Invasive salmonellosis in two infants in our environment: The importance of contact with domestic reptiles

Salmonelosis invasiva en dos lactantes en nuestro medio: la importancia del contacto con reptiles domésticos

Dear Editor,

The primary reservoir of *Salmonella* spp. is the digestive tract of various animals (poultry, cattle and pigs). The main source of infection in humans is through the consumption of animal-derived food products[1] and, less frequently, the intake of contaminated milk formula[2]. Small reptiles, such as the domestic turtle, are relevant reservoirs in our area, with a colonisation rate of 48%, accounting for 6% of salmonellosis in humans[3]. We present two independent cases of invasive infections by *Salmonella* spp.

Case 1. A one-month-old infant with a 12-hour history of fever and irritability, with a bulging fontanelle on examination. The family had a domestic turtle of the Emydidae genus and family, from Tennessee and Kentucky, a subspecies of *Trachemys scripta troostii*. Laboratory tests revealed CRP of 6.3 mg/l, negative procalcitonin and leukocytosis of 24,690/mm^3, with neutrophilia. Lumbar puncture (LP) revealed a cloudy fluid with 210 leukocytes/μl (36% polymorphonuclear, 64% mononuclear), glucose concentration of 48 mg/dl and protein concentration of 52 mg/dl. The Gram stain and the FilmArray™ (bioMérieux, Madrid, Spain) of the CSF were negative. Ampicillin, ceftriaxone and aciclovir were started. The blood culture was negative at the end of the incubation period. *Salmonella* spp. was isolated in the CSF by culture in conventional media with a microbiological profile sensitive to all the antimicrobials tested. Treatment was optimised with intravenous ceftriaxone and ciprofloxacin for one month, after sterile LP at 72 h. A transfontanellar ultrasound was performed, without identifying complications of meningitis. The patient presented with diarrhoea 24 h after the onset of symptoms, remaining afebrile at 48 h. A study of cohabitants, the pet (waste water) and milk formula was carried out. *Salmonella* spp. with the same microbiological profile as our case was detected in the stool culture of the brother and of the pet. No abnormalities were detected in neurological follow-up or neuroimaging (MRI and cranial ultrasound scan).

Case 2. A two-month-old infant with a 24-hour history of fever, diarrhoeal stools and septic appearance. The family had a pet turtle of the same genus and species as in case 1. After completion of complementary studies and stabilisation, intravenous ceftriaxone was started. Laboratory tests revealed thrombocytosis of 600,000/mm^3 and CRP of 56.7 mg/l. The LP was normal. The blood culture and CSF culture were negative. *Salmonella* spp. was detected in stool culture with conventional media with the same sensitivity phenotype as case 1. Intravenous antibiotic therapy was maintained for five days. A study of cohabitants, milk formula and turtle waste water was carried out, isolating *Salmonella* spp. in the turtle water and in the stool culture of the grandmother (cohabitant) with the same sensitivity as our case. The patient responded to treatment without complications.

The genus *Salmonella* is an important cause of acute gastroenteritis, usually self-limiting. In infants and immunocompromised individuals, it can cause severe extraintestinal manifestations (sepsis, meningitis and secondary focal infections)[4]. On suspicion of salmonellosis in these cases, antimicrobials should be administered early. Third generation cephalosporins (for at least four weeks) are the treatment of choice in meningitis caused by *Salmonella* spp[5]. A neuroimaging study is recommended, even in neurologically asymptomatic patients responding to antibacterial treatment, due to the high risk of complications that would justify a longer duration of antibiotic therapy[6]. A follow-up LP should be performed 48−72 h after treatment, and in the event of persistent *Salmonella* in the CSF, some authors propose combination therapy with intracellular antimicrobials, such as quinolones[7]. Ciprofloxacin has excellent bioavailability at the meningeal level due to its lipid solubility, which allows it to cross the blood-brain barrier, reducing mortality, the risk of relapse and complications. Other authors recommend initial combination therapy with third generation cephalosporins and quinolones for a minimum of three weeks from CSF sterilisation[8].

