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## Case report

# Xerostomia in a patient with scrub typhus <sup>☆</sup>

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### ABSTRACT

Scrub typhus is an acute febrile disease caused by the intracellular organism *Orientia tsutsugamushi*. The main pathogenesis is focal or disseminated multi-organ vasculitis caused by the infection of endothelial cells and the perivascular infiltration of leukocytes. Many studies have reported interstitial pneumonia, cholecystitis, pancreatitis, and meningoencephalitis in scrub typhus. However, there is no report about sialoadenitis in a patient with scrub typhus. A 79-year-old man was admitted to the emergency room due to a high fever, headache, and myalgia. Scrub typhus was confirmed based on the indirect immunofluorescence assay and the nested polymerase chain reaction. He suffered from severe dry mouth and underwent Tc-99m pertechnetate salivary scintigraphy. While the radiopharmaceutical uptake of the bilateral parotid and submandibular glands was within normal range, salivary excretion into the oral cavity was markedly decreased. After the proper antibiotic treatment, salivary scintigraphy was performed again. Radioactivity in the oral cavity was increased and the ejection fraction (%) after using sialogogue was also improved to the normal range. As far as we know, this is the first report to show salivary scintigraphy of a patient with scrub typhus. By using a Tc-99m pertechnetate salivary scintigraphy, we found that the excretory function of salivary glands was markedly decreased, while the uptake ability was preserved in scrub typhus, unlike Sjögren's syndrome and radiation-induced xerostomia. Salivary scintigraphy presents dry mouth objectively and provides quantitative values as well. Salivary scintigraphy could contribute to the assessment of sialoadenitis before and after treatment of scrub typhus.

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## Introduction

Scrub typhus is an acute febrile disease caused by the intracellular organism *Orientia tsutsugamushi*, which is transmitted by the bite of infected larvae of the tsutsugamushi mite (chigger) [1]. Within the eschar lesion, *O. tsutsugamushi* invades monocytes/macrophages and dermal dendritic cells, then replicates inside the cells [2–3]. Activated dendritic cells migrate to lymph nodes via lymphatic vessels and cause regional and generalized lymphadenopathy [4]. The main pathogenesis is focal or disseminated multi-organ vasculitis caused by the infection of endothelial cells and the perivascular infiltration of leukocytes [5–7]. Many studies have reported interstitial pneumonia, cholecystitis, pancreatitis, and meningoencephalitis in scrub typhus [9]. However, there is no report dealing with sialoadenitis in a patient with scrub typhus.

Salivary scintigraphy using Tc-99m pertechnetate is an imaging modality that provides the functional status of major salivary glands. It has been used mostly in radiation-induced xerostomia and rheumatic disease such as Sjögren's syndrome. Until now, there is no report of salivary scintigraphy in scrub typhus.

Here, we present a 79-year-old man who underwent Tc-99m pertechnetate salivary scintigraphy both before and after antibiotic treatment of scrub typhus.

## Case reports

A 79-year-old man was admitted to the emergency room with a high fever, headache, and myalgia that developed a few days ago. On physical examination, there was a 1.5 × 1.4-cm-sized eschar lesion on the left anterior chest wall. Scrub typhus was confirmed based on the increase in indirect immunofluorescence assay titer  $\geq 1:640$  against *Orientia tsutsugamushi* and a positive result of a nested polymerase chain reaction

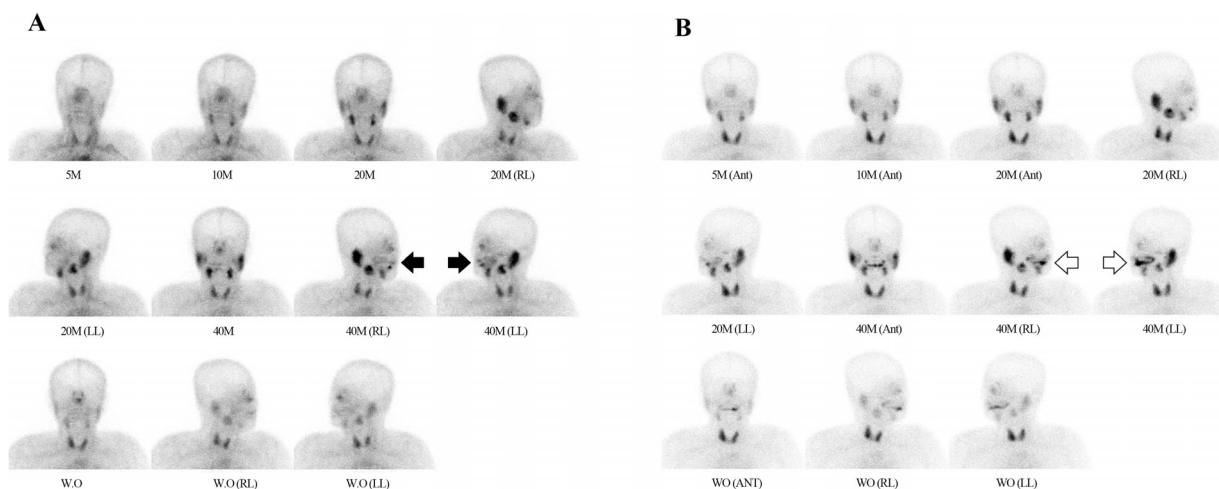
targeting the 56-kDa gene of *O. tsutsugamushi*. Nested PCR was performed as described previously by Hwang et al. [8]. The amplified PCR products were confirmed by 1.2% agarose gel electrophoresis, purified using a QIAquick gel extraction kit (QIAGEN), and sent to COSMO Genetech (Seoul, Korea) for sequencing. The *O. tsutsugamushi* genotype was Boryong.

