



Complication after Cochleoimplantation: Case report



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ABSTRACT:

Introduction: Cochlear implantation is a surgical procedure introduced in the second half of the 20th century, providing an opportunity for auditory rehabilitation in patients with severe sensorineural hearing loss. Despite its high effectiveness and relative safety, the intervention may be associated with various postoperative complications that differ in frequency, severity, and time of onset.

Objective: To present a clinical case of an early postoperative inflammatory complication following cochlear implantation in an 11-month-old child and to discuss the factors related to its occurrence and management.

Materials and Methods: A case is presented of an 11-month-old child with confirmed congenital deafness who underwent cochlear implantation using a classical retroauricular transmastoid approach. In the early postoperative period, infection of the surgical wound developed, accompanied by flap necrosis and implant exposure. A two-stage surgical revision was performed, along with targeted antibiotic therapy based on microbiological testing.

Results: Following timely surgical intervention and systemic antibiotic treatment, complete healing of the surgical wound

was achieved, with preservation of the implant. One month later, activation of the cochlear implant was successfully performed without any additional complications.

Discussion: Inflammation of the surgical wound is among the most common complications following cochlear implantation. The main risk factors include the presence of concurrent infections and noncompliance with postoperative recommendations. Timely surgical intervention and adequate antibiotic therapy are crucial for preserving the implant and preventing serious consequences.

Conclusion: Cochlear implantation is a modern and effective method of auditory rehabilitation, but it is not without the risk of complications. Surgical wound infection, although rare, may compromise the final outcome. The surgeon's experience, proper preoperative preparation, and strict postoperative monitoring are key factors in minimizing this risk.

Keywords: cochlear implantation, postoperative inflammation, cochlear implantation complications.

Introduction:

Cochlear implantation, as a surgical procedure, began its development in the 1960s and gradually evolved from an experimental technique into a standard surgical intervention, enabling a large number of people to hear again despite severe congenital or acquired hearing impairments, thereby positively influencing their quality of life.

Although it is relatively safe compared to other surgical interventions [1], like any operative procedure, cochlear implantation has its failures and complications. The success of this surgical intervention depends on many factors, with the surgeon's experience performing the procedure being considered a primary one [2]. The first reported complication following cochlear implantation was

in 1995 by Cohen and colleagues [3], and in the subsequent years, various complications differing in type, severity, and time of onset have been reported worldwide [4,5].

In the international literature, complications following cochlear implantation are divided into two main groups: minor (not requiring revision surgery), occurring in 20–30% of cases, and major (requiring reoperation), occurring in 2–5% of patients. Minor complications include facial nerve stimulation, electrode migration, vertigo, tinnitus, and others [6]. Major complications include the development of meningitis, flap necrosis, electrode removal, non-functioning implant, and facial nerve paralysis. Minor complications, to a large

extent, cannot be entirely avoided even by the most experienced surgeon, whereas major complications—with the exception of mechanical damage to the implant during patient use—are considered

potentially avoidable with properly performed surgery and adequate postoperative care [7]. Another classification divides complications according to their time of onset into early and late (Table 1).

Table 1. Classification of complications following cochlear implantation.

Early (intraoperative and postoperative) complications	
Surgical complications:	
1. Bleeding or hematoma in the operative area.	
2. Infection of the surgical wound.	
3. Cerebrospinal fluid leak (in case of injury to the inner ear or dura mater).	
4. Facial nerve injury (paresis/paralysis).	
5. Vomiting, vertigo, nystagmus (labyrinth irritation).	
General surgical risks:	
1. Anesthetic complications	
2. Allergic reactions	
Late complications	
Infections:	
1. Mastoiditis, meningitis (rare; preoperative vaccination is recommended).	
2. Chronic infection of the operative area.	
Mechanical/technical:	
1. Damage to or displacement of the electrode array.	
2. Implant malfunction → may require reimplantation.	
3. Capsular fibrosis around the electrodes → reduced effectiveness.	
Neurological/sensory:	
1. Persistent vertigo or imbalance.	
2. Tinnitus	
3. Impaired sound perception or lack of expected auditory progress.	
Cosmetic and local:	
1. Necrosis or thinning of the skin over the receiver.	
2. Pain or discomfort around the implant.	

