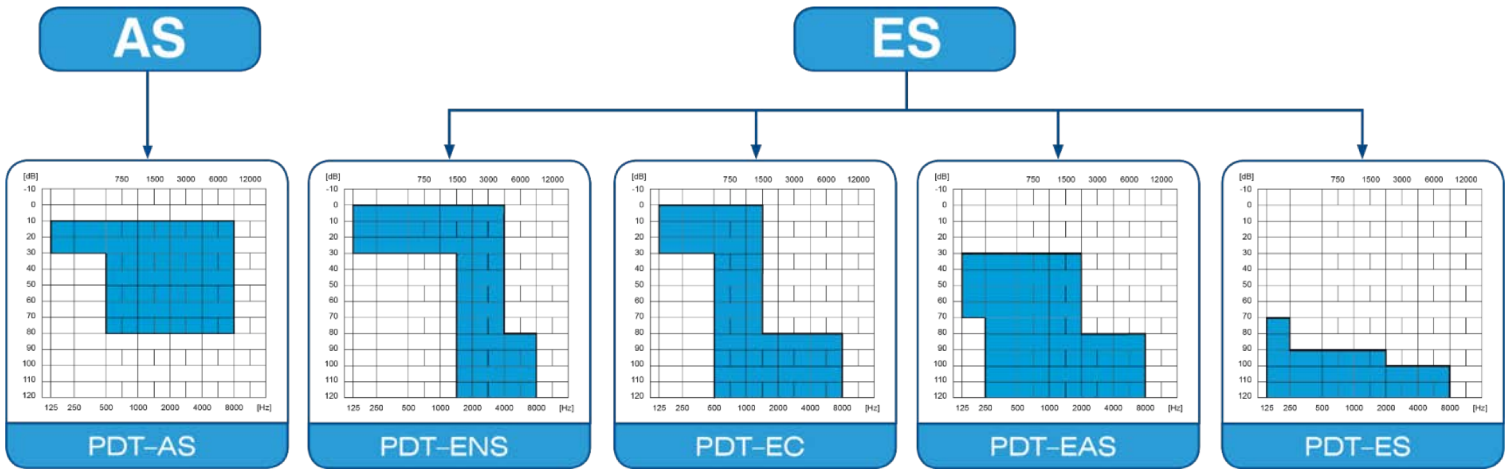
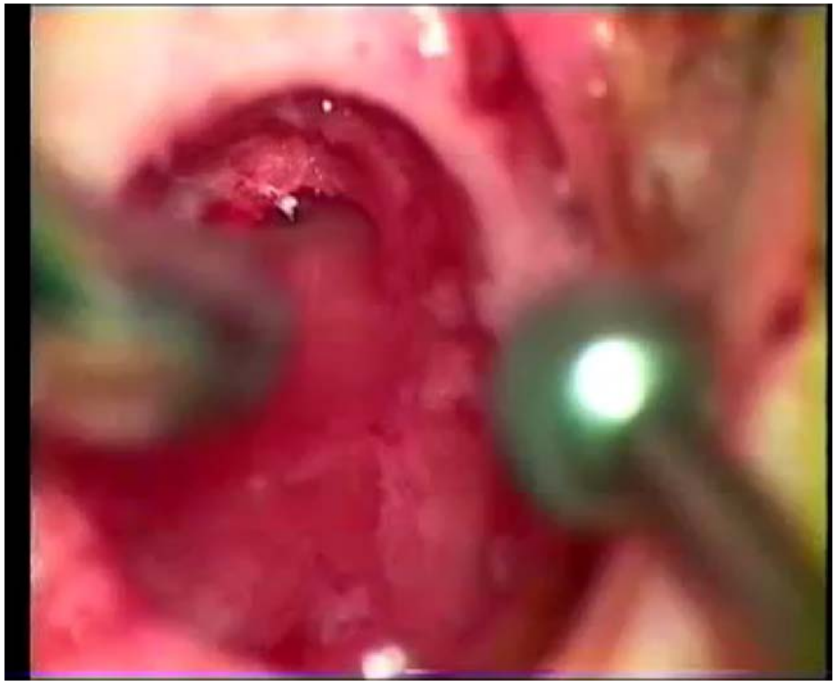
Authors: Skarzynski P.H., Skarzynski H., Lorens A., Swierniak W., Sosna M.

