Tick-Induced Facial Palsy

Kene İlişkili Fasiyal Paralizi

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ABSTRACT

Ticks are obligate blood-sucking arthropods that exist worldwide. Their targets include all vertebrates and humans. Ticks are harmful to people with regard to transmission in many viral, bacterial, and parasitic infections. In addition to these diseases and toxin-induced neurological complications, tick-induced paralysis is a syndrome related to neurotoxin production, and its mortality ratio in the literature is reported to be approximately 10%. Tick-induced isolated facial paralysis is a rare form of the disease developing because of attachment to the external auditory canal or attachment behind the ear. Our country and region are under risk in terms of included tick habitat for tick-induced paralysis that is responsible particularly for hard ticks. In our article, we aimed to present a case with isolated facial paralysis that occurred after the internal auditory canal was bitten by *Hyalomma margintum* species belonging to the hard ticks group and to probe the management of this disease. *(Turkiye Parazitol Derg 2015; 39: 248-51)*

Keywords: Tick, facial nerve palsy, ear

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ÖZ

Keneler tüm dünya üzerinde varlığını sürdürebilen zorunlu kan emici artropodlardır. İnsanların da dahil olduğu tüm omurgalılar hedeflerini oluşturur. İnsanlara birçok viral, bakteriyel ve paraziter enfeksiyonun bulaştırılmasında ve toksin bağlı nörolojik komplikasyonlar ile zarar verebilirler. Kene ilişkili paralizi %10 mortal seyretme eğiliminde iken kene ilişkili fasial paralizi ise kenenin daha çok dış kulak yolu veya kulak arkasında tutulumu ile gelişen daha selim seyirli formudur. Özellikle sert kenelerin sorumlu olduğu kene ilişkili paralizi açısından ülkemiz ve bölgemiz içerdiği kene habitatı açısından risk altındadır. Bu yazımızda iç kulak yolunda sert kene grubundan *Hyalomma margintum* türü kene tutunması sonrası gelişen izole fasial paralizi olgusunu sunmayı ve hastalığın yönetimini irdelemeyi amaçladık. *(Turkiye Parazitol Derg 2015; 39: 248-51)*

Anahtar Kelimeler: Kene, fasiyal sinir paralizi, kulak

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INTRODUCTION

Ticks are obligate blood-sucking arthropods that exist worldwide. They live by feeding on blood, except during the egg period; their targets within this period comprise all vertebrates (1, 2). Besides being harmful to people by sucking blood, they can also be harmful via transmission in many viral, bacterial, and parasitic infections. In addition to these diseases, they can cause foreign body reaction, hypersensitivity reaction, and toxin-induced neurological complications (1).

Tick-induced paralysis is a syndrome related to neurotoxin production developing after hours or days following tick bite, presenting ascending flask paralysis (3). The ratio of mortality in the literature is reported to be approximately 10%, and symptoms are reversible by detecting and removing the tick within the early period (3, 4). Tick-induced isolated facial paralysis is a rare form of the disease developing because of the attachment to the external auditory canal or attachment behind the ear and occurring between 3 days and 3 weeks after attachment (4). Our country and region are under risk in terms of included tick habitat for tick-induced paralysis that is responsible, particularly for hard ticks. We believe that reports limited by case presentations in the literature will increase within the following periods.

In our article, we aimed to present a case with isolated facial paralysis that occurred after the internal auditory canal was bitten by *Hyalomma margintum* species belonging to the hard tick group and to probe the management of this disease.