Since the patient complaint of severe dry mouth, we performed salivary scintigraphy using Tc-99m pertechnetate. On pretreatment static images 40 minutes after injection, the radiotracer uptake of the bilateral parotid and submandibular glands was within normal range, however, the salivary excretion into the oral cavity was markedly decreased (Fig. 1, arrow). He received oral doxycycline monohydrate 100 mg, twice a day for 5 days. Fever subsided after 2 days of doxycycline monohydrate administration. On the salivary scintigraphy after antibiotic treatment, radioactivity in the oral cavity was increased, suggesting improvement of excretory function (open arrow). The ejection fraction (%) after intake sialogogue (orange juice, 200 mL) was also increased from 49%–58% to 63%–72% (Fig. 2). The interval between the scans was 42 days. He got along well during the hospital stay and was discharged on hospital day 5.

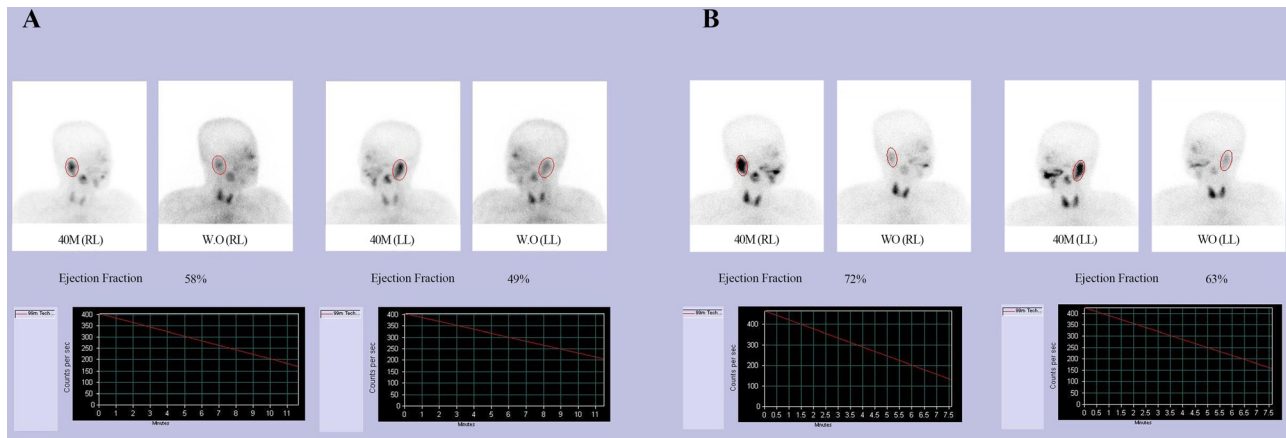
## Discussion

The usual clinical presenting features of scrub typhus are fever, chills, headache, myalgia, skin rash, lymphadenopathy, and eschar. Dry mouth is another common symptom in patients with scrub typhus. However, no prior studies have elucidated the cause of dry mouth in patients with scrub typhus.

Salivary scintigraphy using Tc-99m pertechnetate is a widely used imaging modality that evaluates the function of major salivary glands and helps to diagnose acute/chronic salivary gland disorders and tumors. Salivary epithelial cells have sodium/iodide symporters (NIS) that take up univalent anions such as  $I^-$  and  $Cl^-$ .<sup>9</sup> Tc-99m pertechnetate ( $^{99m}TcO_4^-$ ) is also taken up by the salivary epithelial cells via a NIS



**Fig. 1** – On pre-treatment imaging (A), salivary excretion into the oral cavity was markedly decreased 40 minutes after radiotracer injection (arrow). After antibiotic treatment (B), radioactivity in the oral cavity was increased to normal range (open arrow).



**Fig. 2 – Ejection fraction (%) was measured after administration of sialogogue (orange juice, 200 mL). It increased from 49%–58% (A) to 63% – 72% (B).**

and is secreted into saliva. [10] After accumulation of Tc-99m pertechnetate by the major salivary glands, loading of sialogogues, such as lemon juice or vitamin C powder, stimulates the secretion of saliva, which helps to assess the secretory function of salivary glands and to indicate obstruction of the salivary ducts.

Salivary scintigraphy has been used mostly in radiation-induced xerostomia and rheumatic disease such as Sjögren's syndrome and these diseases usually have showed markedly decreased ability both in uptake and excretion. Unlike this, in scrub typhus, the uptake ability of parotid and submandibular glands were preserved and the excretory function was recovered after proper antibiotic treatment. As far as we know, this is the first report to describe salivary scintigraphy in scrub typhus. Salivary scintigraphy presents dry mouth objectively and provides quantitative values as well. Salivary scintigraphy could contribute to the assessment of sialoadenitis before and after treatment of scrub typhus.

### Authors' contributions

Conceptualization: all authors. Data curation and Formal analysis: Yeon-Hee Han. Investigation: Joo-Hee Hwang and Chang-Seop Lee. Supervision: Chang-Seop Lee. Validation: Joo-Hee Hwang. Visualization: Yeon-Hee Han. Writing—original draft: Chang-Seop Lee. Writing—review & editing: Yeon-Hee Han and Joo-Hee Hwang. Approval of final manuscript: all authors.

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