Does more than one intra-operative insertion of an cochlear implant array have an effect on measured impedances?

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Conclusions

There appears no prolonged alteration in impedance values following intra-operative re-insertion.

This has importance in consideration of intra-cochlear drug delivery techniques and indeed cochlear implant surgical training.

Introduction

Throughout the development of cochlear implantation there has been an evolution in devices including the concept of ‘re-implantable’ electrode arrays.

There are a range of situations that could result in the implant array being removed soon after insertion and requiring reinsertion within the same operative procedure. These may include tip fold over, failure to achieve complete insertion or implant failure. The eventual sequela of such an event on outcome is not yet known.

Impedance measurements provide us with an objective test of cochlear implant function and a potential proxy measure for fibrosis.

Methods

Analysis of the Sydney Cochlear Implant Centre database from 1994 – 2016 was carried out. All included cases were attempted surgeries where an electrode fault (short circuit or open circuit cases) necessitated immediate explantation and re-implantation within the same operative procedure.

Cases were removed from analysis in cases of labyrinthitis ossificans or intra-operative electrode array buckling.

All controls were normal insertions which were age matched and had received the same electrode array inserted by the same operating surgeon.

Impedance values measured at intra-operatively, ‘switch on’, three months and one year were recorded. The ‘common ground’ was used.

Results

31 cases identified within our database. This was made up of 14 CI 24(RE) ST arrays; 6 CI 422 arrays and 11 CI 512 arrays. Anova testing was performed, with statistical analysis of the mean common ground impedance for each of the 22 electrodes.

Although initially statistically significant distinctions were seen intraoperatively and at switch on between the control and re-insertion groups. None remained discernable by one year.