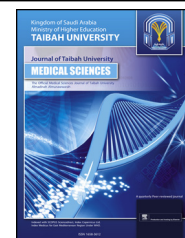




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Case Report

A contrivance of tick removal to prevent skin damage: Injection into the tick before removal



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المخلص

يلتصق القراد بجلد المضيف عند وجوده في الخارج. طرق إزالة القراد دون التسبب في ضرر للجلد محل نقاش، ويتم عادة إجراء الاستئصال الجراحي مع الجلد. هذه الحالة لرضيع يبلغ من العمر ستة أسابيع يعيش في المنزل مع قطة عائلية وتعرض للدغة القراد. تم قتل القراد قبل إزالته من الجلد عن طريق حقن الكاربوكاين في القراد، وكانت النتيجة إزالة ناجحة للقراد دون الإضرار بالجلد. يمكن أن تكون هذه الطريقة مفيدة لمنع تلف الجلد أثناء إزالة القراد. كما يمكن لحيوان أليف يتجول في الخارج أن يكون وسيلة نقل للقراد إلى داخل المنزل. لذلك يجب أن ندرك أن لدغات القراد يمكن أن تحدث داخل المنزل.

الكلمات المفتاحية: الحقن؛ قطة أليفة؛ لدغة القراد؛ إزالة القراد؛ الرسائل

Abstract

Ticks adhere to the host skin outdoors. Methods for tick removal without causing skin damage are controversial, and surgical excision along with the skin is mainly performed. A 6-week-old infant who lived indoors with a family cat contracted a tick bite. Tick killing before removal by injection of carbocaine into the tick led to successful removal without damaging the skin. This method can be useful for preventing damage to the skin during tick removal. A pet that roams outdoors can be a transmitter of ticks. We should be aware that this risk of tick bites can be hidden indoors.

Keywords: Injection; Pet cat; Tick bite; Tick removal; Transmitter

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Introduction

Ticks are blood-sucking arthropods that wait for a passing host on branches or grass blades outdoors.^{1,2} Ticks adhere to the host skin through their mouthparts. Surgical excision along with the skin, using a biopsy punch or a scalpel, is mainly performed to ensure removal of the tick together with its mouthparts, because retained mouthparts in the skin induce inflammation.¹ Methods for tick removal without causing damage to the skin have remained controversial.^{3–5} Herein we report the case of a 6-week-old infant living indoors who contracted a tick bite. Tick killing before removal by injection of carbocaine into the tick led to successful removal without damage to the skin.

The case

A 6-week-old infant with an unremarkable medical history presented with a tick bite. The tick adhered to the left side of the abdomen of our patient. Our patient did not present any signs of discomfort, such as crying, suggesting that the tick bite was painless although the lesion below the tick's head was erythematous (Figure 1).

We confirmed that the tick was *Haemaphysalis longicornis* using a magnifying glass. Before removal, we injected approximately 0.1 mL of 1% carbocaine into the body of the

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Figure 1: The tick adhering to the skin. The lesion below the tick's head was erythematous.

tick to induce euthanasia. A small amount of carbocaine spilled from the body of the tick. After several minutes, we used tweezers to grasp below the tick's head, close to the skin. The tick was pulled upwards in a straight line. After removal, we confirmed that no mouthparts of the tick were left behind in the skin surface using a magnifying glass, although the skin remained erythematous (Figure 2). We cleaned the lesion with chlorhexidine gluconate and applied gentamicin ointment. We confirmed that the removed tick contained



Figure 2: The surface of the skin after removal. No mouthparts of the tick were left behind, although the skin remained erythematous (arrow).



Figure 3: The removed tick. The removed tick contained its mouthparts (arrow).

its mouthparts, comprising a hypostome and two pulpi, using a magnifying glass (Figure 3).

The erythema disappeared on the following day. No signs of infectious diseases or local granulomas appeared for more than 5 months after tick removal, even though the patient did not receive any prophylaxis with antibiotics. The patient had never moved around outdoors. The family of our patient had a pet cat that was able to roam outdoors. We considered that the cat was a transmitter of the tick to our patient living indoors.