Given the high risk of invasive salmonellosis after contact with domestic reptiles and the increasing incidence in our setting, children under five years of age, immunocompromised patients, pregnant women and the elderly are advised to avoid contact with reptiles, consistent with the recommendations of the Centers for Disease Control and Prevention (CDC)[9]. In Spain, there is a surveillance protocol for salmonellosis established by the Epidemiological Surveillance Network. When a case is detected, it must be reported and a complete epidemiological study is essential in order to determine the origin. The appropriate preventive measures must be implemented to avoid this type of infection, such as the control of import quotas, the promotion of educational campaigns and ensuring that businesses comply with the regulations[10].

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References

1. Worsena CR, Miller AS, King MA. Salmonella infections. Pediatr Rev. 2019;40:543–5, http://dx.doi.org/10.1542/pir.2017-0198.
2. Jones TF, Ingram LA, Fullerton KE, Marcus R, Anderson BJ, McCarthy PV, et al. A case-control study of the epidemiology of sporadic *Salmonella* infection in infants. Pediatrics. 2006;118:2380–7, http://dx.doi.org/10.1542/peds.2006-1218.
3. Marin C, Lorenzo-Rebenaque L, Laso O, Villora-Gonzalez J, Vega S. Pet reptiles: a potential source of transmission of multidrug-resistant *Salmonella*. Front Vet Sci. 2021;7:613718, http://dx.doi.org/10.3389/fvets.2020.613718.
4. Clemente Garulo D, López Saldaña MD, Álvarez Coca J, Alonso Canal L, López Robledillo JC. Piomiositis por *Salmonella* enteritidis en paciente inmunocompetente. An Pediatría. 2010;73:108–9, http://dx.doi.org/10.1016/j.anpedi.2010.05.010.
5. Bay C, Jofré M, Kuzmanic D, Aguirre C. Meningitis por *Salmonella enteritidis* en un lactante. Comunicación de un caso y revisión de la literatura. Rev Chilena Infectol. 2020;37:470–6, http://dx.doi.org/10.4067/S0716-10182020000400470.
6. Price EH. Antibiotics for *Salmonella meningitis* in children. J Antimicrob Chemother. 2000;46:653–5, http://dx.doi.org/10.1093/jac/46.5.653.
7. Wen SC, Best E, Nourse C. Non-typhoidal Salmonella infections in children: Review of literature and recommendations for management: non-typhoidal *Salmonella* infections. J Paediatr Child Health. 2017;53:936–41, http://dx.doi.org/10.1111/jpc.13585.
8. Peromingo Matute E, Quecuty Vela S, Obando Santaella I, Camacho Lovillo MS, León Leal JA. Recaída de meningitis por *Salmonella* tras tratamiento con cefotaxima. An Pediatría. 2005;63:375–6, http://dx.doi.org/10.1157/13079824.
9. Reptiles and Amphibians. Healthy Pets, Healthy People. CDC, 2022. Available from: https://www.cdc.gov/healthypets/pets/reptiles.html.
10. Lafuente S, Bellido JB, Moraga FA, Herrera S, Yagüe A, Montalvo T, et al. *Salmonella paratyphi* B and *Salmonella litchfield* outbreaks associated with pet turtle exposure in Spain. Enferm Infecc Microbiol Clin. 2013;31:32–5, http://dx.doi.org/10.1016/j.eimc.2012.05.013.

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Thermography for the follow-up of skin and soft tissue infections

Termografía para el control evolutivo de las infecciones de piel y partes blandas

Dear Editor,

One of the most typical clinical and biophysical characteristics of skin and soft tissue infections is increased temperature[1]. However, these differences in heat can sometimes be difficult to identify on clinical examination and doubts can arise about how the disease is progressing.

