Superior Canal Dehiscence and Third-Window Disorders

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Key Takeaways

Key Takeaway	What to Know
Third-window syndrome is an otologic chameleon	It produces many audiological symptoms (conductive hearing loss, hyperacusis, pulsatile tinnitus, autophony, ear fullness) and vestibular symptoms (vertigo from pressure or loud sounds, vertigo from exertion, diffuse dizziness).
Tullio phenomenon and Hennebert's sign	Tullio phenomenon is vertigo induced by sound. Hennebert's sign is vertigo or nystagmus induced by pressure changes in the outer ear canal.
Conductive hearing loss can be false	In superior semicircular canal dehiscence, conductive hearing loss, especially at low frequencies, occurs with normal stapedial reflexes and normal or large VEMPs.
Bone conduction hyperacusis	Bone conduction hyperacusis is seen at 250 to 500 Hz (0 to -10 dB), with a positive "ankle-Weber" at low frequencies (128 to 512 Hz).
Order a temporal bone CT	Use correct reconstructions in the Stenvers and Pöschl planes. Photon counting CT gives better resolution with 50% of the radiation.
Bárány Society criteria	All of A through D must be fulfilled: symptom, supporting finding, CT dehiscence (<0.2 mm), and not better explained by another diagnosis.
Not only superior canal dehiscence	Large vestibular aqueduct, cochlear dysplasia, dehiscence to artery or vein, vascular malformation, and cholesteatoma can have the same effects.
Treatment begins with information	Information that the condition is not dangerous comes first. Surgery options are capping or plugging, by a middle fossa or trans-mastoid route, with round window reinforcement as another option.

Course Content

Learner Outcomes

Learner Outcomes

- After this course, participants will be able to identify the characteristic audiological and vestibular symptoms of superior semicircular canal dehiscence syndrome (SCDS) and other inner ear third-window disorders, including autophony, bone conduction hyperacusis, sound- and pressure-induced vertigo, and apparent conductive hearing loss.
- After this course, participants will be able to interpret key diagnostic findings from pure-tone audiometry, acoustic reflex testing, vestibular evoked myogenic potentials (VEMPs), and high-resolution temporal bone CT to differentiate third-window disorders from middle ear pathology.
- After this course, participants will be able to apply the Bárány Society diagnostic criteria for superior semicircular canal dehiscence syndrome, integrating clinical symptoms, objective physiological findings, and radiological evidence.
- After this course, participants will be able to compare conservative and surgical management options for third-window disorders, considering clinical presentation, symptom severity, and potential treatment outcomes.

Introduction: Sound- and Pressure-Induced Vertigo

Third-window syndrome is described as an otologic chameleon. The course opens with patient descriptions of its effects: "The hills are alive with the sound of music," "The voices in the bathtub," "The woman who heard her eyes move," and "Hallelujah!"

- Tullio phenomenon: vertigo induced by sound. Example: the man who notices that the road moves in time with the bass guitar when he plays loud music in his car.
- Hennebert's sign: vertigo or nystagmus induced by pressure changes in the outer ear canal. Example: the patient who gets attacks of vertigo when cleaning his ear or closing the door in his car. It is sometimes a sign of endolymphatic hydrops or Meniere's disease.

Person	Background
Pietro Tullio (1881-1941)	Experimental physiologist, University of Bologna. In experiments on pigeons (1929), semicircular canal neurons were activated by pressure changes and sound.
Camille Hennebert (1867-1954)	Otologist, University of Brussels. Clinical studies on oto-syphilis.
Georg von Bekesy (1961) and Robert Bárány (1914)	Otologic Nobel laureates and bone conduction researchers.

Bone Conduction: Four Theories

Theory	Mechanism
1. Compressional (Tönndorf and others)	The temporal bone vibrates and the inner ear fluid vibrates.
2. Inertial / translatory (Bárány and others)	Different vibrations in the temporal bone and ossicles; the stapes moves in the oval window.
3. Occlusion (von Bekesy and others)	The temporal bone vibrates, air vibrates in the ear canal, and the cochlea is stimulated the "usual" way.
4. Fluid (Sohmer, Freeman et al., 2000)	Skull content (CSF, brain, blood) vibrates. Fluid waves are transmitted to the inner ear through aqueducts, vessels, and nerves ("brain conduction" and "eye conduction").

