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EUROPEAN INSTITUTE FOR ORL



Surgical Treatment in Menière's Disease

Rationale, Techniques and Outcomes

Prof. Dr. Andrzej Zarowski

Chairman - European Institute for ORL-HNS, Antwerp

President - European Academy of Otology & Neurotology

Board Member - International Federation of ORL Societies



THE INTERNATIONAL FEDERATION OF OTORHINO LARYNGOLOGICAL SOCIETIES

**Inner ear pressure disorder : from atelectasia to hydrops
(clinical presentations, imaging, therapeutic strategies)**

Friday June 26th, at 12:00 pm CET Paris



Vestibular Team EIORL

➤ ENT Physicians:

- Catherine Blaivie, Marie Bogaerts, Anne-Sophie Despeghel, Erwin Offeciers, Nathalie Peeters, Nina Standaert, Joost van Dinther, Andrzej Zarowski

➤ Physicists, engineers, PhD researchers:

- Marc Leblans, Floris Wuyts, Morgana Sluydts, Fergio Sismono, Mira Van Wilderode

➤ Audiologists:

- Julie Elen, Sandrine Mertens, Kathleen Verhaegen, Nadia Verstraeten

➤ Vestibular kinesitherapist:

- Maja Van Stappen

➤ Neurologists and psychologists:

- Sonja Buyle

➤ Radiologists:

- Anja Bernaerts, Bert De Foer



This lecture is about...

- Changing approach to vestibular problems
- Available and emerging surgical solutions





Treatment options in Menière's Disease

- Patient education:
 - Natural history, symptomatic therapy, outcomes
 - Lifestyle, dietary guidelines
- Oral pharmacological treatment:
 - High-dose betahistine dihydrochloride
 - Diuretics and corticosteroids
- Non-ablative interventional therapies:
 - Intratympanic corticosteroid injection (ITC)
 - Endolymphatic sac surgery (first proposed by Portmann in 1927)
- Ablative interventional therapies:
 - Intratympanic gentamycin injection (ITG)
 - Labyrinthectomy
 - Vestibular neurectomy (Frazier 1904, Dandy 1924, House 1961)



Surgical Options in MD ?

➤ Sac surgery ridiculed by the „sham surgery” article of Thomsen et al. in 1981

[Thomsen J, Bretlau P, Tos M, Johnsen NJ, Ménière's disease: endolymphatic sac decompression compared with sham (placebo) decompression. Ann NY Acad Sci. 1981;374:820-30.]

- yet at that time no golden standard in diagnosis of Meniere's disease was available
- in 30 operated patients a few cases with wrong diagnosis would have spoiled the statistical analysis

Clinical Trial > Arch Otolaryngol. 1981 May;107(5):271-7.

doi: 10.1001/archotol.1981.00790410009002.

Placebo effect in surgery for Ménière's disease. A double-blind, placebo-controlled study on endolymphatic sac shunt surgery

J Thomsen, P Bretlau, M Tos, N J Johnsen



Review > Otolaryngol Head Neck Surg. 2023 Mar;168(3):554-557.

doi: 10.1177/01945998221116563. Epub 2023 Jan 28.

Endolymphatic Sac Surgery: Understanding the Historical Influence of Circumstance and Statistics

Mahmoud M Hamza ¹, Victoria W Huang ², James G Naples ²

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Menière's disease (MD)

- Clinical diagnosis - AAO-HNS/Bárány society criteria (2015):
 - definite MD
 - probable MD

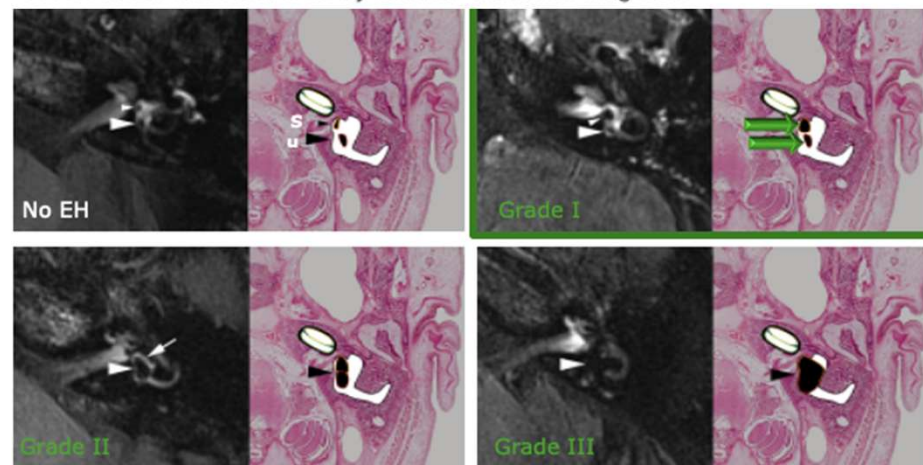
- Game changer: Delayed Gadolinium contrast-enhanced 3D SPACE FLAIR MRI
 - vestibular and cochlear hydrops
 - Intralabyrinthine enhancement
 - Saccus rupture/membraneous atelectasis

DEFINITE MENIERE'S DISEASE

- A. Two or more spontaneous episodes of vertigo, each lasting 20 min to 12 h
- B. Audiometrically low-to-medium-frequency sensorineural hearing loss in one ear, defining the affected ear on at least one occasion, during or after one of the episodes of vertigo
- C. Fluctuating aural symptoms (hearing, tinnitus, or fullness) in the affected ear
- D. Not better accounted for by another vestibular diagnosis

PROBABLE MENIERE'S DISEASE

- A. Two or more episodes of vertigo or dizziness, each lasting 20 min to 24 h
- B. Fluctuating aural symptoms (hearing, tinnitus, or fullness) in the affected ear
- C. Not better accounted for by another vestibular diagnosis



Bernaerts et al, 2019

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Revival of Endolymphatic Sac Surgery

- Endolymphatic sac decompression & shunting
- Endolymphatic duct clipping

Randomized Controlled Trial > [Otolaryngol Head Neck Surg.](#) 2015 Jan;152(1):122-9.
doi: 10.1177/0194599814555840. Epub 2014 Nov 17.

