African Tick Bite Fever in Elderly Patients: 8 Cases in French Tourists Returning from South Africa

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Background. African tick-bite fever, a tickborne disease caused by Rickettsia africae, is endemic in rural areas of sub-Saharan Africa and in the French West Indies. Most cases reported in the literature occurred in middle-aged, otherwise-healthy persons and corresponded to benign diseases. The course of African tick bite fever in elderly people is less well documented.

Methods. The medical records of 8 elderly patients infected with R. africae during a trip to South Africa in 2005 are presented to summarize the epidemiologic, clinical, microbiological, treatment, and disease course characteristics.

Results. Eight patients, aged 63–75 years, developed African tick bite fever symptoms after a trip to South Africa. R. africae was grown from cutaneous eschar biopsy specimens obtained from 4 patients, confirming African tick bite fever. We observed unusual findings in this elderly population. Rash was frequent (present in 87.5% of patients), vesicular (in 100% of patients with rash), and often associated with an enanthema (in 50% of patients with rash). Severe clinical manifestations occurred: lymphangitis and myocarditis in 1 patient and suspected brain involvement in 2 patients. We observed severe and long-lasting general symptoms, including fever (in 75% of patients), chills (87.5%), asthenia (50%), anorexia (50%), and weight loss (12.5%). With doxycycline therapy, the outcome was favorable in all cases, but complete recovery was slow.

Conclusion. Ecotourism to sub-Saharan Africa is expanding, and people of advanced age, often with underlying chronic diseases, account for an increasing proportion of travelers. African tick bite fever appears to be more symptomatic in this population. Recommendations advising personal prophylactic measures to prevent tick bites in travelers to regions of endemicity may be particularly important for elderly individuals.

Rickettsioses are arthropod-borne diseases caused by gram-negative, strictly intracellular bacteria of the genus Rickettsia [1, 2]. They include typhus, spotted fever group rickettsiosis, and scrub typhus [1, 2]. According to Freedman et al. [3], spotted fever group rickettsioses are the second most common cause of fever among travelers returning from the developing world, after malaria but before dengue and typhoid fever. In France, the travel-associated rickettsial diseases that are most frequently observed are African tick bite fever and Mediterranean spotted fever, which are caused by the spotted fever group rickettsiae Rickettsia africae and Rickettsia conorii and, to a lesser extent, murine typhus (due to Rickettsia typhi) and scrub typhus (due to Orientia tsutsugamushi) [4–6]. Only Mediterranean spotted fever is endemic in France, and it is limited to southern France [1]. Most patients with travel-associated spotted fever group rickettsiosis are infected during a trip to sub-Saharan Africa [7].

In Africa, Mediterranean spotted fever has long been considered to be the predominant rickettsial disease [7, 8], although Pijper [9] first suggested in 1936 that 2 different rickettsial diseases may exist on the African continent: Mediterranean spotted fever and African tick bite fever (formerly tick bite fever). In 1992, Kelly et al. [8, 10] first isolated R. africae from patients with African tick bite fever. African tick bite fever is now recognized as the predominant rickettsial disease in sub-Saharan Africa [5, 7, 8, 11] and in the French West Indies [12–15]. Jensenius et al. [5, 8] emphasized that...
nearly 50% of >400 cases of travel-associated rickettsiosis reported in the literature in the past 20 years were microbiologically confirmed *R. africae* infections. They also reported an incidence of African tick bite fever of 4%–5.3% among tourists returning from sub-Saharan Africa [11].

We report 8 cases of *R. africae* infection in elderly people traveling to South Africa. We emphasize some distinctive clinical features in patients with African tick bite fever and, more specifically, note that we observed unusual clinical findings and a more severe course of the disease in our advanced-age population. We also summarize specific diagnostic, prophylactic, and therapeutic approaches for *R. africae* rickettsiosis.

