Program: Hearing Loss and Cochlear Implant Treatment
Speaker: Lindsay Fletcher, AuD of Advanced Bionics and Ben Copeland, MD, PhD of Otolaryngology Associates LLC, Indianapolis
Introduced by: David Bash
Guests: Don Grayson, Vicky Ko, Vicky Lim, Philip Lim, Rees Morgan, Larry Wilson, Rick Roberts, Dick Morricall, Paul Kellogg, Jim Capron, Karen Steinberger
Attendance: 135
Scribe: John Peer
Editor: Ed Nitka

Today's presenters were Dr Ben Copeland of Otolaryngology Associates and Lindsay Fletcher of Advanced Bionics.

Dr Copeland has a BS from Wittenberg and a MS in Neurology from OSU and a MD/PhD from OSU. He is an ENT surgeon specializing in hearing loss surgeries and, especially, cochlear implants.

Hearing loss is one of the harder problems to deal with as it is not obvious to start. There are two types of hearing loss: Conductive where sound waves are not transmitted to the inner ear and sensorineural where the sound waves are not sensed by the hair cells in the inner ear in the cochlea and, thus, not sent to the brain. 99% of hearing loss issues are sensorineural where the hair cells are not functioning properly.

Symptoms of hearing loss include:

- A sense of "fullness"
- A sense of "distortion"
- A "plugged" sensation
- Tinnitus
- Difficulty in loud background situations
- Missing conversations

Tinnitus is the perception of sound in the absence of external stimuli (e.g. phantom arm) and is often an initial symptom of hearing loss. It affects 40 million in the US, mostly between 40-70 years of age, and more men than women. It is rarely disabling, but often annoying.

Hearing loss is initially diagnosed with an audiogram which measures sensitivity to specific frequencies. Below 25 dB indicates hearing loss. However, another significant measure of hearing loss is clarity, i.e. ability to recognize sounds/words.

Treatments are devices (hearing aids primarily) and/or surgery. Hearing aids are appropriate for mild to severe sensorineural or conductive hearing loss. They are relatively simple as they are noninvasive and fit by audiologists (often in consultation with an ENT physician). Rapid advances in technology have led to small size, improved connectivity, and more "natural" sounds.

Surgical options for conductive hearing loss include ossicular reconstruction (solving malfunctions of the transmitting structure that sends sound waves to the inner ear) and tympanic membrane problems (perforation, sclerosis, collapse).

Surgical options for sensorineural hearing loss include, for unilateral loss, an osseointegrated implant (BAHA/Ponto) that conducts sound waves from the hearing loss ear across the skull to the still functional ear.

The ultimate surgical solution for the most severe sensorineural hearing loss is the cochlear implant. This device bypasses the conductive functions and sends an electronic signal directly into the cochlea inner ear, thus bypassing any malfunction of the ear hair cells. The resulting signal is sent to the brain which interprets the signal as sounds. The cochlear implant is surgically implanted behind the ear in the skull and uses an electronic probe inserted into the cochlea to send the critical signals. The surgery and follow-up costs $50-75K in the first year, which also involves listening training exercises. However, the surgery is highly successful, but occasionally there are complicating factors.

During the Q&A after the presentation, it was mentioned that hearing loss in the elderly makes the elderly twice as likely to develop dementia.

Also mentioned in the Q&A is if a child is born deaf, the cochlear implant is a very successful solution. The earlier the child receives the implant, the better. They have no prior knowledge of what the sounds mean when they sense them with the implant, but they are like an open book in that they can associate the “new” sound with the related cause. Again, the earlier the better for the born deaf; the age of one year was mentioned as an opportune target.

The second part of today’s presentation was given by Lindsay Fletcher, AuD, CCC/A of Advanced Bionics. She graduated from Purdue with a BS in Audiology and then earned a doctorate degree in Audiology from IU. She presently works in the manufacturing side of Advanced Bionics which produces state of the art hearing device solutions. A key posture of Advanced Bionics is to introduce new products only when they make a meaningful difference for the client.

Although Advanced Bionics offers a wide range of state of the art products, a key aspect is the client’s recognition that they need more help. They typically have suffered through hearing loss issues for a while, but not until they have run out of simple solutions, will they be receptive to advanced solutions offered by Advanced Bionics.

Advanced Bionics introduced their first cochlear implants in1995 with a ceramic case. They have evolved the technology consistently since then with significant new products in 2003 (Hi-Res 90K CI) and 2016 (Hi-Res 3D CI). The most advanced products have intelligent adaptive electronics to adapt to all clients. A special feature of their latest design is an innovative magnet design that self-aligns when a client needs to take an MRI. Previously, the client would need to have medical procedure or suffer significant pain during the MRI. Their products offer a complete range of hearing solutions from no hearing (Bi and Uni-lateral CI) to solutions for some hearing (a CI and a Naida ™ hearing link to the good ear).

After Phonak’s acquisition of Advanced Bionics, together they can offer complete device solutions for hearing loss problems.

As commented by both Dr Copeland and Lindsay Fletcher, training and listening exercises are important for the Advanced Bionics (or competitors) products to realize the full benefit.

Thanks to both Dr Copeland and Lindsay Fletcher for a very informative presentation.

Lindsay Fletcher and Ben Copeland