Long-term outcomes in Partial Deafness Treatment



1992 – 2018

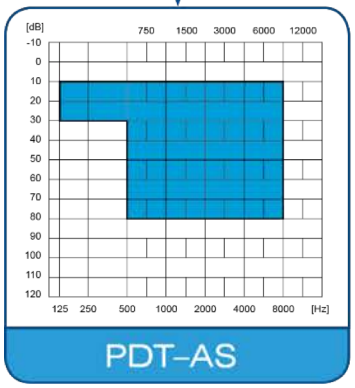
TOTAL > 6500 implantations



PARTIAL DEAFNESS TREATMENT

PROF. H. SKARŻYŃSKI 2014

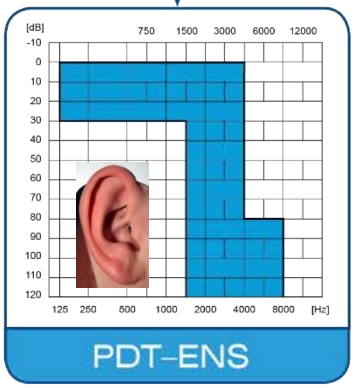
AS



PDT–AS

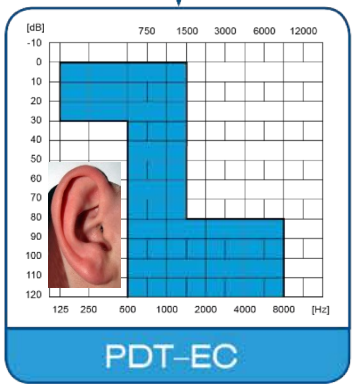
hearing aids
middle ear implants

ES



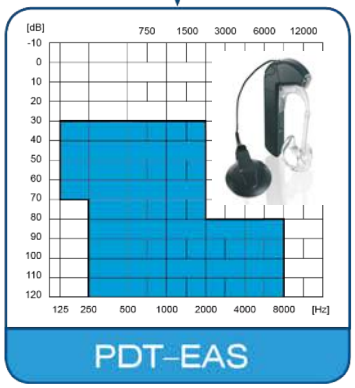
PDT–ENS

16 -19 mm



PDT–EC

20 -25 mm



PDT–EAS

25 -28 mm

PDT–ES

28 -31 mm

- Skarzynski H, Lorens A, Dziendziel B, Skarzynski PH. *Expanding pediatric cochlear implant candidacy: A case study of electro-natural stimulation (ENS) in partial deafness treatment*. Int J Pediatr Otorhinolaryngol. 2015; 79(11):1896–900.
- Skarżyński H., Lorens A. Skarzynski P.H. *Electro-Natural Stimulation (ENS) in Partial Deafness Treatment: A Case Study*. J Hear Sci. 2014(4): CS67-71.
- Skarzynski H, Lorens A, Matusiak M, Porowski M, Skarzynski PH, James CJ. *Cochlear implantation with the Nucleus slim straight electrode in subjects with residual low-frequency hearing.* Ear Hear. 2014; 35(2):e33-43
- Skarzynski H, Lorens A, Matusiak M, Porowski M, Skarzynski PH, James CJ. *Partial deafness treatment with the Nucleus straight research array cochlear implant*. Audiol Neurootol. 2012;17(2):82–91.
- Lorens A, Zgoda M, Skarzynski H. *A new audio processor for combined electric and acoustic stimulation for the treatment of partial deafness*. Acta Otolaryngol (Stockh). 2012 Jul;132(7):739–50.
- Brockmeier SJ, Peterreins M, Lorens A, Vermeire K, Helbig S, Anderson I, Skarzynski H, Van de Heyning P, Gstoettner W, Kiefer J. *Music perception in electric acoustic stimulation users as assessed by the Mu.S.I.C. test*. Adv Otorhinolaryngol. 2010;67:70-80.
- Skarzynski H., Lorens A. *Partial Deafness Treatment*, Cochlear Implant International 2010; 11 (Suppl. 1): 29-41.
- Skarzynski H, Lorens A. *Electric acoustic stimulation in children*. Adv Otorhinolaryngol. 2010;67:135-43.
- Skarżyński H., Lorens A., Piotrowska A., Podskarbi-Fayette R. *Results of partial deafness cochlear implantation (PDCI) using various electrode designs.* Audiol Neurootol. 2009;14 Suppl 1:39-45.
- Lorens A., Polak M., Piotrowska A., Skarżyński H. *Outcomes of Treatment of Partial Deafness with Cochlear Implantation: A DUET Study*. Laryngoscope. 2008; 118(2):288-94.
- Skarzynski H, Lorens A, Piotrowska A, Anderson I. *Partial deafness cochlear implantation in children*. J Pediatr Otorhinolaryngol. 2007;71(9):1407-13.

PARTIAL DEAFNESS TREATMENT

- Skarzynski H., Lorens A., Piotrowska A. *A new method of partial deafness treatment.* Med Sci Monit., 2003 Apr; 9(4):CS20-4.

TYPICAL PARTIAL DEAFNESS TREATMENT

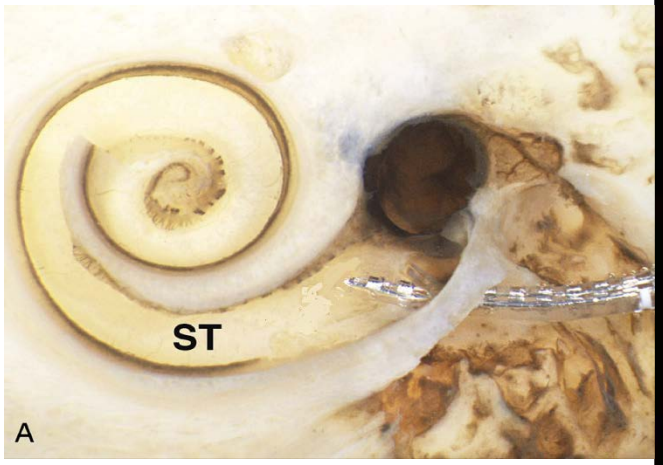
16 YEARS

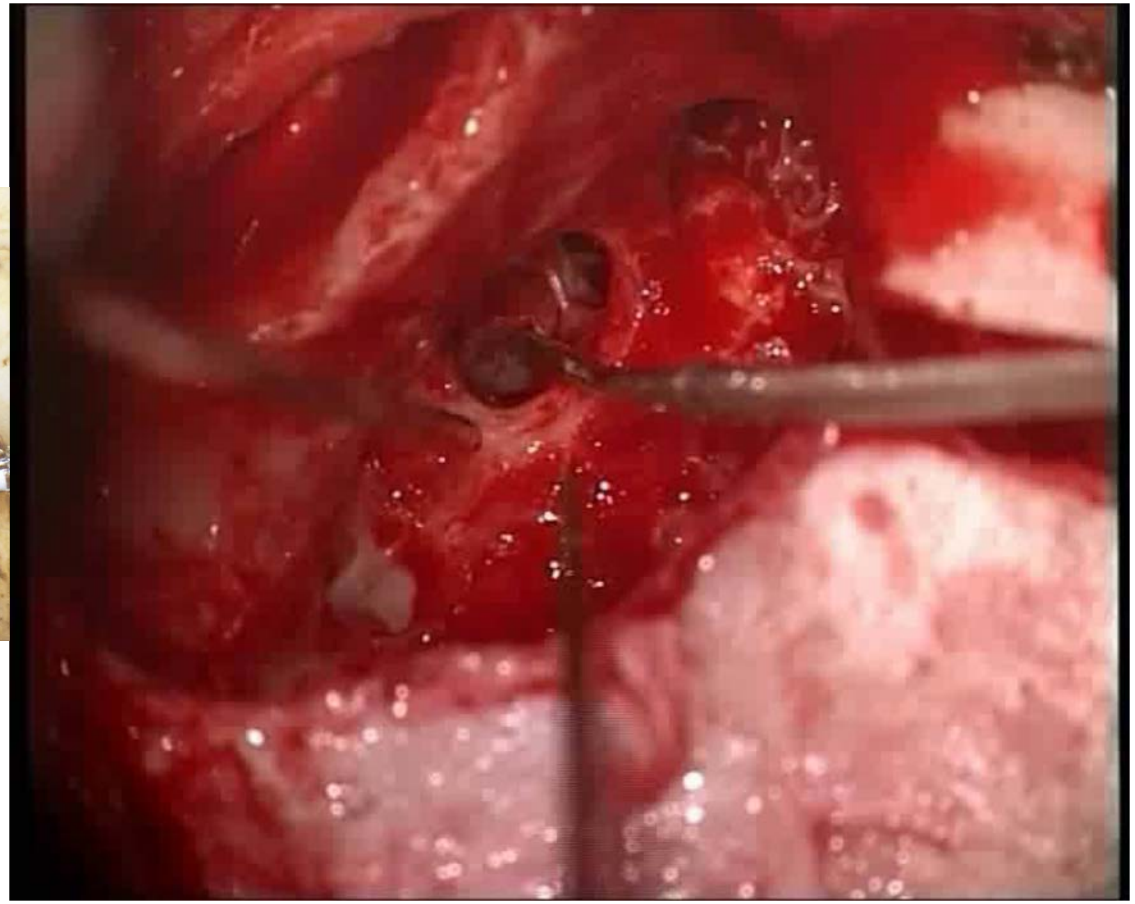
BASIC PRINCIPLES
2002–2018

- 6 STEPS SKARZYNSKI SURGICAL PROCEDURE
- ROUND WINDOW APPROACH
- SOFT ELECTRODES

■ H. Skarzynski et al. *Hearing preservation in Partial Deafness Treatment (PDT)* Medical Science Monitor, 2010 Nov;16(11):CR555-562

