

# Swellings on Forehead – An Enigma: A Case Report

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## Abstract

Acute viral labyrinthitis occurs seasonally in one in 600 patients and may last for up to 2 weeks or more. There is no demonstrable cause and etiology for the disease and it remains speculative. The most common virus associated with labyrinthitis is influenza, whereas some cases may even be associated with unidentifiable viruses. This is a rare case report where an 11-year-old girl with viral labyrinthitis mysteriously presented with tender swellings on the forehead which puzzled the pediatrician and the ENT consult in arriving at a diagnosis. This child presented only with mild-to-moderate grade fever and headache initially. None of her presenting illness was contributory toward labyrinthitis. Her blood count was normal and there were no inflammatory markers present. After culture sensitivity testing and a 10-day initial therapy with norfloxacin, her symptoms improved. However, 2 weeks later, she again presented with severe dizziness and fainting episodes and mild ear pain which favored diagnosis toward viral labyrinthitis. The swellings and fever disappeared after prompt treatment. Here, the forehead swellings were very much misleading and kept the pediatrician and the ENT surgeon in confusion. This case report could be an eye-opener in this area.

**Key words:** Ear, Labyrinthitis, Swelling

## INTRODUCTION

Labyrinthitis is an inflammation of the inner ear that affects the balance and hearing of a person. It may occur as a direct infection of the inner ear or a middle ear infection from cold or flu that spreads into the inner ear.<sup>[1]</sup> Labyrinthitis is often interchanged with the term vestibular neuritis, but vestibular neuritis is confined to the involvement of vestibular nerve only, whereas the term labyrinthitis indicates the involvement of both the vestibular nerve and the labyrinth.<sup>[2]</sup> Both these conditions produce disturbances in balance and coordination in varying degrees and may affect one or both ears. Vestibular neuritis causes vertigo more often than labyrinthitis. The sudden disruption in the afferent neural input results in vertigo, and in the case of labyrinthitis, hearing loss.<sup>[3]</sup> The exact cause and etiology of labyrinthitis is still unknown, and researchers and doctors are still probing into that area. Viral labyrinthitis or vestibular neuronitis typically causes symptoms such as vertigo, nausea, and vomiting which are acute in the first

24 h and subside gradually over the next few days and complete cure takes about a month.<sup>[4]</sup>

The incidence of labyrinthitis and diseases causing vestibular dysfunction increases with age, and the 1-year prevalence rate is around 35.4%.<sup>[5]</sup> The incidence is about 3.5 cases per 100,000 population and it affects both children and adults. The peak age of onset is 40–50 years.<sup>[6]</sup> Viral labyrinthitis is common in adults aged 30–40 years and is rare in children. It usually occurs in the 4<sup>th</sup> decade, and women outnumber men by about 2:1 ratio.<sup>[7]</sup> Bacterial labyrinthitis is rare in the antibiotic era. Meningogenic suppurative labyrinthitis is common in children under 2 years and they are at risk of meningitis. Otogenic suppurative labyrinthitis is associated with cholesteatoma.<sup>[8]</sup> The labyrinth is a delicate membranous network that incorporates the utricle, saccule, semicircular canals, and the cochlea and consists of peripheral sensory organs for balance and hearing. There is a damage to the vestibular and auditory end organs when the membranous labyrinth gets inflamed. A certain degree of hearing loss is always present in labyrinthine infection as the cochlea is invariably affected.<sup>[9]</sup>

Most of the cases of viral labyrinthitis are preceded by an upper respiratory tract infection. Pre-existing bacterial labyrinthitis can also progress into a viral counterpart. A latent herpes infection (HSV-type I) in the vestibular ganglion may get activated affecting the vestibular

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nerve.<sup>[10]</sup> In children, an acute localized ischemia of these structures may be one of the causes. Pressure changes experienced in scuba diving and flying may also lead to labyrinthitis. Systemic complications mimicking a common flu or cold (influenza virus) is very common. However, in this case, the child presented unusually with multiple forehead swellings which were tender to touch. There is no evidence of such presentation of a viral labyrinthitis in the literature so far. Swellings on the forehead are unusual in older children, especially when they present without any pre-existing condition or illness. The swellings in this region generally arise from the skin (cellulitis), underlying bone (osteomyelitis), skin structures (carbuncle or infected sebaceous cyst), or sinuses. Tuberculosis of the skin can also present as any kind of unusual swelling.