Endolymphatic duct blockage: a randomized controlled trial of a novel surgical technique for Ménière's disease treatment

Issam Saliba ¹, Nathalie Gabra ², Musaed Alzahrani ², Djamal Berbiche ³

Twenty-four months postoperatively, **96.5% of the EDB group had achieved a complete control of vertigo spells** against 37.5% of the ESD group with a statistically significant difference ($P = .002$)



Literature review

► J Int Adv Otol. 2023 Nov 1;19(6):511–516. doi: [10.5152/iao.2023.221025](https://doi.org/10.5152/iao.2023.221025)

Endolymphatic Duct and Sac Decompression: A New Life for an Old Technique

[Fabrizio Salvinelli](#)^{1,2}, [Francesca Bonifacio](#)^{1,8}, [Carmen Bigliardo](#)¹, [Michelangelo Pierri](#)¹, [Valeria Frari](#)¹, [Fabio Greco](#)¹, [Maurizio Trivelli](#)¹

According to the American Academy of Otolaryngology–Head and Neck Surgery criteria classification, **2 years after surgery, 87% patients achieved complete control of vertigo** (class A). The hearing remained stable in 93.5% of patients.

> J Vis Exp. 2023 Apr 28;(194). doi: [10.3791/65061](https://doi.org/10.3791/65061).

Endolymphatic Duct Blockage as a Surgical Treatment Option for Ménière's Disease

[Annejet Alida Schenck](#)¹, [Issam Saliba](#)², [Josephina Maria Kruyt](#)³, [Peter Paul van Benthem](#)⁴, [Hendrikus Maria Blom](#)⁵

Results of the duct blockage are promising, with **96.5% of the patients free of vertigo after 2 years**.



Literature review

► *Front Neurol.* 2024 Oct 24;15:1469276. doi: [10.3389/fneur.2024.1469276](https://doi.org/10.3389/fneur.2024.1469276)

The evolution of *intractable* Ménière's disease: attacks resolve over time

[F R Gerritsen](#)^{1,2}, [A A Schenck](#)^{1,2,*}, [H Locher](#)^{2,3}, [R van de Berg](#)⁴, [P P van Benthem](#)², [H M Blom](#)^{1,2,5}

Even in a population with intractable MD, **most patients will experience relief of symptoms over time**. On one hand, **active treatment may accelerate relief of symptoms**, but on the other hand, non-ablative therapies are of debatable effect and ablative intervention carries a risk of life long side effects.



Literature review

► [Singapore Med J.](#) 2015 Nov;56(11):593–598. doi: [10.11622/smedj.2015166](#)

Current evidence for endolymphatic sac surgery in the treatment of Meniere's disease: a systematic review

[Ming Yann Lim](#)^{1,8}, [Margaret Zhang](#)², [Heng Wai Yuen](#)³, [Jern-Lin Leong](#)⁴

> [Acta Otolaryngol.](#) 2019 Nov;139(11):953–958. doi: 10.1080/00016489.2019.1657240. Epub 2019 Sep 9.

Current state of evidence for endolymphatic sac surgery in Menière's disease: a systematic review

[Louise Devantier](#)^{1,2}, [Jesper Hvass Schmidt](#)^{3,4}, [Bjarki Ditlev Djurhuus](#)⁵, [Dan Dupont Hougaard](#)⁶, [Mina Nicole Händel](#)^{7,8}, [Frank Liviu-Adelin Guldred](#)⁹, [Henriette Edemann-Callesen](#)⁷

There currently exists a **low level of evidence** for the use of ESS in the treatment of Meniere's disease. Improvement in vertigo control was seen in both the ESD and placebo groups, strongly suggesting a possible placebo effect.

► [Front Neurol.](#) 2025 Jul 28;16:1635186. doi: [10.3389/fneur.2025.1635186](#)

Endolymphatic sac surgery: past and present controversies

[W P R Gibson](#)^{1,*}

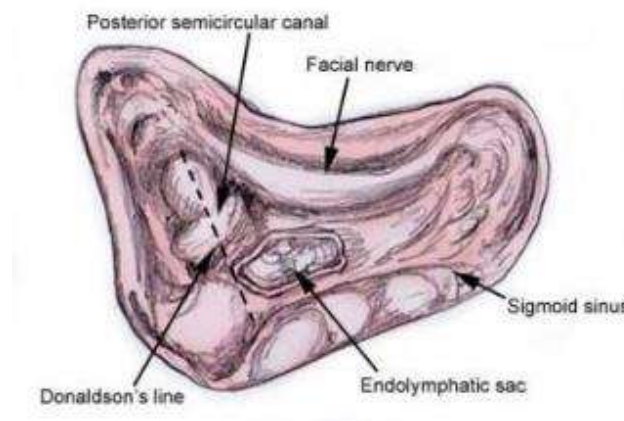
At least 70 % will get relief after ELS surgery whether this has truly altered the pathophysiology **or whether it was merely a placebo response.** Removal of the ELS or clipping the duct probably hastens the progression of the disease to its 'burnt-out stage'.



