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## **Solution of Conductive Hearing Loss in Difficult Situation: Bone Conduction Hearing Device**

Though most of the causes of conductive hearing loss (CHL) are treatable, some are difficult to correct. The most common example of such difficult condition is bilateral congenital atresia of external auditory canals with normal inner ear. In this condition parents are more worried about the cosmetic issues than the hearing as the child responds to sound. Few other difficult acquired cause of CHL are post mastoid surgery having uncorrected hearing with cavity problem, discharging ears, CHL with skin allergies. In these cases it's difficult to use air conduction hearing aid. The solution to correct hearing in such difficult situations is to use bone conduction hearing device. Bone conduction hearing device is a common established treatment option for patients not only with conductive hearing loss but also with mixed hearing loss, as well as for single-sided deafness.

Various types of bone conduction hearing devices like BAHA system, Baha soft band, Ponto system, BoneBridge, SoundArc, ADHEAR are available in the market.

BAHA (Bone Anchored Hearing Aid) system are now available in 2 varieties, BAHA Connect and BAHA Attract. In the Percutaneous BAHA technology, a small titanium implant is fixed in the bone behind the ear and an abutment is anchored into the implant which protrudes through the skin. An audio processor with a mechanical stimulator is attached to the abutment. Sound travels as vibrations from

the processor via abutment to the implant, which then directs the vibrations through the bone to stimulate the inner ear. Both BAHA Connect and Ponto have this technology. However, this percutaneous method often leads to complications including skin infections and osseointegration failure. To reduce the risk of infection or skin growth over the implant, this permanent opening through the skin requires meticulous attention and care, including daily wound cleaning. For anyone who sweats or lives in a humid or warm climate, the wound care can be especially challenging. To get rid of these complications, there are other options like BAHA Attract and Bone Bridge which are designed to leave the skin intact. BAHA Attract uses a magnetic connection to attract the sound processor to the implant. The sound processor fits onto the magnet of sound processor that attracts the internal magnet to hold it in place.

In some cases where the surgical implants are contraindicated like in early childhood, or less than 5 mm of skull bone thickness and who does not want surgery, the Baha SoundArc, Baha softband and ADHEAR are the alternative.

The Baha SoundArc and Baha Softband are designed to provide the same benefits and hearing performance as BAHA or Ponto. The new SoundArc is designed to provide a modern look, be light weight and easy to put on and take off according to the manufacturer. The

SoundArc comes in several sizes and is adaptable to fit different-shaped heads and sizes and offers a variety of soft-coloured tips to match hair or clothes.

ADHEAR system has two parts; the adhesive adapter and the audio processor. The thin adhesive adapter sticks to the skin just behind the ear where there is no hair. The audio processor is clicked onto the adhesive adapter. This is the only non-implanted bone conduction device that doesn't put pressure on skin.

By using direct bone conduction, bone anchored hearing devices like BAHA Connect and Ponto can deliver greater amplification than passive skin-drive devices like a Baha headband, SoundArc, Baha Attract and ADHEAR.

The solution to overcome the effect of skin on amplification is the BoneBridge. It is the first and only active bone conduction implant available. The mechanical transducer is integrated into the implant and is placed completely under the skin fixing on skull bone. Audio Processor is held over the implant through light magnetic attraction. The external audio processor receives sound and converts it into a signal that is transmitted through the skin to the internal implant which converts the signal from the external processor into vibrations which are transmitted to the inner ear.

Though the cost of devices is high, the patients with difficult situation of CHL must be explained about the technology available at present for its solution. All the devices except Ponto system is available in Nepal.

