Protection of Inner Ear Function after Cochlear Implantation: Compound Action Potential Measurements after Local Application of Glucocorticoids in the Guinea Pig Cochlea

Abstract:

Background: Cochlear implant users with residual hearing often benefit greatly from simultaneous electric and acoustic stimulation. However, implantation can cause trauma to the inner ear, resulting in poorer hearing postoperatively. We investigated whether a single local injection of glucocorticoids can reduce hearing loss in long-term implanted guinea pigs. Methods: Three groups of animals underwent implanted guinea pigs. One ear was implanted with an electrode, and the contralateral ear received a cochleostomy only. A single dose of the glucocorticoids triamcinolone or dexamethasone, or of artificial perilymph was infused into cochleae via cochleostomy. Compound action potentials were measured before and after application and for 3 months postoperatively. Tissue growth was measured as the percentage of the total area of the scala tympani that was obliterated. Results: Ears subjected to cochleostomy only and treated with glucocorticoids demonstrated a mild hearing loss. In the implanted ears, both glucocorticoids preserved hearing at least temporarily. The volume of tissue growth within the scala tympani was not reduced, and there was no relation between the amount of tissue and hearing loss. Conclusions: Both glucocorticoids show a potential benefit for hearing preservation in implanted ears. Glucocorticoid therapy may be useful to protect residual hearing during cochlear
implantation.

Stichworte:
Hearing preservation; Otoprotection; Glucocorticoids; Cochlear implantation; Compound action potentials

Zeitschriftentitel:
ORL

Jahr:
2011

Band:
73

Heft / Issue:
4

Seiten:
219--228

Volltext / DOI:
http://doi.org/10.1159/000329791

Verlag / Institution:
S. Karger AG

Verlagsort:
Basel, Switzerland

Print-ISSN:
1423-0275

E-ISSN:
1423-0275

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Occurences:
- Kollektionen > Open Access Publikationen > 2011
- Kollektionen > Open Access Publikationen > Verlage > Karger

entries: