



UHL-case studies: special considerations for the validation of the hearing aid benefit

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Challenges in the provision of hearing devices for children with a UHL

- Diagnostic challenge: Confirmation of the hearing threshold
- implications of the degree and type of the hearing loss
 - Unilateral sensorineural hearing loss of 30 to 60 dB
 - unilateral sensorineural hearing loss of > 60 dB
 - unilateral conductive hearing loss
- challenge of a reliable validation of the device benefit

Case 1

unilateral (conductive) hearing loss and (BC- HA)

5 month baby

Hemifacial microsomia with

- hypoplasia of left mandibule
- atresia of the left external ear canal
- left microtia

NHS: normal hearing screening right ear

Questions:

- hearing sensitivity on the left ear? conductive hearing loss? mixed hearing loss?
- hearing aid?
- fear of parents: risk of breathing problems in times of infections?

Case 1

unilateral (conductive) hearing loss and (BC-) HA

5 month: assessment and counseling

- right ear : normal tympanometry + DPOAE
- starting VRA: FF warble tone 1000Hz/30dB
- counseling:
 - effects of a UHL,
 - need for an ABR with masking
 - options and timing of a (BC-) HA fitting
→ immediately or at least before one year of age
 - nasopharyngeal video-endoscopy ruling out a any problematic obstruction
 - recommendation to see an oral surgeon and a orthodontist

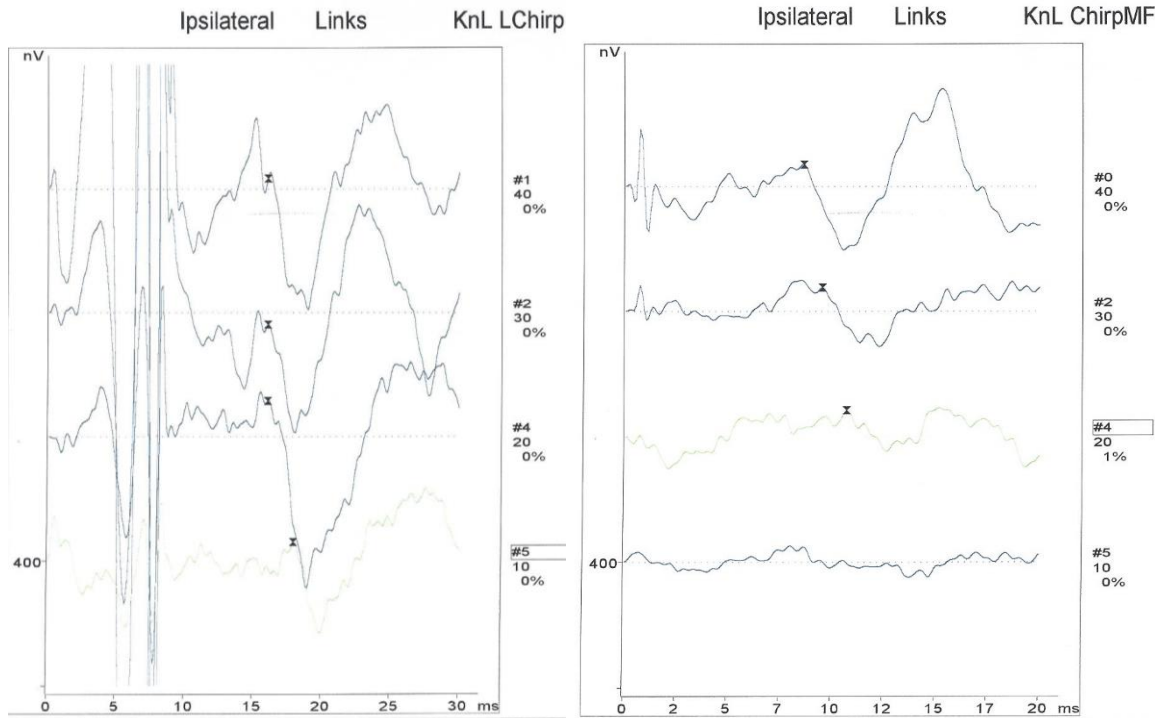
Remaining question:

- hearing sensitivity on the left ear? conductive hearing loss? mixed hearing loss?
- parents decided to proceed with hearing testing and HA at the end of the first year

