

## When Fever Silences Sound: Scrub Typhus Presenting as Sudden Sensorineural Hearing Loss

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### ABSTRACT

Scrub typhus, caused by *Orientia tsutsugamushi*, typically presents as an acute febrile illness but may rarely manifest with atypical features. We report a 32-year-old male presenting with acute unilateral sensorineural hearing loss following febrile illness, without eschar. Laboratory findings revealed thrombocytopenia and transaminitis, with positive serology confirming scrub typhus. The patient improved with doxycycline and adjunctive corticosteroids, showing significant hearing recovery. This case highlights sensorineural hearing loss as a rare early manifestation, likely due to vasculitic or immune-mediated cochlear injury, emphasizing the need for early suspicion and prompt treatment in endemic regions to prevent complications.

### INTRODUCTION

Scrub typhus is an infectious illness caused by *Orientia tsutsugamushi*, transmitted to humans by the bite of the larva of trombiculid mite's larvae [1]. Every year over one billion people are at risk of this disease and almost 1 million each year fall prey to this infection, which makes this disease a significant health burden, particularly across the Asia-Pacific region, which is commonly referred to as the tsutsugamushi triangle [1]. Following the bite of an infected *Leptotrombidium imphalum* mite, the condition usually presents as an acute febrile illness, with high fever, malaise, headache and cough. Generalized lymphadenopathy maybe present. The most characteristic clinical feature of scrub typhus is the presence of an eschar at the site of the bite of the mite. While the disease responds to antibiotics, delayed diagnosis is a major challenge due to its variable and nonspecific manifestation [2]. In certain cases, the infection can progress to acute encephalitis syndrome and multi-organ dysfunction syndrome, contributing considerably to morbidity and death if left untreated.

Sensorineural hearing loss as a manifestation of scrub typhus is a rare and underreported complication, with only a limited number of cases described in medical literature. A sensory neural type of hearing loss has been

reported in patients infected with *Rickettsia rickettsii*, *R. typhi* [3]. Two proposed mechanisms for this condition involve direct invasion of the central nervous system or vasculitis of the cochlear nerve. Infected adults rarely present with sensorineural hearing loss and otalgia as these symptoms may appear without the classic eschar or may precede other systemic features, posing a significant diagnostic challenge [4,5]. Here, we report a case of scrub typhus presenting predominantly with sensorineural hearing loss, highlighting this uncommon but clinically important manifestation and emphasizing the need for early suspicion and prompt diagnosis and treatment.

## CASE DESCRIPTION

A 32-year-old previously healthy male agricultural worker from a rural endemic region presented with acute, painless right-sided hearing loss for a 3-day duration, accompanied by tinnitus without vertigo or otorrhea. This followed a 7-day history of high-grade intermittent fever (up to 39.2°C) with chills, myalgia, and headache. There was no history of recent upper respiratory infection, trauma, or exposure to ototoxic medications. On examination, he was febrile (38.9°C), pulse 104/min, BP 110/70 mmHg. Otoloscopic findings were unremarkable. Tuning fork tests revealed Weber lateralizing to the left ear and Rinne positive bilaterally, consistent with right-sided Sensorineural Hearing Loss (SNHL). Pure tone audiometry confirmed moderate SNHL in the right ear. Systemic examination revealed mild hepatomegaly, with no rash, lymphadenopathy, or eschar identified, thereby obscuring the initial clinical diagnosis.