**PATIENTS AND METHODS**

**Study type.** We present a case series of elderly patients who received diagnoses of African tick bite fever in France after returning from a trip to South Africa.

**Case definition.** A patient was considered to have African tick bite fever if *R. africae* was detected in clinical samples by culture and/or PCR (criterion A) or if suggestive clinical data (e.g., multiple cutaneous eschars, regional lymphadenopathy, or vesicular rash) and epidemiologic data (e.g., similar symptoms among members of the same group of travelers coming back from an area in which African tick bite fever was endemic) were present together with a serologic test result positive for spotted fever group rickettsiae (criterion B) [16].

**Microbiological diagnosis.** Patients’ serum samples were first analyzed at the bacteriology laboratory of Grenoble University Hospital (Grenoble, France), with use of a commercial kit for detection of anti-*R. conorii* antibodies (reference 75901; bioMérieux). Serum samples were then sent to the National Reference Center for *Rickettsia* and rickettsial diseases (Marseille, France), where serologic samples were tested for the following arthropod-borne diseases: *R. conorii*, *R. africae*, *Rickettsia aesculimannii*, *Rickettsia mongolotonimae*, *Rickettsia massiliae*, *R. typhi*, *Rickettsia felis*, *Rickettsia slovaca*, *Rickettsia helvetica*, *Rickettsia israeli*, *Coxiella burnetii*, *Francisella tular- ensis*, *Bartonella henselae*, *Anaplasma phagocytophilum*, and *Borre lia burgdorferi* [16, 17]. *R. africae* was also detected with use of PCR and culture in blood and cutaneous eschar biopsy specimens, as previously described [16].

**Data investigated.** Epidemiologic, clinical, diagnostic, therapeutic, and outcome data were analyzed.

**RESULTS**

We report 8 confirmed cases of African tick bite fever, including 4 cases confirmed by criterion A and 4 cases confirmed by criterion B. The epidemiologic and clinical characteristics of these patients are presented in table 1. The microbiological data are presented in table 2.

**Epidemiologic data.** The 8 patients were French citizens (5 women and 3 men) aged 63–75 years (mean age, 71 years). Three patients had no medical record, and 3 had minor diseases. Patient 4 was immunocompromised because of current treatment with anti-CD20 antibodies for non-Hodgkin lymphoma. The 8 patients visited South Africa for the first time in 2005, from 15 November through 2 December, in a group of 44 tourists, all of whom were retired, elderly people. Therefore, the attack rate of African tick bite fever in this group of 44 tourists was 18% (8 of 44 tourists received a diagnosis of African tick bite fever). Their trip started in Cape Town, South Africa, continued to the southern and eastern coasts, and then crossed the border between South Africa and Mozambique to the Pretoria and Johannesburg regions. Throughout the trip, they resided in hotels, and they visited urban, suburban, and rural areas, including several national parks, and participated in safaris. They only protected themselves against mosquitoes with use of repellants.

**Clinical data.** Symptoms supervened 2 days before leaving South Africa for 1 patient and within 3 days after returning for the remaining 7 patients. Patients consulted their physicians 3–13 days after disease onset. None of the patients remembered being bitten by a tick or removing a tick from their skin, and therefore, the delay between the tick bite and the onset of symptoms could not be estimated. Because the incubation period of African tick bite fever is usually 5–7 days, with a reported maximum of 10 days [7, 8, 11], we suspected that the period of high-risk exposure occurred during safaris in the Kruger National Park and in the Kapama game reserve (north) or in the Hluhluwe Umfolozi game reserve (east coast) 6 days and 9 days before returning to France.

Patients had fever (6 cases), chills (7), headaches (5), myalgias (2), asthenia (4), anorexia (4), and weight loss (1). No patients had neck muscle myalgias. Two patients complained of unusual somnolence. A single typical cutaneous eschar was found in 5 patients, whereas 2–5 eschars were found in the remaining 3 patients. Thus, a total of 17 eschars were found on the pelvis (4 eschars), the arms (4), or the legs (9). Biopsy specimens of the margin of the eschar were obtained for all patients before doxycycline administration.

