NEGATIVE ACOUSTIC REFLEX: AN UNUSUAL FINDING*

J. D. SAMUEL,[1] H. S. GOPAL[2] M. A. RADHA[8] and SUDHA K.MURTHY4

Introduction

The sensitivity of the audiplogical test battery has been greatly enhanced with the introduction of impedance audiometry (Hodgson, 1978). Acoustic reflex testing, a part of impedance battery is a reliable diagnostic indicator of various lesions in the auditory system (Wilber and Feldman, 1976).

Acoustic reflexometry evaluates the condition of the middle ear while the other ear (contralateral) or the same ear (ipsilateral) is acoustically stimulated. The acoustic reflex is also dependent on the sensitivity of the cochlea. The reflex activity of the middle ear muscles is indicated by a reduction in the compliance of the tympanic membrane and it can be observed directly on the balance meter. This decrease in the compliance or increase in the impedance is considered as the positive acoustic reflex.

An exception to this general rule is the negative on-off reflex seen in ears with early otosclerosis. But, so far, in the audiological literature we have not come across even a single report about pure negative reflex. We report such a case who showed only negative reflexes.

Review of Literature

Terkildsen *et al* (1973) and Bel *et al* (1976) have explained the physiology of negative on-off reflex in ears with early otosclerosis. In the progression of otosclerosis there are three stages, as far as acoustic reflex pattern is concerned.

Initially the otosclerotics demonstrate a mixed type reflex i.e., a negative deflection with the initiation of the stimulus, then a positive component with the sustained stimulus and again a negative component appears with the termination of the stimulus. The second stage has only negative on-off reflex i.e., the positive component disappears. In the last stage, the reflex is inhibited totally.

Negative on-off reflex is the first finding even in the absence of audiometrically detectable hearing loss (Terkildsen *et al*, 1973). The presence of negative on-off reflex is a contradictory sign to deafness surgery (Bel *et al*, 1976).

We have observed in this case a *Pure Negative Reflex.* By this, we mean, the balance meter needle deflects to the left with the acoustic stimulation (indi-

1 Mr J. D. Samuel, Lecturer in Audiology, A.I.I.S.H., Mysore.
2, 3, and 4, Students, A.I.I.S.H. Mysore.
* Paper presented at the XII I.S.H.A. Conference, 1979 held at Bombay.

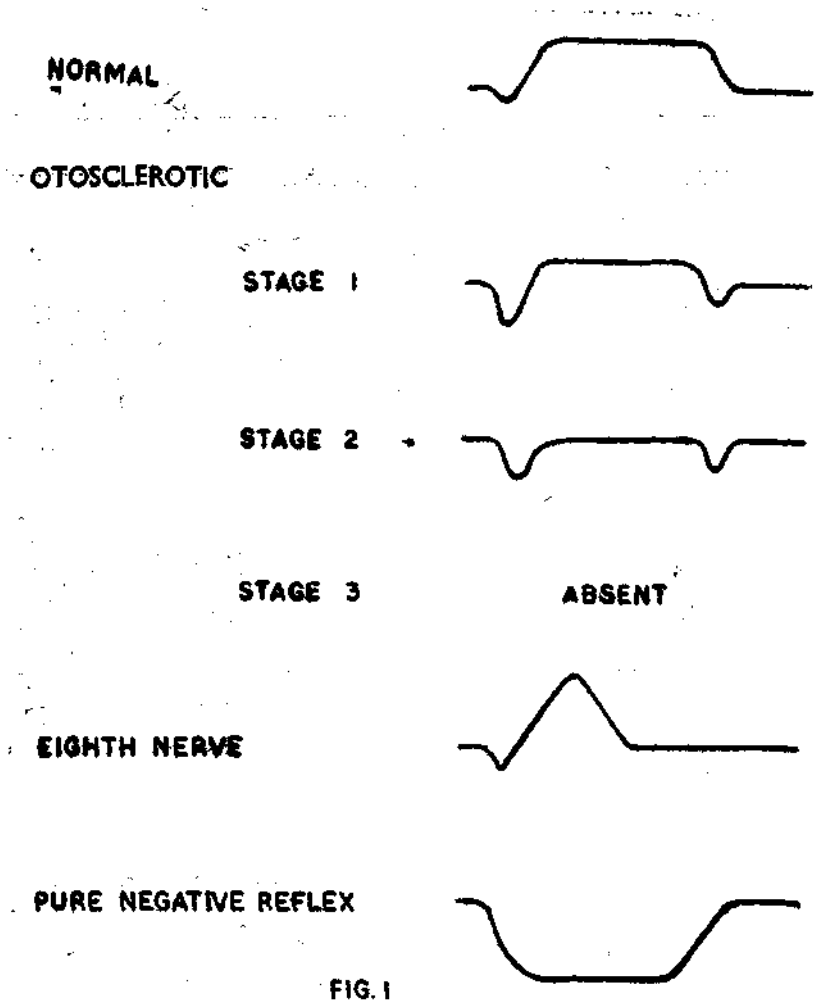


FIG. 1
STAPEDIUS REFLEX PATTERNS

eating an increase in compliance) and stays there during stimulation. This is opposite to the conventionally obtained acoustic reflex. We have not come across any literature wherein a pure negative reflex is reported, but, we have observed in this case.