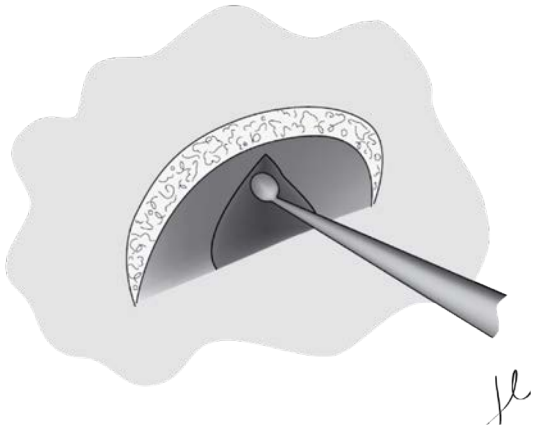
ROUND WINDOW APPROACH



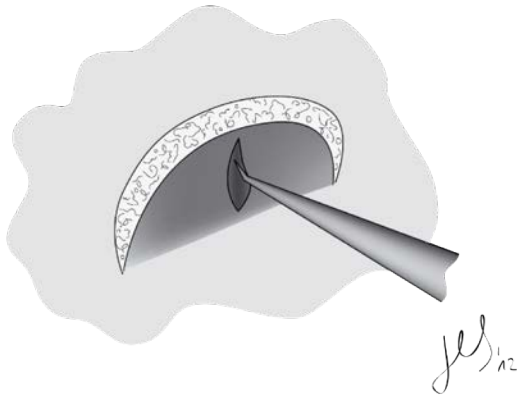


HISTORY
Differences in round window openings

1992



1997 – 2018



- H. Skarzynski et al. *Hearing preservation in Partial Deafness Treatment (PDT)*. Medical Science Monitor, 2010 Nov;16(11):CR555-562.
- Skarzynski H., Lorens A.: *Partial Deafness Treatment*. Cochlear Implants International Volume 11, Sup. 1, June 2010, 29-41.
- Skarzynski H. *Ten years experience with a new strategy of partial deafness treatment*. Journal of Hearing Science 2012; 2(2): 11-18.

FIRST PEDIATRIC MATERIAL IN THE WORLD

1997–2000

N = 62

2000 – H. SKARŻYŃSKI – Antwerp 5th ESPCI (children)

Results of non-functional residual hearing and inner ear structures preservation

- Skarżyński H. et al. *Residual acoustic hearing in the ear before and after cochlear implantation in children (2000).*

OUR FIRST MATERIAL IN ADULTS

1997–2000

N = 16

2000 – A. LORENS – Berlin EUFOS (adults)

Results of non-functional residual hearing and inner ear structures preservation

- *Lorens A. et al. Residual acoustic hearing in the ear before and after cochlear implantation (2000).*

The 6-step Skarzynski surgical technique for cochlear implantation in partial deafness treatment

STEP 1 Antromastoidotomy

STEP 2 Posterior tympanotomy to allow visualization of the round window

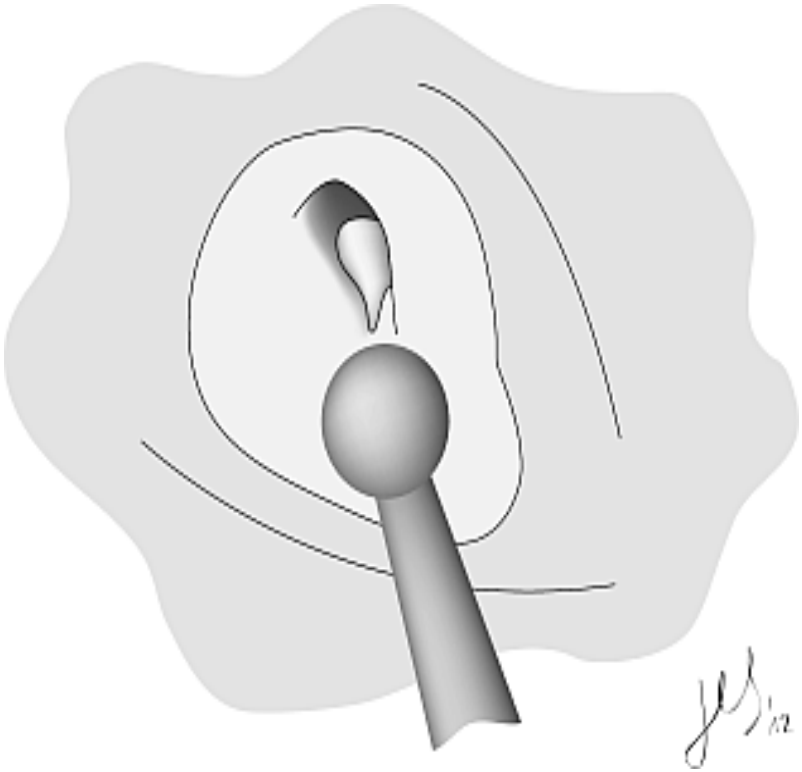
STEP 3 Puncture and incision of the round window membrane

STEP 4 Approach to the scala tympani directly through the round window membrane (partial insertion of the electrode array)

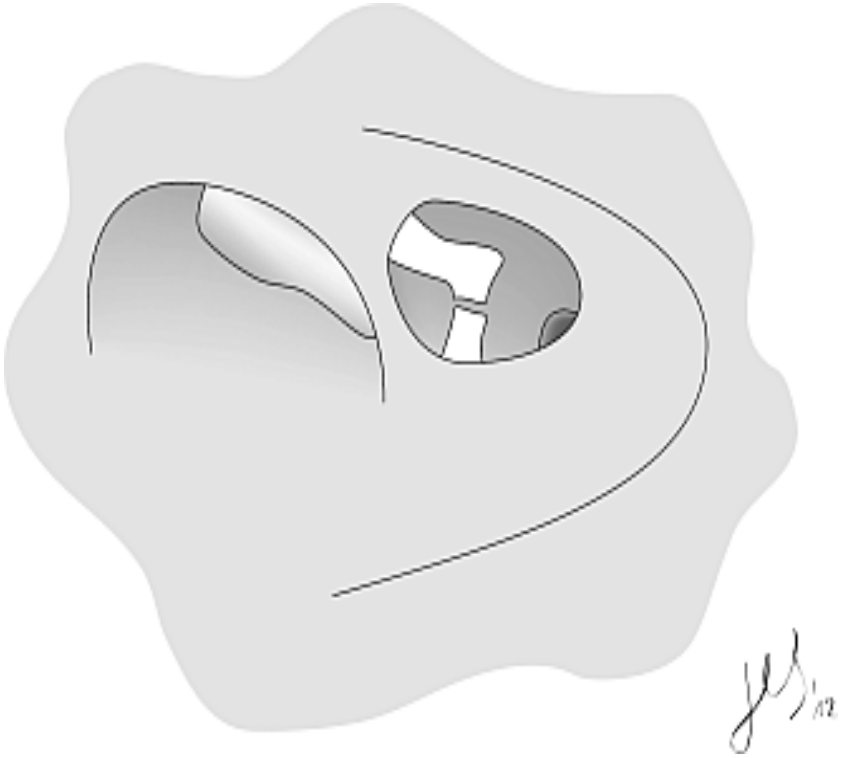
STEP 5 Electrode fixation in the round window niche with fibrine glue (membrane must be partially uncovered to preserve its mobility)