A nonpruriginous rash was noted in 7 (87.5%) of 8 patients, appearing as maculovesicular lesions in all 7 patients (figure 1). The rash was usually discrete and could easily be missed. Cutaneous lesions were rare (usually 10–20 per patient), <1 cm in diameter, and were found on the trunk, abdomen, back, face, and thighs. In some patients, the rash persisted for a prolonged time despite antibiotic treatment. It was associated with conjunctivitis in 4 patients and with purpura of the palate in 3 patients, but it was not with aphthous stomatitis. An inguinal lymphadenopathy was found in 2 patients, 1 of whom presented with a lymphangitis that appeared as a pale erythematous streak extending from the inoculation eschar of the
Table 1. Epidemiologic and clinical data for 8 patients with *Rickettsia africae* infection, compared with data compiled from 10 African tick bite fever case series reported in the literature.

| Variable               | Present study | Overall, proportion (%) of patients | Cases reported in the literature<sup>a</sup>, proportion (%) of cases |
|------------------------|---------------|-------------------------------------|---------------------------------------------------------------------|
|                        | Patient 1     | Patient 2                          | Patient 3                           | Patient 4                          | Patient 5                          | Patient 6                          | Patient 7                          | Patient 8                          | Male sex, 3/8 (37.5) | Male sex, 179/257 (69.6) |
| Age, years             | 71            | 71                                  | 63                                  | 71                                  | 72                                  | 72                                  | 75                                  | 74                                  |                          |                          |
| Sex                    | F             | M                                   | F                                   | M                                   | F                                   | M                                   | F                                   | F                                   | Male sex, 3/8 (37.5) |                          |
| Fever                  | Yes           | Yes                                 | Yes                                 | No                                  | Yes                                 | Yes                                 | Yes                                 | Yes                                 | 6/8 (75%)               | 201/207 (81%)            |
| Chills                 | Yes           | Yes                                 | No                                  | Yes                                 | Yes                                 | No                                  | No                                  | Yes                                 | 5/8 (62.5%)             | 79/120 (66%)             |
| Headache               | Yes           | Yes                                 | Yes                                 | No                                  | No                                  | No                                 | Yes                                 | Yes                                 | 2/8 (25%)               | 160/240 (67%)            |
|Somnolence              | No            | No                                  | No                                  | Yes                                 | No                                  | Yes                                 | No                                  | No                                  | 4/8 (50%)               | 38/49 (78%)              |
| Myalgia                | Yes           | Yes                                 | No                                  | Yes                                 | No                                  | No                                 | No                                  | No                                  | 4/8 (50%)               | 11/32 (34%)              |
| Asthenia               | No            | No                                  | No                                  | Yes                                 | Yes                                 | No                                  | Yes                                 | No                                  | 1/8 (12.5%)             |                          |
| Anorexia               | Yes           | Yes                                 | No                                  | No                                  | No                                  | No                                 | Yes                                 | No                                  |                          |                          |
| Weight loss            | No            | No                                  | No                                  | No                                  | No                                  | No                                 | Yes                                 | No                                  | 1/8 (12.5%)             |                          |
| Eschar(s)              | Yes           | Yes                                 | Yes                                 | Yes                                 | Yes                                 | Yes                                 | Yes                                 | Yes                                 | 8/8 (100%)              | 217/256 (85%)            |
| No. of eschars         | 1             | 2                                   | 1                                   | 5                                   | 5                                   | 1                                   | 1                                   | 1                                   |                          |                          |
| Lymphadenopathy        | Yes           | No                                  | No                                  | No                                  | No                                  | No                                 | Yes                                 | No                                  | 2/8 (25%)               | 129/236 (55%)            |
| Lymphangitis           | No            | No                                  | No                                  | No                                  | No                                  | No                                 | No                                  | Yes                                 | 1/8 (12.5%)             | 8/17 (47%)               |
| Rash                   | Yes           | Yes                                 | Yes                                 | Yes                                 | No                                  | Yes                                 | No                                  | Yes                                 | 7/8 (87.5%)             | 89/217 (41%)             |
| Maculopapular          | No            | No                                  | No                                  | No                                  | No                                  | No                                 | No                                  | No                                  | 0                       | 44/81 (54)               |
| Maculovesicular        | Yes           | Yes                                 | Yes                                 | Yes                                 | Yes                                 | No                                  | Yes                                 | Yes                                 | 7/7 (100%)              | 35/77 (45%)              |
| Purpuric               | No            | No                                  | No                                  | No                                  | No                                  | No                                 | No                                  | No                                  | 1/7 (14.3%)             | 2/95 (4%)                |
| Rash present at day 7  | Yes           | No                                  | Yes                                 | No                                  | Yes                                 | No                                  | No                                  | No                                  | 3/7 (42.9%)             |                          |
| Conjunctivitis         | Yes           | Yes                                 | No                                  | No                                  | No                                  | No                                 | Yes                                 | Yes                                 | 4/8 (60%)               |                          |
| Aphthoid stomatitis    | No            | No                                  | No                                  | No                                  | No                                  | No                                 | No                                  | No                                  | 0                       | 5/45 (11)                |
| Myocarditis            | No            | No                                  | No                                  | No                                  | No                                  | No                                 | Yes                                 | No                                  | 1/8 (12.5%)             |                          |
| Convalescent-phase asthena | Yes        | Yes                                 | Yes                                 | Yes                                 | Yes                                 | Yes                                 | Yes                                 | Yes                                 | 8/8 (100%)              | 6/10 (60%)               |