Discussion

We observed two important clinical issues in our patient. First, tick killing before removal by injection of carbocaine into the tick can prevent damage to the skin in an infant. Second, a pet that roams outdoors can be a transmitter of ticks to an infant living indoors.

Regarding the first issue, retained mouthparts in the skin induce inflammation, resulting in granuloma formation.¹ Thus, surgical excision along with the skin, using a biopsy punch or a scalpel, is mainly performed to ensure removal of the tick together with its mouthparts. There are various folklore tick removal methods that do not involve surgical excision, including burning the tick with a hot match, covering the tick with a suffocating agent such as nail polish, and dousing the tick with a chemical irritant such as methylated spirit or gasoline to encourage the tick to self-remove, but these methods remain controversial.^{1,3,5} We injected carbocaine into the tick, but not into the skin, to avoid causing damage to the skin in our patient. After euthanasia of the tick, mechanical removal with tweezers was performed. A tick should always be pulled upward in a straight line, using a slow movement.³⁻⁵ We preferred to

avoid invasive surgical excision and subsequent suture because our patient was a 6-week-old infant. *Haemaphysalis longicornis* and *Amblyomma testudinarium* are important ticks in the western part of Japan. The mouthparts of *Haemaphysalis longicornis* are shorter than those of other tick species.⁶ This is another reason why we chose tick killing and subsequent mechanical removal rather than surgical excision.

For the second issue, ticks wait for a passing host on low-level branches or grass blades outdoors. When a host passes through, the tick moves onto them for feeding.^{1,2} Our patient was an infant living indoors and could not leave home alone. Thus, our patient had no opportunity to encounter ticks outdoors. Although we have no evidence and there is no way to confirm, we believe it is reasonable to assume that the family cat roaming outdoors was the transmitter of the tick. The present case suggests that infants living indoors can be at risk of contracting a tick bite.

Tick saliva constitutes the main route for transmission of tick-borne pathogens.⁶ The important tick-borne diseases in the western part of Japan are severe fever with thrombocytopenia syndrome (SFTS), Lyme disease, and Japanese spotted fever (JSF).^{7–10} SFTS is an emerging hemorrhagic fever caused by SFTS virus. The primary symptoms of SFTS include fever, nausea, and diarrhea.⁸ Symptomatic therapy is performed because no specific treatment is available. Ribavirin and doxycycline have been used, but their effectiveness is controversial.⁸ Lyme disease is caused by *Borrelia burgdorferi*. The symptoms of Lyme disease include fever, erythema migrans rashes, and various neurological manifestations.⁹ *Borrelia burgdorferi* is susceptible to several classes of antibiotics including doxycycline, amoxicillin, ceftriaxone, and azithromycin.⁹ JSF is caused by *Rickettsia japonica*. The symptoms of JSF include fever and erythema with neither pain nor itch.¹⁰ Treatment with tetracycline is effective.¹⁰ The symptoms of SFTS, Lyme disease, and JSF appear in humans after incubation periods of 6–14 days, 3–30 days, and 2–8 days, respectively.^{7–10} No signs of infectious diseases appeared in our patient for more than 5 months after tick removal, despite no prophylaxis with antibiotics. We suggest that prophylaxis with antibiotics is not always required in infants with successful tick removal.

In conclusion, tick killing before removal by injection of carbocaine into the tick can be useful to prevent damage to the skin in an infant, and a pet that roams outdoors can transmit a tick to an infant living indoors. We should be aware that this risk of tick bites can be hidden indoors. Further studies are needed to determine whether tick killing before removal by injection of carbocaine can become a main therapeutic strategy for tick bites.

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Conflict of interest

The authors have no conflict of interest to declare.

Ethical approval

This study was approved by the IRB on 24 June 2021 (Ref. No. 28). All procedures were in accordance with the Helsinki Declaration of 1975, as revised in 2013.

Consent

Written informed consent for publication of this report has been obtained from the family members of the patient.

Authors contributions

All authors contributed to the examinations and treatment. KT wrote the manuscript. All authors were involved in revising the article critically for important intellectual content. All authors approved the final version.

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