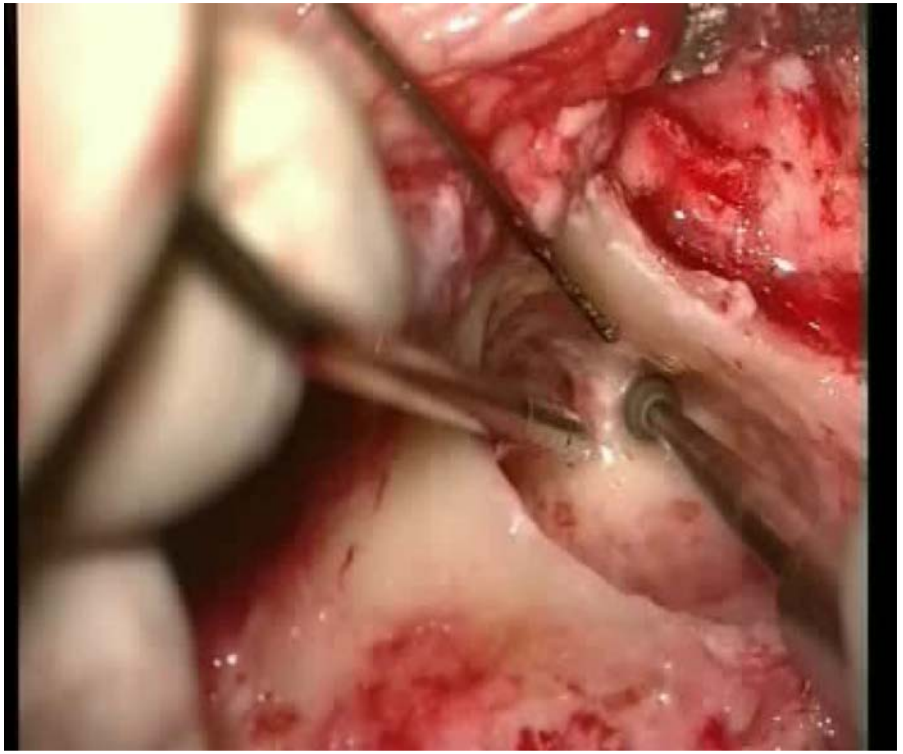
STEP 6 Fixation of the device in a well in the temporal bone