<sup>a</sup> Data are compiled from 10 African tick bite fever cases reported in the literature [7, 11, 18, 23–29].
Table 2. Microbiological data for 8 patients with infection due to *Rickettsia africae*.

| Variable                                      | Patient 1 | Patient 2 | Patient 3 | Patient 4 | Patient 5 | Patient 6 | Patient 7 | Patient 8 |
|-----------------------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| Time from onset of symptoms to first serum sample, days | 3         | 6         | ...       | 5         | 13        | 13        | 13        | 9         |
| Time between first and second serum sample, days  | 45        | 45        | 38        | 42        | 38        | 38        | 38        | 44        |
| Doxycycline administered within 7 days after onset of symptoms | Yes       | Yes       | ...       | Yes       | No        | No        | No        | No        |
| Anti-*Rickettsia conorii* IgG/IgM antibody titers, by test center |           |           |           |           |           |           |           |           |
| bioMérieux (significant titers: IgG, >80; IgM, >40) |           |           |           |           |           |           |           |           |
| First serum sample                            | 80/40     | 80/20     | 1280/160  | <20/20    | <20/80    | 640/640   | 80/40     | <20/40    |
| Second serum sample                           | 1280/80   | 80/40     | 640/80    | <20/20    | 320/640   | 640/640   | 160/80    | 640/80    |
| NRC Marseille; significant titers: IgG >128, IgM >64 |           |           |           |           |           |           |           |           |
| First serum sample                            | <16/16    | <16/16    | 256/32    | <16/16    | <16/32    | <16/32    | <16/16    | <16/16    |
| Second serum sample                           | 128/32    | <16/16    | 128/16    | <16/16    | 32/16     | 32/16     | <16/16    | 64/16     |
| Anti-*R. africae* IgG/IgM antibody titers (NRC Marseille; significant titers: IgG >64, IgM >32) |           |           |           |           |           |           |           |           |
| First serum sample                            | <16/16    | <16/16    | 256/64    | <16/16    | <16/32    | <16/32    | <16/16    | <16/16    |
| Second serum sample                           | 128/32    | <16/16    | 128/16    | <16/16    | 32/16     | 32/16     | <16/16    | 64/16     |
| Culture/blood test                            | ND        | ND        | Negative  | ND        | Negative  | Negative  | Negative  | Negative  |
| PCR/blood test                                 | ND        | ND        | Negative  | ND        | Negative  | Negative  | Negative  | Negative  |
| Culture/eschar                                | Positive  | Positive  | Negative  | Positive  | Negative  | Negative  | Negative  | Positive  |
| PCR/eschar                                    | Positive  | Positive  | Negative  | Positive  | Negative  | Negative  | Negative  | Negative  |