Endolymphatic Sac Surgery

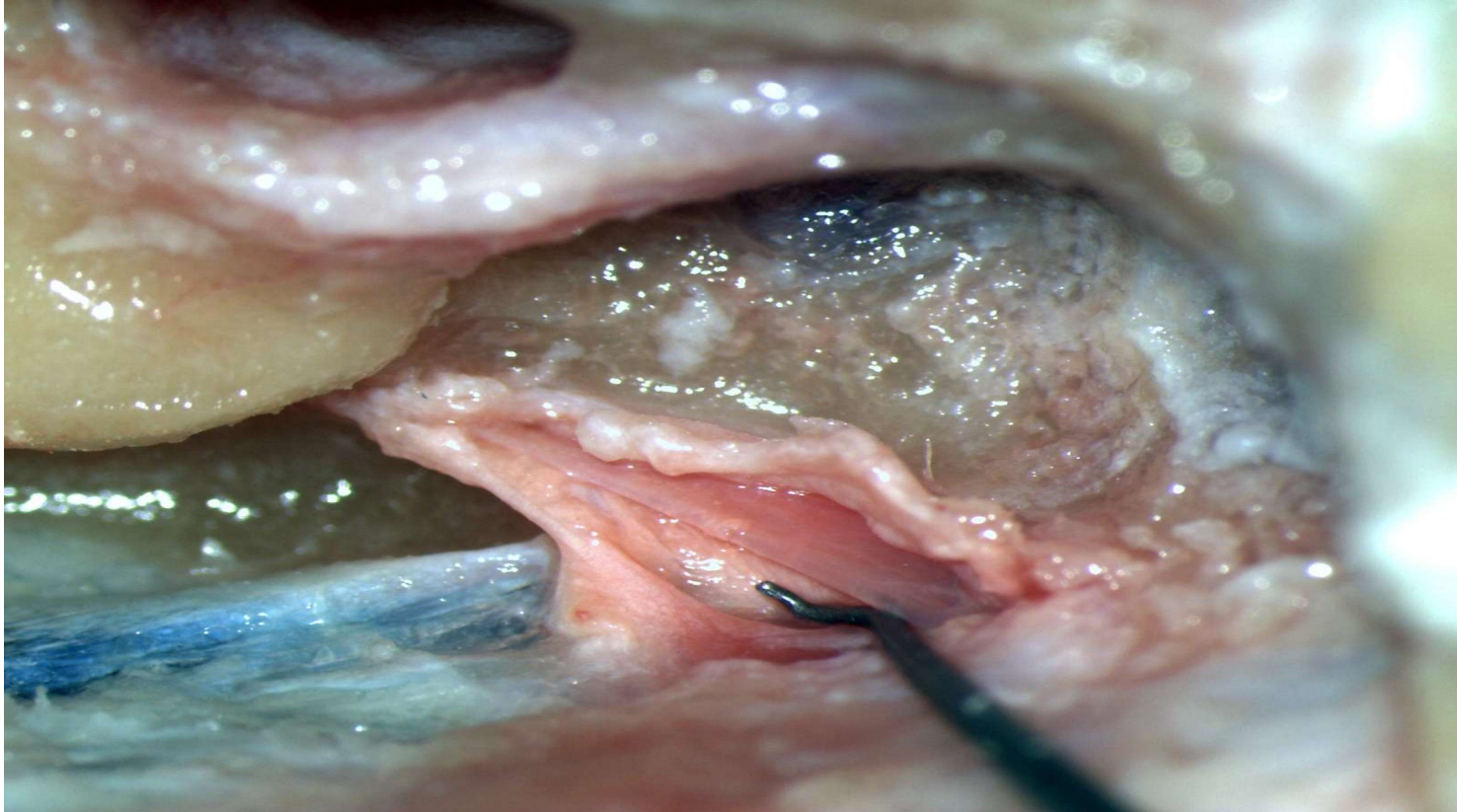
Types of endolymphatic sac surgery:

1. Endolymphatic sac decompression + **shunting** (**ESD-S**)
2. Endolymphatic sac decompression + **clipping** of endolymphatic duct (**ESD-C**)
3. Endolymphatic sac decompression + **clipping** and **ablation** of endolymphatic duct/sac (**ESD-CA**)





Membranous Endolymphatic Sac (R)



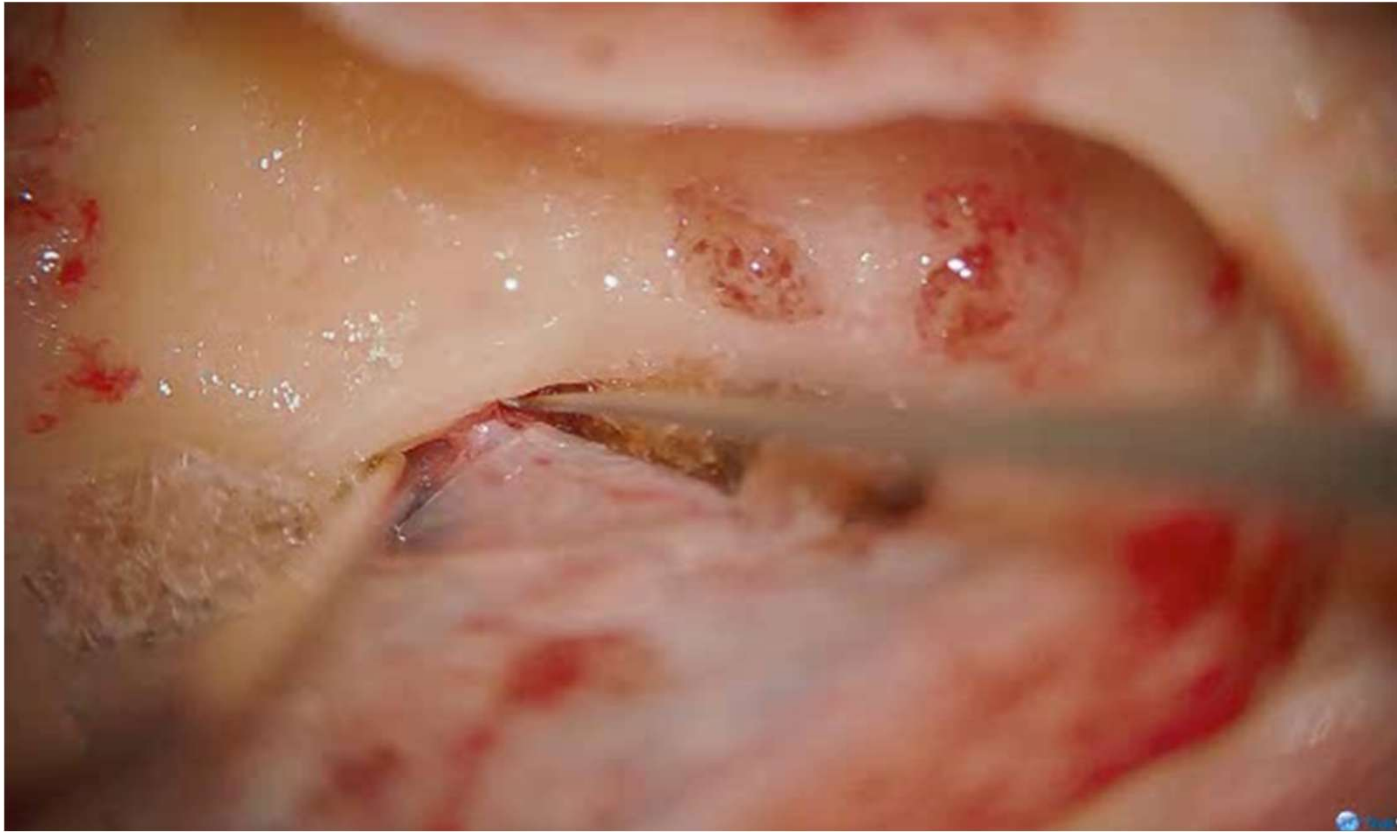


Sac decompression & shunting (R)