CASE PRESENTATION

A 47-year-old male with a history of countryside living presented to the emergency department with complaints of submandibular pain, swelling, redness, incipient speech impediment, sense of numbness on the left side of the face, and restriction in mouth movements during July, 2013. From the history of the patient, it was learnt that he had no history of use of any medicines other than analgesic 1 day ago, no additional disease, and no use of alcohol and cigarette. The patient reported that he had a history of contact with tick on his scalp 16 days ago and removed the tick by his own means and did not apply to any health center. He did not have any other complaints within this period. When the patient was presented to the emergency department, his body temperature was 36.9°C, pulse rate was 86/min, blood pressure was 120/70 mmHg, and respiration rate was 24/min; laboratory findings were as follows: white blood cell (WBC) count was 11600 µL, platelet count (PLT) was 230000 µL, hemoglobin (Hgb) level was 15.5 g/dL, alanine transaminase (ALT) level was 22 unit/liter (U/L), aspartate transaminase (AST) level was 11 U/L, creatinine kinase (CK) level was 57 U/L, and lactate dehydrogenase (LD) level was 149 U/L. On physical examination, the patient was detected with the following: disability of not being able to completely close his left eye, removal of nasolabial sulcus in the left side of the face, a slight shift of the mouth corner to the right side, and a prominent lisp. With these signs, our patient was accepted as having a grade 3 facial paralysis according to the House–Brackman classification (Figure 1). Examination of other cranial nerves, muscle strength and reflexes of arms and legs were normal. As facial paralysis developed in the patient who had a contact with tick 16 days ago and originated from an endemic region presenting Crimean–Congo hemorrhagic fever (CCHF) disease, the patient was examined by an otorhinolaryngologist for the inner ear in terms of atypical attachment site. In the examination, hyperemia, plug formation inside the left ear, and a tick in the inferior canal were detected. The tick was removed alive using alligator forceps under local anesthesia. No solution was applied to the tick before its removal. No evidence of pathology was identified in the tympanic membrane in post-procedure examination. The tick was removed completely and was alive; it was named as *Hyalomma marginatum.* The patient was hospitalized after the procedure, and a therapy with prednisolone of 1 mg/kg/day was started. The patient was followed up for CCHF disease, and he did not have high body temperature for 7 days; no abnormalities were determined in laboratory values. The patient without high body temperature and with regression in facial paralysis was discharged on the 10th day. In terms of complication, the hearing test of the patient who was seen to recover completely after the 2-week follow-up was found to be normal.

Figure 1. Case with facial palsy

DISCUSSION

Ticks are a group of arthropods that suck blood to maintain their life cycle (5). Their spectrum includes wild animals, domestic animals, and humans in contact with these regions. As ticks feed by sucking blood, they are life-threatening vectors of pathogens of many diseases such as Q fever, CCHF, Lyme disease, tularemia, tick-induced encephalitis, babesiosis, Rocky Mountain spotted fever, typhus, and relapsing fever (4). Attachment and nutrition process of a tick is painless because of local anesthetic agent produced by tick during attachment and anticoagulant production to feed and it is difficult to be realized (6). Correspondingly, the risk for development of disease also increases as long as the tick resides in the body. In addition, tick is a vector for a number of diseases; it can also cause disease via toxin production by tick during attachment and feeding (7). Toxin induced clinical picture can vary between the clinical picture where more systemic involvement such as tick-induced paralysis is seen and the clinical picture that is called tick-induced facial paralysis and presents more benign (8). Reports for tick-induced paralysis are associated with *Ixodes* and

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Dermacentor species, particularly from the hard tick group; the first report was from Australia in the 1800s. Although tick paralysis reports from North America, Asia, and South Africa were present in the following period, reports from Europe were rare and as isolated paralysis that is a subform of the disease (8, 9).

Tick paralysis is a clinical picture that is characterized with acute onset resulting in as bilateral flask motor paralysis spreading from bottom to top that occurs via neurotoxins released by female ticks during feeding, which can be fatal (3). *Dermacentor*-induced tick paralysis is motor polyneuropathies with limited participation of the afferent pathways. Experimentally demonstrated pathogenetic factors of *Dermacentor*-induced paralysis include a marked decrease of the maximal motor nerve conduction velocities, decrease in nerve (and their corresponding muscle) compound action potentials, impaired impulse propagation of afferent fibers, and simultaneous increase in the stimulating current potentials necessary to elicit a response (10).

When the literature is reviewed, paralysis is observed within 5 days following tick attachment; it is observed mostly in children, particularly in females (11, 12). Behind the ear, scalp, and neck attachments are reported as regions of high risk (12). Disease is identified during summer months, particularly April–August when ticks are active (13). The bite of *Hyalomma marginatum* species is reported to be a risk factor for the development of disease. After the epidemiologic studies conducted for our country, our region was revealed to be an endemic region in terms of *H. marginatum* species.

The first step for the treatment of disease consists of detecting tick and removing them properly from the body in the early period (10, 12). Subsequently, the clinical picture can be reversed within hours, although there are reports regarding an extended period up to 2 weeks for the reversal of the clinical picture in the literature (14). The reason for losing patients to tick paralysis is the paralysis of respiratory muscles occurring after ascending attachment. At present, there have been two cases of patients who were lost due to tick-induced paralysis and a long attachment duration because of late detection of the tick (1).