**NOTE.** ND, not done.
right ankle to the lymphadenopathy. In this patient, the inoculation eschar was surrounded by a large and purpuric cutaneous inflammation. One woman was hospitalized because of heart failure related to a probable myocarditis on the basis of cardiac ultrasonography and electrocardiography findings.

**Nonspecific biological data.** A mild inflammatory syndrome was found in 6 patients, with a C-reactive protein level above 50 mg/L in only 1 case. No leukopenia, lymphopenia, or thrombocytopenia was found. Moderate elevations of transaminase, alkaline phosphatase, and γ-glutamyl transferase levels were found in 3 patients, and moderate elevation of the bilirubin level was found in another patient. Mild elevation of the creatinine level was found in 3 cases.

**Microbiological data.** The first serum samples were collected 3–13 days after disease onset (mean time after disease onset, 8.8 days). The second serum samples were collected 38–45 days later (mean time to second sample collection, 41 days). The results of serologic tests performed in Grenoble were positive for *R. conorii* for 7 patients. However, a significant modification (4-fold increase or decrease) of antibody titers between acute-phase and convalescent-phase serum samples was observed in only 3 patients. At the French National Reference Center for *Rickettsia* and rickettsial diseases, significant antibody titers against both *R. conorii* and *R. africae* antigens (IgG titer ≥1:128 and/or IgM titer ≥1:64 and IgG titer ≥1:64 and/or IgM titer ≥1:32, respectively [16]) were found in only 3 patients, including in only 2 of the 4 patients with cultures positive for *R. africae*, with cross-reacting antibodies to the other rickettsial species tested. Test results were negative for antibodies against *C. burnetii*, *F. tularensis*, *B. henselae*, *A. phagocytophilum*, and *B. burgdorferi* for samples from all 8 patients. *R. africae* was detected using culture and PCR in eschar biopsy samples obtained from 4 and 3 patients, respectively; it was not detected in blood samples.

**Treatment and outcome.** All patients were treated with doxycycline administered in a 200-mg dose once daily for 4 weeks. Antibiotic therapy was started within 7 days after symptom onset for 3 patients and was started later for the remaining 5. Only 1 patient needed hospitalization, because of lymphangitis and myocarditis. Patients reported slow clinical improvement within a few days. Body temperature returned to normal levels within 7 days of antibiotic treatment. The rash persisted for >7 days in 3 patients, despite good compliance and tolerance of antibiotic therapy. For 2 of these patients, the rash was even more pronounced during the second week of doxycycline therapy. After doxycycline administration, the inflammatory reaction surrounding the eschars disappeared, and complete healing of the eschars was obtained in 2–4 weeks. In all patients, general recovery was slow (15 days to 1 month after diagnosis), and outcome was favorable.
DISCUSSION

The attack rate of African tick bite fever is usually high, up to 33% [18], and cases most often occur in clusters [7, 8]. In our case series, the attack rate was 18%, but it may have been even higher, because many individuals who were on the trip did not consult physicians. Amblyomma hebraeum, the vector of African tick bite fever in South Africa, is found in all parts of the countries visited by the patients [8] and is frequently infected with R. africae in these areas [2].