Case 1

unilateral conductive hearing loss and BC- HA

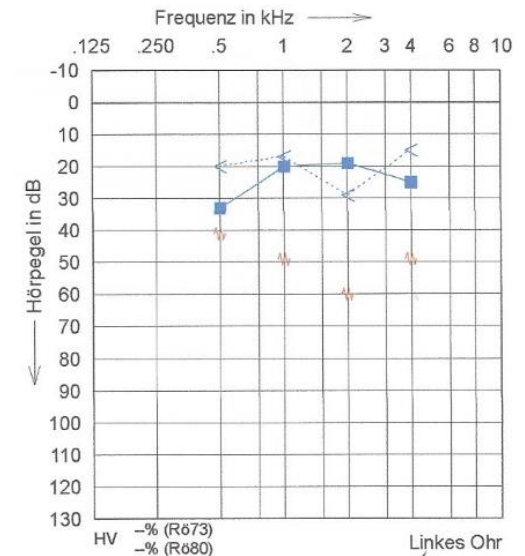
1;0 years: BC- ABR with chirp



4;5 years

play audiometry with masking:

- BC-threshold
- aided threshold BC-HA



BC-ABR left ear:

low chirp: 500Hz (100-800Hz) chirp: <10dB

high chirp: 2000-3000Hz chirp: <20 dB

Case 1

unilateral conductive hearing loss and BC- HA

7;7 years, 1st grade regular school

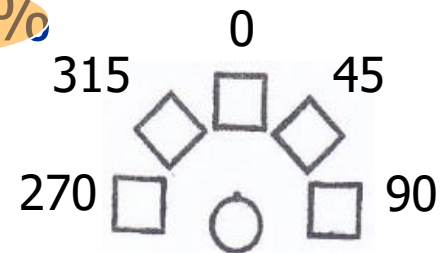
speech audiometry (monosyllable words):

AC left (masking 50-65dB right) 80dB: 20%; 95dB: 90%

FF without HA S45 65dB/ N315 60dB: 100%

FF without HA S315 65dB/ N45 60dB: 30-60%

FF with BC-HA S315 65dB/ N45 60dB: 50-80%



Counseling with 7;7 years:

- new BC-HA fitting
- considering Bonebridge® BC hearing system
- try out of a wireless (FM-) system in collaboration with a specialized teacher (loud mainstream classroom)
- mother requesting a re-assessment by an oral surgeon

Case 2

profound UHL: when and what to fit + validating the benefit

5½ month

AC ABR in melatonin induced sleep with insert earphones:

500Hz (100-800Hz) chirp: right ear 15dB, left ear >85dB

2000-3000Hz chirp: right ear 25dB, left ear >85dB

30th week premature twin delivery

counseling:

- profound UHL left ear
- impact of a UHL: speech development, directional hearing, hearing in noise ...
- options of a HA, options of a cochlear implant
- regular hearing tests

reassessments and counseling at 9½ month and 1;6 years

→ CI assessment → parents decide against a CI (also because of medical problems of the twin brother)

Case 2

profound UHL: when and what to fit + validating the benefit

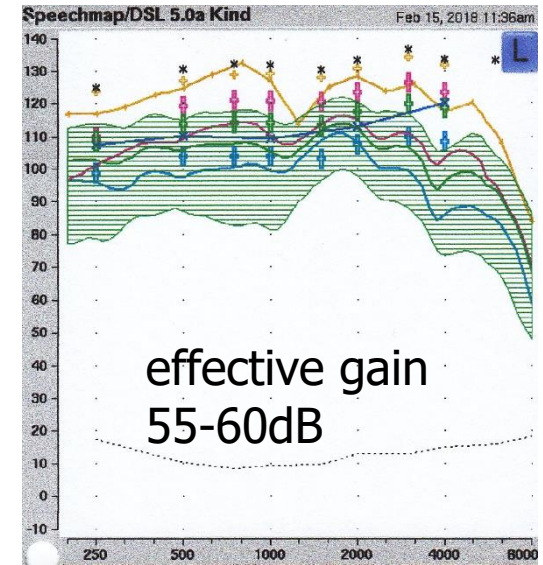
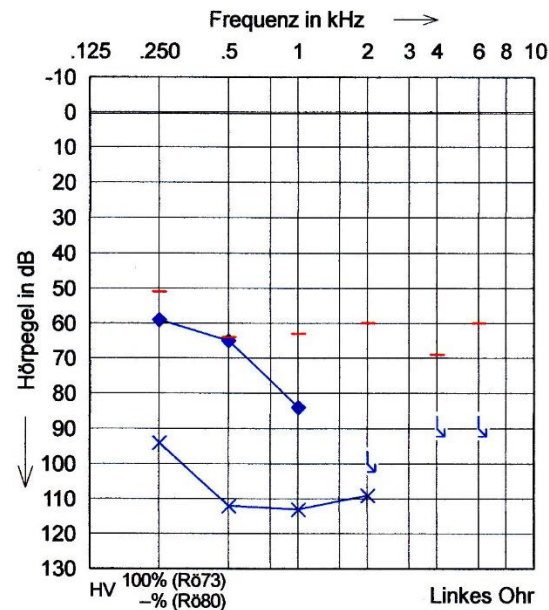
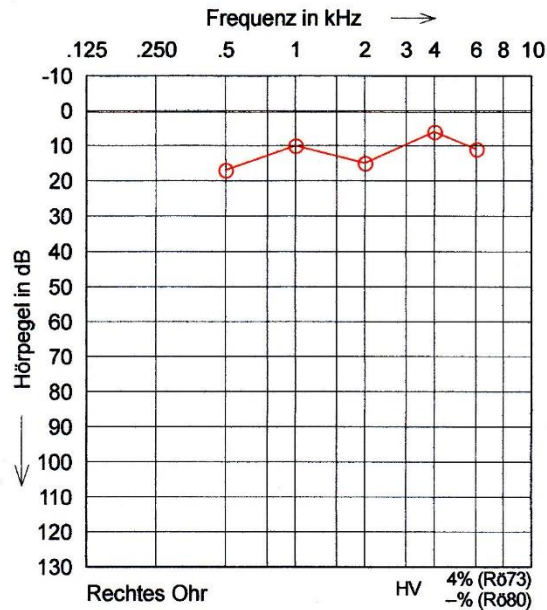
5;10 years