. Case Report

V.N.N., a 25 year male, reported on 21st October 1974 with the complaint of hearing loss. Unfortunately no other clinical information was recorded.

In otological examination, otoscopy revealed thin tympanic membranes and the incudostapedial joints could be seen.

Audiological evaluation included a pure-tone hearing evaluation and impedance audiometric evaluation. Pure-tone hearing evaluation (26.10.1974) revealed the following. Left ear showed as increasing airbone gap towards high frequencies. The cochlear reserve as determined by conventional bone conduction audiometry, was within normal limits. Thus left ear had conductive hearing loss. Right ear air conduction thresholds were within normal limits except for a drop after 2KHZ.

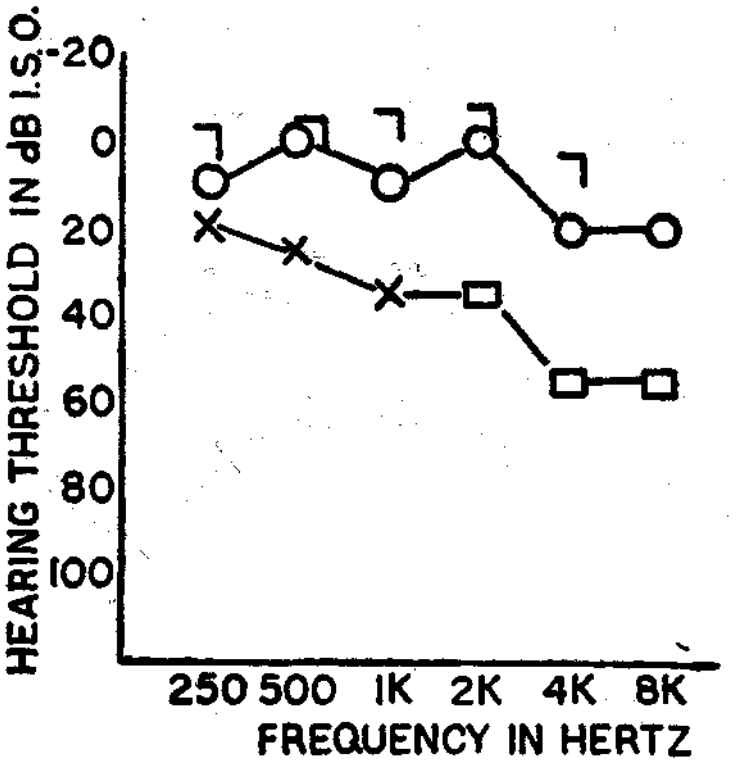


FIG . 2. Avdiometric Findings: (a) Pure-tone Audiogram (21-10-1974)

Impedance audiometry (26.10.1974) revealed increased compliance in left ear. Right ear showed compliance within normal limits. Contralateral reflexes were absent in both the ears-(The highest test tone intensity used was 110 dB HL).

On 10.1.1979 pure-tone audiometric re-evaluation was done. This revealed conductive hearing loss in left ear and hearing within normal limits in the right ear except at 8 KHZ where the threshold was 30 dB HL. This second evaluation revealed progression of the conductive loss in the left ear.

After four years, the repeated impedance audiometric evaluation yielded type ' Ad' tympanograms in both the ears. Negative acoustic reflexes were

observed in both the ears (This time, the highest test tone intensity was 125 dB HL).

Discussion

An interesting observation is that the presence of reflex, although negative, in a ear with conductive impairment when that ear (left) was probe ear. This is highly contradictory to the established concept that reflex will not be observed in the probe ear with conductive impairment.

In the right ear, where there was no audiometrically detectable hearing loss, negative reflexes were observed.

Moreover, the case reported progressive hearing loss, which was confirmed audiometrically (See Fig.2(a)).