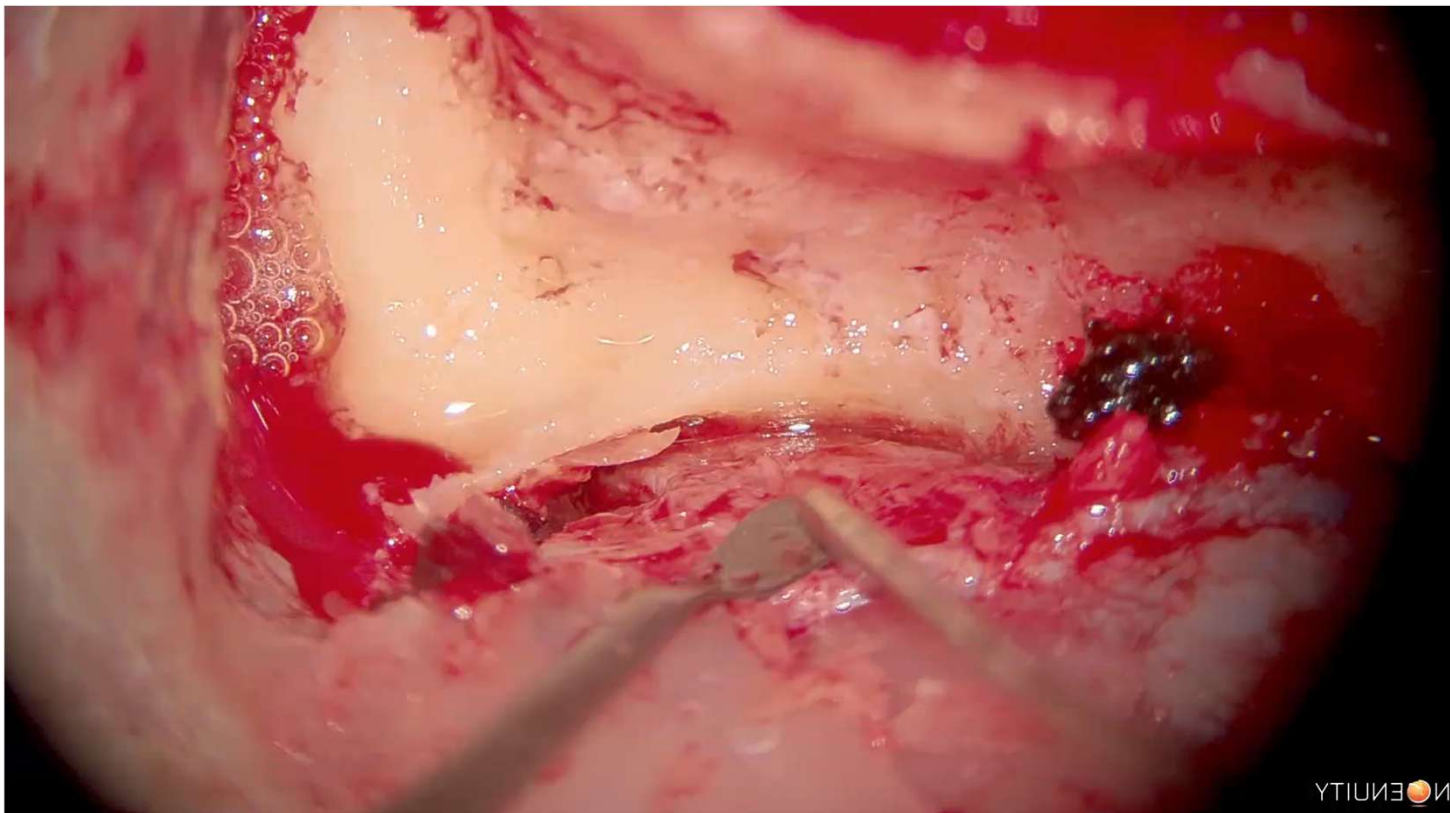


Sac decompression & clipping (R)





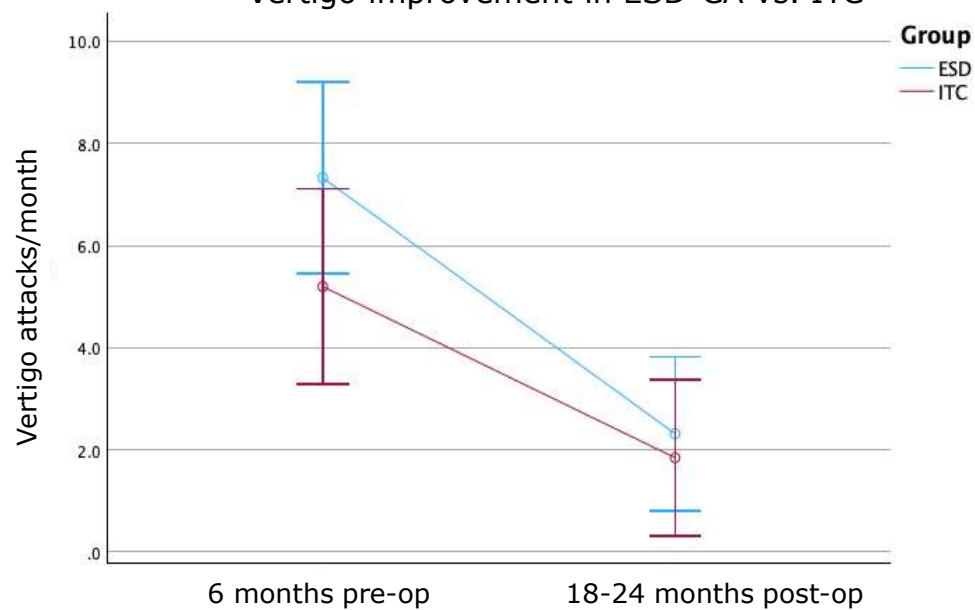
Sac decompression, clipping & ablation (R)