The forehead swellings caused a deviation in the apt diagnosis, and only symptomatic antibiotic therapy was provided initially. Two weeks later, the child repeatedly presented with fainting and vertigo episodes which were the only symptoms that favored viral labyrinthitis. The team of doctors were able to arrive at a proper diagnosis only by exclusion criteria. Upon treatment her symptoms improved and the swellings on the forehead reduced. This case report can serve as an eye opener among the pediatricians and ENT consultants to be cautious and expect the unexpected so as to provide prompt treatment at the appropriate time to avoid complications and ensure a proper cure for the disease.

## CASE REPORT

An 11-year-old girl presented to our outpatient department with moderate-to-high grade fever, malaise, and headache of 10 days' duration. The child was completely normal till this episode. The headache was very severe and was present more in the frontal region. Three swellings of size 1.5 cm × 2 cm were present over the forehead in the region of headache. The child did not have any vomiting or bright visual hallucinations, loose stools, and stiffness of the neck. There was no history of seizures, restriction of neck movements, or limitation of activity. She was admitted to the hospital for 2 days as headache was severe. All blood investigations were normal and there was no increase in the inflammatory markers. She was referred to our clinic by the family physician for further evaluation and management.

Birth history revealed that she is the first child normally at full term. Her birth weight was 3.0 kg, and there was no problem in the neonatal period. She showed normal physical and mental development appropriate for the age and had features of early adolescence but had not yet attained menarche. She had no past history of prolonged

fevers, weight loss, loss of appetite, night sweats, or chronic cough and is immunized up to date. General examination revealed a fairly well-nourished child with a weight of 35 kg (50<sup>th</sup> centile) and a height of 145 cm (50<sup>th</sup> centile). Minimal pallor was noted, and the child seemed to be in pain and had a dull look. No clubbing, cyanosis, or enlarged lymph nodes were present. There was no restriction of neck movements or stiffness except for the three swellings in the frontal region in the middle of the forehead each measuring about 1.5 cm × 2 cm in size. The swellings were soft to firm in consistency and tender to touch. The skin over the three swellings was normal and no pulsations were present. There were no other swellings present in any other body part. General examination of all other organ systems was non-contributory.

Repeat blood investigations showed a normal blood count with no increase in any of the inflammatory markers. Magnetic resonance imaging (MRI) of the brain and swellings was normal. Ultrasound (USG) of the swellings showed only edema and did not reveal any other tissue inside. She was also evaluated by a pediatric rheumatologist who ordered all the markers of rheumatological disease such as ANA, anti-ds DNA antibody, and complement to be done and all these were found normal. ENT examination revealed minimal hearing loss on one side. No other abnormalities were noted. Urine cultures showed the presence of 1 lakh growth of *Escherichia coli* colonies sensitive to norfloxacin. She was then started on a 10-day course of the same. Simultaneously, a 5-day course of azithromycin was also given to treat the skin swellings.

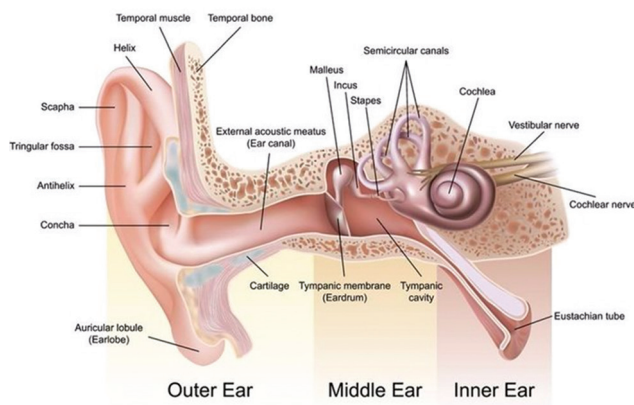
After a 10-day review, she was feeling better with decrease in headache and swelling size and a decrease in tenderness over the swelling. She was well for 2 weeks following which she again developed a moderate grade fever with cold, cough, running nose, and constant headache. She also presented with a slight pain in her ears this time. She had a fainting episode and was readmitted to the hospital where she had another attack of dizziness with nystagmus. Another ENT consult opined that it was a viral labyrinthitis and she was started on tablet cinnarizine and discharged in a day. The headache was present over the frontal swellings intermittently. The dizziness and vertigo episodes gradually decreased, as did the fever. The frontal swellings completely disappeared after nearly 2 weeks.

