The Production and Perception of Consonants in Mandarin-Speaking Children with Cochlear Implants

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摘要

背景：一般認爲早期植入人工耳蝸可以獲得日後較佳的語言表現。本研究控制3項時間要素，包括受試者接受測試時年齡、植入時間和植入年齡，檢驗人工耳蝸植入兒童的國語輔音發音與聽辨能力。本研究亦探索發音與聽辨之關係，並比較人工耳蝸植入兒童與聽力正常兒童的發音與聽辨發展模式。方法：30名植入人工耳蝸的學語前失聰兒童參與本研究。21個國語詞首輔音依照其區別表徵（distinctive features）組成16組最小差異對（minimal pairs）讓受試者進行發音及聽辨作業。統計方法包括線性回歸、變異數分析、t檢定。結果：發音與聽辨作業的得分與植入人工耳蝸年齡呈顯著負相關。受試者依其植入年齡分爲3組，發現最小植入年齡組的發音與聽辨作業之得分皆爲最高。受試者的發音與聽辨發展爲同步漸進。受試者的植入年齡愈小，其發音與聽辨發展模式與正常聽力兒童之發展模式愈相近。結論：本研究的結果支持愈小植入人工耳蝸對學語前失聰兒童愈有利。若於5歲前接受人工耳蝸植入，其發音與聽辨發展模式較爲接近聽力正常兒童之發展模式。本研究的結果除了提供較深入的發音與聽辨資料支持早期人工耳蝸植入的好處，並可應用於臨床人工耳蝸植入術前評估，以及作爲聽力語言復健的參考指標。

Abstract

BACKGROUND: Early cochlear implantation (CI) is thought to be beneficial for improv-ing speech and language performance. Three time factors including participants′ ages when tested, lengths of CI experience, and ages at implantation were controlled to exam-ine cochlear-implanted children′s production and perception abilities of Mandarin conso-nants. The and their production and perception profiles were compared with those of normal hearing children′s. METHOD: 30 prelingually deaf children who received cochlear implantations partici-pated in this study. Materials comprised 21 Mandarin word-initial consonants were arranged into 16 pairs based on distinctive features. Each participant performed produc-tion and perception tasks. Descriptive statistics and Pearson correlation coefficients are provided. Statistical analyses included linear regression, ANOVA, and

t-tests. RESULTS: A significantly negative correlation was found between participants′ mean scores of the production and perception tasks and their ages at implantation. Divided into three sub-groups based on their ages at implantation, participants of the youngest group showed higher scores in both production and perception tasks. The relationship between participants′ speech production and perception tended to be near-synchronization. The younger the participants′ ages at implantation, the more their production and perception profiles were similar to normal hearing children. CONCLUSION: The results supported that earlier implantation is beneficial for prelim-gually deaf children. Children who receive cochlear implants before age five tend to have a production-perception developmental pattern similar to that of normal hearing chil-dren′s. The results of this study not only provided in0depth production and perception data to support early implantation, but also can be applied in evaluating CI candidates pre-surgically and served as reference for aural and oral rehabilitation.