Preliminary results: ESD-CA vs. ITC

Vertigo improvement in ESD-CA vs. ITC



Error bars: 95% CI

Time effect $p < 0.001$ in both groups.
No statistically significant difference between the two groups ($p = 0.212$)

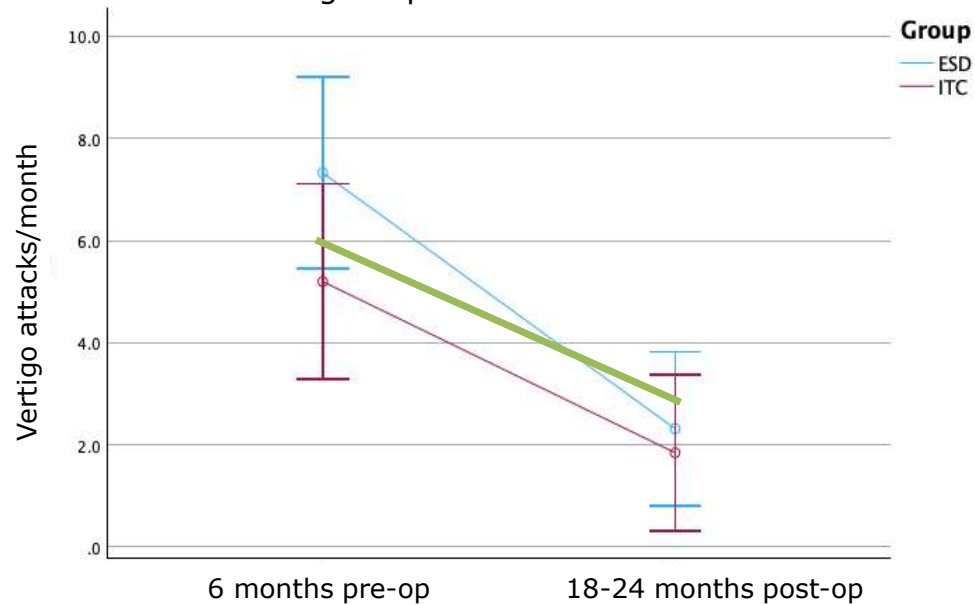
	Group	N	Mean	Std. Deviation	Std. Error Mean
Vertigo improvement	ESD	28	72.0734	48.05508	9.08156
	ITC	26	60.2030	51.39856	10.08009





ESD-CA vs. ITC vs. placebo

Vertigo improvement in ESD-CA vs. ITC



Error bars: 95% CI

BMJ. 2016 Jan 21;352:h6816. doi: [10.1136/bmj.h6816](https://doi.org/10.1136/bmj.h6816)

Efficacy and safety of betahistine treatment in patients with Meniere's disease: primary results of a long term, multicentre, double blind, randomised, placebo controlled, dose defining trial (BEMED trial)

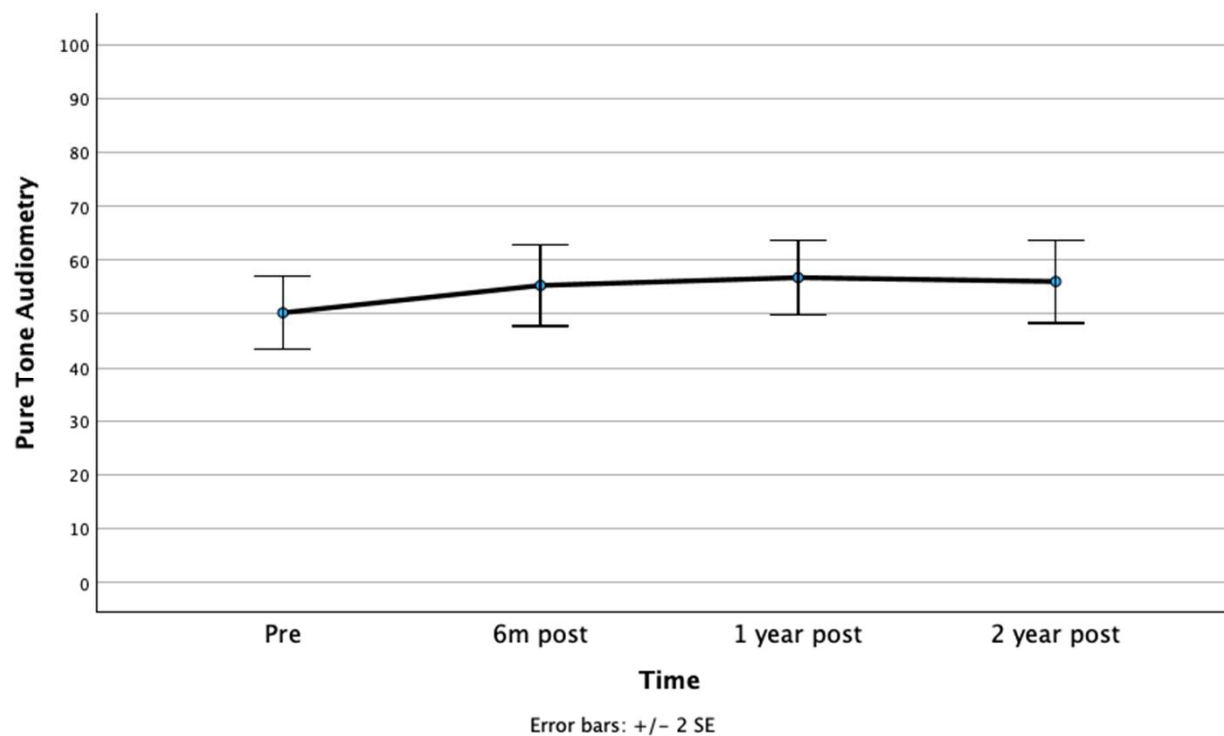
[Christine Adrien](#)^{1,2}, [Carolyn Simone Fischer](#)¹, [Judith Wagner](#)³, [Robert Gürkov](#)⁴, [Ulrich Mansmann](#)², [Michael Strupp](#)^{1,3,☒}, On behalf of the BEMED study group





