

CASE REPORT

Rickettsial infection caused by accidental conjunctival inoculation

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SUMMARY

The most common transmission route of tick-borne *Rickettsia* is through tick bite; nevertheless, other transmission routes should also be considered. We report a case of rickettsial infection in a 15-year-old boy caused by accidental contamination of the conjunctiva through the infected fluid of a crushed engorged tick removed from a dog. Right eye pain, conjunctival hyperaemia with mucopurulent exudate, chemosis and eyelid oedema were the first signs and symptoms. Two days later, the boy developed fever, myalgia, headache, abdominal pain and was vomiting; physical examination showed multiple cervical adenopathies but no rash. He was treated with doxycycline (200 mg/day) for 7 days with progressive resolution of clinical signs. Rickettsial infection was confirmed by immunofluorescence assay with serological seroconversion in two consecutive samples. *Rickettsia conorii* or *Rickettsia massiliae* were the possible causal agents since they are the *Rickettsia* spp found in the *Rhipicephalus sanguineus* dog tick in Portugal.

BACKGROUND

Rickettsiae are obligate intracellular bacteria, transmitted by haematophagous arthropods. The majority of *Rickettsia* from the spotted fever group (SFG) is transmitted by ticks when they bite humans and transmit *Rickettsia* during blood feeding. Although transmission can also occur through the mucous membranes (eg, conjunctiva) either by tick bite (eg, larvae) or through contaminated tick fluids, the latter form is rarely described in the literature. Ocular manifestations have been described in different rickettsioses after a tick bite, but direct transmission leading to infection through the conjunctiva has only been described in a few cases.^{1 2}

Mediterranean spotted fever (MSF) is the most common tick-borne rickettsioses in the Mediterranean basin and Portugal has one of the highest incidence rates of the disease.^{3–5} In Portugal, MSF is caused by two strains of *Rickettsia conorii*: Malish and Israeli spotted fever, but both are transmitted by the same vector, *Rhipicephalus sanguineus*, the tick usually found on dogs. *R. sanguineus* is also the vector of *Rickettsia massiliae*, recently associated with three human cases in Italy, France and Argentina.⁶ The symptomatology of *R. massiliae* infection is similar to other rickettsioses and confirmed clinical diagnosis is only possible by agent isolation or molecular detection because serology cross reacts within the SFG. We report a case of rickettsial infection associated with accidental contamination of the conjunctiva through the



Figure 1 Ocular manifestations (right eye) after accidental conjunctiva contact with infected fluid of a crushed engorged tick removed from a dog.

infected content of a crushed engorged tick removed from a dog.

CASE PRESENTATION

In October 2012, a previously healthy 15-year-old Caucasian boy sought care at the emergency room. The patient reported of right eye pain for the past 6 days; he exhibited conjunctival hyperaemia with mucopurulent exudate, chemosis and eyelid oedema (figures 1 and 2). He denied having fever, ocular trauma or reduction of visual acuity. Slit-lamp examination was normal and fundus examination showed no signs of vasculitis or haemorrhages. He was treated with amoxicillin and clavulanic acid for preseptal cellulitis and topical chloramphenicol (1%) plus prednisolone (0.25%). Ocular symptoms improved but he returned 2 days later (8 days after onset of disease) with high fever, myalgia, headache, abdominal pain, nausea and vomiting. Physical examination revealed multiple cervical adenopathies without hepatosplenomegaly or rash. No tick bites were found.

INVESTIGATIONS

Laboratory investigations did not reveal any abnormal findings with the exception of elevated C reactive protein of 49.6 mg/L. No coagulopathy, renal



Figure 2 Right eye with conjunctival hyperaemia (with mucopurulent exudate), chemosis and eyelid oedema.



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failure or hepatic involvement was shown. After detailed questioning, the patient revealed that he had crushed a blood-engorged tick from his dog the previous week and the blood had accidentally splashed into his eye. Based on this fact and compatible clinical manifestations, a probable case of rickettsiosis was diagnosed. On the same day, the patient serum was tested for the presence of antirickettsial antibodies using immunofluorescence assay (IFA) and detection of rickettsial DNA was performed by PCR in the blood sample.

