

Remote Microphone Design for Patients with Outer Ear Malformations

Personalized Hearing Devices for Unique Situations

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Abstract

Concomitant hearing loss with cranio-facial abnormalities is a common occurrence. These patients present challenges when being fit with traditional amplification using either Behind-The-Ear or custom In-The-Ear technology. Remote microphone (RM) hearing instruments, using an externalized microphone, provide personalized flexibility when manufacturing custom instruments. This clinical poster presents 2 clinical case studies in which the RM design was used to create specialized devices for patients with outer ear malformations.

Introduction

A remote microphone hearing instrument is defined as a custom aid fabricated with an externalized microphone placed in the outer ear, usually the concha cymba.

The microphone is connected to the device using a thin wire and microphone capsule shaped to match the individual geometry of the patient's outer ear.

This design technique provides several new benefits for end users including:

- Wind noise reduction, directional benefit and natural gain related to pinna effects
- Separation between microphone and receiver increases available gain
- Use of large venting for patients with good low frequency hearing to abate occlusion

The design flexibility of the RM instruments is useful when addressing the needs of patients with outer ear malformations. The following cases illustrate the flexible design defined by:

- Individual characteristics of the outer ear malformation
- The degree of hearing loss
- The specialized design considerations for the RM instrument to meet the physical and electroacoustic needs for each individual

Case 1



Outer Ear Malformation Following Head Trauma

- Sex: Male
- Hearing Loss: 65 dB flat
- Fitting challenges: Device retention, previous interference issues between glasses and BTE instruments, gain and acoustic feedback
- Solution: RM microphone tube provides an anchor against concha cymba to maintain instrument placement within the ear canal. Instrument provides sufficient gain and eliminates BTE interference issues

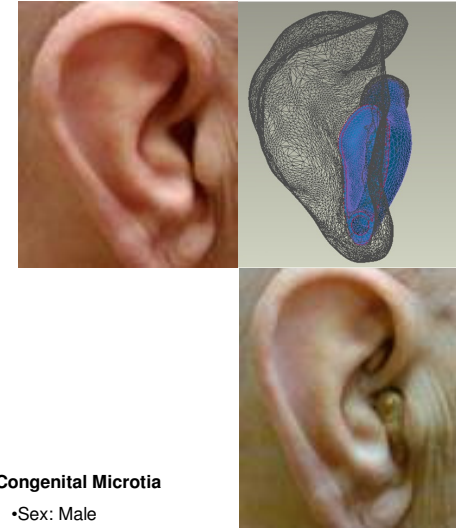
Discussion

RM CIC devices allow for flexible design

Design challenges often involve both physical fit and amplification characteristics

Patients with acquired or congenital ear malformations present with specific challenges that can be addressed by RM CIC devices as outlined by these cases

Case 2



Congenital Microtia

- Sex: Male
- Hearing Loss: 70 dB flat
- Fitting challenges: Size constraints and comfort due to narrow ear canal, gain and acoustic feedback
- Solution: RM microphone allowed for a smaller CIC shell. Sufficient separation between microphone and receiver allows for adequate gain before feedback

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