Results sac surgery

PTA in ESD surgery group





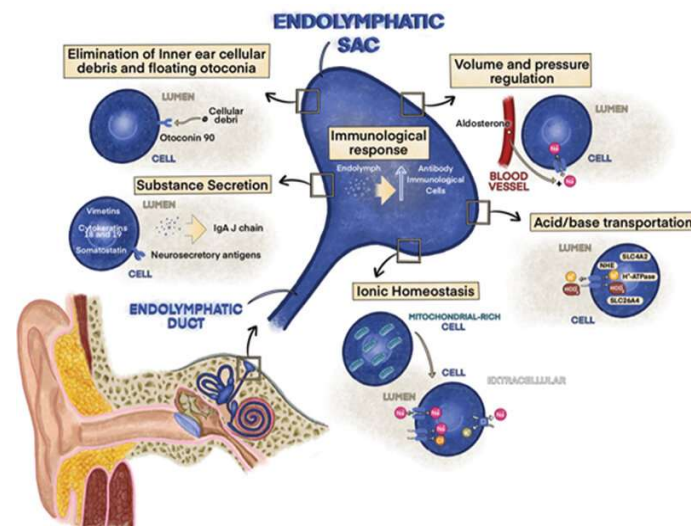
Hypothesis: how does it work?

- Reduction of pressure in the endolymphatic sac
- Ablation of the sac causes changes in homeostasis

> [Laryngoscope](#). 2017 Jun;127(6):E201-E208. doi: 10.1002/lary.26074. Epub 2017 Mar 14.

The human endolymphatic sac expresses natriuretic peptides

Martin Nue Møller ¹, Svend Kirkeby ², Jonas Vikeså ³, Finn Cilius Nielsen ³,
Per Cayé-Thomasen ^{1 4}





Different etiologies of Menière's Disease ?

- Increasing radiological and histopathological evidence indicates that many patients with Ménière's disease have a congenitally hypoplastic or morphologically abnormal vestibular aqueduct and endolymphatic sac.

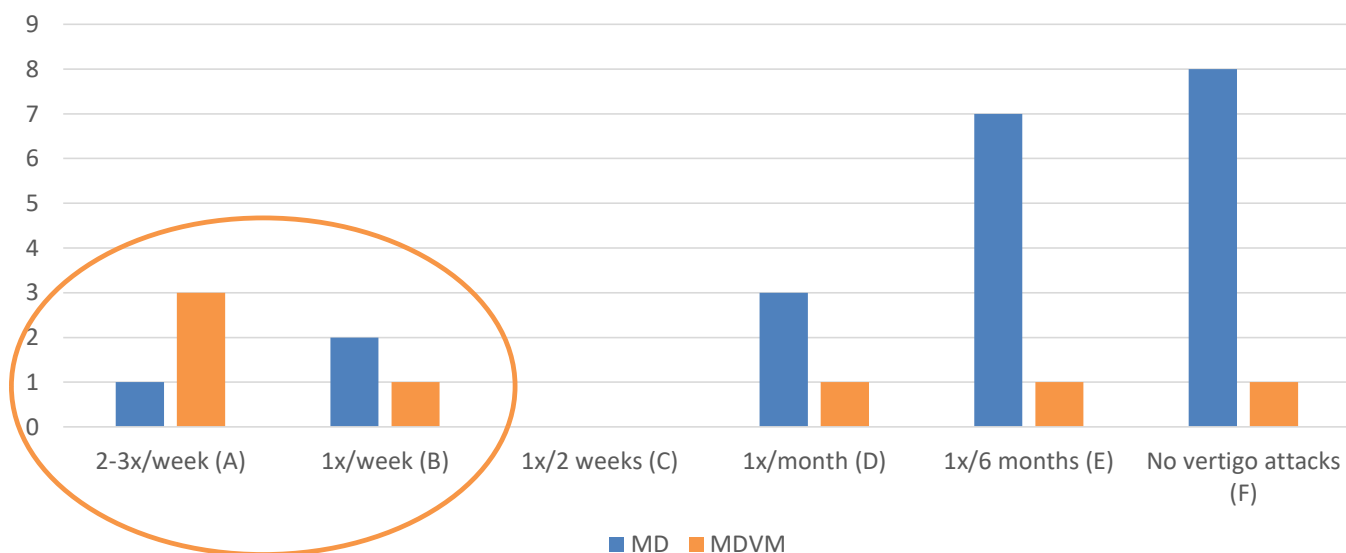
Bächinger et al., 2019	CT: Angular Trajectory of the Vestibular Aqueduct (ATVA).	Abnormal VA/ES morphology identifies possibly different MD phenotypes
Kämpfe Nordström et al., 2020	3D CT	Shorter and morphologically abnormal VA
Noyalet et al., 2022	Micro-CT + + synchrotron + histology	Anatomical evidence supporting VA/ES abnormalities in MD

Different etiologies and phenotypes of Menière's disease?



Concomitant vestibular migraine (VM)?

Vertigo attacks 18-24 months postoperatively in ESD-CA group



MDVM: 25% (Neff et al., 2012)

Non-responders:

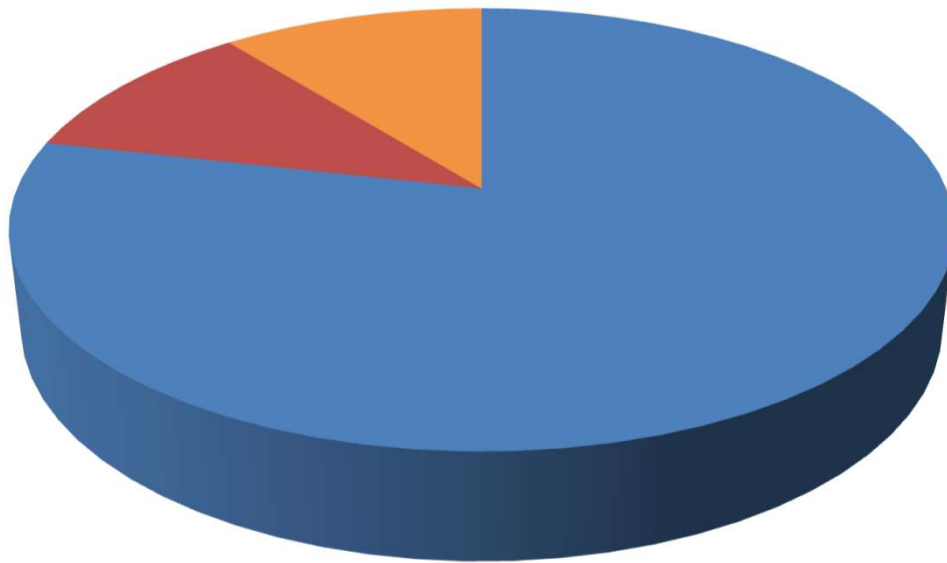
- MDVM in 57.1% in group A-B
 - MDVM in 25% in overall group
- CAVE small sample size