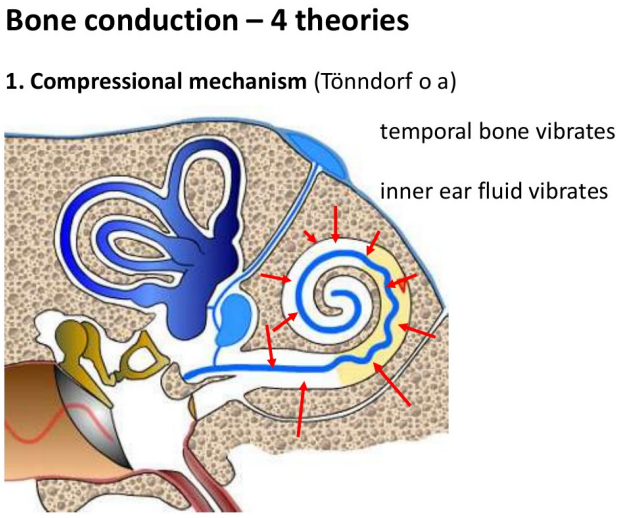


Figure 1. Bone conduction theory 1: compressional mechanism.

Inner Ear Conductive Hearing Loss

Inner ear conductive hearing loss is a hearing impairment with a consistent conductive element but without evidence of tympanic membrane or ossicular problem.

- It accounts for 1 in 700 "otosclerosis" cases (Shea, 1993).
- Possible explanations raised on the slide: increased basilar membrane stiffness (Gazec & Schuknecht, 1969) and increased perilymphatic pressure (Cremers et al., 1983).

Case: Unsteadiness and Right-Sided Conductive Hearing Loss

A 75-year-old man with a history of two coronary infarctions, coronary by-pass surgery, two knee arthroplasties, and spinal stenosis surgery was referred for unsteadiness and right-sided conductive hearing loss.

- No Tullio (vertigo by loud sound), no Hennebert (vertigo by pressure changes in the outer ear canal), no nystagmus during Valsalva or jugular vein compression, and no spontaneous nystagmus.
- Strong right-beating headshaking nystagmus. Conductive hearing loss in the right ear with normal stapedial reflexes in the right ear. CT brain was normal.
- At the revisit, a 256 Hz tuning fork was placed at the medial malleolus. He felt nothing, but heard the tone in the right ear.

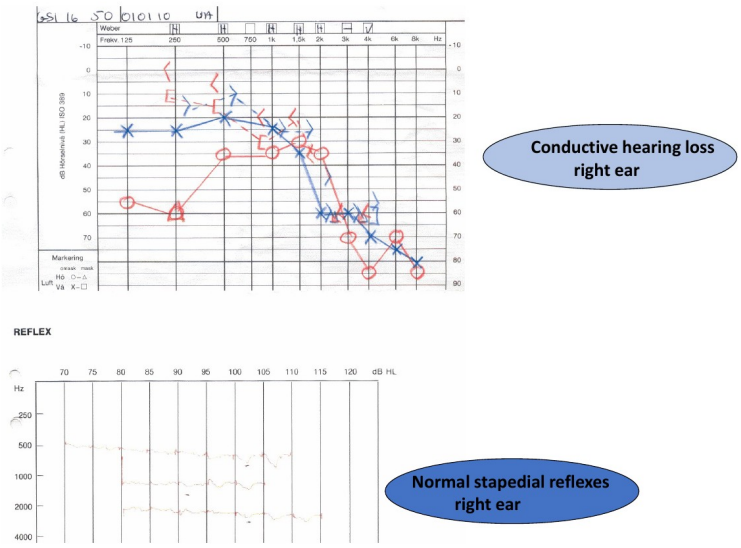


Figure 2. Audiogram with conductive hearing loss, right ear, and normal stapedial reflexes, right ear.

"A diagnostic procedure was performed" and the diagnosis was superior semicircular canal dehiscence (Minor LB et al., 1998).

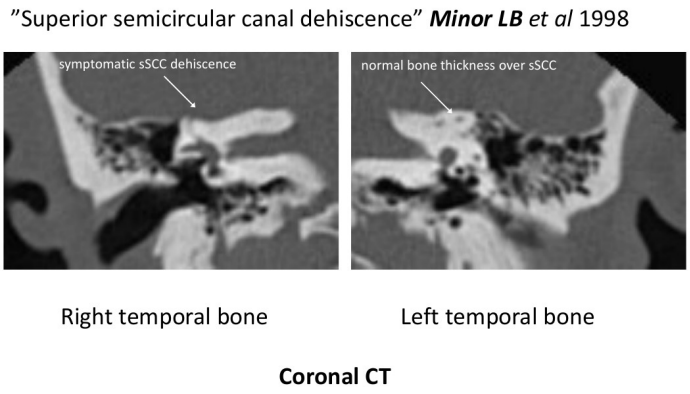


Figure 3. Coronal CT of the right and left temporal bones: symptomatic dehiscence and normal bone thickness.

Superior Semicircular Canal Dehiscence

- Lloyd B. Minor was the first to describe superior semicircular canal dehiscence (1998), but a dehiscence has also been seen in a 2,400-year-old mummy (Dalchow et al., 2012).
- Two percent are born with thin bone over the inner ear. The bone becomes thinner during life (3 cases, ages 8 to 13 years). Trauma (labor, skull trauma) is another factor.
- Symptoms: vertigo by loud sound (Tullio); vertigo by pressure changes (Hennebert); unspecific dizziness or unsteadiness; tinnitus (sometimes pulse synchronous); conductive hearing loss (false); bone conduction hyperacusis; autophony. Audiological symptoms are more common than vestibular.