Isolated facial paralysis is a clinical picture that occurs within hours, days following tick attachment that can reverse by removing tick from the body, and that cruises more benign. Paralysis caused by tick depends on toxin released by the salivary gland (4). Approximately 40 species of soft (argasid) and hard (ixodid) ticks secrete salivary toxins that cause paralysis in humans and some animals. This toxin is found to interfere with the liberation or synthesis of acetylcholine at the motor end plate of muscle fiber (8). The severity of paralysis is independent of the number of tick infested, and a correlation between the duration of tick attachment and the likelihood of transmission of toxin/infection was reported (8, 9).

Several theories may explain the pathophysiology of localized facial nerve palsy in an intra-aural tick infestation. It is likely that the presence of perforation in the tympanic membrane enabled the tick saliva (with toxin) to enter the middle ear and reach the facial nerve probably through a natural dehiscence of the fallopian canal causing paralysis (12, 15). In cases in which the tympanic membrane is intact, direct extension of the inflammatory process to the fallopian canal is via persistent dehiscence or direct invasion of infectious organisms into the facial canal through the middle ear that results in the edema of the inflamed nerve within the canal. Bayazit et al. (14) found facial nerve dehiscence in 18 out of their 202 patients. In addition, Nager and Proctor reported a higher incidence of 55% cases of canal dehiscence in the tympanic segment of the facial nerve.

Tick species identified in our case was also named as *Hyalomma marginatum* belonging to the hard tick group (Figure 2).

In the differential diagnosis of disease, Bell's paralysis, Lyme disease should be considered. Serology for Lyme disease in our case was negative.

Tick-induced facial paralysis is a disease that can be protected and reversed with early procedure (12). A number of cases present with otalgia based on enzyme secretion of tick as the first sign. Moreover, dizziness, tinnitus, and ear hemorrhage are the other most encountered signs (8). In our case, the first complaint was determined as pain in the submandibular region, swelling, and redness. Clinical picture was reported to be reversed when tick was properly removed from the body in the treatment of the disease (12). In our case, symptoms regressed during the 10th day after tick removal, and no evidence of pathology was determined in the physical examination during the 2nd week of follow-up. Recovery period is similar to the literature data. Tympanic membrane of the patient was detected as intact during the follow-up after the removal of tick.

If there is atypical attachment in the presence of complaints causing clinical suspicion in regions that are endemic in terms of tick, particularly the region in our study, otoscopic examination and removal of the detected tick properly and quickly will be useful for preventing the disease.

Complete removal of the tick rapidly and in the manner of including the mouth part after tick attachment is the suggested approach for preventing disease development (1, 12). The tick detected in our case was removed without applying any procedure previously using alligator forceps and without applying any solution on the tick. No piece that remained on the attachment site was detected after the procedure. Iwasaki et al. (16) initially excised the abdomen of the tick in a case where tick attachment was detected and a method to remove the remaining pieces 3 days later was applied and published as a new and successful method. Ürbüz et al. (17) reported a

Figure 2. *Hyalomma marginatum* from the hard tick group in our case

case with complete tick removal after initially killing it with alcohol following its detection. Although it is recommended to check whether or not tick limbs remained in the attachment site after tick removal, there are controversial reports in the literature indicating that tick pieces remaining in the attachment site following tick removal pose a risk for the development of disease (4, 12). We consider that removing a tick alive using a proper method without exposing it to any chemical agent as soon as possible after detecting tick and not leaving any piece at the bite site are crucial. The process should be completed with disinfection of the bite site after the procedure.

Tick paralysis is a preventable cause of illness and death that, when diagnosed promptly, requires simple, low-cost intervention. The risk for tick paralysis and other tick-borne diseases may be reduced by the use of repellents on skin and permethrin containing acaricides on clothing (4). Careful examination of potentially exposed persons for ticks and prompt removal of ticks are recommended. Ticks can be removed using forceps or tweezers to grasp the tick as closely as possible at the point of attachment (18). Removal requires the application of even pressure to avoid breaking-off of the body. Gloves should be worn before tick removal.

CONCLUSION

Tick paralysis is a preventable disease and we are of the opinion that in patients with sudden acute ear pain and facial palsy, particularly belonging to rural areas, the ear canal should be examined carefully to exclude the possibility of parasitization by ticks.

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