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Hearing impairment

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The rhythms of life: conversation, the roll of the train, rain on the roof and the pulse of music. For most of us, these are taken for granted; sound is how we sense the world, how we interact with others. Sound adds colour to life, alerts us to opportunity or to threat, and evokes the romance or the danger in a motion picture. So much that is taken for granted. Can you imagine what life might be like without this fabric of our human experience? This chapter explores how life may be lived to its full extent when the challenge of hearing impairment is your reality. It is written from the perspective of a doctor whose privilege it is to treat the hearing impaired, and who has watched people come to terms with their sensory impairment and through this journey regain their confidence and love of living.

How does hearing impairment manifest?

For most people, the first indication of hearing loss is an increased difficulty in following conversation when there is considerable background noise. Typically, this may be a family gathering, a party, or speaking with someone on a busy street; the 'ease of listening' that has until now has been taken for granted is gone, and much greater concentration is required to follow conversation. At this stage of 'mild' hearing impairment there is usually no problem conversing when the listening environment is less trying — for example, during a one-on-one conversation over coffee. Other family members might, however, grumble that the person

doesn't always attend when spoken to, especially when being called from another room. When children have a hearing impairment they may seem not to attend to parental instruction, especially while involved in noisy play.

Mild hearing loss is typically associated with denial — the person concerned seldom acknowledges the problem, and may suggest to others that it is they who are not speaking clearly! A particular vulnerability is at work, where colleagues may not feel comfortable to raise the possibility of hearing loss.

Moderate hearing loss is much more noticeable to the person concerned. While still able to carry out a conversation one-on-one in a quiet room, daily life will be impacted more severely. The enjoyment of social engagement may be dulled because it has become difficult to keep up with the flow of conversation among a group of people. Parties become hard work. Following the dialogue at the movies is no longer straightforward. People may respond by withdrawing themselves from social situations, and arguably the greatest burden of hearing loss, namely progressive social isolation, emerges.

If the hearing loss is severe to profound, many people have real trouble hearing on the telephone, they cannot follow the TV, hear at the movies or participate in conversation among a group of people. It may still be possible to converse one-on-one, but the other party will need to face the hearing-impaired person and speak clearly and slowly. Untreated, most people withdraw from social life, and are unable to undertake employment where oral communication is required. Music will sound distorted, and no longer be aesthetically as pleasing. Another difficulty encountered is an inability to hear environmental sounds: the front door bell, the telephone ring, a smoke alarm, a car horn, or the approach of a tram. Environmental sounds help to keep us out of harm's way; they give a mother confidence that she knows when her baby is crying, and alert us when other person wishes to make contact. It

is little wonder that hearing-impaired people are prone to lose self-confidence, feel alone in the world, or experience depression.

Acknowledging that something needs to be done

The first step towards relieving the burden of hearing loss is to acknowledge that there is a problem and to seek help. This may seem like a surprising thing to say, but an extraordinary number of people in our community do not seek help. The milder the hearing loss, the more people tend to resist seeking professional attention. For others with more severe hearing loss, their reluctance to progress the matter may be based upon denial of the loss, or a belief that nothing can be done. But this is seldom the case given the improvements in hearing aid and other technologies to rehabilitate a hearing loss.

Families should encourage their relatives to see either an audiologist or an ear nose and throat surgeon (ENT) when hearing loss is suspected. The ENT will determine whether the problem arises from the ear canal, the middle or the inner ear, and assess whether the condition can be treated medically. The hearing test will help to confirm the severity of the hearing loss, and how this has impacted upon the understanding of speech.

Optimising your hearing, and realistic expectations concerning rehabilitation

So, what can be done for hearing loss? Before we come to this, it is helpful to provide a brief overview of the types of hearing impairment. These may be understood as being caused by either a problem with the conduction of sound through the ear canal, the ear drum or the tiny bones that connect the drum to the inner ear (which is known as a conductive loss), or a loss of function of the inner ear and or its neural connections, which we call a sensorineural hearing loss.

In general, a conductive loss can be treated by surgery, or if preferred, a hearing aid. When the conductive loss has been overcome, the sound quality is excellent, approaching that of normal hearing.

Sensorineural hearing loss, on the other hand, is in most people permanent, and can only be treated with either a hearing aid or an auditory prosthesis, such as a cochlear implant. Age-related and noise-induced hearing losses are the most frequently encountered types of sensorineural loss, but there are many other manifestations, such as hereditary or drug-induced deafness. A distinguishing feature of sensorineural loss is that even with optimal treatment, sounds may seem distorted, and lack clarity. Minimising this distortion has been a major focus of hearing aid development for many years. Understanding that when the sensorineural loss is severe enough that the distortion makes communication near impossible was Graeme Clark's motivation for developing the bionic ear.