Q1 **Quiz Hint:** Vertigo or oscillopsia induced by loud sound is the Tullio phenomenon. Symptoms of superior semicircular canal dehiscence also include vertigo from pressure changes (Hennebert), tinnitus, bone conduction hyperacusis, and autophony.

Findings That Point to a Third Window

Look for combinations of:

- Conductive hearing loss, especially at low frequencies.
- Bone conduction hyperacusis at 250 to 500 Hz (0 to -10 dB).
- Normal stapedial reflexes (despite conductive hearing loss).

- Normal or large VEMPs (despite conductive hearing loss).
- Positive "ankle-Weber" (low frequencies 128 to 512 Hz).
- Hennebert's sign, Tullio phenomenon, and vertigo or nystagmus with Valsalva or jugular compression.

Q2 **Quiz Hint:** Look for combinations of conductive hearing loss, especially at low frequencies, with normal stapedial reflexes and normal or large VEMPs despite the conductive hearing loss, plus bone conduction hyperacusis.

VEMP example

A 54-year-old previously healthy man had right-sided hearing loss and tinnitus after loud noise exposure, with no vertigo, no Tullio, and no Hennebert. To hear his car radio better, he used to press his knee against the door while driving. He had a conductive hearing loss in the right ear with normal stapedial reflexes, and a large VEMP (500 Hz tone burst) despite the conductive hearing loss.

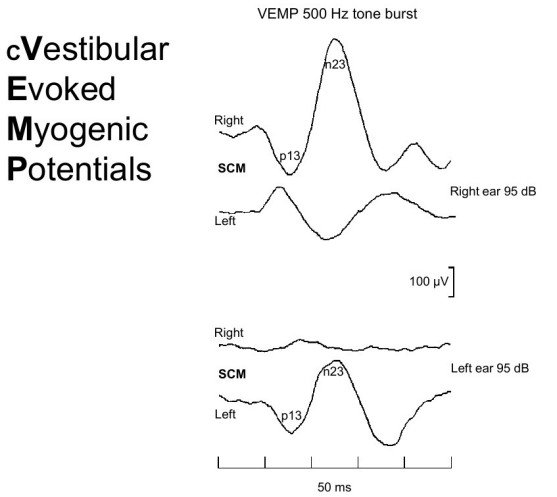


Figure 4. Large VEMP despite conductive hearing loss.

Imaging: Order a Temporal Bone CT

- Order a CT of the temporal bone (photon counting CT is best), with reconstructions in the Pöschl and Stenver planes.
- Photon counting CT (PC-CT) offers better resolution and 50% of the radiation.

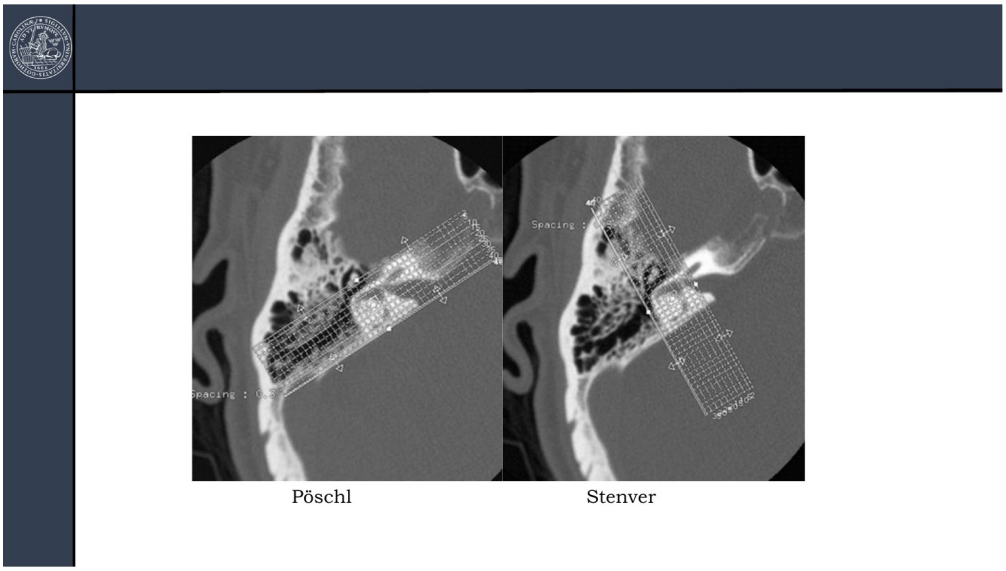


Figure 5. Temporal bone CT in the Pöschl and Stenver planes.

