or degree of damage. These tests include:

- **Laboratory tests.** If there's discharge from your ear, your doctor may order a laboratory test to detect a bacterial or viral infection of your middle ear.
- **Tuning fork evaluation.** Tuning forks are two-pronged, metal instruments that produce sounds when struck. Simple tests with tuning forks can help your doctor detect hearing loss. A tuning fork evaluation may also reveal whether hearing loss is caused by damage to the vibrating parts of your middle ear (including your eardrum), damage to sensors or nerves of your inner ear, or damage to both.
- **Tympanometry.** A tympanometer uses a device inserted into your ear canal that measures the response of your eardrum to slight changes in air pressure. Certain patterns of response can indicate a perforated eardrum.
- **Audiology exam.** If other hearing tests are inconclusive, your doctor may order an audiology exam, a series of tests that measure how well you hear sounds at different volumes and pitches.

## **Treatments and drugs**

Most perforated eardrums heal without treatment within a few weeks. If the tear or hole in your eardrum doesn't heal by itself, treatment will involve procedures to close the perforation. These may include:

- **Eardrum patch.** If the tear or hole in your eardrum doesn't close on its own, an ENT specialist may seal it with a paper patch. With this office procedure, your ENT may apply a chemical to the edges of the tear to stimulate growth and then apply a paper patch over the hole. The procedure may need to be repeated more than once before the hole closes.
- **Surgery.** If a paper patch doesn't result in proper healing or your ENT determines that the tear isn't likely to heal with a patch, he or she may recommend surgery. The most common surgical procedure is called tympanoplasty. Your surgeon grafts a tiny patch of your own tissue to cover the hole in the eardrum. This procedure is done on an outpatient basis, meaning you can usually go home the same day unless medical conditions require a longer hospital stay.