Quality control after cochlear ILS resection and cochlear implantation

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Introduction ILS

Schwannoma of the labyrinthine with a rate of 1/1000

Growing attention related to increased number of MRI in cases of unilateral deafness and the option for a cochlear implantation

Classified by Kennedy et al., 2004
(Salzman et al., 2012)

Matter of debate, if ILS is a slow or fast growing entity
(Tieleman et al., 2008; Van Abel et al. 2013)
Successful hearing rehabilitation with cochlear implant

(Kronenberg 1999, Aschendorf et al., 2016, Carlson et al., 2016, Plontke et al., 2017)

Different techniques applied

- No tumor removal (Carlson et al., 2016; Eitutis et al., 2021)

- Pusher with dummy electrode (Aschendorf et al., 2016)

- Various techniques, individualized approach (Plontke et al., 2018)
Implant Magnet

without pain, magnet dislocation and demagnetization at 3 T

without wrap

(Todt et al., 2017)

Oticon ZTI at 1,5 T (Todt et al., 2018)

Experiences with mit AB 3D, Nucleus Profile
Implant Position

Visualization of IAC (Walton et al., 2014, Carlson et al.,

Reproduceable visualization of IAC and cochlea (Todt et al., 2015)

Magnet position > 8 cm from external auditory canal
Anteversion of the head inside the scanner allows a rotation of the artifact away from the IAC and the cochlea in the coronal plane (Ay et al., 2020)

Highly important in badly positioned implants !!!!
MRI and CI- VS/ILS

MRI observation of ILS und VS after surgery and CI is reproduceably possible!

N= 8
ILS = 5
VS = 3

- magnet
- implantposition/ head position
- MRI sequence

Todt et al., 2020, Frontiers in Neurol
AIM:

What are the results of an MRI follow up after 1 year post tumor removal and cochlear implantation in cochlear intralabyrinthine schwannoma (cILS)
Material and Methods:

Patients: 7, 4x cILS, 3x vcILS

Surgeries: individualized approach (extended cochle, first turn access, labyrinthectomy and drill out)

Scans: 1x 1.5 T, 6 x 3T, T1 GAD 2 mm, T2 TSE 1, 5mm

Implants: Medel Synchrony ½, AB 3D, Nucleus Profile, N 512

Time: Re-scanning after mean of 13,4 month
Results:

pre OP
cILS

post
OP
exten,
+ first
turn
Results:

pre OP
cILS

post OP
extended
cochleostomy
Results:

pre OP
cILS

post
OP
drill
out
Results:

pre OP
vc ILS

post OP
exten, +
first turn+
lab.
Conclusion:

MRI follow up is possible after tumor removal and cochlear implantation, if 1) implant magnet, 2) implant position, 3) MRI sequence are considered.

Tumor removal can be incomplete.

Preoperative MRI sequence voxel size (slice thickness) should be under 2 mm to limit the missing of tumor growth in structures like modiolus and fundus of IAC.
Discussion:

MRI follow up should be performed even in ILS cases with combined CI surgery

Long-term follow up will help to learn more about tumor growth behavior

Long term follow up will help to learn more about behavior of tumor under electrical stimulation.
Thank you for your attention !!