Q4 **Quiz Hint:** Order a temporal bone CT with reconstructions in the Stenvers and Pöschl planes. Photon counting CT gives better resolution with 50% of the radiation.

Bárány Society Criteria for Superior Canal Dehiscence Syndrome

All of A through D must be fulfilled for the diagnosis (Bárány Society, Ward et al.).

Criterion	Requirement
A	At least 1 of the following: 1. Bone conduction hyperacusis (autophony) 2. Vertigo or oscillopsia by loud sounds (Tullio) 3. Vertigo or oscillopsia by pressure changes (Hennebert) 4. Pulse-synchronous tinnitus
B	At least 1 of the following: 1. Nystagmus typical for excitation or inhibition of the superior canal by sound or pressure changes (middle ear, intracranial) 2. "Super hearing": -5 to -10 dB bone conduction (low to mid frequencies) 3. Large VEMP responses (low thresholds, large amplitudes)
C	Dehiscence on temporal bone CT (<0.2 mm), with correct reconstructions in the Stenvers and Pöschl planes.
D	Not better explained by another diagnosis.

The same criteria apply to other third windows.

Q3 **Quiz Hint:** All criteria A through D must be fulfilled: at least one characteristic symptom, at least one supporting finding such as nystagmus, "super hearing," or large VEMP responses, dehiscence on temporal bone CT, and the condition is not better explained by another diagnosis.

Third Windows and Their Symptoms

Type of third window	Examples
Malformations	Large vestibular aqueduct (LVAS), Mondini, and similar
Acquired "third windows"	Superior semicircular canal dehiscence; dehiscences to nerves, vessels, and others

Symptom type	Symptoms
Audiological	Hearing loss (conductive) Hyperacusis Tinnitus (pulsatile) Autophony (own voice, body sounds) Ear fullness
Vestibular	Vertigo from pressure (Hennebert) Vertigo from loud sounds (Tullio) Vertigo from exertion Diffuse "psychiatric" symptoms

Third-window syndrome is not only superior canal dehiscence, but superior canal dehiscence is the most common.

How a Dehiscence Affects Hearing and Balance

- Sound energy is shunted through the opening, producing a false "conductive hearing loss."
- Sound stimulates the balance organs (superior semicircular canal, saccule), producing Tullio and VEMP findings.
- Sound waves in the CSF reach the inner ear by the "extra" opening and stimulate the organ of Corti, producing "bone conduction hyperacusia." The slide asks whether this occurs by stimulation of the outer hair cells.

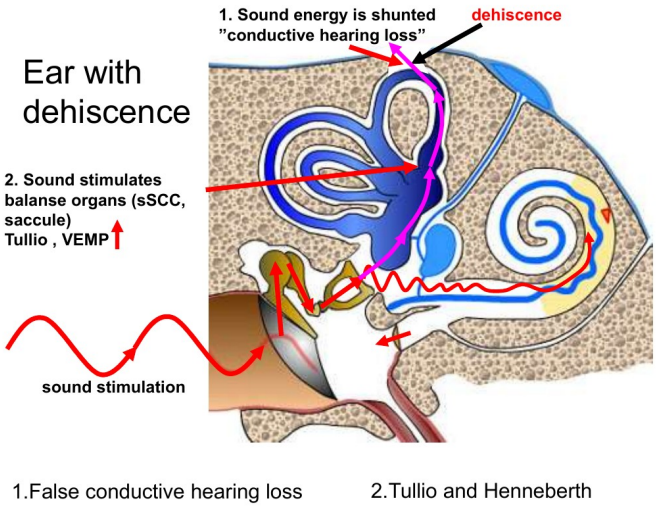


Figure 6. Ear with dehiscence: false conductive hearing loss, Tullio and Hennebert.

Case Examples

- Choir singers with superior canal dehiscence in the left ear (a 45-year-old woman and a 40-year-old man) reported Tullio.
- A 49-year-old woman with hereditary spastic paraparesis and left dehiscence reported dizziness, conductive hyperacusis, and "Doctor, I hear my eyes move!"
- A 33-year-old man with a left dehiscence had left-sided blockage since 2004 and no vertigo; STAR and cVEMP were left greater than right.
- A patient with left hearing loss for 20 years was on the waiting list for stapedotomy. cVEMP was positive on the left, ankle-Weber was positive, and CT of the temporal bones was read as "normal." The slide advises looking at the CT again before surgery. A second look at the CT showed superior canal dehiscence; hearing aids were used instead of surgery and the patient was very satisfied.
- A 40-year-old man had an operation in 1980 for conductive hearing loss in the right ear (autologous columella) with an initially good result, then progressive hearing loss. At 2 months he had Tullio and Valsalva effects, Weber to the right, a positive tuning fork at the right malleolus, and cVEMP +/+. CT showed destruction of the tegmen and a large fistula to the inner ear: iatrogenic cholesteatoma.

