

Two Atypical Cases of Tick Bites: A Fully Engorged Tick and Multiple Ticks

Akio KONDOH^{*1}, Mayu KAWAI^{*1}, Hanako YAMAOKA^{*1}, Shiho TAMIYA^{*1},
Hiroshi TACHIBANA^{*2} and Tomotaka MABUCHI^{*1}

^{*1}Department of Dermatology

^{*2}Department of Parasitology, Tokai University School of Medicine

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Ticks have a cosmopolitan distribution and, as such, are also found in Japan. Ticks are typically ectoparasites of wild animals, however, humans can also be bitten when visiting environments inhabited by ticks. Herein, we describe two cases with atypical tick bites. Case 1 was an elderly Japanese male patient who presented with a fully engorged tick measuring $20 \times 17 \times 8$ mm; it is rare for ticks to attain a length of 20 mm. Case 2 was an elderly Japanese female with severe dementia who presented with multiple tick bites, which is rare, after going missing for 6 days before being found in a densely wooded area. Ticks are responsible for the transmission of many infectious agents, such as bacteria, viruses and parasites. The National Institute of Infectious Diseases and the Ministry of Health, Labour and Welfare regularly inform citizens of the risks posed by tick bites. However, the tick bites could not be prevented in our patients. Further edification about tick bites, tick-borne diseases, and their prevention are considered necessary in Japan.

Key words: gigantic tick, giant tick, biggest tick, multi tick bites

INTRODUCTION

Ticks have a cosmopolitan distribution and a total of 900 tick species have been described to date [1]. According to the National Institute of Infectious Diseases (NIID), a total of 47 tick species inhabit Japan (<https://www.niid.go.jp/niid/ja/sfts/2287-ent/3964-madanitaisaku.html>). Ticks have four lifecycle stages, namely eggs, larvae, nymphs, and adults; with the exception of the egg stage, all of the stages are hematophagous. Humans are accidental hosts of ticks, which typically parasitize wild animals. However, humans can also be bitten when visiting habitats inhabited by ticks [1]. Ticks are responsible for the transmission of numerous infectious agents, such as bacteria, viruses, and parasites [1]. In Japan, Lyme disease, Japanese spotted fever, and severe fever with thrombocytopenia syndrome are the most well-known tick-transmitted infections [2]. Consequently, the NIID and the Ministry of Health, Labour and Welfare (MHLW) regularly inform citizens on the need to prevent these infections.

CASE REPORTS

Case 1: An 84-year-old male Japanese farmer presented at our hospital with a nodule on his lower jaw. The size of the nodule increased rapidly from several millimeters to 2 centimeters within 20 days. At the initial dermatological examination, we noticed a yellowish engorged tick measuring $20 \times 17 \times 8$ mm in size with four pairs of short legs attached to his left lower jaw

(Fig. 1). The skin around the site of the tick bite was red and inflamed. The tick and its mouthparts were removed surgically, and the tick was identified as an adult female *Amblyomma testudinarium* (Fig. 2). The patient's erythema and inflammation both resolved after 14 days of treatment with minocycline. After 5 weeks, we confirmed that he had neither skin symptoms nor systemic symptoms. Serum IgG and IgM antibody titers against *Orientia (O.) tsutsugamushi* strains, including Kato, Karp, and Gilliam strains, were all negative.

Case 2: An 89-year-old Japanese female with severe dementia went missing for 6 days. She was found in a densely wooded area in an old uninhabited house and hospitalized at Tokai University Oiso Hospital for treatment. She was referred to our department from Internal Medicine with a tick bite on her hip. Dermatological examination revealed eight ticks on her trunk and lower extremities (Fig. 3). All of the ticks and their mouthparts were removed surgically and identified as female *A. testudinarium* adults. The patient showed no symptoms after 14 days of treatment with minocycline. Serum IgG and IgM antibody titers against *O. tsutsugamushi* strains, including Kato, Karp, and Gilliam strains, were all negative.

