Testing Hearing

Each ear is tested separately by applying light finger pressure to the tragus to occlude the opposite ear. Some recommend that this finger should be gently rotated to rub the skin creating a masking noise. A word or number is whispered softly to see if the patient can hear. The patient must either have their eyes closed or be unable to see your lips moving. Some practitioners use the number 26 to test higher tones and 100 to test lower tones.

The Rinne and Weber tests are commonly performed as a supplement to checking hearing by whispering.

Which tuning fork?
A tuning fork of 256Hz or 512Hz is used.
Note this is much higher pitched than the fork used for testing vibration sense: 128Hz ENT consultants would be most indignant if a “neurologist’s tuning fork” were used for hearing!

Sensorineural loss is also frequently called:
Nerve deafness
Perceptive deafness
Presbyacusis

Terminology
Sensorineural deafness implies deafness due to disease of the sensory system in the cochlea or damage to the acoustic component of the eighth nerve. The most common cause of this is “wear and tear” type degeneration affecting the cochlea, which is common with age and accelerated in people exposed to prolonged or excessive noise. Typically high frequencies are affected first. The general term is “perceptive loss”, but sometimes the term “presbyacusis” is used; this implies that hearing is OK if the source is nearby (presby), but there is real difficulty in a large room with background noise.

Causes of sensorineural loss
Presbyacusis
Drugs eg aminoglycosides
Meningitis
Paget’s disease (compressing nerve in temporal bone)
Acoustic neuroma (nerve damage in cerebello-pontine angle)

Causes of conductive loss
Wax
Chronic serous otitis media (glue ear)
Acute otitis media
Otosclerosis

This includes causes affecting the external canal, tympanic membrane and middle ear containing the ossicles.

The Rinne test
Normally conduction of sound through the air via the external canal, tympanic membrane and middle ear is about twice as efficient as conduction through bone. The Rinne test is designed to see if this is the case. The tuning fork is held over the mastoid process and then in front of the external canal and the patient asked which is louder. Alternatively, it may be held over the mastoid until it fades and then moved to in front of the meatus to see if the sound is still audible.
Normally, air conduction is better than bone conduction and this is referred to as a positive Rinne test (AC>BC)
In sensorineural deafness, both AC and BC are reduced, but the ratio is maintained and the Rinne remains positive. Its main use is in a conductive deafness, where bone conduction is good but air conduction is impaired- BC>AC- this is referred to as a negative Rinne. This implies a hearing loss of 15-20dB.

The Weber Test
The tuning for is held on the vertex or the centre of the forehead and the sound should normally be heard in the middle of the head. This tests bone conduction through the skull to the cochlea and auditory nerve.

In conductive hearing loss- the sound is lateralised to the affected ear. This may be because the nerve becomes more sensitive to sound (up-regulation of sensitivity) in an attempt to compensate for the middle ear problem (conductive loss). If there is bilateral conductive loss, the sound is localised to the ear that is more severely affected.

So in a conductive deafness, the Rinne test will be negative and the Weber test will localise to the affected ear.

This Weber test is more sensitive than the Rinne test and may show lateralisation to the affected ear with only 5dB of conductive loss. If the Rinne is positive (normal) and the Weber lateralises to the affected ear, this implies a hearing loss of between 5dB and 15dB.

In perceptive loss, the results of the Weber test are very variable. The typical (but not invariable) finding in perceptive deafness is that the sound localised to the normal ear. But sometimes the sound does not localise even when severe unilateral perceptive deafness is present- instead it may be heard in the midline.

“False negative” Rinne
In very severe unilateral deafness, the Rinne may be negative- with air conduction absent and bone conduction present via transmission to the opposite cochlea. It would be easy using this test alone to make the false assumption of a conductive loss. This is where combining the Weber test helps- if the problem were conductive, the Weber test would localise at this ear. However, if it does not localise, the diagnosis is probably “total deafness”.

Typical finding with moderate unilateral conductive loss:
Rinne negative (BC>AC) on affected side
Weber lateralises to affected ear.

Typical finding with moderate unilateral sensorineural loss
Rinne positive (AC>BC) in affected ear
Weber lateralises to opposite ie normal ear