Other Inner Ear Third Windows

Not only superior canal dehiscences: all "third windows" to the "vestibular side" of the inner ear can have the same effects.

- Large vestibular aqueduct
- Cochlear dysplasia (Mondini-like)
- Dehiscence to artery or vein

- Vascular malformation
- Cholesteatoma

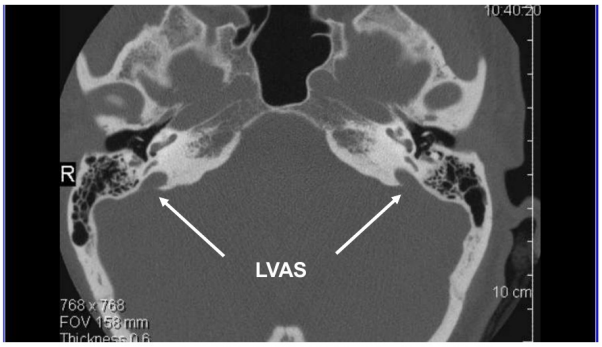


Figure 7. CT showing large vestibular aqueducts (LVAS).

- Cochlear dysplasia was shown in a 31-year-old woman. A 25-year-old woman was on the waiting list for stapedotomy on the right.
- A 7-year-old girl referred from school health (twin born in week 33, aABR 35 dB pass bilaterally, tested at school at age 7) had right-sided conductive hearing loss; paracentesis showed an aerated middle ear and a PC-CT scan was ordered. It showed a third window in the superior and posterior semicircular canal on the right side.
- In Lund, cVEMP is done on all patients with conductive hearing loss before surgery. If VEMPs are preserved, a CT of the temporal bones is done to look for a third window.

Hearing With the Feet: Bone Conduction at the Ankle

One woman with bone conduction hyperacusis due to superior canal dehiscence and 10 plus 4 young women (audiology students) with normal hearing were tested with a bone stimulator on the left lateral malleolus.

- Tests: (1) pure tone and speech audiometry to the ankle; (2) otoacoustic emissions without and with tone stimulation to the ankle.

Speech audiometry (bone conductor, 50 dB, left lateral malleolus)	Superior canal dehiscence	Normal 1	Normal 2	Normal 3	Normal 4
FB-lists	30% (8 of 25 words, one consonant wrong)	0% (0 of 25)	0% (0 of 25)	0% (0 of 25)	0% (0 of 25)

Speech audiometry (bone conductor, 50 dB, left lateral malleolus)	Superior canal dehiscence	Normal 1	Normal 2	Normal 3	Normal 4
Hagerman's sentences	54% (27 of 50 words)	0% (0 of 50)	6% (3 of 50)	0% (0 of 50)	12% (6 of 50)

- In the left dehiscence patient, an otoacoustic emission appeared with stimulation of 500 Hz at 60 dB (and at 250 Hz at 45 dB and 20 dB) on the left lateral malleolus, and she heard the tone in the left ear.
- The slide states that the "classic" bone conduction theories cannot explain this. Energy waves set up at the lateral malleolus are transmitted through the body (by bone? by fluids?), reach the inner ear through aqueducts and third windows, and stimulate the outer hair cells, which are activated in a frequency-specific way and activate the inner hair cells (auditory perception).

cVEMP Findings

- cVEMP thresholds are lower in SCDS and depend on the size of the window (Yew et al., 2012; Niesten et al., 2014).
- 80 dB stimuli distinguish SCDS from controls (Verrecchia et al., 2018).

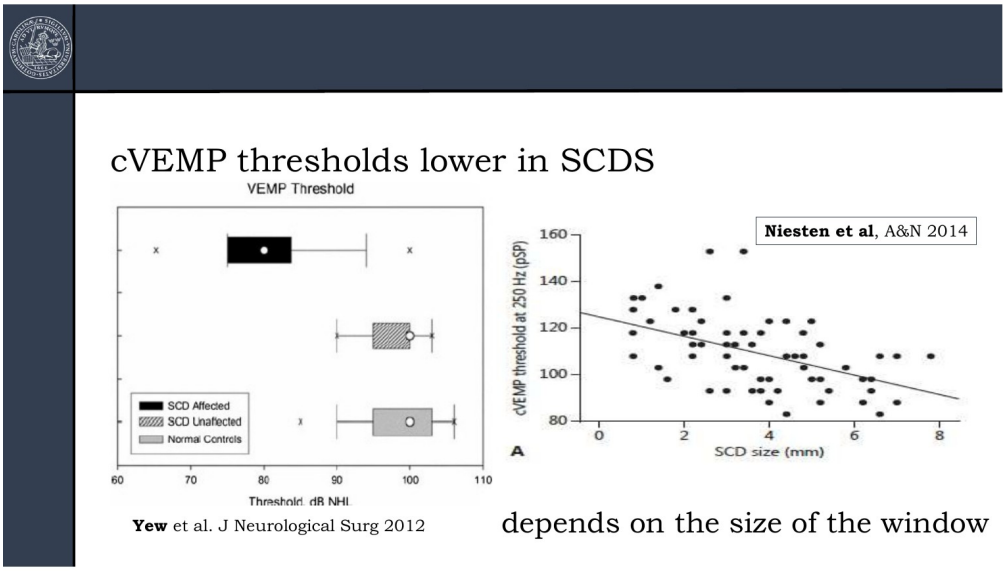


Figure 8. cVEMP thresholds are lower in SCDS and depend on the size of the window.

