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Brief Communication

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Louse-borne relapsing fever in a refugee from Somalia arriving in Belgium

Gilles Darcis[1,*], Marie-Pierre Hayette[1], Sebastien Bontems[1], Anne-Sophie Sauvage[1], Christelle Meuris[1], Marjan Van Esbroeck[2], and Philippe Leonard[1]

[1]Centre Hospitalier Universitaire (CHU) de Liège, Liège, Belgium and [2]Institute of Tropical Medicine, Antwerp, Belgium

*To whom correspondence should be addressed. Email: gdarcis@chu.ulg.ac.be

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Abstract

We report a case of louse-borne relapsing fever (LBRF) in a refugee from Somalia who had arrived in Belgium a few days earlier. He complained of myalgia and secondarily presented fever. Blood smears revealed spirochetes later identified as *Borrelia recurrentis*. LBRF should be considered in countries hosting refugees, particularly those who transit through endemic regions.

Key words: Louse-borne relapsing fever, *Borrelia recurrentis*, refugee, spirochetes

Introduction

More than a million migrants and refugees crossed into Europe in 2015. The number of first-time asylum applicants increased in European countries by more than 150% in the third quarter of 2015 compared with the same quarter of 2014 and reached 413 800.[1] Syrians, Afghanis and Iraqis are the top three citizenships of asylum seekers but the number of refugees from East Africa also substantially increased. Asylum applicants from Somalia, Sudan and Ethiopia recorded relative increases in the European Union in the third quarter of 2015 compared to the same quarter of 2014 (+38%, +127% and +94%, respectively).[1] This has led to the introduction of infectious diseases that are almost never encountered in developed countries, including louse-borne relapsing fever (LBRF).[2]

Case description

A 20-year-old Somalian refugee presented to our emergency department the day after his arrival in Belgium in August 2015. He complained of diffuse myalgia which predominated in lower limbs and also suffered from arthralgia. He had no fever or chills but reported feeling cold. On the way to Belgium, he travelled through Italy but was afraid to give more details about his travel.

On admission, the physical examination was normal. Systolic/diastolic blood pressure was 95/60 mmHg and heart rate was 64 per min. Oxygen saturation was normal (97%, norm: 95–100%). Laboratory analysis showed moderate anaemia (haemoglobin: 13 g/dl, norm: 13.3–17.2 g/dl), thrombocytopenia (thrombocytes: 91 000/mm^3, norm: 170000–400 000/mm^3), normal white blood cell count, elevated C-reactive protein (104 mg/l, norm: <6 mg/l), moderately elevated hepatic enzymes (aspartate transaminase: 114 U/l, norm: 14–40 U/l; alanine transaminase: 82 U/l, norm: 6-40 U/l and gamma-glutamyl transferase: 63U/l, norm: 5–50 U/l). Kidney function was normal. Urine analysis was normal. Abdominal echography did not show hepatomegaly or splenomegaly. After few days, he developed fever (39°C). He complained of severe myalgia and arthralgia and he was suspected to develop malaria. Malaria antigen detection tests were positive for *Plasmodium falciparum* and *P. vivax* (Palutop+4 Optima, ALL.DIAG). However, Giemsa-stained thick and thin films did not detect any *Plasmodium* but showed a large number of spirochetes resembling *Borrelia* (19058/mm^3) (Figure 1). In order to confirm the absence of *Plasmodium*, a polymerase chain reaction (PCR) specific for *Plasmodium* species was performed on blood and was negative.[3] Identification of spirochetes was performed by gene sequencing. DNA was extracted from an EDTA-blood sample, a portion of the bacterial 16 s rRNA genes was amplified and Sanger sequencing was performed using modified primers PC0mod and PC3mod as described.[4] A megablast (blast-n 2.2.32+) of the 670 nucleotide-long sequence obtained was performed on the NCBI Blast site.[5] A unique 100% identity match was obtained for this sequence with the 16s region of the *Borrelia recurrentis* genome. The GenBank reference of the sequence is KU189228.

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Serological analyses were also performed and IgM response to *Borrelia burgdorferi* was detected. In contrast, IgG response was not detected. Western blotting detected proteins p30 and VlsE. Antibodies against *P. falciparum* were detected but not against *Treponema pallidum* or *Leptospira*.

The patient was first treated for relapsing fever with 1 million units of intravenous penicillin G. *Intravenous* injection was preferred to an intramuscular route due to the low platelet count. He next received doxycycline 100 mg twice a day for seven days. This treatment schedule was chosen to avoid the Jarisch–Herxheimer reaction. The patient was discharged from the hospital after 5 days of treatment.

The health care team from the centre for refugees hosting the patient was contacted in November. The patient was doing well and did not relapse. Lice could not be recovered from the patient's clothing.

