BONE-ANCHORED HEARING AIDS (BAHA)
Candidacy: BAHAs or other bone-conduction (BC) implants are used for a variety of hearing losses when air conduction (AC) aids are less applicable.
EAC Aid Intolerance
Indications for Implant Hearing Devices

- Atresia
- Narrow / Stenosis / Subluxing concha
- Feedback howl
- Perspiration / Otitis Externa / Myringitis
- Excessive / Hard cerumen
- Mastication / Aid occlusion discomfort
- Manual disability
- Cosmesis
BAHA implant, original percutaneous device. The aid functions via a titanium screw inserted through the skin into the temporal bone, to stimulate the cochlea via skull vibration.
Cochlear Baha 3 System

The Baha System has three components:

1. SOUND PROCESSOR - picks up sound and converts to vibration
2. ABUTMENT - transfers vibrations from Sound Processor to Implant
3. IMPLANT - titanium, placed in bone behind ear where it osseointegrates and transfers vibrations directly to cochlea via bone conduction

Cochlear percutaneous device hardware.
Osseointegration

With a Baha Implant, the bone and implant fuse, at which time the abutment and sound processor can be attached.

Osseointegration. Closely adherent growth of bone over titanium surfaces fixes the BAHA pedestal in situ securely, providing optimal bone conduction conditions.
Cochlea percutaneous and transcutaneous BAHA devices.
Baha System basics

Components of the Baha System:

1. Titanium implant placed in the bone just behind the ear

2. External Sound Processor which connects to the implant via an abutment

Overall plan of the Cochlear BAHA system (original percutaneous device).

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Baha Candidacy
Conductive Hearing Loss

Common aetiologies of conductive component:

- Chronic otitis media/CSOM (chronic suppurative otitis media)
- Aural Atresia
- Cholesteatoma
- Otosclerosis

BAHA application to conductive losses. If the EAC is intolerant of an AC aid, BC devices are effective alternatives.
EAC suitability aside, when major conductive losses are present, the BC aids perform better then the AC option.
Advanced mixed sensorineural and conductive losses frequently respond poorly to AC aiding. BC aids bypass the conductive problem but the sensorineural thresholds must be adequate.
BC implants can overcome “head shadow”, but do not help direction finding, stereo effect or summation (better appreciation of sound by the combination of two ears).
Cochlear percutaneous device models, in order of power

The audiological criteria are illustrated below.
Single sided sensorineural deafness (SND), is common, often sudden and profound. If the contralateral hearing is normal, BC implants can overcome “head shadow”.

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Use of a bone conduction implant in unilateral SND. Good SN reserves (above 20 db.) in the better ear are essential.
Bone conduction candidacy. BC devices are used for the ipsilateral ear for conductive losses, or mixed losses when the SND component is not severe. Contralateral stimulation requires normal SND thresholds.
BC implants in unilateral SND. The device will eliminate the head shadow effect but will not restore direction finding, stereo effect, summation/squelch.
BAHA candidacy in children. Bone thickness precludes implantation in early childhood; a Softband or other BC aid is essential for optimal hearing maturation during this period.
Cochlear BAHA Attract transcutaneous (intact skin) device, designed to avoid the percutaneous abutment.
The Attract model is based on magnetic attraction to maintain position, but loses power compared with the percutaneous models and may cause pressure discomfort.
Prior to surgery, a Softband trial is used to demonstrate function. In children, the skull is thick enough for a BAHA at 5-7 years, depending on the case.
Preparatory to BAHA use, a Softband aid is essential to permit optimal auditory cortex development, as in cochlear implant surgery.
Lateral view of the Softband aid used in a microtia/EAC atresia child.
A Contact Mini BC headband aid, used in paediatric cases.
Moderately severe microtia.
Percutaneous BAHA surgery. Preferred site of implantation.
Original BAHA percutaneous technique. A thin split skin flap was elevated, laid back after implantation to promote rapid healing.
Skin flap creation using a dermatome.
Raised flap. The subcutaneous tissue is then excised to permit implant insertion that avoids thick surrounding skin that is more prone to reactions.
Exposed periosteum, prepared to create a drill-hole.
Drill-hole and abutment insertion.
Final percutaneous abutment appearance with surrounding thinned and hairless skin.
Detail of a percutaneous abutment. Hygiene is essential, skin reactions are common if this is neglected.
BAHA use in a chronic otitis case. Alternatively, the EAC can be closed after excision of disease.
BAHA use in a radical mastoidectomy case. Large postaural fistula present.
Same case, older model processor in place. The external device snaps on to the abutment, retained by a spring fitting.
Current percutaneous model external device in situ.
BAHA use in a severe microtia/EAC atresia case. BC implants are optimal in these cases, once the bone site can accept the device.