## DISCUSSION

Labyrinth is a membranous structure of the inner ear that is surrounded by dense bone. It gets infected when there is otitis media of the middle ear which can spread further into the inner ear and the internal auditory canal.

Bacterial and viral labyrinthitis do exist with viral being the most common.<sup>[11]</sup> The membranous labyrinth consists of the cochlea, which converts sound vibrations into nerve impulses and aids in hearing and the vestibular system that contains a complex network of semicircular canals which maintains balance by providing information about the body's spatial orientation.<sup>[12]</sup> The cochlea and the vestibular system send signals to the brain through the vestibulocochlear nerve (8<sup>th</sup> cranial nerve).<sup>[13]</sup> The bony labyrinth is the bony part that contains the membranous labyrinth, which, in turn, is contained in the temporal bone. Labyrinthitis is an infection that affects these structures of the ear and disrupts the flow of sensory information from the ear to the brain that can result in headache, dizziness, vertigo, tinnitus, and even hearing loss.<sup>[14,15]</sup>

### Anatomy of the Ear



Viral and bacterial infections do exist, and viral labyrinthitis is the most common. In general, bacterial labyrinthitis is more severe than viral labyrinthitis, and the treatment modalities for the two are very different. This is why getting a correct diagnosis from a doctor is important. 25% of the cases have at least a single brief prodrome of vertigo, dizziness, tinnitus, unilateral or bilateral hearing loss, and a feeling of fullness in the ears more typical of Ménière's disease.<sup>[16]</sup> Although labyrinthitis is not life-threatening, it is essential to distinguish it from other serious disorders such as transient ischemic attack, stroke, or a brain tumor. An alternative diagnosis should be sought as the presence of otorrhea may also suggest head injury, otalgia suggests herpes zoster oticus, and neck pain or stiffness suggests meningitis or vertebral artery dissection.<sup>[17]</sup> Certain drugs such as aminoglycosides, antihypertensives such as amlodipine, antidepressants, antiepileptics, and benzodiazepines can also cause vertigo. All these should be ruled out to arrive at a clear diagnosis.<sup>[18]</sup> Carbon monoxide exposure is also a rare cause of acute vertigo and should be ruled out.

The etiology for the three frontal swellings on the forehead associated with this case is not exactly known, but it could be probably because of congestion in the frontal sinuses which also caused intermittent headache in the child. The differential diagnoses for forehead swellings in children, in general, are sinusitis, cellulitis, osteomyelitis, carbuncle, infected sebaceous cyst, hematoma, inflammatory cutaneous tuberculosis, and, rarely, Pott's puffy tumor.<sup>[19]</sup> In this case, the swellings on the forehead misdirected diagnosis toward panniculitis as the swellings were soft to firm in consistency and resembled to arise from the subcutaneous fatty tissues. The swellings were thoroughly examined with MRI and USG, and no tissue growth was found inside except for edema. All the blood markers were normal. The headache, dizziness, and vertigo episodes finally lead to the proper diagnosis of viral labyrinthitis.

Viral labyrinthitis is usually characterized by sudden, unilateral loss of vestibular function and hearing. The acute onset of incapacitating vertigo is frequently associated with nausea and vomiting, which is very characteristic of this disorder. In this case, the child initially had only fever and headache which is common to many other diseases and additionally three swellings on the forehead, which again redirected the diagnosis. Most often, patients with viral labyrinthitis are bedridden while the symptoms subside gradually. Vertigo resolves after several days to weeks, whereas unsteadiness and positional vertigo may be present for several months. Hearing loss is the primary presenting symptom in many patients. An URI precedes the onset of cochleovestibular symptoms in about 50% of the cases. Recurrent attacks have been reported but are rare and confused with Ménière disease. The resolution of vertigo and dysequilibrium is due to partial recovery of vestibular function, with concurrent central compensation of the remaining unilateral vestibular deficit. Return of hearing generally mirrors the return of vestibular function. A unique form of viral labyrinthitis is the aforementioned herpes zoster oticus or Ramsay Hunt syndrome which is due to the reactivation of a latent varicella-zoster virus infection that occurs years after the primary infection. This virus may attack the spiral and vestibular ganglion in addition to the cochlear and vestibular nerves.<sup>[20]</sup>