All literature data available agrees that no matter what type they are if complications are diagnosed early and receive appropriate treatment, the prognosis is good. The importance of preoperative patient preparation and preoperative education on complications and their management is mandatory before the surgical intervention.

Case report:

We present an 11-month-old child, born from a second uneventful pregnancy (the first pregnancy resulted in a girl with congenital deafness who was successfully cochlear implanted). In February 2025, congenital deafness was confirmed. Preoperative preparation was carried out, and examinations including imaging studies (CT and MRI) revealed no abnormalities in the normal anatomy of the external, middle, and inner ear.

On June 26, 2025, a cochlear implant was placed in the left ear using the classic retroauricular trans-mastoid approach. The surgical procedure was completed without complications; however, six hours postoperatively, the child developed a fever of 38.5 °C, which rose to 39 °C over the next 24 hours, accompanied by intermittent coughing. The pediatric consultation revealed a spastic cough and coarse vesicular breathing with occasional fine moist rales at the lung bases. There was no erythema in the ear, nose, or throat area, and no exudates on the tonsils. Chest and heart X-ray showed a bilateral increased reticulonodular pattern in the perihilar regions with slight peribronchial changes, but no well-defined infiltrates or shadows. Laboratory tests showed leukocytosis (WBC $15.77 \times 10^9/\text{L}$) and a mild anemic syndrome (HGB 87 g/L, down from a baseline of 107 g/L), with no other abnormalities. Clindamycin was added to the preoperatively initiated Ceftriaxone. On the third postoperative day (June 29, 2025), the child was referred to the pediatric clinic for treatment of diagnosed acute laryngotracheitis and pneumonia, with the surgical wound remaining unremarkable. After a one-day stay in the pediatric clinic and despite being informed of the potential health risks, the mother refused to continue inpatient treatment and discharged the child against medical advice. Prolonged home treatment with Augmentin was prescribed.

Four days later, on July 4th, 2025, the child was readmitted to the ENT Clinic of University Hospital “St. George” with a history of discharge from the left postauricular area at the site of the surgical wound, which had begun on July 2nd 2025. On the next day (July 3rd), the parents also noticed redness in the same area. On examination, the nasal and pharyngeal mucosa appeared pale pink without pathological secretions. Auscultation revealed clear vesicular breath sounds and no wheezing. The child was afebrile, and laboratory results were entirely within normal limits (HGB 117 g/L, WBC $7.68 \times 10^9/\text{L}$, CRP 2 mg/L). Examination of the retroauricular area revealed an open surgical wound with hyperemia of the surrounding tissues and a skin–muscle flap compromised by infection, indicating flap necrosis (Fig. 1), as well as the presence of purulent wound discharge. The cochlear implant, including parts of the electrode, was exposed (Figs. 2 and 3).



Fig. 1. Open surgical wound with purulent discharge and compromised skin–muscle flap.



Figs. 2 and 3. Exposed cochlear implant(including the electrode) within the opened surgical wound

Primary surgical debridement of the inflamed operative wound was performed, and the wound was left open (Fig. 4). Antibiotic therapy with Meronem and Efloran was initiated. The wound secretion sent for microbiological testing revealed the presence of *Staphylococcus aureus*

Three days after the initial surgical debridement, once the operative wound had significantly improved, plastic closure of the defect was performed, and a tube drain was placed for three days (Figs. 5 and 6). A sterile “turban-type” dressing was changed daily.

Uncomplicated postoperative course (Fig. 7), during which some sutures break through (Fig. 8), but the wound nevertheless healed by secondary intention (Figs. 9 and 10).



Fig. 4. Surgically debrided wound on the day of admission, loosely packed with gauze soaked in Iodasept.



Figs. 5 and 6. Two-layer closure (periosteum/subcutaneous tissue and skin) of the operative cavity opened by the infectious process, with placement of a tube drain



Fig. 7. Wound healing after its plastic closure



Fig. 8. Partial skin sutures break through



Figs. 9 and 10. Fully healed operative wound by secondary intention with formation of a wide scar

The child was discharged from the clinic on the 9th day after the plastic closure of the affected by the inflammatory process operative wound, afebrile, and in excellent general and local condition. One month later, the activation of the hearing implant was successfully performed.

