Revisiting detachment techniques in human-biting ticks

Asli Akin Belli, MD,[a] Emine Dervis, MD,[b] Sirri Kar, MD,[c] Onder Ergonul, MD,[d] and Aysen Gargili, MD[e]
Mugla, Istanbul, and Tekirdag, Turkey

Background: Early and complete removal of ticks using the right technique is important to reduce tick-transmitted diseases. Several chemical and mechanical detachment techniques have been described previously.

Objective: We aimed to compare the performance of 4 tick-detachment techniques that are widely used in human beings and to determine the optimal method from these techniques.

Methods: A cross-sectional study was conducted on 160 patients between April and June 2010. Patients with reported tick bite were reviewed retrospectively and divided into the following 4 groups according to the tick-detachment technique used: card detachment, lassoing, freezing, and tweezers. Performance of each technique was evaluated according to the number of fully detached, nondetached, and crushed ticks and the duration of application.

Results: Of the 160 tick-bite cases assessed, we found the following efficacy rates: 82.5% (33/40), technique using tweezers; 47.5% (19/40), lassoing technique; 7.5% (3/40), card detachment; and 0% (0/40), freezing technique. The efficacy rate of the technique using tweezers was significantly higher than that of the other 3 techniques ($P < .05$).

Limitations: This was a relatively small sample size and not designed as a randomized clinical trial.

Conclusion: Tick detachment using tweezers, performed in an appropriate manner, is the easiest and most effective technique. (J Am Acad Dermatol 2016;75:393-7.)

Key words: freezing; parasite-host relations; techniques; tick bites; tick infestations; tweezers.

Ticks are among the most significant parasites of animals and man.[1] Approximately 10% of the known species are involved in the transmission of more than 200 pathogens.[2,3] Currently tick species that complete their life cycle in human beings are not known; however, 33 tick species are known to feed on human beings, and of these, 28 are responsible for disease transmission.[4,5]

Increasing awareness of tick-borne diseases in the world has led to proper application of related control programs. However, the emergence of tick-borne diseases as epidemics could cause panic. A similar situation arose in Turkey when the Crimean-Congo hemorrhagic fever epidemic first struck in 2003. According to the records of the Ministry of Health, approximately 300,000 people were admitted annually to hospitals with reported tick bite.[6] Such high statistics have urged physicians to evaluate procedures for the examination of tick bite cases and efficacy of various tick detachment techniques.

In this study, we aimed to compare the performance of 4 widely used tick-detachment techniques and to determine the optimal method from these techniques.

From the Department of Dermatology, Mugla Sitki Kocman University Training and Research Hospital[a]; Department of Dermatology, Haseki Training and Research Hospital, Istanbul[b]; Department of Biology, Namik Kemal University, Tekirdag[c]; Department of Infectious Diseases, Koc University Medical School, Istanbul[d]; and Faculty of Health Sciences, Marmara University, Istanbul.[e]

Funding sources: None.
Conflicts of interest: None declared.

Accepted for publication January 27, 2016.

Reprint requests: Asli Akin Belli, MD, Department of Dermatology, Mugla Sitki Kocman University Training and Research Hospital, Orhaniye Mah, Ismet Catak Cad, 48000 Mugla, Turkey. E-mail: dr_asliakin@hotmail.com.

Published online March 2, 2016.
0190-9622/$36.00

http://dx.doi.org/10.1016/j.jaad.2016.01.032

METHODS

A cross-sectional study was conducted on 160 patients admitted to the Dermatology Clinic at the Haseki Training and Research Hospital with reported tick bite between April and June 2010. Informed consents of the patients were reviewed and those were voluntary included in the study. Because the study is a part of public health studies and the Haseki Training and Research Hospital is connected to the Provincial Health Directorate, its approval by the ethics committee was exempted. To ensure the homogeneity of the results, only patients with *Ixodes ricinus* involvement were selected. According to the tick-detachment technique they were subjected to, patients were divided into 4 groups. To provide a fair comparison of the results, equal numbers of biological stages (ie, larva, nymphs, and adults) and physiological situations (ie, newly attached, semiengorged, and engorged) of the attached ticks were included in the groups. Ticks were detached using tweezers and 3 commercial devices based on freezing technique (TICKNER, Laboratory Tickner AG, Zug, Switzerland), lassoing technique (Trix Ticklasso, Innotech, Fridhem, Sweden), and card-detachment technique (Zeckenkarte, SafeCard ApS, Skanderborg, Denmark). The commercial devices were used according to manufacturer guides. In the technique using tweezers, ticks were grabbed from the mouthparts and were pulled out without twisting. Efficacy of each technique was evaluated based on the number of fully detached, nondetached, and crushed ticks and the duration of application.

A statistical program was used for data analysis (SPSS for Windows, v.20.0, IBM Corp, Armonk, NY). The χ^2 test was used to compare the groups for qualitative data. Odds ratio and 95% confidence interval were calculated. *P* less than .05 was assessed as significant.

CAPSULE SUMMARY

- Although several tick detachment techniques are commercially available, the optimal method is still unknown.
- We compared the performance of 4 tick removal techniques and found that using tweezers was most effective.
- Tick detachment using tweezers and cleaning of the bite site are recommended clinical approaches.

RESULTS

The efficacy rates were 7.5% for the card-detachment technique, 47.5% for the lassoing technique, 0% for the freezing technique, and 82.5% for tick detachment using tweezers. For applications carried out by the card-detachment technique, immature ticks in all physiologic situations and newly attached or semiengorged adult ticks (Fig 1) could not be detached; such ticks easily slipped from the aperture of the device. The lassoing technique failed to detach small immature ticks and tightly attached adult ticks. Engorged immature ticks were detached successfully using this technique (Fig 2). When using the freezing technique, all ticks were crushed during applications (Fig 3). Regarding technique using tweezers, most ticks were detached successfully (Fig 4); some specimens were crushed, although still detached (Table I).

When the tick-detachment techniques were compared, there were significant differences between all the applications ($P < .001$). The efficacy rate of the technique using tweezers was significantly higher than that of all the other devices ($P < .05$) (Table II).

DISCUSSION

Transmission of infectious agents by ticks is closely related to blood-sucking time of ticks. For the prevention of transmission, early and appropriate removal of the attached ticks is of utmost importance.[7-10]

Although a large number of mechanical, chemical, and physical techniques have been described for tick detachment, there is limited experimental evidence to support the suggested strategies. The main chemical and physical tick-detachment techniques include the use of vegetable oil, petroleum jelly, fingernail polish, alcohol, gasoline, vinegar, and liquid nitrogen and may involve heat applications and injection of local anesthetics.[11-14] However, it has been shown that chemical applications may cause saliva discharge and intestinal secretions within the host as a result of the reactive contractions in the tick. Further, suffocating ticks by smothering them with chemicals is a passive technique, causing respiratory distress to ticks. Ticks are known to breathe 3 to 15 times per hour during the feeding process; therefore, simply covering the body cannot initiate the self-detachment.[11,15-18]

Tick detachment using tweezers is a commonly used technique. It was reported that complication and risks involved in tick detachment, such as breaking off mouthparts, were low when using this technique.[11,12,15,19] The technique using tweezers involved grabbing the tick around its mouthparts and pulling it off straightly. It was also advised not to rotate the tick.[11,12,15] In the current study, the technique using tweezers was more successful than the other 3 techniques.