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Sudden Unilateral Profound Sensorineural Hearing Loss Due to Mumps

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ABSTRACT:
Mumps is an acute, self-limiting systemic viral disease that can cause serious complications, one of which is sensorineural hearing loss (SNHL). While SNHL occurs in only 1 in 1,000 mumps cases, it remains a significant complication due to its poor prognosis and low chances of restoring hearing. This case report presents a 6-year-old boy who developed sudden, profound unilateral SNHL following parotid swelling and a low-grade fever. Initially, the condition was treated conservatively, but after two weeks, his hearing impairment became apparent. Despite initiating medication, no improvement was observed. The hearing loss occurred within seven days of symptom onset. Previous studies have shown that medical treatments, including steroid therapy, have not been successful in restoring hearing once SNHL has developed, particularly when caused by viral infections like mumps. The prognosis for recovering hearing from viral-induced SNHL is generally poor and often linked to the severity of cochlear damage. This case highlights the critical need for early detection and preventive strategies to manage mumps and its complications. While vaccination is an effective tool for preventing mumps, it cannot fully prevent complications like SNHL. This underscores the importance of vaccination in reducing mumps incidence and its associated risks. The broader clinical and public health implications emphasize the need for continued vaccination campaigns, early diagnosis, and improved therapeutic options for those affected by SNHL due to mumps. Future research should focus on developing effective treatments for SNHL caused by viral infections like mumps.
Keywords: Mumps; Systemic disease; Complications

INTRODUCTION

Mumps is an enveloped, single-stranded RNA virus belonging to the family Paramyxoviridae, and it causes an acute infectious disease mainly in children and young adults (Rubin et al., 2015). Mumps is an acute, self-limiting systemic disease that can potentially cause serious complications, including inflammation of the salivary glands, pancreas, testes, meninges, and inner ear. One of its well-known complications is sensorineural hearing loss. Cases of SNHL associated with mumps are reported in approximately 1 in 1000 cases. This disease is also known for its poor prognostic features regarding the restoration of hearing, especially in those with profound loss. Transmission occurs through droplet spread, and humans are the only known host (Atrasheuskaya et al., 2019).

The most common clinical manifestations of infection include a flu-like illness and bilateral swelling of the parotid glands (Cohen et al., 2014). Hearing loss due to mumps is typically unilateral and profound with a rapid onset. Although steroids have been clinically administered in cases of mumps deafness according to treatments for idiopathic sudden sensorineural hearing loss, the prognosis for patients with profound impairment is generally poor (Kutz et al., 2019). There is no specific antiviral therapy for mumps (Koga et al., 2018). The effectiveness of vaccination against mumps has been widely confirmed, and the WHO, 2(017) recommends immunization coverage of 90% to prevent mumps outbreaks (Bautista-Gomez et al., 2021). Therefore, it has been recommended that routine audiological evaluations be conducted for all patients after mumps infection.

The virus reaches and infects the inner ear through the bloodstream during viremia or via the cerebrospinal fluid that enters the perilymphatic space through the internal auditory meatus or the cochlear aqueduct. Dizziness and vertigo have been reported in about half of post-mumps infection cases. It is reasonable to consider that the vestibular system is affected along with the cochlea following mumps infection (Fukushima et al., 2018). However, the vestibular system has received less attention than the cochlea, probably because the general malaise in the acute stage of mumps infection often overshadows vertigo symptoms, particularly in children (Young et al., 2020).

Previous studies have documented the association between mumps and sensorineural hearing loss (SNHL), but the underlying mechanisms and long-term outcomes remain inadequately addressed. For instance, the study by Berti et al. (2015) observed that the incidence of SNHL in mumps cases is rare (1/1000) but did not explore the clinical management or prognosis of hearing recovery in these patients. Similarly, a study by Di Martino et al. (2018) highlighted the importance of early detection and steroid treatment for SNHL, yet it did not provide detailed insights into the effectiveness of different treatment regimens in cases of profound hearing loss. These studies fail to offer a comprehensive understanding of the long-term impact of mumps on hearing, particularly in severe cases of SNHL.

This study aims to fill that gap by focusing on the specific issue of profound unilateral SNHL associated with mumps, with an emphasis on the clinical outcomes of treatment and long-term prognosis. By providing an in-depth analysis of the effectiveness of steroid therapy and the lack of a proven antiviral treatment, this research extends the existing literature. Moreover, it underscores the importance of vaccination—which has been widely confirmed as an effective preventive measure—by linking it to a reduction in both mumps incidence and its severe complications, such as SNHL. The findings contribute to public health policy by reinforcing the need for continued immunization and regular audiological evaluations following mumps infections.