If labyrinthitis is suspected, both aural and ocular examinations must be done. The doctor should examine the external ear and the tympanic membrane and look for the presence of cholesteatoma or vesicles in the case of herpes zoster oticus. Mastoid tenderness and nuchal rigidity should be checked for followed by a cranial examination for evidence of palsies and hearing loss. Gait assessment is also to be performed as the patients tend to fall toward the affected side while standing or walking. An inability to walk or stand suggests ischemia. A simple hearing test



with 256-Hz (middle C) or 512-Hz (top C) tuning fork can be done. Head impulse test is a very sensitive test for peripheral vestibular function. Ocular examination should include inspection of the ocular range of motion, papillary response, a fundoscopic examination to assess papilledema, and nystagmus. A skew deviation test may also be performed to assess vertigo. The best oculomotor exam (H.I.N.T.S.: Head-Impulse—Nystagmus—Test-of-Skew) appears more sensitive to assess patients with acute labyrinthitis from stroke.<sup>[21]</sup>

Conditions to consider in the differential diagnosis of labyrinthitis include vertebrobasilar insufficiency, presyncopal dizziness, cerebellar infarct, dysequilibrium of aging, drug-induced vertigo and/or hearing loss, autoimmune disease of the inner ear, Benign paroxysmal positional vertigo (BPPV), ototoxicity, perilymphatic fistula, skull base tumor, and other cerebellopontine angle tumors.<sup>[22]</sup> Routine blood tests and viral antibody tests are not helpful in the diagnosis of viral labyrinthitis. Fungus blood culture in addition to standard blood culture is required. Culture sensitivity test is to be done if middle ear effusions are present. Computed tomography scan is not necessary, but it may help to rule out mastoiditis. Pure-tone audiometry may be indicated in hearing loss. Caloric testing and electronystagmogram help in determining the prognosis for recovery.<sup>[23]</sup>

The initial treatment for viral labyrinthitis is bed rest and hydration. Most patients can be treated on an outpatient basis. However, they should be cautioned to seek further medical care if the symptoms worsen, especially neurologic symptoms (e.g., diplopia, slurred speech, gait disturbances, localized weakness, or numbness). Patients with severe nausea, vomiting, and intractable vertigo require hospital admission and may benefit from intravenous fluid and antiemetic medications. Diazepam or other benzodiazepines are helpful as vestibular suppressants. A short course of oral corticosteroids is very helpful. The role of antiviral therapy is not well established. In a randomized controlled trial by Strupp *et al.*, steroids (methylprednisolone) were found to be more effective than antiviral agents (valacyclovir) for recovery of peripheral vestibular function in patients with vestibular neuritis and these apply to the treatment of viral labyrinthitis as well.<sup>[24]</sup> The antiviral drugs such as acyclovir, famciclovir, and valacyclovir shorten the duration of viral shedding in patients with herpes zoster oticus and prevent some auditory and vestibular damage if started early in the clinical course. Corticosteroids are administered to reduce inflammation and edema in the facial canal and labyrinth. Here, the child was treated with cinnarizine (antihistamine and calcium channel blocker) to reduce the symptoms of cold. She was also treated initially with norfloxacin due to the presence of *E. coli* in urine cultures (indicates a

coexisting bacterial infection) and azithromycin to treat the skin swellings.

## CONCLUSION

The fever and headache episodes gradually progressed to dizziness and fainting in this child due to missed diagnosis at an early stage. This, of course, is a rare presentation of viral labyrinthitis with the forehead swellings that stole all the attention. The diagnosis was made only by exclusion criteria, and there was no definitive symptom initially suggestive of labyrinthitis. Viral labyrinthitis is usually benign and self-limiting. The complications usually are unilateral hearing loss, BPPV, and falls. Prognosis of hearing loss with viral labyrinthitis is usually better once the acute infection is resolved. Bacterial or suppurative labyrinthitis may result in profound hearing loss. The vertigo and dizziness may still be present for a few days to weeks even after resolution of the primary infection. In this case, the child gradually recovered in 2 weeks' time once prompt treatment was initiated and the frontal swellings also disappeared completely. This case report teaches the pediatrician and the ENT consult always to expect the unexpected and be ready for any kind of presentation of a usual disease in an unusual manner to ensure prompt and early diagnosis and avoid complications. In our case, the forehead swellings indeed were an enigma!!!

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