TREATMENT

Antibiotic therapy with doxycycline was administered for 7 days (200 mg/day).

OUTCOME AND FOLLOW-UP

After 24 h of antibiotic therapy, the fever disappeared and the clinical signs progressively resolved with no sequelae.

Clinical diagnosis was confirmed by serology. Detection of antibodies in acute and convalescent sera was performed by 'in-house' IFA using a *R. conorii* antigen as previously described.⁷ Seroconversion was demonstrated in convalescent sera collected after a 3-week interval from the first negative serum sample, showing increased antibody levels of IgM=32 and IgG=128 antibodies. According to the European guidelines for tick-borne disease diagnosis and previous seroprevalence studies performed in the Portuguese population, the reference laboratory established a positive cut-off for *Rickettsia* spp in serum dilution of 1:128 (IgG titre) for endemic countries.^{3 8}

DISCUSSION

In this report, we confirm a SFG rickettsial infection in a child with ocular manifestations after conjunctival transmission. This mode of transmission is rarely described, but in our patient it was the most probable route of infection.^{1 2 9} The difficulties establishing the diagnosis were related to the fact that the patient did not have an inoculation eschar or the rash that typically appears around day 5 in rickettsioses. However, some reported studies performed on Portuguese patients with MSF reveal that in up to 10% of cases the rash never occurs. Indeed, even though *Rickettsia* is transmitted by tick bite, several patients do not develop the inoculation eschar. In addition, up to one-third of patients infected with *R. conorii* Israeli spotted fever do not recall a recent tick bite or contact.³

The revelation that the patient received a splash of blood from a crushed tick quickly helped to establish the possible clinical diagnosis. The appearance of the typical systemic symptoms 1 week after inoculation, the clinical improvement with doxycycline and positive serology for *Rickettsia* confirmed the diagnosis.

Although systemic manifestations of MSF are frequently reported, a few cases have been described with specific ocular involvement.^{10 11} Ocular manifestations are usually unilateral and frequently asymptomatic in 64% of the patients. Usually, asymptomatic infections can only be detected by a careful dilated fundoscopic examination.¹⁰ The ocular changes generally have a self-limited evolution, disappearing between the 3rd and the 10th weeks of disease, even in patients who showed a severe posterior segment involvement.^{2 10 11}

The most frequent ocular sign includes petechial lesions on the bulbar conjunctiva due to local vasculitis with conjunctivitis. Parinaud's oculoglandular syndrome, characterised by unilateral

granulomatous conjunctivitis and with enlarged submandibular lymph nodes, has been described in MSF cases, and it was also seen in our patient.^{2 9} Other ocular manifestations such as keratitis, uveitis, retinal vasculitis, endophthalmitis and anterior ischaemic optic neuropathy have also been described.^{2 10 11}

Serology by IFA is the gold standard used in the diagnosis of SFG rickettsioses. However, the serological test for rickettsioses does not allow us to distinguish among different *Rickettsia* spp of SFG.⁵ *Rickettsia* spp can only be identified by isolation or molecular detection (PCR) and sequencing. The failure to detect rickettsial DNA in a blood sample could be because the sample was collected 8 days after the onset of disease and the level of rickettsiaemia in the blood was already insufficient to be detected.

Although it was not possible to identify the *Rickettsia* spp that caused the patient's infection, either *R. conorii* or *R. massilliae* was the probable causative agent, since in Portugal *R. sanguineus* dog ticks have been found harbouring these two *Rickettsia* spp.³

Learning points

- ▶ Rickettsial aetiology should not be ruled out in the absence of typical signs, such as 'tache noir' or maculopapular rash, especially during the first week of illness.
- ▶ Chances of rare forms of transmission must be borne in mind; conjunctival inoculation is rare but nonetheless a possibility.
- ▶ Ocular manifestations are known and are usually limited to bulbar conjunctiva.

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