METHOD

Case Presentation

A 6 year-old immunized boy presented during an endemic period of mumps in a elementary school Tangerang, he was brought to Tangerang City Hospital by his parents having complained of hearing impairment for 2 week, an insidious onset of left-sided parotid swelling with low-grade fever. His condition was associated with nausea and vomiting on the first two days, and on the third day his parotitis started to cease during which he began complaining of tinnitus and his parents started notice that after 2 week he had difficulty hearing. But at this point there was no headache, nor any sign of parotitis. All the patients friend had mumps during this endemic but none of them developed complications. Otherwise, the family history was negative for hereditary or systemic disease, and also negative for ototoxic medication or trauma.

Audiometric Data

Audiometry was performed using pure tone audiometer in a sound proof booth. The pure tone threshold for each ear were determained at frequencies of 125, 250, 500, 1000, 2000, 4000 and 8000Hz for air conduction, and at 250,500, 1000, 2000, and 4000 Hz for bone conduction with masking appropriate. In this case result is profound sensorineural hearing loss unilateral.

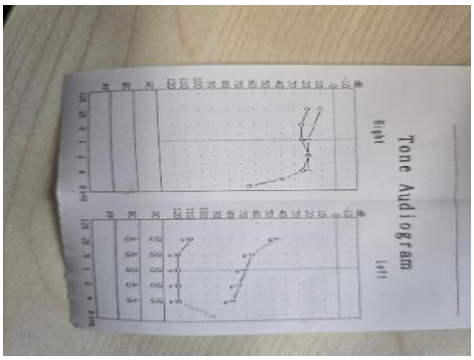

Figure 1. Audiometric Data

RESULTS AND DISCUSSION

Mumps is disease of children and young adults cause an enveloped, single-strained RNA virus belonging to the family paramyxovirida. It is an acute self-limiting systemic disease that can potentially cause serious complications. Transmission is by droplet spread, and human are the only know host (McLean et al., 2019). The most common clinical manifestations of infection include a flu-like illness and bilateral swelling of the parotid gland. However, subclinical infection is known to be common, and approximately 30% of patients with mumps may not experience parotid swelling. Cases of SNHL associated with mumps are only reported in 1/1000 cases. This disease is also know for its poor prognostic feature regarding the restoration of hearing, especially fo those with profound loss (Patel et al., 2020).

Mumps is acquired through inoculation and replication of the virus in the nasal or upper-respiratory-tract mucosa (Sara et al., 2014). Mumps infection occasionally induce the potential for complications such a pancreatitis, orchitis, oophoritis, aseptic meningitis, encephalitis and sensorineural hearing loss (Davison et al., 2021). Hearing loss due to mumps is thought to be unilateral and profound with rapid onset. Although mumps is an apparently mild disease, it can cause hearing impairment. Beside possibly causing sudden unilateral hearing loss, mumps can also result in vestibular dysfunction (Sara et al., 2014).

Hearing loss due to mumps can be present in three different ways: complete unilateral, partial unilateral and bilateral complate SNHL (Noguchi et al., 2017). Several patients with hearing impairment exhibit vestibular pathology in the affected ear after mumps infection. Damage to the inner ear following mumps is likely to be a direct result of the infection. The virus reach and infects the inner ear through the blood, or through the cerebrospinal fluid that reaches the perilymphatic space via the internal auditory meatus or the cochlear aqueduct. Studies on the effect on the vestibular system following mumps infection are quite rare and are mainly in the form of case reports.

The pathophysiology of hearing loss due to mumps is thought to be by direct invasion of cochlea damaging the organ corti, the cochlear nerve myelin sheath, and degenerating the stria vesicularis, tectorial and reissner membrane (Dikkici et al., 2022). Tanaka et al, experimentally confirmed that mumps related deafness is cause by degeneration of the organ corti. Even asymptomatic or mild mumps infection can cause hearing impairment .

Many treatment strategies have failed to restore hearing, and there is no treatment proven to be effective for sudden SNHL (Zhang et al., 2019). However, a trial of steroidal therapy has been implemented recently (Stachler et al., 2019). Intratympanic steroidal injection has become more popular in recent years. This method delivers more consentration steroid to affected tissue, as well as treating patients with vasodilator, anticoagulant, and hyperbaric oxygen therapy (Rauch et al., 2018).

The prognosis for patients with profound SNHL is very poor apart from cochlear implantation surgeries, which achieved good result regarding speech and sound perception in patients who do not have central nervous system damage involved. The probable relationship between vestibular disorders and mumps had been mentioned in some studies, but detailed studies are rare. In this study, we attempted to evaluate the extent of hearing impairment and otolith organ damage after mumps infection further.

CONCLUSION

Mumps-induced sensorineural hearing loss (SNHL) is typically permanent and resistant to treatment, emphasizing the importance of prevention through widespread vaccination programs. In Tangerang, government efforts should focus on maintaining high immunization coverage and establishing cochlear implant centers to support individuals affected by profound hearing loss. Public awareness campaigns promoting early diagnosis, prompt intervention, and routine audiological evaluations after mumps infection are vital to mitigating the long-term social and psychological impacts of SNHL. Future research should explore more effective therapeutic interventions for mumps-related SNHL and assess the long-term benefits of integrated vaccination and rehabilitation strategies in community health systems.

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