Preliminary results: ESD-CA +/- ablative therapy

ESD-CA +/- ablative surgery <24 months (MD vs. MDVM)



■ ESD-CA (N=22) ■ ESD-CA + ablative therapy in MDVM (N=3) ■ ESD-CA + ablative therapy in MD (N=3)

Additional ablative therapy <24 months:
21.4%

MDVM in 50% (<> 18% in responders)



66% vertigo-free after ablative surgery

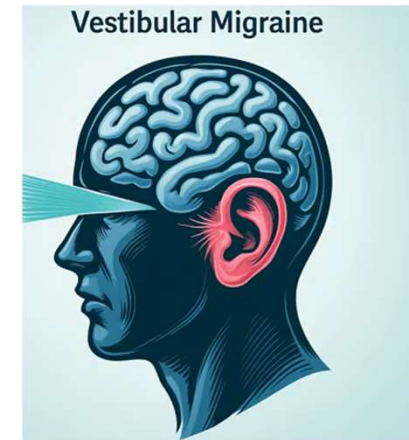
CAVE small sample size





Study limitations - considerations

- Retrospective study design
- Relatively small sample size
- Group of non-responders:
 - a significant proportion has concomitant VM (+/- 50%)
 - psychological assessment necessary: NPQ, DASS-21
- AAO-HNS criteria 18-24 months postoperatively: regression to the mean? (Blom et al., 2024)



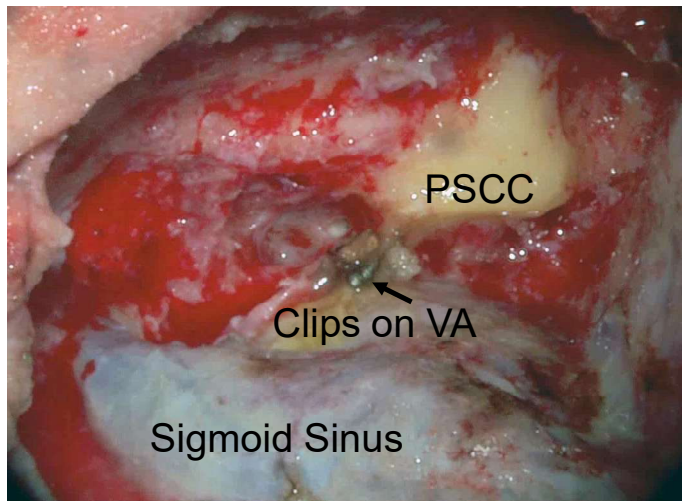


Unsuccessful cases of sac surgery

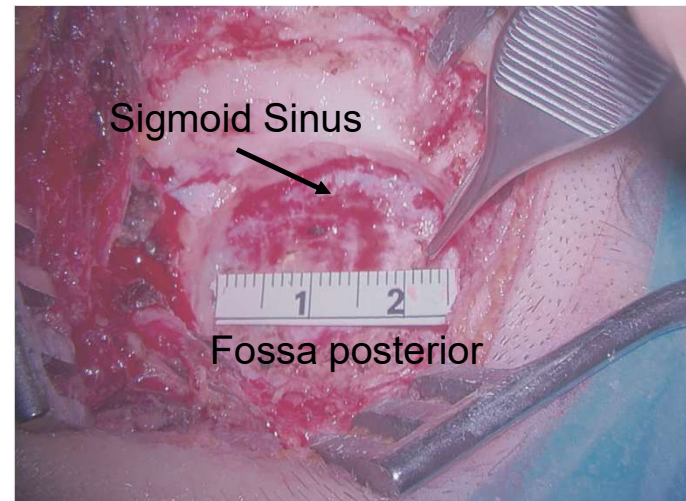
- Intratympanic gentamycine:
 - transtympanic (40mg/ml, 45 minutes' instillation)
 - via middle ear inspection with dissection of the round window niche
- Labyrinthectomy:
 - in deaf ears
 - (with simultaneous placement of a cochlear implant)
- Vestibular neurectomy:
 - via retrolabyrinthine approach (in patients after sac surgery)
 - via retrosigmoid approach



