

Foreign Body Reaction After Cochlear Implantation: A Case Report

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Key words: Cochlear Implantation; Foreign Body Reaction

Foreign body reaction is a rare complication after cochlear implantation. When such complications do occur, they may be intractable and difficult to be cured with antibiotics or surgical revision that may lead to cochlear reimplantation finally. In this article, we presented a patient with foreign body reaction who recovered well after cochlear reimplantation and has been in good health throughout the 6 years of follow-up at regular intervals in Affiliated Eye Ear Nose and Throat Hospital of Fudan University.

A 3-year-old boy with profound, idiopathic, sensorineural hearing loss underwent right cochlear implantation with a Nucleus 24 M device (Cochlear Corporation, Australia). After 2 years, seroma, edema occurred above the postauricular implant site. Simultaneously, the patient no longer received auditory benefit from the device. The granulation tissue and involved skin over the implant site were excised, and a new Nucleus 24 K device was reimplanted at the ipsilateral side. Nucleus 24 M and Nucleus 24 K are two different models of cochlear. The intracochlear electrodes of Nucleus 24 M are curved and that of Nucleus 24 K is straight. No postoperative problems were observed during the 6 years of follow-up. Final culture results were negative. Histology of the granulation tissue surrounding the implant site showed a typical giant cell foreign body inflammatory reaction [Figure 1]. The color of the device was found to be violet and surrounded by granulation tissue during cochlear reimplantation surgery [Figure 2]. Analysis of the old device revealed 5 electrodes anomalies and the bacterial biofilm was not found around the device by scanning electron microscope.

Foreign body reaction is diagnosed with typical histologic findings and clinical symptoms. Foreign body reaction, which is composed of macrophage and foreign body giant cells, is the end-stage response of the inflammatory and wound healing responses following implantation of a medical device, prosthesis, or biomaterial. In the present case, the absence of a positive culture and the bacterial biofilm did not support an infection-based cause. Therefore, the most likely explanation was a foreign body reaction due to the seroma above the implant site and the histologic finding of a typical giant cell foreign body inflammatory reaction. Lim *et al.*^[1] reported a case of foreign body reaction in 180 cochlear implantees. In addition, Migirov *et al.*^[2] analyzed the causes for revision procedures, surgical findings in 45 reoperated cochlear implant patients. Foreign body reactions were noted in 2 children and 1 adult.

Foreign body reaction may develop immediately after implantation or may be delayed up to 10 years following surgery. In this case, seroma, edema occurred above the postauricular implant site in 2 years postoperatively. According to the histologic findings, a foreign body reaction was highly suspected for postoperative complication. For management of foreign body reactions, conservative treatment might be insufficient. Explantation might be necessary in most cases, and reimplantation would be an effective method. Migirov *et al.*^[2] reported 3 patients with foreign body reactions. The device was removed in 2 patients, and they underwent implantation a few months later. The parents of the third patient refused additional surgery after explantation. In another case,^[1] the cochlear implant device had to be removed 14 months postoperatively because the steroid therapy to foreign body reaction could

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DOI:
10.4103/0366-6999.161402

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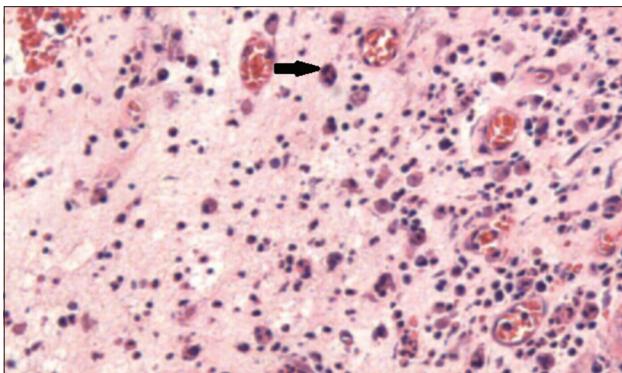


Figure 1: Histology of the granulation tissue surrounding the implant showed a typical giant cell foreign body inflammatory reaction (arrow: multinucleated giant cells, H and E, $\times 200$).

not continue for long period. No device was reimplanted due to the rejection of the parent. In our experience, one new Nucleus 24 K device was reimplanted and no postoperative problems were observed during the 6 years of follow-up.

Shepherd *et al.*^[3] described animal testing of the biocompatibility of silicone cochlear implants in 1984. Although foreign body giant cell reaction was not discovered, a mild tissue reaction in the form of fibrosis and a lymphocytic cell infiltration were reported. Further, Nadol *et al.*^[4] analyzed histopathology of temporal bones of 8 subjects who had experienced a soft failure. Foreign body or hypersensitivity reaction was observed in 6 (75%) of the cases, which meant that foreign body reactions were rare, but might be more common than we realized. This research presented a solid conclusion that a tissue response in the form of foreign body or a hypersensitivity reaction might be one possible cause of a soft failure of cochlear. In another research,^[5] connective tissue that covered and encapsulated cochlear implants was obtained during reimplantation procedure for electronic device failure and underwent histologic analysis. Typical giant cell foreign body inflammatory reaction was found in 7 of the 15 specimens. The authors commented that local tissue response might be one possible cause of electronic device failures because, in most cases, the reason for these failures remained unclear. In the present case, histology of the granulation tissue surrounding the implant showed a typical giant cell foreign body inflammatory reaction and the analysis of the old device revealed 5 electrodes

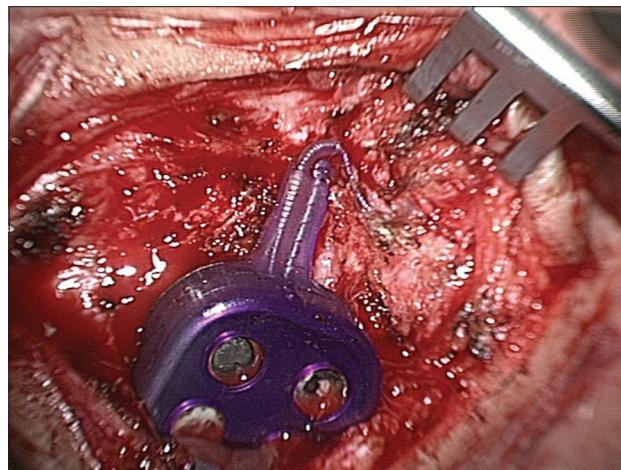


Figure 2: The color of the device was found to be violet and surrounded by granulation tissue during cochlear reimplantation surgery.

anomalies. As cochlear implants can and do interact with the surrounding tissue in the recipient's skull, we strongly recommend the device manufacturers to investigate the relation between foreign body reaction and electronic device failures and develop new techniques to avoid such problem.

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Received: 21-12-2014 **Edited by:** Ya-Lin Bao

How to cite this article: Xin Y, Yuan YS, Chi FL, Wang J, Yang JM. Foreign Body Reaction After Cochlear Implantation: A Case Report. *Chin Med J* 2015;128:2124-5.

Source of Support: Nil. **Conflict of Interest:** None declared.