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128-Multidetector CT for Assessment of Optimal Depth of Electrode Array Insertion in Cochlear Implant Operations

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Abstract : Objective: To assess the diagnostic reliability of multi-detector CT in pre and post-operative evaluation of cochlear implant candidates. Material and Methods: The study includes 40 patients (18 males and 22 females); mean age 5.6 years. They were classified into two groups: Group A (20 patients): cochlear implant device was Nucleus-22 and Group B (20 patients): the device was MED-EL. Cochlear length (CL) and cochlear height (CH) were measured pre-operatively by 128-multidetector CT. Electrode length (EL) and insertion depth angle (α) were measured post-operatively by MDCT. Results: For Group A mean CL was 9.1 mm ± 0.4 SD; mean CH was 4.1 ± 0.3 SD; mean EL was 18 ± 2.7 SD; mean α angle was 299.05 ± 37 SD. Significant statistical correlation ($P < 0.05$) was found between preoperative CL and post-operative EL ($r^2=0.6$); as well as EL and α angle ($r^2=0.7$). Group B's mean CL was 9.1 mm ± 0.3 SD; mean CH was 4.1 ± 0.4 SD; mean EL was 27 ± 2.1 SD; mean α angle was 287.6 ± 41.7 SD. Significant statistical correlation was found between CL and EL ($r^2= 0.6$) and α angle ($r^2=0.5$). Also, a strong correlation was found between EL and α angle ($r^2=0.8$). Significant statistical difference was detected between the two devices as regards to the electrode length. Conclusion: Multidetector CT is a reliable tool for preoperative planning and post-operative evaluation of the outcomes of cochlear implant operations. Cochlear length is a valuable prognostic parameter for prediction of the depth of electrode array insertion which can influence criteria of device selection.

Keywords : angle of insertion (α angle), cochlear implant (CI), cochlear length (CL), Multidetector Computed Tomography (MDCT)
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