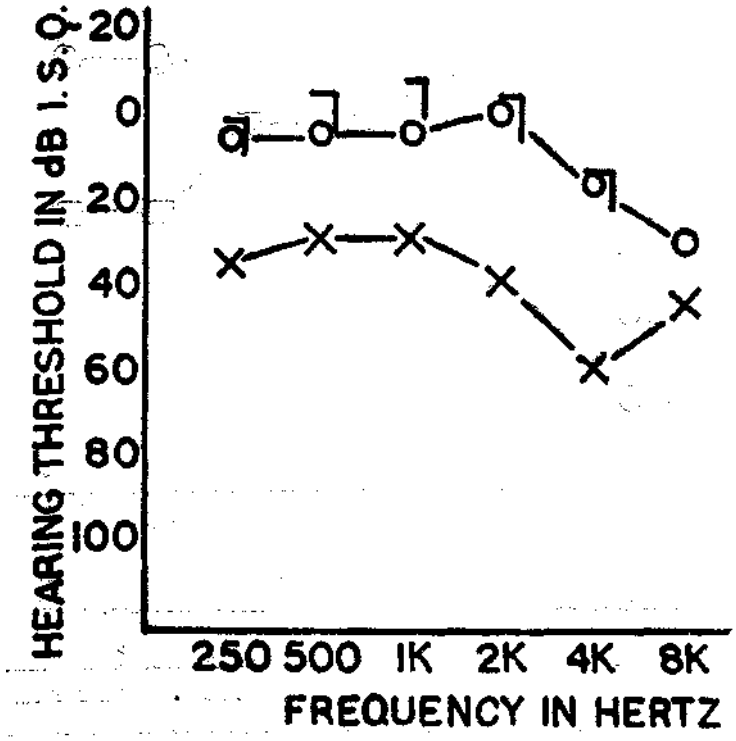
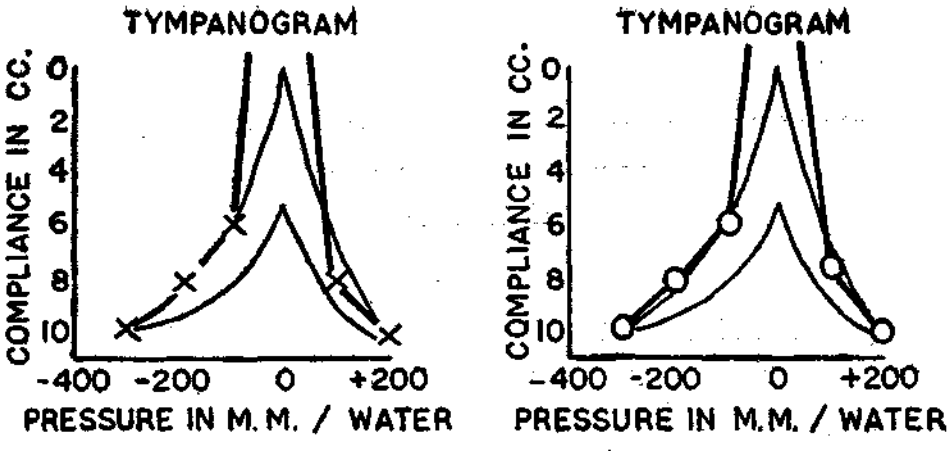


Fig. 2. (b) Pure-tone Audiogram (10-1-1979)

-Another puzzle is the appearance of reflex in the second evaluation, despite progressive hearing loss. We propose the following explanation for this:

1. The first evaluation might have failed to elicit the reflexes because of maximum permissible intensity for reflexometry was limited (Madsen Zo70 impedance bridge was used with a portable audiometer Beltone 12D)



LEFT RIGHT

STAPEOIUS MUSCLE REFLEX

PHONE ®

500	1K	2K	4K
100	110	125	A

PHONE Ⓛ

500	IK	2K	4K
115	120	A	A

Fig. 2. (c) Impedance Findings (10-1-1979)
(All the observed reflexes were negative acoustic reflexes)

2. The clinician might have considered the negative reflexes as artifact (if at all it had occurred).

3. The negative reflex in the second evaluation, might be a new and a later development.

These observations indicate that the pure negative reflex has some significance in audiological diagnosis hitherto not considered.

Conclusion

We feel that pure negative acoustic reflex is of diagnostic value as they were observed in an ear with conductive impairment. The exact nature of underlying pathology giving rise to this kind of reflex is yet to be established.

REFERENCES

Bel,J.,Causse,J.,Michaux,D.,Eizard, R.,Canut, Y.,andTapon, J. A.,(1976). *Audiology.* 15, 128.

Hodgson, W. R., (1978). Tests of hearing—Birth through one year. *In* F. N. Martin (ed), Pediatric Audiology. p. 192, Prentice-Hall Inc.

Terkildsen, K., Osterhammel, P., and Breatau, P., (1973). *Archives of Otolaryngology,* 98, 152.

Wilber, L.A., and Feldman, A. S., (1976). *In* A. S. Feldman and L. A. Wilber (eds). Acoustic Impedance and Admittance, p. 345. The Williams and Wilkins Co.