Treatment and Surgery

- Information: it is not dangerous.
- Other options raised: transmyringeal tube, CBT/ACT/coping, and surgery.

- All prospective studies are on operated patients.
- Surgery: two ways (capping or plugging) and two routes (middle fossa or trans-mastoid), plus round window reinforcement.
- Who are operated? Mainly autophony, hyperacusis, and oscillopsia are better after surgery (Mozafari et al., 2021; Saliba et al., 2014).

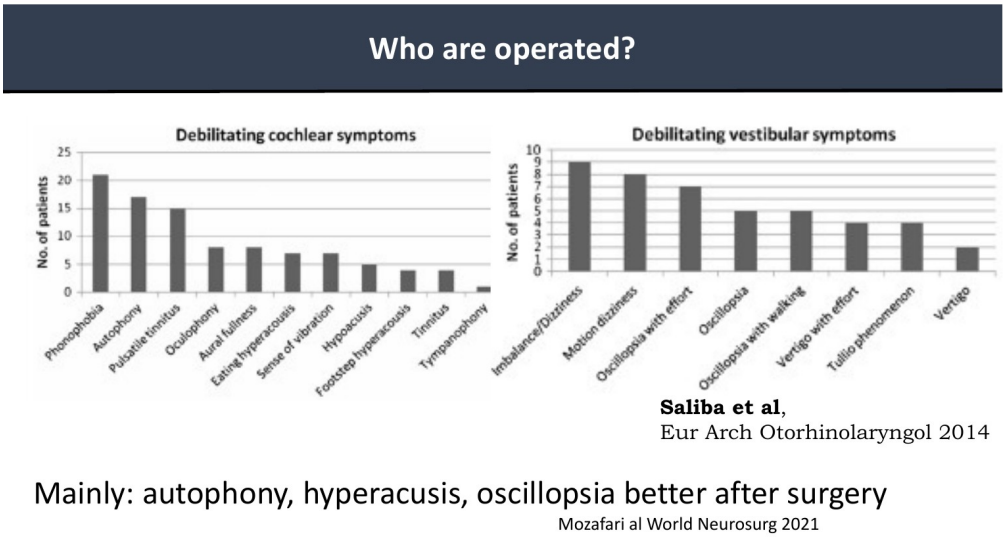


Figure 9. Debilitating cochlear and vestibular symptoms in patients who are operated.

Symptom resolved, n (%)	Middle fossa	Transmastoid	P value
Vertigo	4 of 6 (66)	18 of 29 (62)	.85
Autophony	8 of 10 (80)	38 of 40 (95)	.30
Tullio	8 of 10 (80)	17 of 19 (89)	.54
Aural fullness	4 of 5 (80)	11 of 17 (65)	.53
Pulsatile tinnitus	3 of 5 (60)	19 of 24 (79)	.49

Outcome data from 68 patients (21 middle fossa, 47 transmastoid); Schwarz et al., 2019.

- The slide recommends round window reinforcement (quick, reversible); if not better, other surgery. 7 of 194 patients had re-operation after round window surgery (Chemtob, 2019).
- Not even American surgeons operate until the patient has tried other treatment, such as anti-migrainous treatment, for 6 to 12 months.

Q5 **Quiz Hint:** Treatment starts with information that the condition is not dangerous. Surgery (capping or plugging) is not considered until other treatments have been tried, with even surgeons waiting 6 to 12 months.

Conclusion

Conclusion

- Third-window syndrome is an otologic chameleon with many audiological and vestibular symptoms; superior canal dehiscence is the most common cause.
- Conductive hearing loss with normal stapedial reflexes and normal or large VEMPs should prompt a temporal bone CT in the Stenvers and Pöschl planes.
- The Bárány Society criteria require a symptom, a supporting finding, CT dehiscence, and no better alternative diagnosis.
- Treatment starts with information that the condition is not dangerous; surgery is considered after other treatment has been tried.

Interactive Worksheet

Click any box to type in it. Checkboxes are best completed in desktop Word. This worksheet follows the course agenda and is for your own use.

Course	Superior Canal Dehiscence and Third-Window Disorders
Presenter	Mikael Karlberg, MD, PhD
Course/Event ID	42693
Date	Click here to enter text.

