



Pulsatile Tinnitus Foundation

Information for Patients with Pulsatile Tinnitus

Pulsatile tinnitus (PT) is a common symptom originating from turbulent blood flow within blood vessels (veins and arteries). It is often described as a **swushing, whooshing, thumping, or fetal monitor sound**, which happens in time with the heartbeat. Most often the origin of these sounds is within the head, though it can come from the neck or chest. An accurate diagnosis of the underlying cause of this symptom is essential for effective treatment. PT should not be confused with other audible rhythmic sounds that are *not* in time with the heartbeat.

Evaluation

Patients with PT should be evaluated by an otolaryngologist (Ear, Nose, and Throat) and neurovascular specialists (interventional neuroradiologist, interventional neurologist, endovascular neurosurgeon) with expertise in this symptom. A thorough history must be taken focusing on timing, onset, severity, aggravating/alleviating conditions, etc. The physical is a comprehensive head and neck exam, and should always include listening to the skull, neck, and chest with a stethoscope. In addition, an audiogram (hearing test) should be obtained in all patients. Depending upon the findings of the examination and the hearing test, imaging consisting of either a CT, MRI, or ultrasound may be ordered. In very rare instances an angiogram is required. Blood tests such as red blood count (hemoglobin), cholesterol level, and thyroid tests are obtained when anemia, hyperthyroidism, or atherosclerosis are suspected.

Treatment

Successful treatment of PT is entirely dependent on an accurate diagnosis and differs for the varied diagnoses. As most causes are benign and not life-threatening, observation (no intervention) is a reasonable option for many patients. However, for those with more serious conditions causing PT, or for those whose PT is extremely bothersome, there are many possible treatments depending on the cause.

Conditions that may be treated medically include idiopathic intracranial hypertension, anemia, and migraines. Others may be treated with either surgery or interventional radiology procedures.

Caution: Some patients and even surgeons may be tempted to “tie off” the large veins in the neck, especially if compression of these veins in the clinic results in a decrease/elimination of the PT. This procedure **should never** be performed. It is not only ineffective in the long-term, but it is also associated with significant, often life-threatening risks. Likewise, stenting of the cervical internal jugular vein is also frequently associated with long-term complications and should be avoided (unlike intracranial sinus stenting, which is often curative).

In our experience, the most common causes of etiologies of PT are stated below.

1. **Idiopathic Intracranial Hypertension Syndrome.** (Historically known as “benign intracranial hypertension” or “pseudotumor cerebri”). This is a condition characterized by build-up of pressure inside the skull/brain. While it frequently affects overweight females, all ages and demographics are encountered. In addition to PT, headaches and blurred vision are sometimes associated symptoms.
2. **Sigmoid Sinus and Jugular Bulb Abnormalities.** This is when the shape of major veins inside the head results in turbulence of blood flow, and/or when there is loss of bone overlying a major vein allowing sound to transmit directly to the ear. This condition does not have the risk of a stroke. Nearly all patients with venous causes of pulsatile tinnitus can suppress their sound with ipsilateral jugular compression, and occasionally exacerbate it with contralateral compression.
3. **Arterial narrowing or irregularity.** Any kind of narrowing or stenosis of the carotid (and less often vertebral) artery can result in turbulent flow at and beyond the site of stenosis. This loud flow can be heard as pulsatile tinnitus. Examples include atherosclerosis, dissection (tear of the artery wall), fibromuscular dysplasia (FMD), and others.
4. **Migraine.** Up to 2% of individuals with migraine have PT, which usually occurs in both ears and tends to be high frequency (pitch).
5. **Arteriovenous Fistula.** This is a direct communication between arteries and venous sinus or cortical veins in the lining of the brain called the “dura.” Many produce loud and objective pulsations, especially when involving the sigmoid sinus or jugular bulb. This condition carries risk of a potential stroke, epilepsy, and other major morbidity.
6. **Glomus Tumors of the Middle Ear & the Undersurface of Skull.** These are benign slow growing tumors but if left untreated can substantially impact quality of life and when very large can be life-threatening.
7. **Superior Semicircular Canal Dehiscence Syndrome:** This is an absence of bone over the balance canals. Although frequently associated with imbalance/dizziness, PT is its most common symptom.
8. **Sensorineural (nerve type) Hearing Loss.** This usually affects older individuals (hearing loss of aging). Associated PT often occurs in both ears and, unlike most PT, is high-pitched. Although the PT associated with this problem is in sync with the pulse, it does not arise from a vascular (blood vessel) source.
9. **Fibromuscular Dysplasia (FMD).** This disease mainly involves the arteries of the neck and kidneys. It most often presents in women between 20 and 60 years of age. PT can be the only symptom and is related to irregular morphology of the involved artery, or sometimes a direct (vertebro-vertebral) fistula. High blood pressure and headache are other potential manifestations.
10. **Pregnancy.** PT may develop rarely during pregnancy, especially the third trimester, and is likely due to a normal increase in blood volume. This condition may subside soon after delivery.
11. **Hyperdynamic States.** Basically, any state of pathologically high / fast overall global blood flow. Examples include low red blood cell counts (anemia), hyperthyroidism, sickle cell disease, and others.
12. **Other causes are of course encountered.** Evaluation by a physician familiar with PT is often necessary.