Primary and Referred Otalgia: Overview for the Family Physician

Beth Lange, MD, FRCSC

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The plugged or painful ear is a common presentation in family practice, with a large differential diagnosis. Otolgia can be caused by primary otologic disease, but it can also be referred from other anatomical areas that share a common nerve supply.

Primary otalgia often has accompanying symptoms, such as hearing loss, tinnitus, dizziness, and signs of infection, such as fever or discharge from the ear canal.

Referred otalgia is sensed in the area of the ear, but the discomfort originates from a non otologic source. Often, clear symptoms of ear disease are not present. Knowledge of the causes of referred otalgia should guide appropriate investigation, and it may expedite treatment if a more serious diagnosis is present.1,2

**Primary Otologic Causes: Eustachian Tube Dysfunction**

Eustachian tube dysfunction is one of the most common causes of primary otalgia. The main function of the opening of the eustachian tube during swallowing or yawning is the equalization of ambient atmospheric pressure in the middle ear. Consequently, the sensation of eustachian tube dysfunction (ETD) is similar to the discomfort felt in the ear during airplane descent.

In patients who complain of a plugged ear, hearing loss is the most important symptom. This type of hearing loss is often described as “echoing,” and patients say that they feel like they are “in a barrel.” The interested physician can reproduce this by pressing their own tragus to occlude the ear canal while speaking or humming. The sound is heard best in the ear with conductive hearing loss, and it is the basis of the Weber tuning fork test.

It should be remembered that a patient may describe sensorineural hearing loss (SNHL) as a “plugged” sensation. An audiogram and tympanogram (which tests middle ear function) will differentiate between eustachian tube dysfunction and SNHL. These hearing tests may be done by a community audiologist.

Careful examination of the tympanic membrane in eustachian tube dysfunction will show retraction, or “pulling in” of the tympanic membrane, and the malleus handle assumes a more horizontal position. Examination may also show other problems, such as wax impaction, infection, cholesteatoma, or tumour.

**Treatment for Eustachian Tube Dysfunction**

When ETD occurs with an upper respiratory tract infection, sinusitis, allergies, etc., then
appropriate treatment of the primary cause combined with short courses of decongestants, antihistamines, and nasal steroid sprays is the usual recommendation.

In the case of a serous otitis with associated mouth breathing in children, a plain x-ray of the lateral nasopharynx should be conducted to rule out adenoid enlargement. The physician should have a high index of suspicion for nasopharyngeal carcinoma in Asian or Inuit patients presenting with a serous otitis. Epistaxis and nasal obstruction may also be present, and the patient should be referred urgently to an otolaryngologist for endoscopic examination of the nasopharynx. A plain x-ray or CT scan of the nasopharynx can be ordered.

Referred Otolgia

If pain or a “plugged” sensation exists without any other otologic symptoms, with normal examination and hearing, then referred otalgia is likely to blame.

Origins of Referred Otolgia

The innervation of the ear is supplied by four cranial nerves (CN), V, VII, IX and X, as well as two superior cervical plexus nerves, C2 and C3. Each of these nerves is shared by other anatomical areas, and referred pain in the ear can be traced to the areas that share these nerves.

The auriculotemporal nerve (CN V) supplies sensory afferents to the tragus, anterior auricle, anterior wall of the external canal, and anterior portion of the lateral tympanic membrane. These nerves are shared by the temporomandibular joint (TMJ), teeth, mandible, and parotid submandibular gland, and pain in these regions of the ear may be due to TMJ dysfunction, dental and mandibular pathology, as well as parotid disease.

The posterior auricular nerve (CN VII) sends sensory afferents that provide innervation of the posterior wall of the external ear canal, posterolateral surface of the tympanic membrane, and posterior skin of the auricle. Here, referred pain may come from a cerebellopontine angle tumour (acoustic neuroma), herpes zoster, and pathology in the pharynx, base of the tongue, and tonsils.

The glossopharyngeal nerve (CN IX) provides sensation to the concavity of the concha, the inferior and posterior aspects of the external auditory canal, and the lateral surface of the tympanic membrane. Referred pain in this area may result from sinusitis, a pharyngeal or base of tongue tumour, glossopharyngeal neuroma, or laryngeal pharyngeal reflux.

The vagus nerve (CN X) provides sensation to the concavity of the concha, the inferior and posterior aspects of the external auditory canal, and the lateral surface of the tympanic membrane. Referred pain here may be caused by esophageal pathology, such as cricopharyngeal spasm or esophageal tumour. Upper mediastinal and left and upper pulmonary lesions may cause pain in the left ear, owing to the difference in the course and relations of the left vagus nerve.

Finally, the cervical plexus nerves (C2 and C3) innervate the posterior auricle and the skin overlying the mastoid bone and parotid. Referred pain may be caused by cervical spine degenerative disease and Arnold-Chiari malformation type 1.
History

Referred otalgia is a diagnostic challenge that should begin with a complete head, neck, and chest history and examination. Special attention should be paid to the following aspects of the patient’s medical history:

- Head and neck infections, thyroid disease
- Dental problems, pain aggravated by jaw movement, wisdom teeth
- Cancer risk factors (e.g., smoking and alcohol)
- Gastroesophageal reflux
- Trauma
- Dysphagia, odynophagia, voice change
- Cervical spine arthritis
- Cardiopulmonary history

Examination and Diagnosis

An examination of the ear is necessary to identify any primary ear pathology. Unilateral ear symptoms should include a conductive hearing loss (serous otitis media, etc.), and SNHL should be excluded by the Weber test. A 512 tuning fork held on the top of the forehead will localize to the ear with greater conductive hearing loss. The nose, throat, head, and neck should also be examined, including palpation of the parotid and submandibular salivary glands.

The thyroid and cervical lymph nodes should be evaluated, and an indirect or fiberoptic exam of the larynx should be conducted. The history and examination should guide the physician in ordering tests. For example, a long-time smoker with left otalgia should have a chest x-ray done to rule out a Pancoast tumour of the lung.1

Temporomandibular joint dysfunction is one of the more common causes of referred otalgia.3 Palpation of the TMJ during jaw movement is done by placing the examiner’s small finger in the ear canal and pressing gently anteriorly over the joint capsule. Similarly, intra-oral palpation of the area between the upper and lower molars (the retromolar trigone) may also cause pain with wisdom teeth problems. The physician may give temporary relief with analgesia, soft diet, and warm compresses, but the patient should be referred to a dentist for more definitive management.

Finally, cervical spine disease may cause pain below and behind the ear. It is often related to changes in neck position and was found to be the cause of referred otalgia in 30% of patients in one study. This finding will likely increase as the population ages.5

It is important to remember that the symptoms of referred otalgia can suggest serious disease. Patients with a history of smoking, alcohol use, GERD, and HPV are at risk for oral, head, and neck cancers. Laryngeal and esophageal cancers present with voice changes, dysphagia, and odynophagia. Thyroid cancer (particularly with a positive family history) may be difficult to appreciate in the obese neck, and neck ultrasound is very helpful, particularly as more diagnostic imaging facilities are doing ultrasound guided fine needle biopsy for thyroid as well as neck masses.6

References


Dr. Beth Lange is a Clinical Associate Professor in the Departments of Surgery and Clinical Neurosciences at the University of Calgary in Calgary, Alberta.