We present the case of a 54-year-old woman, with no history of interest, who went to the Dermatology A&E department with a painful lumbar lesion of several days' duration, accompanied by fever. On examination, an erythematous, hot and indurated plaque was observed in the lumbar region and mid-upper gluteal region, diagnosed as a skin and soft tissue infection or infectious cellulitis. As a portal of entry, an ulcerated, pearly, shiny plaque was seen in the intergluteal fold, consistent with genital lichen sclerosus. A smear was taken from the intergluteal fold, in which Gram-positive mixed flora was found. As treatment, a cycle of amoxicillin-clavulanate 875 mg/125 mg orally every 8 h for 7 days was prescribed, potentiated with topical ozenoxacin and fluticasone in combination to be applied to the intergluteal area, with resolution of the symptoms.

At the time of diagnosis, a thermographic image was taken with a FLIR camera adaptable to an iOS device. In the image, a temperature difference of 2.55 °C was observed between the affected and perilesional skin, with follow-up images taken on days 2 and 7 of therapy revealing a decrease in this temperature difference (2.49 °C and 0.66 °C, respectively) until it was practically equal to healthy skin (Fig. 1). It can be seen that the response to antibiotic therapy was notable from the first day and the changes could be clearly visualised in the thermographic image.

Thermography is a non-invasive imaging technique that makes it possible to establish temperature differences by analysing the infrared radiation emitted by the skin, which correlates with its temperature and facilitates the assessment of subclinical inflammation[2]. Its most widespread medical use has been for fever screening during the COVID-19 pandemic[3]. In the field of infectious diseases, it has been used to screen for tinea unguium, to predict residual neuralgia in herpes zoster or to assess pressure ulcers[4–6].

It is a simple and cheap technique that can be carried out with devices that can be adapted to mobile phones. The results, which are visible on a colour map with zones that correspond to hotter

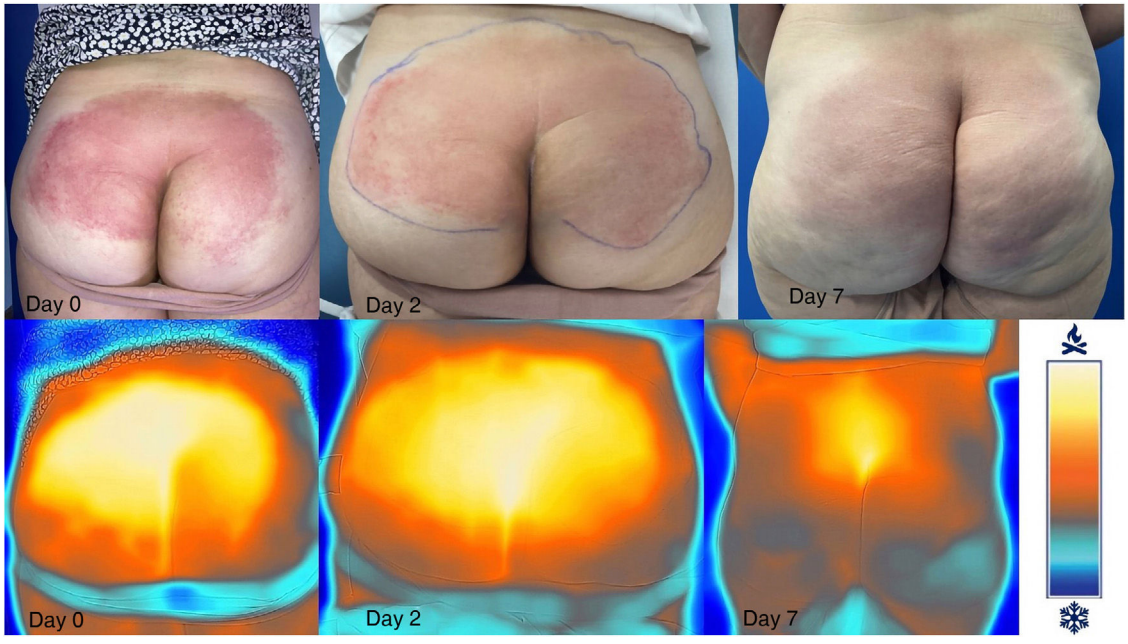

Fig. 1. Clinical and thermographic monitoring of the progression of skin and soft tissue infection on days 0, 2 and 7 of treatment with amoxicillin-clavulanate.

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