- parents are planning a small mainstream 1st grade class 6 month later
- good speech development (better than his twin brother)
- parents are looking again for HA solution → child comes with a power-HA on left ear + a wireless (FM-) system for the left ear, parents report:
 - child accepted and is wearing the HA
 - with HA better accessible from left ear
 - does no longer turn the right ear in in direction of the TV
 - with FM (connected to the HA on left ear) can understand the mother several rooms away or over greater distances in the kindergarten

Perfect fitting? Can the benefit be validated?

Case 2

profound UHL: when and what to fit + validating the benefit



speech audiometry (monosyllable words):

AC left (masking 70dB) 110dB: 0%

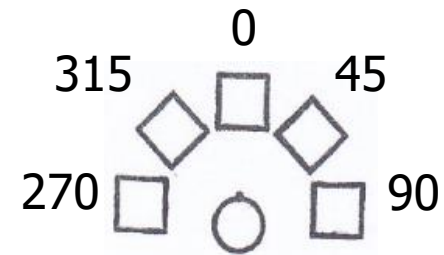
FF with HA (insert masking right ear 70 dB) S315 70/80dB: 0%

Case 2

profound UHL: when and what to fit + validating the benefit

evaluation of the wireless (FM-) system connected to the HA on the left ear:

speech audiometry (monosyllable words):



FF with HA without FM:

S0 65dB/ N90+270 70dB: 80% (SNR: -5dB!)

S0 65dB/ N90+270 75dB: 30%

FF with HA + FM
on left ear:

S0 65dB/ N90+270 75dB: 20%

no significant difference

Case 2

profound UHL: when and what to fit + validating the benefit

conclusions and counseling:

- profound UHL with very little residual hearing on left ear
 - no speech understanding on left ear
 - comparable good speech understanding in noise without technical devices
- the Power-HA is functioning like a transcranial CROS system
- the FM signal reaches the normal hearing right ear also through the HA as a transcranial CROS
- recommended: using a FM-receiver in an open fitting on the normal hearing right ear (instead of an FM-receiver connected to the left HA)

provision of hearing devices for children with a UHL

a summary of some considerations

- Masking is essential in
 - diagnostic assessment: ABR + tone audiometry + speech audiometry
 - HA validation: aided thresholds + speech audiometry
- Counseling is essential
- the possible benefit of a HA depends on the amount of residual hearing:
 - UHL 30-60(70)dB: a good hearing aid benefit should be possible
 - UHL >70dB: a sufficient HA benefit becomes unlikely; a CI might be an option
 - Conductive-UHL: for an early threshold a BC-ABR is necessary and feasible especially, when a harmonic stimulus like the chirp is used

provision of hearing devices for children with a UHL

a summary of some considerations

- Wireless(FM)system: the overall benefit might be better, if fitted on the normal hearing ear
- Caring for a child with a UHL is a multidisciplinary task:
 - audiological/medical assessment
 - fitting of technical devices
 - early intervention
 - educational audiology with counseling/guidance for the kindergarten, the school, the university ...

Thank you for your attention!



Konsenspapier der DGPP zur
Hörgeräte-Versorgung bei
Kindern, Vers. 3.5 :
www.dgpp.de

BIAP: Recommendation 12/06:
Unilateral Hearing loss
Assessment and Counselling
after Newborn Hearing
Screening (UNHS) – Annex:
Fitting of Technical devices
www.biap.org