STEP 1 ANTROMASTOIDOTOMY

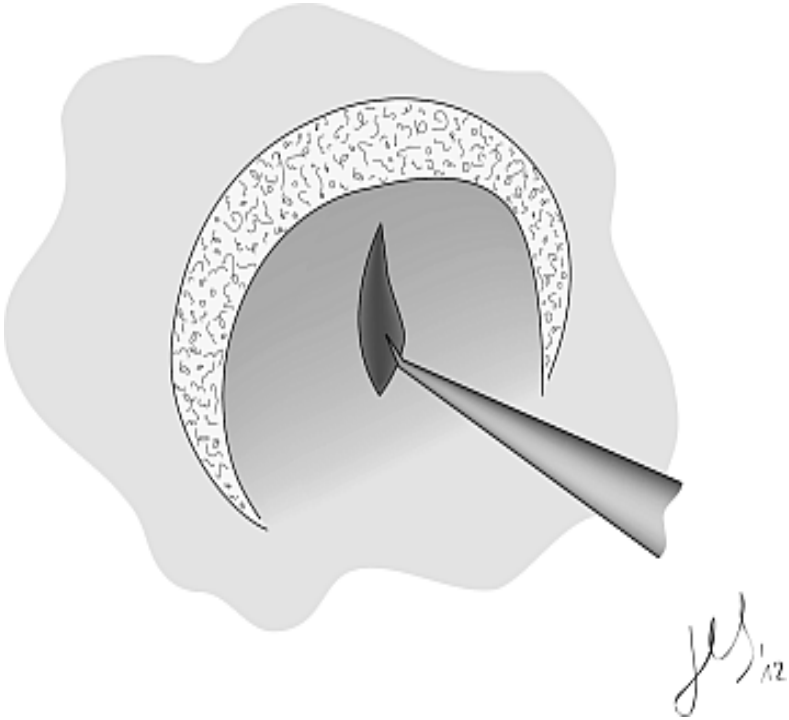


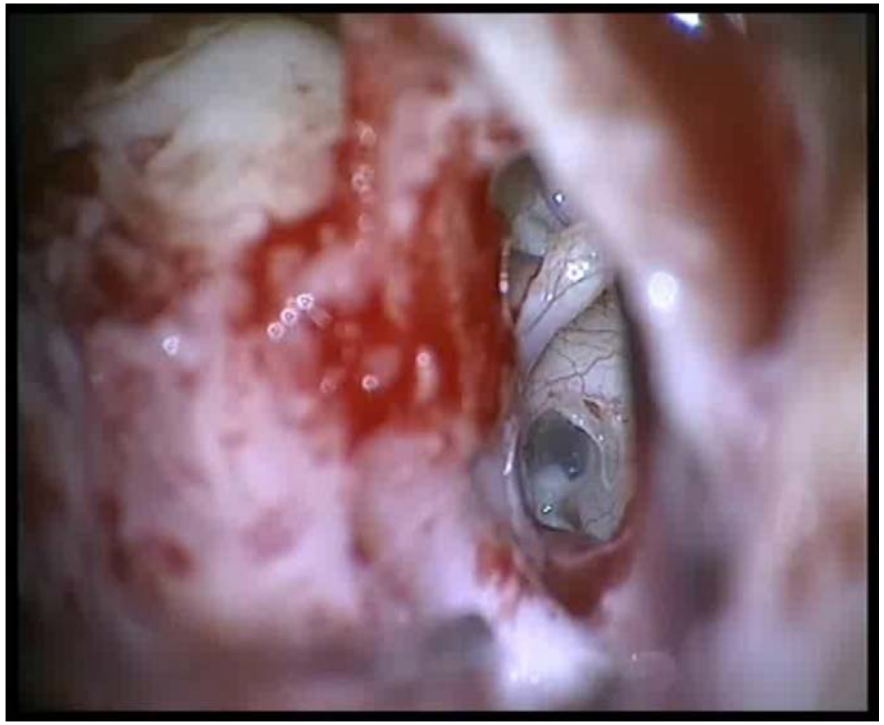
STEP 2 POSTERIOR TYMPANOTOMY TO ALLOW VISUALIZATION OF THE ROUND WINDOW NICHE





STEP 3 PUNCTURE AND INCISION OF THE ROUND WINDOW MEMBRANE

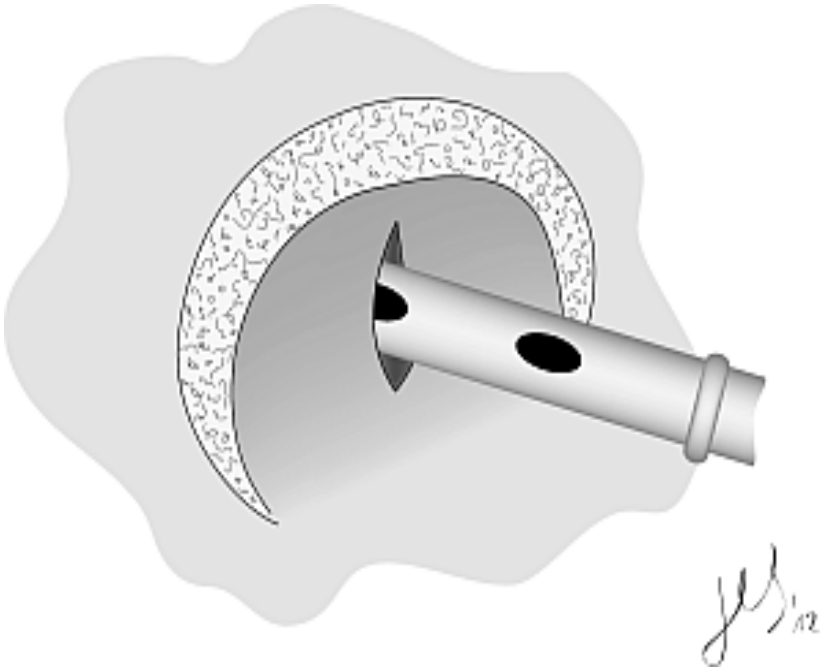




STEP 4

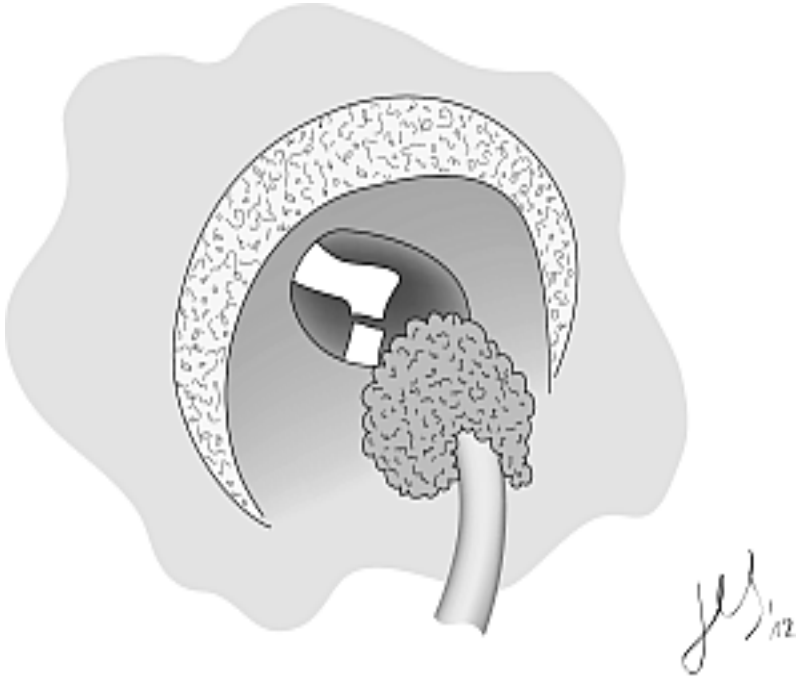
APPROACH TO THE SCALA TYMPANI DIRECTLY THROUGH THE ROUND WINDOW MEMBRANE

(PARTIAL INSERTION OF THE ELECTRODE ARRAY)

