INNER EAR ABNORMALITIES IN COCHLEAR IMPLANT CANDIDATES

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Preoperative assessment for cochlear implantation includes clinical examination, audiological testing, speech therapeutic and psychological evaluation. Radiological imaging is an important part of preoperative evaluation. Its main role is to analyze middle ear and inner ear anatomy, and to detect the abnormalities that could define the etiology of hearing loss, as well as to identify patients with a contraindication for cochlear implantation.

In this study we present various inner ear abnormalities revealed by radiological examination in our cochlear implant patients candidates, and we report the adapted surgical management.

Materials and methods

We analyzed the imaging findings of 325 patients with bilateral profound hearing loss who were candidate for cochlear implantation in our department between June 2007 and December 2014. Radiological evaluation consisted for all the patients on High resolution computed tomography (HRCT) and magnetic resonance imaging (MRI). All HRCT examinations were performed with contiguous 0.4 - 0.5 mm coronal sections and 0.4 - 0.5 mm axial sections obtained parallel to the orbitomeatal line. MRI examinations were performed on a 1.5 Tesla system T2 weighted contiguous slices of 2 mm thickness through the temporal bone in axial and coronal planes.

Imaging study focused on: mastoid pneumatization, the size of the internal auditory meatus, presence of cochlear nerve, the status of bony labyrinth and cochlear duct patency.

Results

All patients had severe to profound sensorineural hearing loss. The age range was from 14 months to 65 years old (mean age 10.8 y.o.). The majority of patients (85.5%) were of pediatric age group. Prelingual hearing loss were diagnosed in 66.6 % of patients.

Preoperative evaluation would include both temporal bone CT and MRI. Each of them provide different, but complementary information. High resolution computed tomography (HRCT) and magnetic resonance imaging (MRI) are both well suited for assessing the osseous structures: mastoid, bony labyrinth, the round window niche, and depicting anatomic middle ear variations of surgical importance such as: dehiscent facial nerve, high jugular bulb and aberrant carotid artery, while magnetic resonance imaging (MRI) provides excellent soft tissue detail particularly cochlear duct, the cranial nerves and brain. However some authors [1] report that CT using axial and semi-longitudinal planes is equivalent to MRI in predicting cochlear patency. The advantage of the advantage of MRI over CT is in diagnosing cochlear nerve agenesis. The prevalence of inner ear morphological abnormality in children with SNHL reported by some studies [4] is estimated at a rate of 20–30%. Only cases with congenital absence or severe hypoplasia of the cochlear nerve or the cochlea, preclude cochlear implantation. In the other cases such as Mondini dysplasia and partial obliteration of the cochlea a short straight electrode array should be inserted.

Discussion

Surgical procedures went without complications. Peroperative Gusher in one patient (common cavity), Short electrode array was inserted in patients with Mondini dysplasia, and partial ossification of the basal turn of the cochlea.

Conclusion

Thorough examination of temporal bone structure, cochlear nerve and auditory pathways is required in presurgical assessment for cochlear implantation to determine the suitability of the ear to receive an implant, to select the ear to be implanted and also to detect additional findings that may affect the choice of the electrode array, adapt the surgical procedure and thus avoid intraoperative complications.