



Intraoperative Neurophysiological Monitoring for Cochlear Implant Surgeries

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ABSTRACT

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Cochlear implant surgeries offer profound benefits for individuals with severe hearing loss. By bypassing damaged or nonfunctional parts of the inner ear, these implants restore access to sound, significantly improving speech comprehension and communication skills. Cochlear implants enable users to engage in conversations, enjoy music, and access environmental sounds. They also enhance overall quality of life, facilitating social integration and educational and employment opportunities. These surgically implanted devices are a game-changer for those without conventional hearing aids, providing a bridge to the auditory world and a chance for a more fulfilling and connected life.

INTRODUCTION

Cochlear Implants (CI) offer significant benefits to patients. Considering the increasing number of CI surgeries, taking great care in preventing facial nerve (cranial nerve VII) and auditory nerve (cranial nerve VIII) injury is crucial. During CI surgery, intraoperative neurophysiological monitoring (IONM) of the facial nerve can significantly aid the surgeon when combined with a comprehensive medical history, physical examination, and appropriate pre-operative imaging. In this case, we will discuss the pre-operative and intraoperative considerations of CI surgery and the implications of using IONM for facial nerve monitoring.

INTRAOPERATIVE NEUROPHYSIOLOGICAL MONITORING (IONM)

IONM is a crucial technique employed during cochlear implant (CI) surgery to safeguard the integrity of the auditory nerve and surrounding structures. Its primary goal is to minimize the risk of neural injury and optimize surgical outcomes. During CI surgery, IONM involves the real-time monitoring of the patient's neurophysiological responses.

The process typically includes several components:

- 1. Electromyography (EMG)** records muscle activity to identify any facial nerve damage, as the facial nerve runs near the cochlea.
- 2. Auditory Brainstem Response (ABR)** evaluates the integrity of the auditory pathway, specifically the cochlear nerve, by monitoring electrical activity in the brainstem in response to auditory stimuli.
- 3. Electrocochleography (ECochG)** measures the electrical potentials generated by the cochlea itself, ensuring proper implant placement.
- 4. Nerve monitoring** assesses the facial nerve's function to prevent damage during surgery.

These real-time readings guide the surgeon's actions, enabling immediate adjustments if any anomalies are detected. IONM greatly enhances the safety and precision of cochlear implant surgeries, minimizing the risk of postoperative hearing loss or other complications while maximizing the patient's chances of successful hearing restoration.

PRE-OP AND INTRA-OP CONSIDERATIONS

Preoperative considerations include appropriate workup, including a thorough history and physical examination with special care for audiometric history, evaluation, and preoperative imaging. Intraoperatively, special consideration should be given to IONM of the facial nerve while drilling over the facial recess. Care should be taken about specific anatomical considerations based on preoperative imaging.

DISCUSSION

IONM of the facial nerve during CI surgery can significantly help the surgeon. While rates of facial nerve injury are low in incidence during CI surgery, IONM can be especially useful in cases of variant anatomy,

younger patients, congenital malformations, or revision surgeries. It is a cheap and cost-effective way to safeguard the facial nerve and should be considered during all CI surgeries.

CONCLUSION

Cochlear implantation can have tremendous benefits for patients, but the potential risks of facial nerve injury can be devastating. IONM of the facial nerve during CI surgery can help prevent such injury and do so in a cost-effective and time-efficient manner. The surgeon should also consider using IONM to monitor the facial nerve during electrode insertion. Taking these precautions can significantly reduce the risk of facial nerve injury, ensuring successful outcomes for patients undergoing CI surgery.

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REFERENCES

1. Jahangiri FR: Surgical Neurophysiology: A Reference Guide to Intraoperative Neurophysiological Monitoring (IONM). Second Edition. Jahangiri FR (ed): CreateSpace Independent Publishing Platform, Charleston, SC, USA; 2012.
2. <https://globalinnervation.blogspot.com/2023/10/intraoperative-neurophysiological.html>.
3. Hsieh HS, Wu CM, Zhuo MY, Yang CH, Hwang CF. Intraoperative Facial Nerve Monitoring During Cochlear Implant Surgery. *Medicine (Baltimore)*. 2015;94(4):e456. doi:10.1097/MD.000000000000456
4. Heman-Ackah SE, Gupta S, Lalwani AK. Is facial nerve integrity monitoring of value in chronic ear surgery? *The Laryngoscope*. 2013;123(1):2-3. doi:10.1002/lary.2336.

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