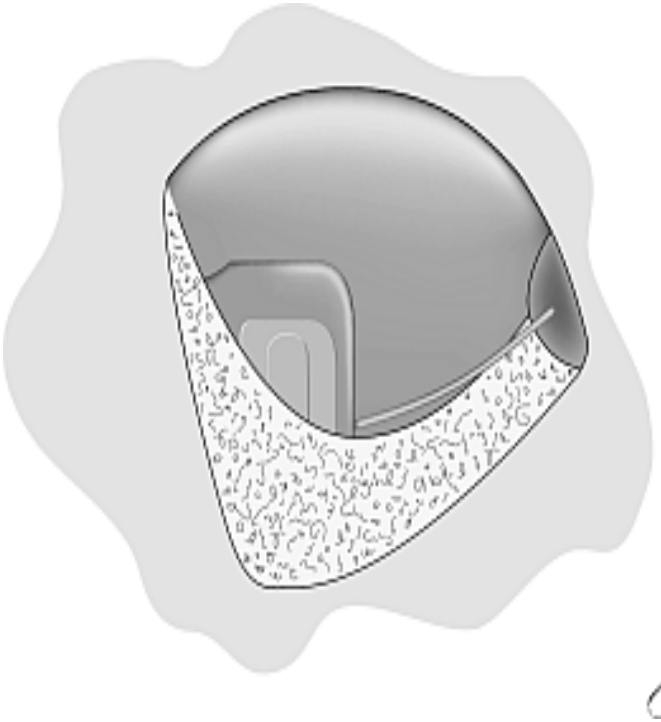


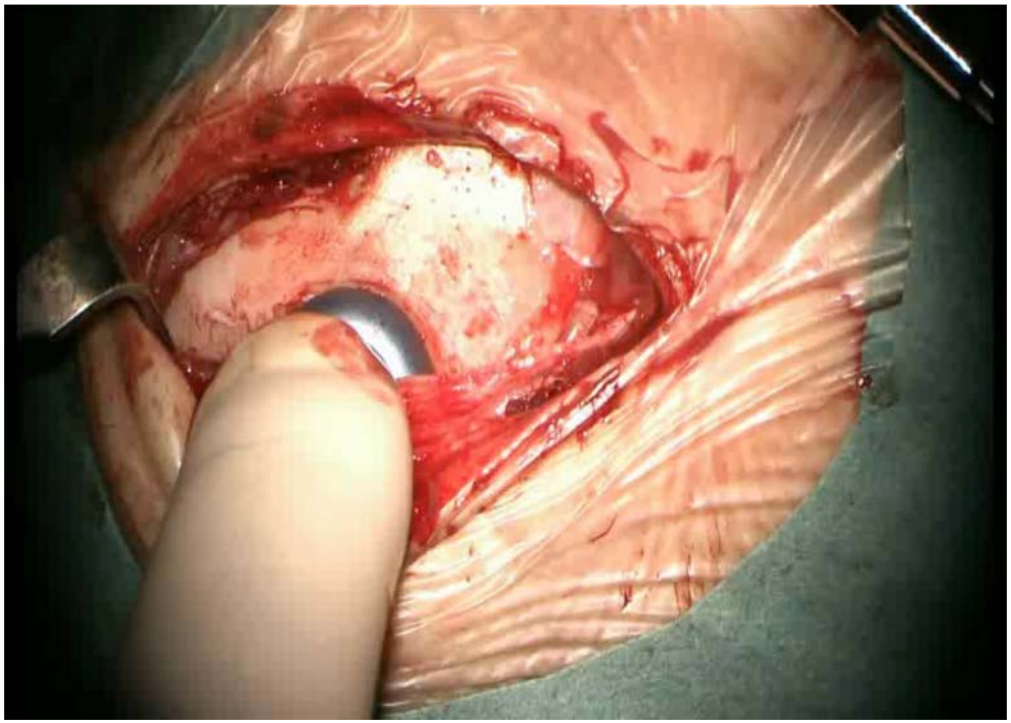
STEP 5

ELECTRODE FIXATION IN THE ROUND WINDOW NICHE WITH FIBRINE GLUE (MEMBRANE MUST BE PARTIALLY NCOVERED TO PRESERVE ITS MOBILITY)