Vestibular neurectomy approaches



Retrolabyrinthine approach
left ear

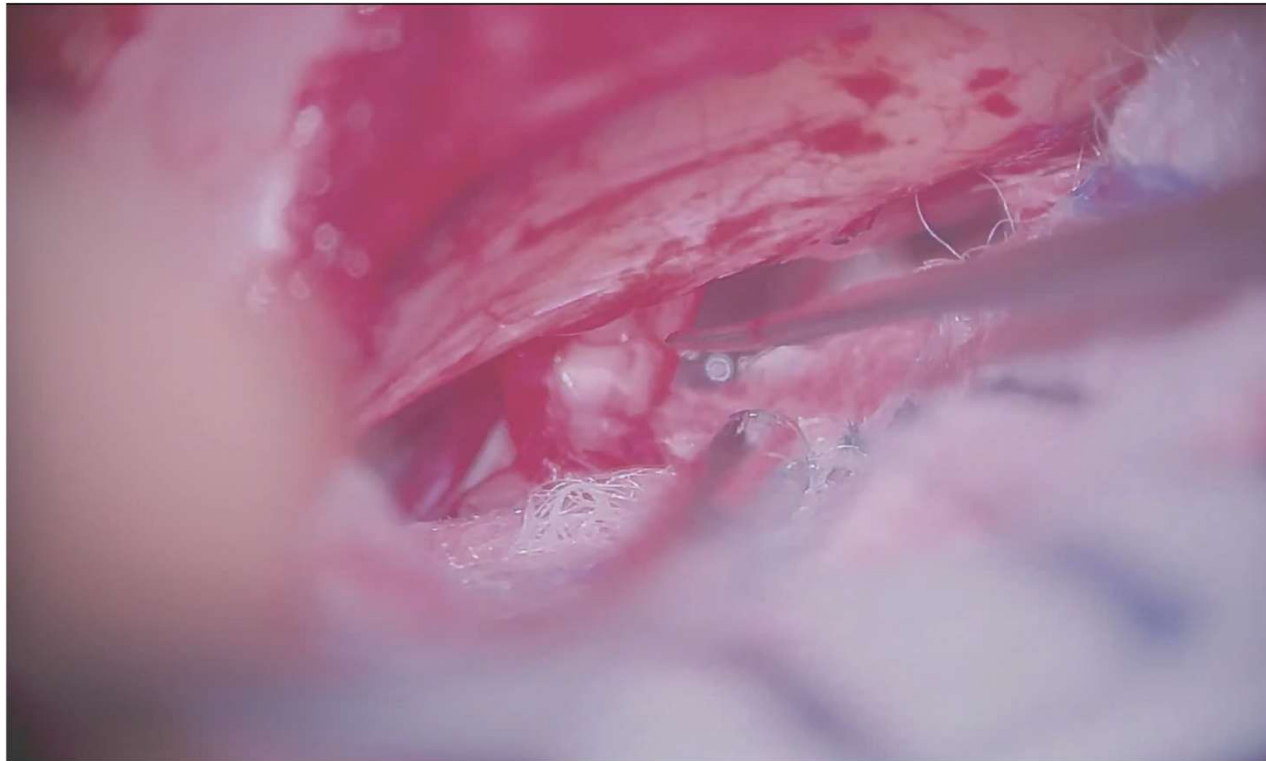


Retrosigmoid approach
left ear





Vestibular neurectomy - RS (L)





Conclusion

- Accurate radiological and audiological diagnostics together with the new technological developments allow for re-appearance/revival of surgical treatments for Meniere's disease.
- Prospective trials necessary: placebo-controlled randomized clinical trial (RCT)



Thank you for listening





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Multidisciplinary approach

Hearing Center Melakos



Veerle Verhaegen



Daphna Riff



Cedric De Backer



Elfi De Nutte

Radiology Department



Bert De Foer



Jan Casselman



Anja Bernaerts

Physiotherapy



Maja Van Stappen

Neurology



Sonja Buyle





Literature review

> J Vis Exp. 2023 Apr 28;(194). doi: 10.3791/65061.

Endolymphatic Duct Blockage as a Surgical Treatment Option for Ménière's Disease

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The evolution of intractable Ménière's disease: attacks resolve over time

F R Gerritsen ^{1,2}, A A Schenck ^{1,2,*}, H Locher ^{2,3}, R van de Berg ⁴, P P van Benthem ², H M Blom ^{1,2,5}

Even in a population with intractable MD, **most patients will experience relief of symptoms over time.** On one hand, **active treatment may accelerate relief of symptoms**, but on the other hand, non-ablative therapies are of debatable effect and all intervention carries a risk of life long side effects.

> Eur Arch Otorhinolaryngol. 2022 Oct 8;280(3):1119–1128. doi: [10.1007/s00405-022-07580-8](https://doi.org/10.1007/s00405-022-07580-8)

Is endolymphatic sac surgery an efficient treatment of Ménière's disease patients? A systematic literature search and meta-analysis

Franziska A Szott ^{1,*}, M Westhofen ¹, S Hackenberg ¹

The findings of this meta-analysis indicate that endolymphatic sac surgery **may be beneficial** as a treatment for Ménière's disease **in terms of a positive impact on functional level scale and vertigo control** while yielding a negative impact on pure tone average hearing loss and on speech comprehension.

> Singapore Med J. 2015 Nov;56(11):593–598. doi: [10.11622/smedj.2015166](https://doi.org/10.11622/smedj.2015166)

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Ming Yann Lim ^{1,*}, Margaret Zhang ², Heng Wai Yuen ³, Jern-Lin Leong ⁴

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BMJ Open Effectiveness of endolymphatic duct blockage versus endolymphatic sac decompression in patients with intractable Ménière's disease: study protocol for a double-blinded, randomised controlled trial

Annejet A Schenck ¹, Josephina M Kruijt ², Peter Paul van Benthem ³, Suzanne C Cannegieter ^{4,5}, Wilbert B van den Hout ⁶, Stefan Böhlinger ⁷, Sebastiaan Hammer ⁸, Susan P M Hombergen ⁹, Henk M Blom ^{1,3,10}

> J Int Adv Otol. 2023 Nov 1;19(6):511–516. doi: [10.5152/iao.2023.221025](https://doi.org/10.5152/iao.2023.221025)

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Fabrizio Salvinelli ^{1,2}, Francesca Bonifacio ^{1,*}, Carmen Bigliardo ¹, Michelangelo Pierri ¹, Valeria Frari ¹, Fabio Greco ¹, Maurizio Trivelli ¹

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Randomized Controlled Trial > Otolaryngol Head Neck Surg. 2015 Jan;152(1):122–9. doi: [10.1177/0194599814555840](https://doi.org/10.1177/0194599814555840). Epub 2014 Nov 17.

Endolymphatic duct blockage: a randomized controlled trial of a novel surgical technique for Ménière's disease treatment

Issam Saliba ¹, Nathalie Gabra ², Musaed Alzahrani ², Djamal Berbiche ³

Twenty-four months postoperatively, **96.5% of the EDB group had achieved a complete control of vertigo spells** against 37.5% of the ESD group with a statistically significant difference (P = .002)

> Acta Otolaryngol. 2019 Nov;139(11):953–958. doi: [10.1080/00016489.2019.1657240](https://doi.org/10.1080/00016489.2019.1657240). Epub 2019 Sep 9.

Current state of evidence for endolymphatic sac surgery in Ménière's disease: a systematic review

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The identified RCTs individually **reported a positive effect of both the placebo and active treatment** groups following surgery, strongly indicative of a placebo effect. The overall certainty of the effect was very low.

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