



Brazilian Journal of
OTORHINOLARYNGOLOGY

www.bjorl.org



ORIGINAL ARTICLE

Effect of conductive hearing loss on central auditory function[☆]

Arash Bayat^{a,*}, Mohammad Farhadi^b, Hesam Emamdjomeh^c, Ahmad Daneshi^b, Golshan Mirmomeni^d

^a Department of Audiology, School of Rehabilitation, Ahwaz Jondi-Shapour University of Medical Sciences, Iran University of Medical Sciences, Tehran, Iran

^b Department and Research Center of Otolaryngology, Head and Neck Surgery, Hazrat Rasoul Akram Hospital, Iran University of Medical Sciences, Tehran, Iran

^c Department of Audiology, Hazrat Rasoul Akram Hospital, Iran University of Medical Sciences, Tehran, Iran

^d MS in Statistics, Tehran University of Medical Sciences, Tehran, Iran

Received 27 May 2015; accepted 7 February 2016

KEYWORDS

Adult;
Auditory temporal processing;
Conductive hearing loss;
Gap in noise

Abstract

Introduction: It has been demonstrated that long-term Conductive Hearing Loss (CHL) may influence the precise detection of the temporal features of acoustic signals or Auditory Temporal Processing (ATP). It can be argued that ATP may be the underlying component of many central auditory processing capabilities such as speech comprehension or sound localization. Little is known about the consequences of CHL on temporal aspects of central auditory processing.

Objective: This study was designed to assess auditory temporal processing ability in individuals with chronic CHL.

Methods: During this analytical cross-sectional study, 52 patients with mild to moderate chronic CHL and 52 normal-hearing listeners (control), aged between 18 and 45 year-old, were recruited. In order to evaluate auditory temporal processing, the Gaps-in-Noise (GIN) test was used. The results obtained for each ear were analyzed based on the gap perception threshold and the percentage of correct responses.

Results: The average of GIN thresholds was significantly smaller for the control group than for the CHL group for both ears (right: $p=0.004$; left: $p<0.001$). Individuals with CHL had significantly lower correct responses than individuals with normal hearing for both sides ($p<0.001$). No correlation was found between GIN performance and degree of hearing loss in either group ($p>0.05$).

[☆] Please cite this article as: Bayat A, Farhadi M, Emamdjomeh H, Daneshi A, Mirmomeni G. Effect of conductive hearing loss on central auditory function. Braz J Otorhinolaryngol. 2016. <http://dx.doi.org/10.1016/j.bjorl.2016.02.010>

* Corresponding author.

E-mail: arashbayat2004@yahoo.com (A. Bayat).

Conclusion: The results suggest reduced auditory temporal processing ability in adults with CHL compared to normal hearing subjects. Therefore, developing a clinical protocol to evaluate auditory temporal processing in this population is recommended.

© 2016 Published by Elsevier Editora Ltda. on behalf of Associação Brasileira de Otorrinolaringologia e Cirurgia Cérvico-Facial. This is an open access article under the CC BY license (<http://creativecommons.org/licenses/by/4.0/>).

PALAVRAS-CHAVE

Adulto;
Processamento
temporal auditivo;
Perda auditiva
condutiva;
Gap no ruído

Efeito da perda auditiva condutiva na função auditiva central

Resumo

Introdução: Já foi demonstrado que a perda auditiva condutiva (PAC), em longo prazo, pode influenciar na detecção precisa das características temporais dos sinais acústicos ou do processamento auditivo temporal (PAT). Pode-se argumentar que o PAT pode ser o componente subjacente de muitos recursos do processamento auditivo central, como a compreensão da fala ou localização do som. Pouco se sabe sobre as consequências da PAC nos aspectos temporais do processamento auditivo central.

Objetivo: Este estudo foi projetado para avaliar a capacidade de processamento auditivo temporal em indivíduos com PAC crônica.

Método: Durante este estudo transversal analítico, 52 pacientes com PAC crônica leve a moderada e 52 indivíduos com audição normal (controle), idades entre 18 e 45 anos, foram recrutados. Para avaliar o processamento auditivo temporal, foi utilizado o teste de resolução temporal *Gaps-in-Noise* (GIN). Os resultados obtidos para cada orelha foram analisados com base no limiar de percepção da quebra de continuidade (*gap*) e na porcentagem de respostas corretas.

Resultados: A média dos limiares no GIN foi significativamente menor para o grupo controle que para o grupo PAC em ambas as orelhas (direita: $p=0,004$; esquerda: $p<0,001$). Os indivíduos com PAC apresentaram respostas corretas significativamente mais baixas que os indivíduos com audição normal em ambas as orelhas ($p<0,001$). Não houve correlação entre o desempenho no GIN e o grau de perda auditiva em ambos os grupos ($p>0,05$).

Conclusão: Os resultados sugerem uma redução da capacidade de processamento auditivo temporal em adultos com PAC comparados com indivíduos apresentando audição normal. Portanto, o desenvolvimento de um protocolo clínico para avaliar o processamento auditivo temporal nessa população é recomendado.

© 2016 Publicado por Elsevier Editora Ltda. em nome da Associação Brasileira de Otorrinolaringologia e Cirurgia Cérvico-Facial. Este é um artigo Open Access sob a licença de CC BY (<http://creativecommons.org/licenses/by/4.0/>).

Introduction

Chronic Conductive Hearing Loss (CHL) is characterized by reduced efficiency of sound transmission through the external and/or middle ear and usually involves a reduction in sound level or the ability to hear faint sounds. Several investigators have argued that this long-term sensory deprivation may produce irreversible changes in the anatomical and functional integrity of the central auditory structures,¹⁻³ such as changes in the relative size of neuron dendrites in subcortical nuclei^{4,5} or synaptic and spike adaptation disruptions in the auditory cortex.⁶

It has been also demonstrated that auditory deprivation following CHL may be associated with a number of sensory and cognitive difficulties as well as deficits in psychosocial development.⁶⁻⁸ These problems may continue long after hearing thresholds return to normal limits.

CHL may influence the accurate processing of the time structure of the acoustic signal, e.g. delays low frequency sounds entering the inner ear by up to 150 μ s.⁹ Auditory Temporal Processing (ATP), one of the (central) auditory processing mechanisms, refers to the ability of the auditory system to process temporal characteristics of a sound

stimulus within a specific time period.^{2,5,10,11} It can be argued that ATP may be the underlying component of many auditory processing capabilities, including the processing of speech transients and voicing information, segregation of auditory figure from auditory ground and localization cues,^{12,13} and being a prerequisite for speech and language acquisition.¹⁴ This notion can be observed at different levels ranging from the neuronal sensitivity of first order neurons to the cortical level.^{15,16}

The Gaps-In-Noise (GIN) test provides a clinically feasible method of assessing ATP, temporal resolution, wherein the subjects are required to detect gaps within a continuous auditory stimulus.^{3,17} This test could be easily administered and performed using common equipment, and used for a wide age range (beginning from 7 years of age). The GIN yields good sensitivity (74%) and specificity (94%) to central auditory nervous system dysfunction in adult populations while still demonstrating clinical feasibility.¹⁵ It has been shown that GIN is more sensitive to cortical compromise as opposed to brainstem deficits.¹⁵

Aravindkumar et al.⁷ reported bilaterally impaired temporal processing ability in their study of 26 patients with refractory complex partial seizures and Mesial Temporal

Download English Version:

<https://daneshyari.com/en/article/5713961>

Download Persian Version:

<https://daneshyari.com/article/5713961>

[Daneshyari.com](https://daneshyari.com)