Coming to terms with the reality that a hearing aid cannot lead to crystal-clear hearing when the deafness is sensorineural is of profound importance in making the best of a hearing aid. The sound will not be normal. But our brains have a remarkable capacity to adapt to new listening conditions, and after a few months most people perceive their aids as being much more natural sounding. This effect is even more pronounced with a cochlear implant, which for most people sounds severely distorted when first used, but over the next few months begins to sound much more as people remembered normal hearing to be. We call the brain's capacity to make these adjustments 'neural plasticity'. This happens quite naturally, and all one has to do is 'let it happen'. I urge you to start off with realistic expectations: do not anticipate natural sounding hearing with your aid, but have confidence that with time, this will come.

Another important thing to appreciate is that dissatisfaction with hearing aids will often occur because they are not optimally

'tuned up', or that the aid in current use is no longer appropriate for the hearing loss. These problems are those most often encountered when a long-standing hearing aid user is finding it more difficult to hear. Setting up a hearing aid is an art, and it requires an experienced audiologist or appropriately qualified audiometrist. Internet-based set-up is now feasible and can be very effective, but this is still overseen by an audiologist. Cheap aids advertised in the local newspapers are to be avoided; these cannot be optimised in the manner required to provide the best hearing and are likely to lead to unsatisfactory outcomes. As one's hearing loss progresses, it is necessary to change the aid from time to time in order to ensure that the device is fit-for-purpose. Similarly, many non-users of hearing aids bought them some years prior, and the aid may now be inadequate.

Understanding your own hearing needs

When considering one's own hearing loss and its remediation, two important principles need to be addressed. The first is that hearing requirements can vary considerably between individuals, depending upon their social and work needs. The second is that hearing with two ears is always easier than hearing with one. Two ears are required in order to perceive the direction from which a sound originates. This we call sound 'localisation'. Localisation is a key step in selectively attending to sounds of interest (such as a voice, or music), and separating these from competing noise. We do this automatically, both with hearing and also with vision.

The idea is perhaps easier to understand with vision: consider something in your peripheral vision. Most likely, you will not have even been aware of it until you have actively thought about it — that is, until you attended to it. Sound localisation is one of the more important reasons why hearing is always better with two ears. Individuals with only one hearing ear will describe considerable difficulties when listening in the presence of background noise. This is the reason why, whenever possible, it is recom-

mended that hearing is optimised in both ears, and not just one. However, whether this is really necessary depends upon one's hearing requirements. For the CEO of a large corporation, everything possible may need to be done to rehabilitate hearing in both ears, so that conversation can be followed in the boardroom, or large social occasions. On the other hand, an older person living by themselves, who usually converses one-on-one in a quiet room, may be equally well served with a hearing aid in one ear. What we learn from this is that it is important for individuals to have insight into the specific situations where they need to hear better. This will inform the clinical decisions relating to hearing rehabilitation.

Strategies for living

Living life to its best means learning how to adapt to hearing loss, as much as it does optimising hearing with aids, surgery or a hearing prosthesis such as a cochlear implant. Family members and friends of a hearing-impaired person may need to learn to face the individual prior to commencing a conversation, or to gain their attention in other ways (such as touch). Care should be given to the choice of environment for social interactions: noisy, reverberant places (like many restaurants) are less appropriate than a quiet room. Sitting in the corner or a nook of a restaurant is usually better than being in the middle of the room, and an outside table can also be good. At home or at work, carpets or rugs can reduce reverberation of sound, which can be a major issue for clarity of hearing. During family gatherings, reduce distracting noise, such as the television or background music. Assistive listening devices, such as telephones for the hearing impaired, the teletext phone relay service, or remote headphones for watching the television can also make a big difference.

There has recently been a technological revolution leading to devices that communicate wirelessly with a hearing aid. These hold great promise for improving communication and the independence of hearing-impaired people. Mobile phones can talk directly

to contemporary hearing aids, and can also be used to stream music. Remote microphones, which communicate wirelessly with a hearing aid, may be worn by a teacher in class, a podium speaker or a companion in a noisy café. Similarly, advances in digital signal processing have improved the 'smartness' of hearing aids, so that many can detect the type of listening environment and change the way in which speech or music is extracted from competing sound signals. When done automatically, the result is 'adaptive' listening, where the aid switches settings in response to the ambient sound environment without user intervention. This means that hearing can now be optimised in a much wider range of listening situations. Another evolving field that holds promise for assisting communication with the hearing impaired, particularly older individuals who may not be technologically savvy, is automated speech recognition. This is now widely implemented in automated telephone enquiry systems, such as directory enquiries, and is increasing available on mobile phones and tablets, or personal computers. These systems can also transcribe the spoken word, and when used on mobile phones or tablets are an alternative to writing when communicating with a hearing-impaired person. An added advantage of this approach is that the text font can be made very large, which is helpful when a person also has trouble with their vision.

Conclusions

Hearing connects us with others and is the basis for our social engagement. In order to live life to its fullest, it is best to acknowledge one's hearing loss, have insight into when and where one is having difficulties, and seek an opinion on hearing rehabilitation. There are now more options than ever for helping the hearing impaired, and with perseverance one can expect significant improvements in the ease of listening.