Learning Objectives

1. Identify the characteristic audiological and vestibular symptoms of superior semicircular canal dehiscence syndrome (SCDS) and other inner ear third-window disorders, including autophony, bone conduction hyperacusis, sound- and pressure-induced vertigo, and apparent conductive hearing loss.
2. Interpret key diagnostic findings from pure-tone audiometry, acoustic reflex testing, vestibular evoked myogenic potentials (VEMPs), and high-resolution temporal bone CT to differentiate third-window disorders from middle ear pathology.
3. Apply the Bárány Society diagnostic criteria for superior semicircular canal dehiscence syndrome, integrating clinical symptoms, objective physiological findings, and radiological evidence.
4. Compare conservative and surgical management options for third-window disorders, considering clinical presentation, symptom severity, and potential treatment outcomes.

Module 1: Third-Window Symptoms and Bone Conduction (Objective 1)

Key Terms

Key Term	Definition in your own words
Tullio phenomenon	Click here to enter text.
Hennebert's sign	Click here to enter text.
Inner ear conductive hearing loss	Click here to enter text.

Key Term	Definition in your own words
Bone conduction hyperacusis	Click here to enter text.

Matching

Write the letter of the matching description in the box next to each term or person.

Letter	Term or Person	Description
Click here to enter text.	1. Pietro Tullio	A. Different vibrations in the temporal bone and ossicles; the stapes moves in the oval window
Click here to enter text.	2. Camille Hennebert	B. Skull content (CSF, brain, blood) vibrates and fluid waves reach the inner ear through aqueducts, vessels, and nerves
Click here to enter text.	3. Compressional mechanism (Tönndorf and others)	C. Experiments on pigeons: semicircular canal neurons activated by pressure changes and sound
Click here to enter text.	4. Occlusion mechanism (von Bekesy and others)	D. Clinical studies on oto-syphilis
Click here to enter text.	5. Inertial / translatory mechanism (Bárány and others)	E. The temporal bone vibrates and the inner ear fluid vibrates
Click here to enter text.	6. Fluid mechanism (Sohmer, Freeman et al.)	F. Air vibrates in the ear canal and the cochlea is stimulated the "usual" way

Descriptions are listed in a different order than the numbered items.

Pause and Apply (If-Then plan): If a patient reports vertigo when exposed to loud sounds or pressure changes, then I will ...

Click here to enter text.

Module 2: Audiological and Vestibular Findings (Objectives 1 and 2)

Window Pane Summary: Findings That Point to a Third Window

Pure-tone audiometry findings Click here to enter text.	**Stapedial reflex findings** Click here to enter text.
VEMP findings Click here to enter text.	**Bone conduction and tuning fork findings** Click here to enter text.

Sequencing

The steps below are out of order. Number them 1 through 5 in the order of the workup described in the course.

Step number	Action
Click here to enter text.	Perform a CT of the temporal bones with reconstructions in the Stenvers and Pöschl planes.
Click here to enter text.	Identify a patient with conductive hearing loss before surgery.
Click here to enter text.	Check the findings against the Bárány Society criteria A through D.
Click here to enter text.	Confirm that the VEMPs are preserved.
Click here to enter text.	Perform cVEMP testing.

Quick Check

Normal stapedial reflexes despite a conductive hearing loss can point to a third window.

☐ True ☐ False

A positive ankle-Weber is most relevant at high frequencies (4000 to 8000 Hz).

☐True ☐False

Which imaging is ordered when a third window is suspected?

☐A. Brain CT only

☐B. Temporal bone CT with reconstructions in the Stenvers and Pöschl planes

☐C. Skull radiography

Pause and Apply (If-Then plan): If a patient has a conductive hearing loss and large VEMPs, then I will ...

Click here to enter text.

Module 3: Diagnostic Criteria and Clinical Cases (Objectives 2 and 3)

Fill-in-the-Blank Guided Notes

The Bárány Society criteria require ____ of criteria A through D to be fulfilled for the diagnosis:

Click here to enter text.

Criterion C requires dehiscence on temporal bone CT of less than ____ mm, with correct reconstructions in the ____ and ____ planes:

Click here to enter text.

List the three supporting findings in criterion B:

Click here to enter text.

Unfolding Case: Unsteadiness and Right-Sided Conductive Hearing Loss

Part 1. A 75-year-old man with a cardiac and orthopedic surgical history is referred for unsteadiness and right-sided conductive hearing loss. He has no Tullio, Hennebert, or spontaneous nystagmus, but strong right-beating headshaking nystagmus. What information is most relevant? What would you notice first?

Click here to enter text.

Part 2. The audiogram shows a right conductive hearing loss, and the right stapedial reflexes are normal. What does this pattern indicate?

Click here to enter text.