DISCUSSION

Both of Tokai University Hospital and Tokai University Oiso Hospital are located south of Mount Oyama in western Kanagawa Prefecture. The rural nature of the area allows ticks to come into close contact with humans. Although ticks are common throughout



Fig. 1 A yellowish engorged tick on the left lower jaw.



Fig. 2 Ventral surface of the engorged tick (*Amblyomma testudinarium*) showing four pairs of short legs.

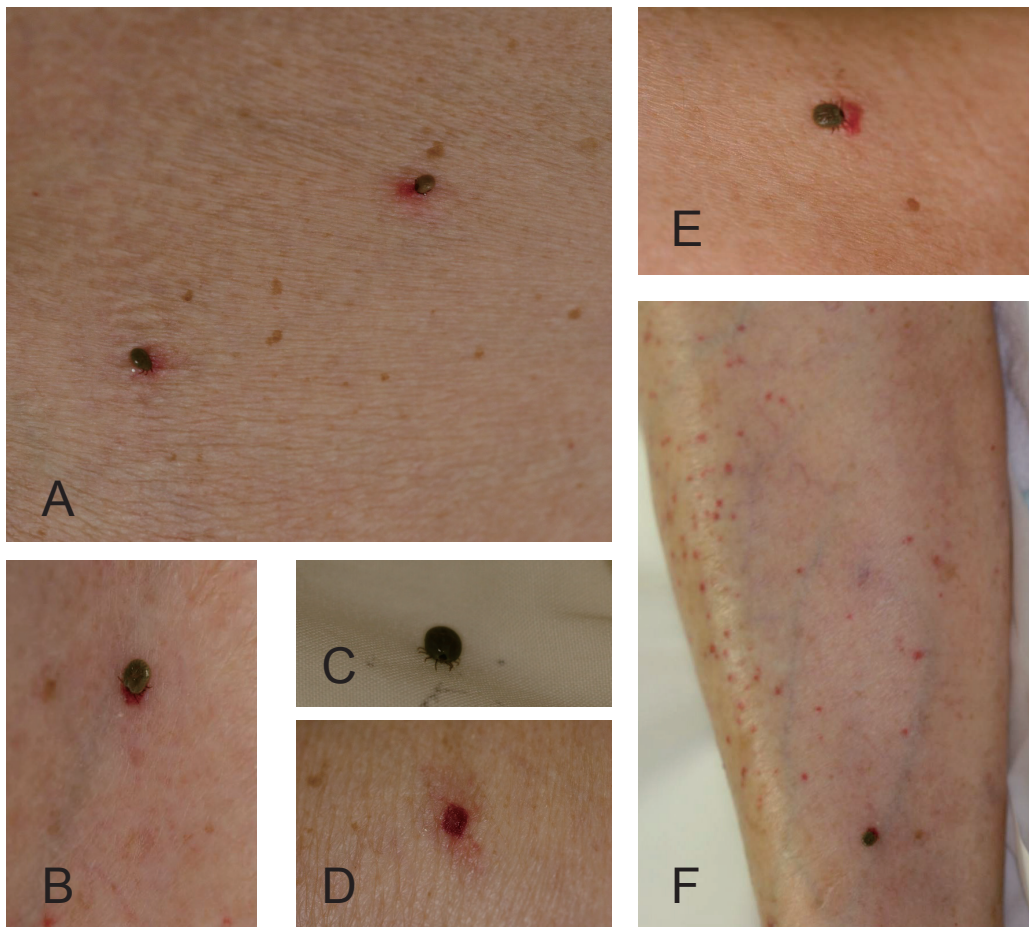


Fig. 3 Ticks attached to the (A) abdomen, (B) left shoulder, (C) left side of the abdomen (dislodged), (D) hip (showing erythema and erosion after removal of 1 of 2 ticks), (E) right thigh, and (F) right lower leg.

the year, they are very active from spring to early fall. At this time of year, many of the residents of this rural area hike up the hillsides and mountains to collect bamboo shoots and mushrooms.