Patients with African tick bite fever usually present with mild-to-moderate clinical manifestations, and no fatal cases have been reported to date [7, 8, 11]. Complications, such as prolonged fever [12], reactive arthritis [11], peripheral nerve involvement [19], encephalitis [20], and myocarditis [21], have been reported on rare occasions. However, rickettsial diseases may be more severe in elderly patients with underlying chronic diseases [22]. Jensenius et al. [8] reported that patients with African tick bite fever were usually men (accounting for 72% of patients) and had a mean age of 40 years [8]. In contrast, in our series, women accounted for 62% of the cases, and the mean age was 71 years. We observed a more severe clinical expression of African tick bite fever in these patients than that reported in other studies.

We compared clinical data recorded for our 8 patients with data compiled from 10 microbiologically confirmed African tick bite fever case series reported in the literature (a total of 257 cases; mean patient age, 40.1 years) (table 1) [7, 11, 18, 23–29]. In the literature, a rash was reported in 41% of cases (table 1). It consisted of macular or maculopapular lesions in 54% of cases, vesicular lesions in 45%, and purpuric lesions in 4%. Seven of our 8 patients presented with a maculovesicular rash. In some patients, it persisted for a prolonged period and even worsened for a few days, despite doxycycline administration. It was associated with conjunctivitis in 4 patients and purpura of the palate in 3 patients. Such enanthema has never been reported in patients with African tick bite fever. Only aphthoid stomatitis has been described in 5 patients [11, 24]. In our case series, the rash appeared to be more frequent and more often of the vesicular type than what is usually reported in the literature; in addition, in our case series, rash was possibly associated with an enanthema.

Complications occurred in 1 of our patients who had lymphangitis and suspected myocarditis. In 2 other patients, we suspected brain involvement because of the existence of abnormal sleepiness. The literature reported lymphangitis in only 9 patients with African tick bite fever (7 men and 2 women; mean age, 52 years) [8, 24, 27, 28, 30]. The term lymphangitis-associated rickettsiosis has been proposed for Rickettsia sibirica mongolitimonae infections [31]. However, the clinical aspect of the lymphangitis-associated rickettsiosis is a deep, erythema-tous, stringlike lymphangitis [31, 32], whereas we observed a pale erythematous streak in patient 8. Only 1 case of myocarditis has been previously reported, in a male patient with African tick bite fever who was 35 years old [21]. Neuropsychiatric disorders have been rarely reported in adults with African tick bite fever [27, 28, 33]. Encephalopathies have been described in infants [21].

Finally, compared with African tick bite fever cases reported in the literature, our group of patients presented more-severe and longer-lasting general symptoms. Chills were observed more frequently (87.5% vs. 66% of cases). Fifty percent of our patients complained of anorexia. This feature has been studied in only 1 case series [23], with anorexia present in 34% of patients (mean age, 23.5 years). Weight loss was present in 1 of our patients and, to our knowledge, has not been previously reported in patients with African tick bite fever. Asthenia has been previously reported in 3 other studies as occurring in 33%-84% of cases [23, 26, 27]. It was present in 50% of our patients, but more importantly, the return to normal activity was slow, taking 4 weeks. Convalescent-phase asthenia (i.e., asthenia after 14 days of disease progression) occurred in all of our patients. In the literature, only 1 case series reported the progression of general symptoms after diagnosis and treatment of African tick bite fever [18]. This study reported convalescent-phase asthenia in 60% of cases in a group of patients with a mean age of 57 years. Two other case reports described a slow recovery occurring within 3 weeks in 2 women aged 50 and 48 years [33, 34]. Previous reports have suggested that the clinical expression of African tick bite fever might be more symptomatic with greater age [23, 35]. Special attention should be paid to elderly people, who more frequently have chronic underlying diseases and who may present with more-severe general illness and delayed recovery.