Laboratory investigations showed hemoglobin 12.8 g/dL, total leukocyte count 6,200/ $\mu$ L, and platelet count 78,000/ $\mu$ L. Liver function tests demonstrated AST 132 IU/L, ALT 118 IU/L, alkaline phosphatase 210 IU/L, and total bilirubin 1.6 mg/dL. CRP was elevated at 64 mg/L. Renal parameters were within normal limits (serum creatinine 0.9 mg/dL). Peripheral smear for malarial parasites was negative, and dengue NS1 antigen and IgM serology were non-reactive. Blood cultures remained sterile. In view of persistent fever with thrombocytopenia and transaminitis in an endemic setting, serological testing for Scrub typhus was performed and returned positive. The atypical presentation with isolated sudden SNHL in the absence of eschar led to an initial diagnostic dilemma, with differentials including viral labyrinthitis and idiopathic sudden SNHL. The probable mechanism involves rickettsial vasculitis affecting cochlear microcirculation or immune-mediated neuritis, both rare but recognized phenomena.

The patient was initiated on doxycycline 100 mg orally twice daily for 7 days, along with supportive therapy including antipyretics and adequate hydration. Defervescence occurred within 48 hours, and platelet counts improved to 132,000/ $\mu$ L by day 5. In view of auditory involvement, adjunctive oral corticosteroids (prednisolone 1 mg/kg tapered over 10 days) were administered. Over the next 2 weeks, the patient experienced gradual recovery of hearing, with repeat audiometry showing significant improvement.

## DISCUSSION

Scrub typhus is an acute febrile illness caused by *Orientia tsutsugamushi*, an obligate intracellular bacterium, transmitted via the bites of *Leptotrombidium* chigger mites [1]. It is a re-emerging infectious disease prevalent in countries like China, India, Indonesia, Japan, Korea, Philippines, Sri Lanka, Taiwan, and Thailand and is an often-underestimated public health problem in the Asia Pacific area [2]. The "tsutsugamushi triangle" refers to a geographical region in the Asia-Pacific area where scrub typhus is highly endemic [2]. *O. tsutsugamushi* spreads

throughout the body via the blood and lymphatic vessels, so that patients infected with this microorganism manifest a variety of clinical symptoms and signs such as myalgia and diffuse lymphadenopathy [3]. It mainly targets the endothelial cells leading to microvascular vasculitis causing capillary leak, ischemia, and inflammation. We report an atypical neuro-otological presentation of a systemic vasculitic infection - Scrub typhus without eschar presenting as SNHL. This case presented a diagnostic dilemma wherein no eschar formation was seen, but the patient presented with acute, painless right-sided hearing loss for a 3-day duration, accompanied by tinnitus. The probable mechanism involved rickettsial vasculitis affecting cochlear microcirculation or immune-mediated neuritis. Moreover, Labyrinthine artery being an end artery supplying inner ear, becomes more vulnerable to ischemia due to absence of any collateral circulatory channels.

A similar association between scrub typhus and auditory manifestations has been described by Kang JI et al., reported as acute sensorineural hearing loss and severe otalgia occurring in the early phase of illness. Although the mechanism of hearing loss in scrub typhus has not yet been elucidated, at least two mechanisms have been proposed. In the first, the rickettsiae directly invade the central nervous system and induce vasculitis in the acute stage, and this damages the cochlear division of the eighth cranial nerve [5-7]. In the second, vasculitis is produced in the vasa vasorum of the cochlear nerve by a secondary immune mechanism [4]. While previous studies have described auditory manifestations in presence of classical systemic features, our case underscores presence of sensorineural hearing loss as an isolated manifestation.

This case highlights the importance of routine audiometry evaluation for cochlea, for it being a sensitive marker of systemic microvascular injury in scrub typhus.

## CONCLUSION

This case highlights scrub typhus as an uncommon yet clinically significant cause of unilateral sudden sensorineural hearing loss, even in the absence of classical features such as eschar. The combination of acute febrile illness with thrombocytopenia and transaminitis in endemic settings should prompt early suspicion for rickettsial infection despite atypical presentations. The diagnosis can overlap with more common etiologies of sudden hearing loss which can pose a challenge, requiring a high index of clinical suspicion. Therefore, prompt initiation of doxycycline, along with adjunctive corticosteroids can result in rapid clinical recovery and favorable auditory outcomes, emphasizing the importance of early recognition and targeted management.

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