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# Understanding Eschar: Pathognomonic Marker of Scrub Typhus

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## Abstract

Scrub typhus, caused by *Orientia tsutsugamushi* and transmitted through the bite of infected trombiculid mite larvae (chiggers), remains a significant public health concern across the Asia-Pacific region and beyond. Eschar is a painless, necrotic, blackened skin lesion, occurring at the site of the mite bite. It is one of the most distinctive clinical features and is a valuable diagnostic sign. This article examines the pathophysiology, morphological characteristics, and anatomical distribution of eschar in scrub typhus, highlighting its role as a pathognomonic marker that can guide early clinical diagnosis, particularly in resource-limited settings where laboratory confirmation is unavailable or delayed. The prevalence of eschar across geographic regions and patient populations varies widely. Hence, the importance of a thorough skin examination to avoid misdiagnosis when eschar is atypically located or absent. Early recognition of eschar and timely initiation of antibiotic therapy are critical in preventing severe complications, including multi-organ failure and death. Clinicians practicing in or receiving patients from endemic regions should maintain a high index of suspicion and integrate eschar identification into routine febrile illness evaluation.

**Keywords:** Chiggers, clinical, eschar, morphological, *Orientia tsutsugamushi*, pathognomonic, scrub typhus, trombiculid

## 1. Introduction

Scrub typhus, also known as Tsutsugamushi disease, is a zoonotic infection caused by *Orientia tsutsugamushi*, a small Gram-negative obligate intracellular bacterium transmitted to humans through the bite of the larval stage of trombiculid mites (chiggers) (Figure 1)[1-4].

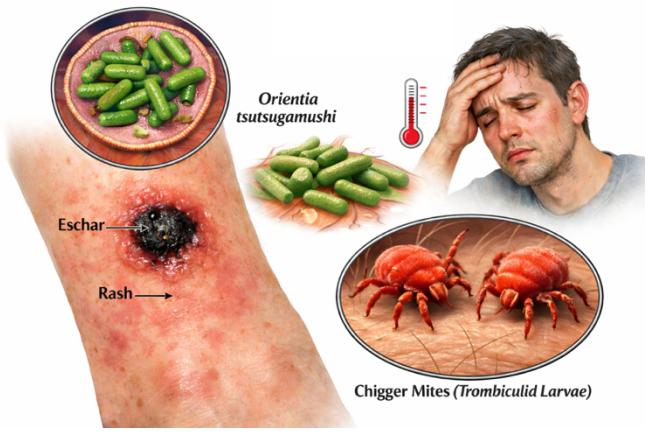


**Figure 1:** Scrub typhus infection - clinical features, etiologic agent, and vector

This disease is endemic to a region called the *Tsutsugamushi Triangle*, which extends from Japan, Taiwan, China, and South Korea to Nepal, northern Pakistan, Papua New Guinea, and northern Australia. It is also quite prevalent in South Asian countries, including India and Sri Lanka[1,2]. Humans are accidental hosts of this disease. Scrub typhus can present with a range of clinical manifestations, from a mild, self-resolving illness to severe, life-threatening disease. The incubation period is around 6-21 days. Most of the patients present with acute onset fever. Other clinical manifestations include headache, myalgia, cough, malaise, gastrointestinal (GI) symptoms and maculopapular rash. This rash begins on the trunk and then spreads into the limbs. It is seen mostly towards the end of the first week of the illness[1-5].

An eschar is often considered a pathognomonic feature of scrub typhus. However, its presence is variable and frequently overlooked. The prevalence of eschar varies widely among studies. According to a systematic review, it ranges from 7 to 80%[5,6]. The bacteria enter the epidermis and superficial dermis and primarily target endothelial cells and dermal macrophages. Once they start proliferating inside host cells, the immune system induces localized inflammation leading to formation of the eschar at the site of the mite bite[5].

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## 2. Morphological Evolution of Eschar

Eschar is a small, dry, dark, dead piece of tissue that looks like a skin burn from a cigarette. When present, it occurs prior to the onset of fever and other symptoms (Figure 2)[2]. The eschar evolves through characteristic stages. First it appears as a small papule at the site of mite bite. Then it progresses to a shallow ulcer with an erythematous base, and subsequently develops central necrosis, forming a black scab. The surrounding erythematous area gradually develops scaling. The scab usually detaches within two to three weeks. Most of the patients present during the ulcerative stage rather than the fully necrotic phase[7,8].


**Figure 2:** Stages in the evolution of an eschar
*Extreme left: 3 days from symptom onset (A SE03); Extreme right: 20 days from symptom onset (G SE20)*
*(Reproduced from Park et al., 2016[8] under CC BY 4.0 license)*

## 3. Factors Contributing to Under-recognition

Though pathognomonic, eschars are often missed during clinical examination. Eschars are painless and non-pruritic, which may hinder their detection. They may resemble a simple scab or healed abrasion and can be misdiagnosed. Sometimes, detection may be difficult due to skin color, especially among dark-skinned patients. Additionally, differences in immune response among hosts, as well as the strain of pathogen may also play a potential role in the development of eschar[9].

## 4. Anatomical Distribution and Sex-related Patterns

Eschars are commonly located in anatomical regions where the skin folds, where pressure points are present, or in areas where tight clothing is worn. The most commonly reported sites are the groin, axilla, and trunk. Systematic reviews and meta-analyses have quantified this distribution. According to these studies, approximately 39% of eschars are found on the trunk, 24% in the groin, and 17% in the axilla. Limbs and head region show relatively low frequency of distribution[6,7,9].

Sex-related differences in eschar location have also been observed, likely reflecting variations in clothing habits, skin folds, and routine physical activity. The anterior trunk and periumbilical region are common sites in both males and females. In contrast, the lower limbs are more frequently affected in males, whereas in females, eschars tend to be present more on the back. However, these patterns are not universal. Regional cultural practices, occupational exposure, and differences in clothing can influence both the prevalence and exact location of lesions.

## 5. Clinical Implications

Molecular diagnostic studies further support the diagnostic value of eschars, with polymerase chain reaction (PCR) testing of eschar material showing higher positivity rates compared to whole blood, particularly in early or atypical disease. Moreover, studies have found that these test results are not affected by prior antibiotic therapy[7,10].

## Disclosure

The AI tool, ChatGPT (free version) was used to create the image presented in Figure 1.

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