Discussion

Louse-borne relapsing fever (LBRF) is a vector-borne disease caused by infection with a spirochete, *Borrelia recurrentis*. The vector is the human body louse, *Pediculus humanus humanus*, a strict human parasite, living in clothing and feeding on humans. They are associated with malnutrition, lack of hygiene and poverty.[6] LBRF was once distributed worldwide. However, since the end of the Second World War, the disease has been restricted to a small number of areas of extreme poverty in East Africa where infestation with clothing lice is common, mostly in Ethiopia and neighbouring countries such as Eritrea, Sudan and Somalia.[7,8] In these countries, LBRF is associated with significant morbidity and mortality, in excess of 30% of untreated cases and up to 6% for those receiving appropriate treatment.[9] The incubation period is 3–12 days.

Very recently, multiple cases of LBRF have been reported in the Netherlands, in Italy, Germany and Switzerland in patients with a history of migration from endemic areas.[10–13,14] To our knowledge, we report here the first case of LBRF described in Belgium. LBRF will undoubtedly be seen more often in Europe as a result of increasing migratory flows. Importantly, Lucchini *et al.* described five cases in Italy and reported that two of these were long-term residents in the country and had probably acquired the infection while being housed in the same facilities as the newly arrived refugees, highlighting the possibility of local transmission of LBRF.[13] Therefore, basic hygiene is highly recommended in reception centres for asylum-seekers, including washing and drying of clothes and bedding at >60°C on a regular basis for infected individuals and close contacts.[12]

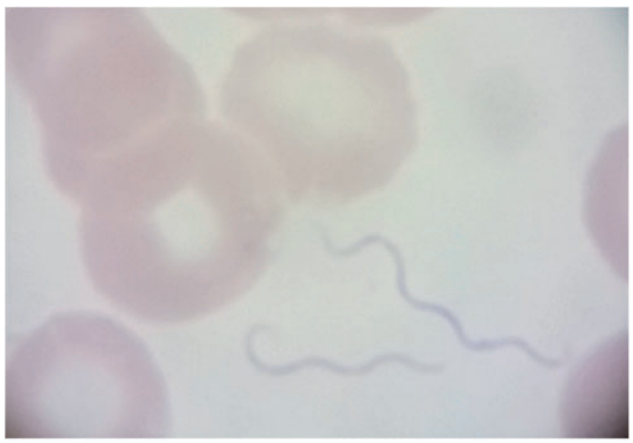

Figure 1 May–Grünwald Giemsa stained blood smear showing two spirochetes, characterised by numerous and irregular undulations, of a 20-year-old male refugee from Somalia with louse-borne relapsing fever, Belgium, 2015. Original magnification ×1000.

In addition to the infrequency of the disease in Europe, multiple pitfalls illustrated by this case report can cause delays or make diagnosis challenging. Clinical presentation can vary from one patient to another. Fever is not always present at the beginning. Moreover, detection of cross-reactive antigens of other pathogens such as *Borrelia burgdorferi* can lead to misdiagnosis. Coinfection with malaria is common and this diagnosis was suspected in our patient following antigen testing. However, this hypothesis was ruled out by microscopy and PCR assay. The reactivity of blood samples with antibodies against HRP-2 (*P. falciparum* (*Pf*) antigen) and *P. vivax* (*Pv*) specific-pLDH is challenging. After treatment, if a long-term detectability of HRP-2 (about 28 days) has been described, Pv-pLDH generally disappears after 3 days. However, cross reactivity between the *Pf* line and the *Pv* line has also been described with this rapid test.[15] Unfortunately, we do not have information regarding a possible recent malarial episode from the patient. Therefore, we can rumble a recent history of treated malaria due to *Pf* and we can also hypothesise a cross reactivity between the *Pf* line and the *Pv* line.

Serological testing led to the presence of reactive IgM against *Borrelia burgdoferi* antigens. Due to the high conservation between the genomes of *Borrelia* sp. that cause relapsing fever and Lyme disease, a cross reactivity is highly probable.[16]

Regarding treatment for LBRF, tetracycline, erythromycin, chloramphenicol and penicillin have been shown to be effective.[17] However, treatment can be extremely problematic since a majority of patients develop a life-threatening febrile inflammatory Jarisch–Herxheimer reaction (JHR) after starting antibiotic treatment, particularly when spirochete numbers are high.[9] JHR results from the release of a great amount of cytokines associated with the death of spirochetes during antibiotic treatment.[18]

At the present time, there is no consensus on the antibiotic treatment that should be used to treat LBRF. Tetracycline has been found to be superior to penicillin for fever clearance time and relapse rate among patients with LBRF. However, it seems that JHR occurred less often among patients treated with penicillin.[18] Some authors have proposed a sequential treatment of penicillin in the first day followed by tetracycline orally in divided doses for 7 days. We used this strategy, which lacks the disadvantages of penicillin (relapses) and tetracycline (severe JHR) when each drug is used alone.[19] JHR was not observed.

In conclusion, refugees transiting through endemic regions are at risk of acquiring LBRF. Over-crowding and a lack of hygiene could ease the spreading of lice. The possibility of locally acquired LBRF should be considered in individuals sharing the same living environment. Prevention strategies based on hygiene measures and delousing would surely be effective ways to control transmission of *Borrelia recurrentis* and other louse-borne pathogens.

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Conflict of interest: None declared.

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