Three months later, at the follow-up examination, the wound showed excellent healing. The scar was larger than what is usually observed after an uncomplicated cochlear implantation, which was due to partial wound healing by secondary intention.



Fig. 11. Three months later

Discussion:

Cochlear implantation has proven to be an excellent option for improving hearing in both children and adults. Due to the increasing number of patients receiving cochlear implants, a corresponding rise in the number of postoperative complications can logically be expected.

Implantation of a cochlear device is a traumatic procedure, during which inflammatory changes occur, leading to early and late intracochlear alterations. As a result, fibrous tissue or ossification often develops within the cochlea, which can compromise speech perception through the implant and impair its functioning [8]. Properly selected patients, thorough preoperative preparation, and adherence to established cochlear implantation protocols largely minimize the occurrence of complications, but cannot entirely prevent them.

Inflammation of the surgical wound in the early postoperative period is one of the most common complications, which, on the other hand, has a good prognosis when properly managed. In our case, the timely initiation of conservative therapy and the two-stage surgical treatment of the wound prevented further complications and compromise of the cochlear implantation.

In many cases, inflammatory complications are due to underestimation of a smoldering infection in other parts of the patient's body. In our case, CT imaging of the head revealed signs of rhinosi-

nusitis, whose impact on the surgical wound and possible role in the development of inflammation cannot be proven but may be suspected. On the other hand, the lack of cooperation and adherence to postoperative instructions by the parents during this early postoperative period also played a role — in our clinical case, the mother left the hospital voluntarily despite the explanations and recommendations for continued treatment of the diagnosed pneumonia.

In the global literature, among the wide range of complications — including facial nerve palsy, vertigo, cerebrospinal fluid leakage, and electrode dysfunction — inflammation ranks among

the leading ones. The reported incidence of this complication varies within an exceptionally broad range, leading to the conclusion that the rate of inflammatory complications, particularly in the early postoperative period, depends on the experience of the surgical team performing the procedure. Over the past seven years in our cochlear implantation center, the presented clinical case represents the only observed early postoperative inflammatory complication.

Extremely useful for comparing postoperative complications and widely applied worldwide is the **Clavien–Dindo classification** [9], which divides complications into five main categories (Table 2).

Table 2. Clavien-Dindo Classification of Postoperative Complications

Grade	Definition
I	Any deviation from the normal postoperative course without the need for pharmacological treatment or surgical, endoscopic, and radiological interventions Allowed therapeutic regimens are: drugs as antiemetics, antipyretics, analgetics, diuretics, electrolytes, and physiotherapy. This grade also includes wound infections opened at the bedside
II	Requiring pharmacological treatment with drugs other than such allowed for grade I complications. Blood transfusions and total parenteral nutrition are also included.
III	Requiring surgical, endoscopic or radiological intervention
IIIa	Intervention not under general anesthesia
IIIb	Intervention under general anesthesia
IV	Life-threatening complication (including CNS complications)* requiring IC/ICU management
IVa	Single organ dysfunction (including dialysis)
IVb	Multiorgan dysfunction
V	Death of a patient
If the patient suffers from a complication at the time of discharge, the suffix “d” (for “disability”) is added to the respective grade of complication.	
*Brain hemorrhage, ischemic stroke, subarachnoid bleeding, but excluding transient ischemic attacks. CNS, central nervous system; IC, intermediate care; ICU, intensive care unit.	

Postoperative complications related to cochlear implantation usually fall into Grade II or III according to this classification. In our case, the complication corresponds to Grade IIIb. Cases of Grade IV and V complications are rare, with patient death reported primarily in instances of severe postoperative bacterial meningitis leading to multiple organ failure.

Conclusion:

Cochlear implantation is a modern and highly effective method for improving the quality of life of patients with various types of hearing loss, and it has undergone rapid development in recent years.

Despite its relative safety, the surgical procedure is not free from a certain number of postoperative complications, one of which is inflammation of the surgical wound.



Adequate treatment of this complication usually ensures patient's rapid recovery, with the main risk being exposure of the implant and disruption of its future functioning.

Preoperative preparation, imaging studies, adherence to surgical protocols, and the surgeon's experience are of great importance in minimizing this complication, which, as with any surgical intervention, cannot be completely avoided in all cases.

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