Microbiological diagnosis of rickettsial diseases relies primarily on serologic test results [7, 8, 11, 16]. However, significant antibody titers may be detected only 3–4 weeks after symptom onset [36]. They may not be detected in patients with mild disease, in immunocompromised patients, and in patients receiving early tetracycline therapy [36]. We found significant antibody titers to R. conorii and/or R. africae antigens in 7 of the 8 patients studied. However, seroconversion or 4-fold variation in antibody titers between acute-phase and convalescent-phase serum samples were observed in only 3 patients. In 1 immunocompetent patient, with culture-proven R. africae infection, serologic test results remained negative. This patient received doxycycline therapy within the first week after symptom onset. Because of antigenic cross-reactions, serologic test results cannot provide identification of the Rickettsia species involved. Western blot and cross-adsorption techniques are useful [16, 37], but they are laborious. In reference laboratories,
diagnosis of rickettsial diseases and identification of the species involved may currently be obtained by culture or PCR-based techniques [6, 7, 16, 38]. Especially, detection of *Rickettsia* species DNA using PCR in cutaneous eschar biopsy specimens allows early diagnosis of rickettsial disease and molecular identification of the *Rickettsia* species involved.

The optimum treatment of African tick bite fever has not been defined specifically [7, 8, 11], but it may resemble that recommended for other spotted fever group rickettsioses. Traditionally, tetracycline therapy should be administered for 7–14 days or until 2 days of apyrexia are obtained [7, 8]. A single-day doxycycline regimen is also effective in patients with mild disease [1, 2]. Fluoroquinolones are an effective alternative [5–8]. In the literature, most patients with African tick bite fever have been treated with doxycycline (200 mg/day for 7–10 days), but treatment durations of up to 3 weeks have been reported [7, 8, 18]. Our patients received doxycycline therapy for 4 weeks. The first decision was to treat these patients for 7 days. The duration of treatment was extended for another 7 days at the first follow-up visit because of severe asthenia in all patients, persistent rash in 3 patients (with extension of the rash in 2 patients), and suspicion of severe systemic infection in 3 patients (including 1 woman who was hospitalized for lymphangitis and myocarditis and 2 patients with abnormal sleepiness suggesting brain involvement). Fourteen days after treatment initiation, all patients had a good clinical response with improved symptoms. However, a significant fatigue persisted in most patients. An additional 14 days of doxycycline therapy was prescribed to achieve complete cure, because it was not possible to reassess the patients’ health at the third week. On the 28th day, all of the patients had recovered their general condition, and their activities and lives had returned to baseline levels. The duration of antibiotic treatment may have been rather long in this population, compared with the recommendations reported in the literature [8]. Patients with African tick bite fever with long-lasting symptoms or with complications, such as reactive arthritis, have been previously cured with 2-week or 3-week treatment courses [11, 18, 28, 34].

Ecotourism to sub-Saharan Africa, especially to South Africa, has significantly expanded in the past decade. People traveling to these countries should be informed about and simple prophylactic measures should be taken to prevent occurrence of these usually benign but frequent diseases. No human vaccines for rickettsial diseases are available, and administration of a prophylactic antibiotic therapy is not currently recommended [11]. Prevention of African tick bite fever and other spotted fever group rickettsioses primarily relies on personal protective measures against tick bites. Commercially available insect skin repellents that contain at least 19.5% diethyl-3-methylbenzamidine are active against *Amblyomma* ticks [39], but their action is limited to ~2 h, and travelers rarely repeat skin applications [39]. Wearing protective clothing to reduce exposed skin areas during bush walking and meticulous inspection of the skin surface thereafter are currently the major prophylactic measures.

In conclusion, people traveling to sub-Saharan Africa are exposed to a significant risk of acquiring African tick bite fever. Recommendations advising personal prophylactic measures be taken to prevent tick bites are particularly important for elderly individuals, who may present with severe general symptoms, complications, and delayed recovery. Because tourism is on the increase among the elderly population, travel-associated diseases will probably be more frequently observed in this population and will pose special diagnostic and therapeutic challenges to physicians.

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