Ticks typically measure several millimeters in length. Although adult female ticks are capable of ingesting 100 times their weight in blood [1], it is rare to find engorged ticks measuring 20 mm long. A clinical study on tick bites in Japan (published in Japanese) reported that 20 among 21 *A. testudinarium* specimens were less than 10 mm long (with the mean approximately 5 mm), and the largest tick measured

12.8 × 10.3 mm in length [2]. The tick removed from our Case 1 patient is one of the largest ticks reported to date in Japan. We hypothesized that the size of the tick was reflected by the time tick had been feeding on the patient. We therefore analyzed the duration of tick attachment in our previous cases of tick bite. A total of 30 cases of tick bite were reported at Tokai University Hospital from January 2005 to June 2017. The patients in 15 cases were older than 50 years-old, and the patients in the other 15 cases were younger than 50 years-old. Mean duration of attachment was 2.1 ± 0.4 days, with a range from 0 to 9 days. The period

of attachment was significantly longer in older patients than younger patients (Wilcoxon's rank sum test, $p < 0.05$); mean attachment duration in patients older or younger than 50 years-old was 3.3 days and 0.9 days, respectively. Our Case 1 patient, who is 84 years-old, mistook the tick for a rapidly growing tumor for 21 days. Although previous medical records did not specify the size of the ticks in previous cases, we suspect that the size of the engorged tick could have increased further if it had remained attached to the patient.

The incidence of single tick bites in patients is higher than that of multiple bites. The clinical study of 94 patients that were bitten by ticks in Japan also reported that 84 of 94 patients (89.3%) presented with single bites [2]. The other 10 patients presented with multiple tick bites [2]. Among these 10 patients, 4 had 2 ticks, 1 had 10 ticks, 1 had more than 10 ticks, and the number of ticks on the remaining 4 patients was unknown [2]. In another review of 1,223 patients with tick bites in Japan (published in Japanese), 1,186 of 1,223 patients (97.0%) had single bites [3]. Of the 37 patients with multiple tick bites, 13 had 2 ticks, 3 had 3 ticks, 1 had 4 ticks, 2 had 8 ticks, and 18 had more than 10 ticks [3]. Seventeen of the 18 patients with more than 10 tick bites were bitten by a large number of larvae and/or nymph ticks, but no adult ticks. Furthermore, 66.7% (12 of 18 cases) of the ticks were larvae and/or nymphs of *A. testudinarium* [3]. Larval ticks move to the ends of grass leaves where they wait for potential hosts to pass by and then attach themselves to the host in large numbers. However, due to the small size of their mouthparts, larval ticks are easily dislodged from a host [3]. Our patient in Case 2 is a unique case in that she had been lying on the floor of an abandoned house in a wooded area for several days, which meant that the *A. testudinarium* adults could feed on her easily. Compared to other ticks, *A. testudinarium* is relatively anthropophilic [2].

Ticks should be removed as soon as possible. Although the risk of developing Lyme disease after a tick bite is less than 5%, viruses, bacteria, or parasites can be transmitted from the tick to the host within 24 hours [4]. Ticks secrete an adhesive substance that keeps them firmly attached to the skin, thus, the

mouthparts often remain embedded in the skin if the tick is not removed carefully. Since the infectious agents are located in the salivary glands inside the abdomen of the tick, the mouthparts can be left in the skin with the risk of infection [4]. In the cases reported in this study, all of the ticks, including their mouthparts, were removed surgically. Recently, a tick remover has been developed to remove ticks with their mouthparts intact. Initiating an antibiotic therapy is not recommended [4], but, in our cases, the patients were treated with minocycline after considering their age and the duration of attachment.

In Japan, the NIID and the MHLW regularly inform citizens about the risk of tick-borne diseases. The information they provide describes the epidemiology of ticks, the prevention of tick bites, and the symptoms of tick bites. However, the patients described in this study could not prevent being bitten by ticks.

Herein, we presented two cases with atypical tick bites. Although humans are accidental hosts of ticks, they may be bitten after entering areas where ticks are present. Further edification regarding tick bites, tick-borne diseases, and prevention of tick bites is considered necessary in Japan.

CONFLICT OF INTEREST

None.

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