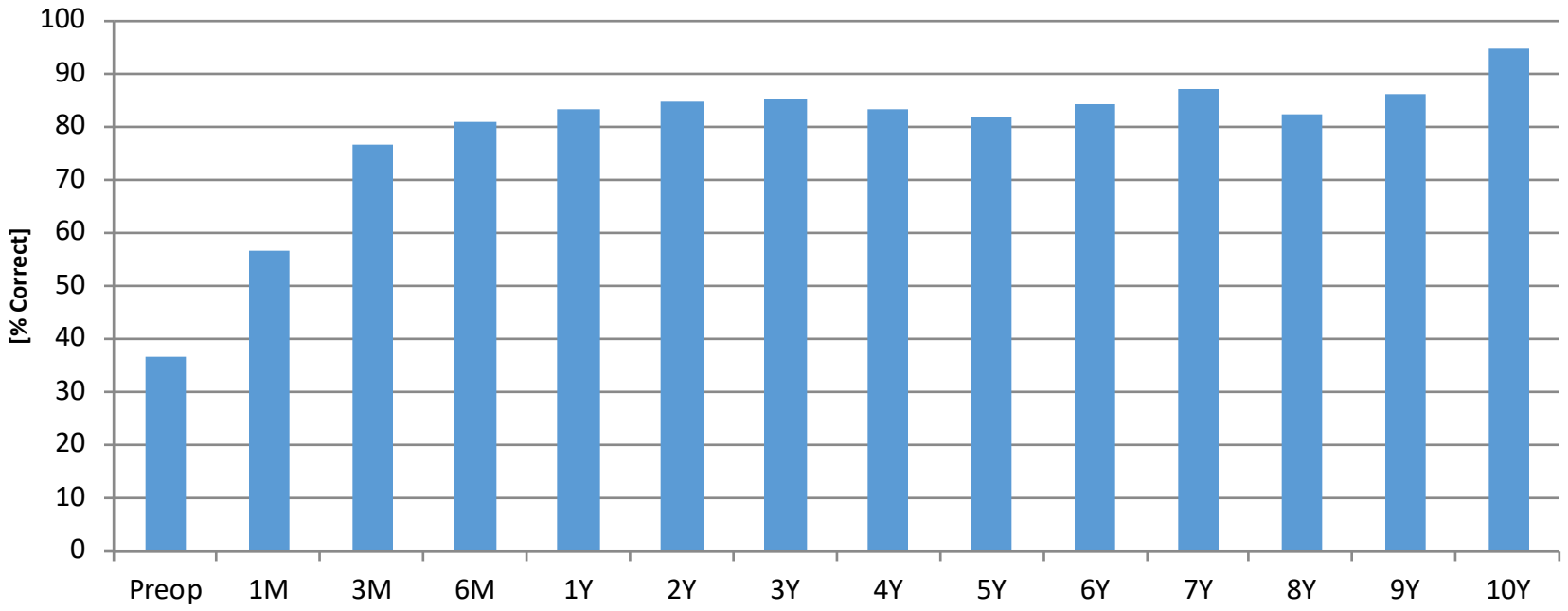


STEP 6 FIXATION OF THE DEVICE IN THE WELL IN TEMPORAL BONE



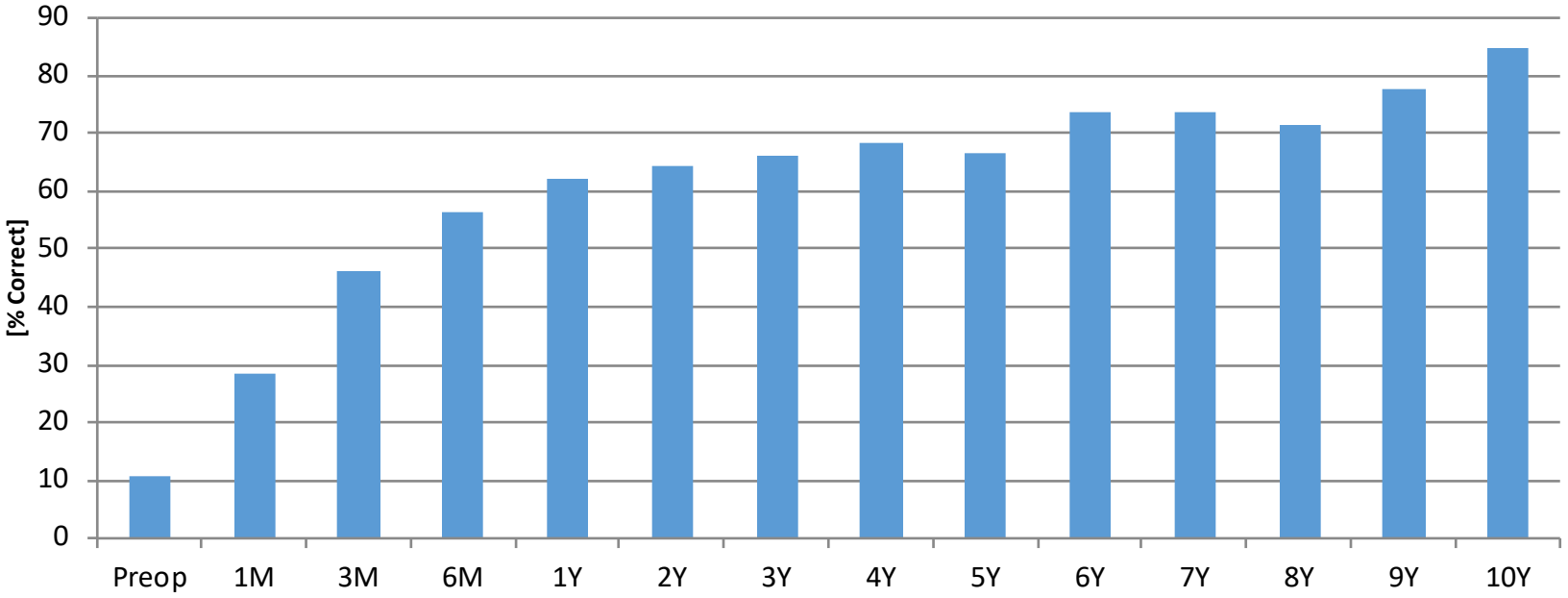


Monosyllables in quiet



- Significance between 1-6M ($P<0.05$)
- No significance between 6M, 1-5Y ($P>0.1$)

Monosyllables 10 dB SNR



- Significance between 1M-6M ($P<0.05$)
- Significance between 6M-4Y, 6M-3Y ($P<0.05$)
- 6M-2Y ($P=0,11$), 6M -5Y ($P=0,055$)
- No significance between 1Y-5Y ($P>0.1$)

OUR HP classification system

- The HP classification system has been discussed for over 2 years. Several proposals have been debated and reviewed to define a qualitative HP classification system that relates the hearing loss to available hearing (in other words to use relative change instead of absolute difference) and is suitable for all users with measurable pre-operative residual hearing.

- To overcome the limitations of the commonly used systems, we propose:

$$\text{Relative change} = ((PTApost - PTApre)/(PTAmax - PTApre))$$

where:

PTApost is pure tone average measured post-operatively,
PTApre is pure tone average measured pre-operatively,
PTAmax is the limits of the audiometer.

OUR HP classification system

- The hearing loss is converted to preservation by calculating 100% minus relative change in %:

$$S = [\ 1-((PTApost-PTApre)/(PTAmax-PTApre))*100]\ [\%]$$

where S is preservation numerical scale.

- The numerical scale is converted to a categorical scale for ease of reporting.

Percent of residual hearing preserved	**Classification**
>75%	Complete HP
>25-75%	Partial HP
0-25%	Minimal HP
No measurable hearing	Loss of hearing / No hearing

2014 r. – Newest extention of indications for PDT – H. Skarżyński

PDT-ENS (ADULT) – electro-natural hearing

ELECTRO-NATURAL STIMULATION (ENS) IN PARTIAL DEAFNESS TREATMENT: A CASE STUDY

Henryk Skarżyński[1,2], Artur Lorens[2], Piotr Henryk Skarżyński[1,3,4]

[1] Oto-Rhino-Laryngology Surgery Clinic, Institute of Physiology and Pathology of Hearing, Warsaw/Kajetany, Poland
[2] World Hearing Center, Institute of Physiology and Pathology of Hearing, Warsaw/Kajetany, Poland
[3] Heart Failure and Cardiac Rehabilitation Department of the Medical University of Warsaw, Warsaw, Poland
[4] Institute of Sensory Organs, Warsaw/Kajetany, Poland

Corresponding author: Piotr H. Skarżyński, World Hearing Center, Institute of Physiology and Pathology of Hearing, Mochnackiego 10 Str., 02-042 Warsaw, Poland, e-mail: p.skarzynski@inz.waw.p

Abstract

Background: There is a significant group of elderly patients whose hearing impairment is characterized by normal or slightly elevated thresholds in the low and mid frequency bands (below 1500 Hz) with nearly total deafness in the high frequency range. These patients very often remain beyond the scope of effective treatment by hearing aids.

Case Report: This study presents the case of a 75-year-old patient with good hearing in the range 125–1500 Hz and deafness at other frequencies. An implant was used to restore hearing at high frequencies, while preserving low and mid frequency acoustic hearing in the implanted ear. This can be described as electro-natural stimulation (ENS) of the inner ear.

Conclusions: The results demonstrate that low and mid frequency hearing (up to 1500 Hz) can be preserved using the round window surgical technique. A substantial improvement in speech discrimination was also observed when electrical stimulation on one side was combined with acoustic stimulation on both sides. There is scope to extend qualifying criteria for cochlear implantation to include elderly patients suitable for ENS.

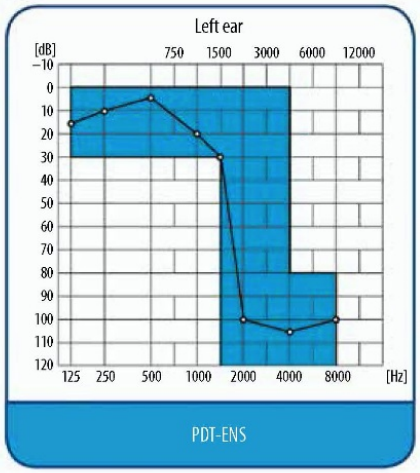
Keywords: Partial Deafness Treatment • hearing preservation • electric stimulation • cochlear implants

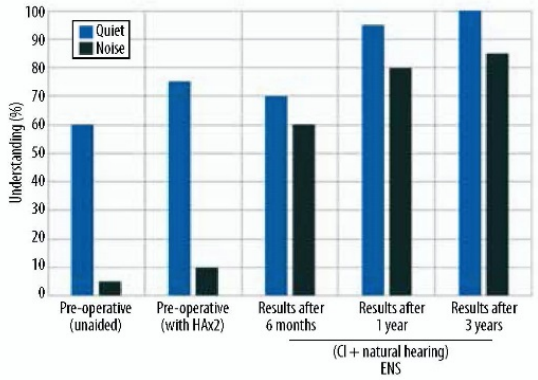
LA ESTIMULACIÓN ELECTRO-NATURAL (ENS) EN EL TRATAMIENTO DE LA SORDERA PARCIAL: UN ESTUDIO DE CASO

Resumen

Introducción: Hay un gran grupo de pacientes de edad avanzada cuya pérdida auditiva se caracteriza por los umbrales de audición normales o un poco elevados en las frecuencias bajas y medias (por debajo de 1500 Hz), combinado con una sordera casi total en el rango de las frecuencias altas. Muy a menudo, no se puede ayudar al paciente efectivamente con los audífonos.