Part 3. At the revisit, a 256 Hz tuning fork on the medial malleolus is not felt, but he hears the tone in the right ear. How does this change your interpretation?

Click here to enter text.

Part 4. What test would you order next, and what would you look for? Which criteria would you apply?

Click here to enter text.

Module 4: Other Third Windows and Management (Objectives 1 and 4)

Window Pane Summary: Compare and Contrast

	Conservative management	Surgical management
What it involves	Click here to enter text.	Click here to enter text.
When it may be considered	Click here to enter text.	Click here to enter text.

	Conservative management	Surgical management
Evidence or outcomes noted in the course	Click here to enter text.	Click here to enter text.

Quick Check

Only superior canal dehiscence can act as a third window.

☐True ☐False

All prospective studies of surgery discussed in the course are on operated patients.

☐True ☐False

Which statement reflects the management principles in the course?

☐A. Surgery is the first step for every patient

☐B. Information that the condition is not dangerous comes first, and other treatment is tried before surgery

☐C. Hearing aids are never an option

Pause and Apply (If-Then plan): If a patient with a confirmed dehiscence has mild symptoms, then I will ...

Click here to enter text.

Clinical Reference Tool: Bárány Society Criteria Checklist

Criterion (all of A through D must be fulfilled)	Met?	Patient findings
A. At least 1 characteristic symptom (bone conduction hyperacusis, Tullio, Hennebert, or pulse-synchronous tinnitus)	☐Yes ☐No	Click here to enter text.

Criterion (all of A through D must be fulfilled)	Met?	Patient findings
B. At least 1 supporting finding (typical nystagmus, "super hearing," or large VEMP responses)	☐Yes ☐No	Click here to enter text.
C. Dehiscence on temporal bone CT (<0.2 mm) in the Stenvers and Pöschl planes	☐Yes ☐No	Click here to enter text.
D. Not better explained by another diagnosis	☐Yes ☐No	Click here to enter text.

This tool is for clinical reference only. Always follow your facility's protocols.

Post-Course Reflection

What was the most significant thing you learned today that surprised you or challenged your existing practice?

Click here to enter text.

What knowledge gaps did this course reveal in your own skills or knowledge?

Click here to enter text.

Describe a specific patient or client from your own practice where you would apply something from this course:

Click here to enter text.

What is one thing you will do differently in your practice next week as a result of this course?

Click here to enter text.

Action Plan

Identify at least 2 specific, measurable changes you plan to make to your clinical practice as a direct result of this course. Use the If-Then format where possible: "If I encounter [situation X], then I will [action Y]."

My Action Plan Goal	Target Date	How I Will Measure Success
Click here to enter text.	Click here to enter text.	Click here to enter text.
Click here to enter text.	Click here to enter text.	Click here to enter text.

Notes

Quiz Summary

The following quiz hints appeared throughout the course content. Use this section as a quick study reference.

Q1	**Quiz Hint:** Vertigo or oscillopsia induced by loud sound is the Tullio phenomenon. Symptoms of superior semicircular canal dehiscence also include vertigo from pressure changes (Hennebert), tinnitus, bone conduction hyperacusis, and autophony.
Q2	**Quiz Hint:** Look for combinations of conductive hearing loss, especially at low frequencies, with normal stapedial reflexes and normal or large VEMPs despite the conductive hearing loss, plus bone conduction hyperacusis.
Q3	**Quiz Hint:** All criteria A through D must be fulfilled: at least one characteristic symptom, at least one supporting finding such as nystagmus, "super hearing," or large VEMP responses, dehiscence on temporal bone CT, and the condition is not better explained by another diagnosis.
Q4	**Quiz Hint:** Order a temporal bone CT with reconstructions in the Stenvers and Pöschl planes. Photon counting CT gives better resolution with 50% of the radiation.
Q5	**Quiz Hint:** Treatment starts with information that the condition is not dangerous. Surgery (capping or plugging) is not considered until other treatments have been tried, with even surgeons waiting 6 to 12 months.

Additional Information

Presenter Bio

Dr. Mikael Karlberg is an Associate Professor at the Department of Otorhinolaryngology, Lund University, Sweden, with over 35 years of experience. He specializes in the diagnosis and treatment of balance disorders and vertigo. Dr. Karlberg has authored over 60 articles in international scientific journals and co-authored the book "Det snurrar – Allt om yrsel och balanssjukdomar" (Bazar Förlag, 2023). He is the President of the Bárány Society and has served as the Scientific Secretary of the Swedish Society of Otorhinolaryngology. Dr. Karlberg is widely recognized for his contributions to research and clinical practice in vestibular disorders.

Presenter Disclosure

Financial Disclosures: Dr. Mikael Karlberg did not receive an honorarium from Inventis for this course.

Non-Financial Disclosures: There are no non-financial disclosures to disclose.

This learning event does not focus exclusively on any specific product or service.

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Additional Information (continued)

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