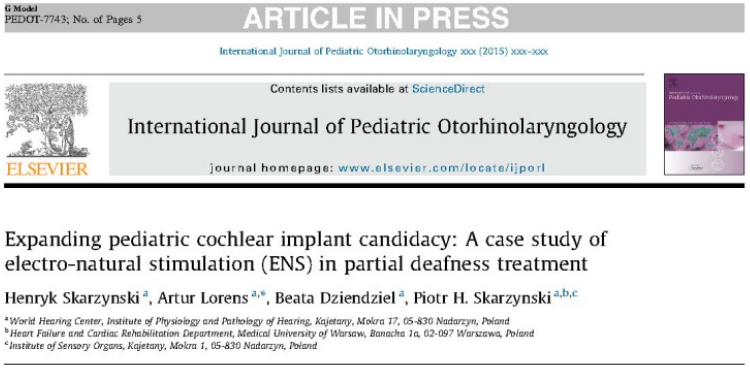
Caso clínico: Este trabajo presenta un caso de una paciente de 75 años de edad, con buena audición en el rango de 125 a 1500 Hz y la sordera en las otras frecuencias. Fue usado un implante para restablecer la audición en el rango de las frecuencias altas. La audición acústica fue guardada en el oído implantado en las frecuencias bajas y medias. Esta situación se puede describir como un caso de estimulación electro-natural (ENS) del oído interno.





2015 r. – Latest extention of indications for PDT – H. Skarżyński

PDT-ENS (CHILD)– electro-natural hearing



G Model
PEDOT-7743; No. of Pages 5

ARTICLE IN PRESS

International Journal of Pediatric Otorhinolaryngology xxx (2015) xxx–xxx

Contents lists available at ScienceDirect

International Journal of Pediatric Otorhinolaryngology

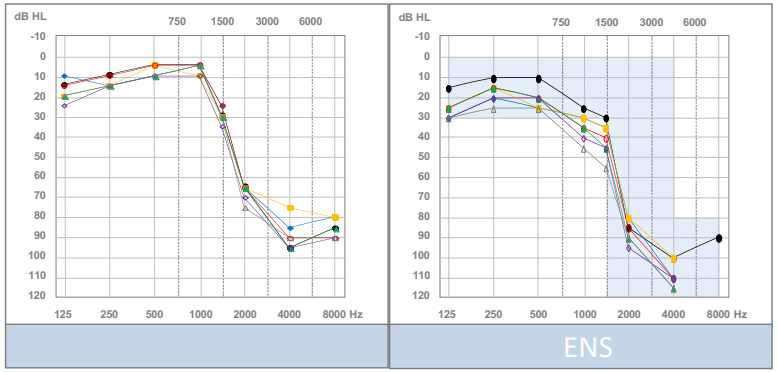
journal homepage: www.elsevier.com/locate/ijporl

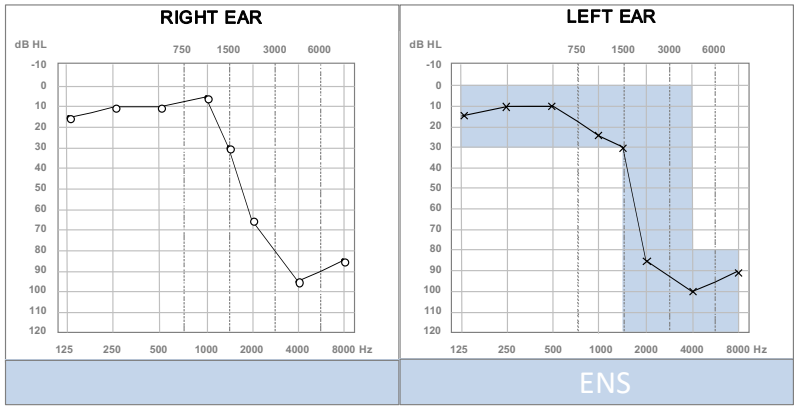
ELSEVIER

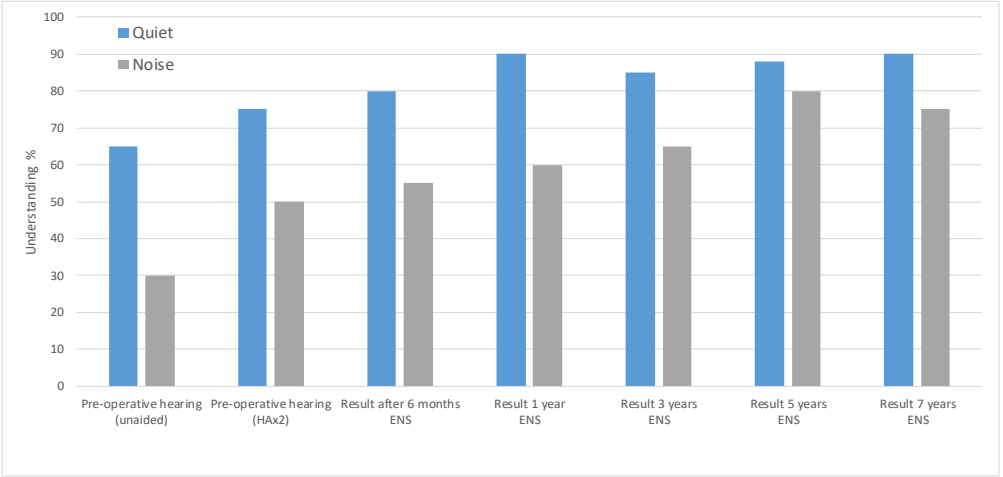
Expanding pediatric cochlear implant candidacy: A case study of electro-natural stimulation (ENS) in partial deafness treatment

Henryk Skarzynski [a], Artur Lorens [a,*], Beata Dziendziel [a], Piotr H. Skarzynski [a,b,c]

[a] World Hearing Center, Institute of Physiology and Pathology of Hearing, Kajetany, Mokra 17, 05-830 Nadarzyn, Poland
[b] Heart Failure and Cardiac Rehabilitation Department, Medical University of Warsaw, Banacha 1a, 02-097 Warszawa, Poland
[c] Institute of Sensory Organs, Kajetany, Mokra 1, 05-830 Nadarzyn, Poland







CONCLUSIONS

- The optimal hearing in quiet is reached around 6 months after IS.
- To reach the optimal hearing in noise takes several years.
- No sudden complete losses (after 1 month postoperatively) observed.
- Mean loss for postlingually deafened patients per year is 2-3dB; this is true for both implanted and non implanted ear and it is related to pts etiology.
- There are no losses caused after 1 month postoperatively that could be related to the electrode presence in the cochlea.

Organization of the world's and Europe's largest congresses and scientific conferences

28 May-1 June 2019

32nd Politzer Society Meeting

2nd World Congress of Otology

XXXV World Congress of Audiology 2020

WORLD HEARING CENTER

INSTITUTE OF PHYSIOLOGY AND PATHOLOGY OF HEARING

KAJETANY/WARSAW, POLAND

THANK YOU FOR YOUR ATTENTION