Table 1 Clinical characteristics, diagnosis and treatment of presented cases.

	Patient 1	Patient 2	Patient 3
Sex, age	Female, 11 years	Male, 3 years	Male, 11 years
History	Mild trauma	Abdominal surgery	No relevant history
Presenting symptoms	Fever, limp	Fever, limp	Fever, limp
Physical examination	Pain on left hip rotation Limited lumbar flexion	Abdominal guarding Flexed hip	Left adductor pain on palpation Painful rotation
Blood tests-WBC	$25.3 \times 1000/\mu L$	$29.5 \times 1000/\mu L$	$11.7 \times 1000/\mu L$
C-reactive protein	62 mg/L	310 mg/L	111 mg/L
Blood culture	*S. aureus MS*	Negative	*S. aureus MS*
Imaging tests	Plain X-ray MRI (diagnostic)	Ultrasound CT (diagnostic)	Ultrasound Bone scintigraphy MRI (diagnostic)
Abscess location	Left iliacus	Right psoas	Internal obturator
Treatment	Cloxacillin	Piperacillin-tazobactam Clindamycin	Cloxacillin
Drainage	Yes	Surgery	No

CT, computed tomography; MRI, magnetic resonance imaging; MS, methicillin-sensitive; WBC, white blood cells.

panied by limping. The gold standard imaging test is MRI, and early initiation of empirical antibiotherapy can prevent complications, although drainage is required if abscesses develop or there is no improvement with antibiotherapy. Testing for detection of the PVL toxin may help predict the course of disease and the development of complications.

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Susceptibility to azithromycin in non-typhoid *Salmonella*: A therapeutic option☆

Sensibilidad a azitromicina en *Salmonella* no tifoidea: opción terapéutica

Dear Editor:

As the prevalence of antimicrobial resistance continues to increase, epidemiological surveillance of in vitro susceptibility is crucial. For the purpose of monitoring these data on an ongoing basis, clinical or epidemiological cut-off points are indispensable tools that have to be made available. On the other hand, although uncomplicated infections by nontyphoidal *Salmonella enterica* (NTS) do not usually require antibiotherapy, certain patients with immunodeficiencies or of extreme age, among other possible circumstances, may benefit from administration of broad-spectrum cephalosporins or fluoroquinolones to reduce the risk of bacteraemia and extraintestinal infection. However, their excessive use for treatment of animal and human infections has led to an increase in the isolation of resistant strains. In this context, azithromycin emerges as a possible alternative.[1,2] However, none of the committees on antimicrobial susceptibility (Clinical and Laboratory Standards Institute [CLSI] and European Committee on Antimicrobial Susceptibility Testing [EUCAST]) have defined azithromycin clinical cut-off points for treatment of NTS to date.

As surveillance programmes become aware of the importance of detecting drug resistance mechanisms, epi-

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demiological cut-off points may be useful when clinical cut-off points are not available. Thus, many studies have applied the epidemiological cut-off values (ECOFF) defined by the EUCAST for azithromycin and *Salmonella enterica* serotype Typhimurium to interpret in vitro susceptibility data, especially in endemic areas.[3] When it comes to NTS, the lack of epidemiological cut-off points for azithromycin combined with the recommendation against the routine use of antibiotherapy in infections by these serotypes have resulted in a dearth of studies on their in vitro susceptibility. Published studies have usually applied the ECOFF established for the susceptibility of *Salmonella enterica* serotype Typhi (*Salmonella* Typhi) to azithromycin.[4–6] Our aim was to provide information on the in vitro susceptibility to azithromycin of the NTS strains causing acute gastroenteritis in the patients managed in our hospital to contribute to the knowledge on the usefulness of this drug as an alternative treatment option in patients with salmonellosis.

At the Hospital Infantil Universitario Niño Jesús (Madrid, Spain), antimicrobial susceptibility testing was performed in 124 NTS strains (1 strain per patient) out of a total of 212 strains isolated between 2016 and 2019. Susceptibility testing was performed by the diffusion gradient method (Etest MIC Evaluator™, Oxoid, bioMérieux) applying the ECOFF for *Salmonella* Typhi established by EUCAST (minimum inhibitory concentration [MIC] $\leq$ 16 mg/L). The zone of inhibition was measured over a black background using reflected light and a magnifying glass. In 98% of strains, the MIC of azithromycin was 16 mg/L or less. The MICs of azithromycin in the 121 strains ranged from 0.75 to 16 mg/L (median, 3 mg/L). The MIC of azithromycin in 3 strains exceeded the ECOFF. Of all strains, 41% were resistant to amoxicillin, 6% to trimethoprim-sulfamethoxazole and 2% to ciprofloxacin. Seven isolates had resistance to both amoxicillin and trimethoprim-sulfamethoxazole. None of the isolates was resistant to cefotaxime. The *Salmonella* infection was acquired in the community in 194 patients (92%), of who 13% required hospital admission due to protracted or severe diarrhoea, comorbidities or the development of bacteraemia. Twenty-six percent of patients belonged to risk groups and therefore candidates for antibiotherapy. Nine (4%) had some form of cancer and 41 (19%), who were not oncology patients, were aged up to 12 months at the onset of the episode of gastroenteritis (23% of these patients were aged up to 3 months). We ought to highlight 6 patients (3%) treated with third-generation cephalosporins. Three of them developed bacteraemia by NTS, 1 had Crohn disease and the remaining 2 had a clinical diagnosis without microbiological confirmation and received treatment for suspected food poisoning with NTS, which was confirmed later by isolation in stool culture. Interestingly, the review of the health records revealed 1 case in which azithromycin was administered after isolation of both NTS and *Campylobacter* species in the stool culture, with successful resolution of disease. Thus, a single antibiotic agent may be effective against 2 of the most frequent pathogens that cause bacterial gastroenteritis in our region.

Our findings add to the data published to date that, based on in vitro susceptibility results, it supports the use of azithromycin as alternative treatment of NTS infection in cases without sepsis or to complete treatment if bacteraemia is suspected. Several studies in Europe have reported MICs of azithromycin of 4–8 mg/L for a majority of the tested NTS isolates.[4,5] In one of the few studies conducted in Spain, Martín-Pozo et al[6] found a MICs ranging from 6 to 48 mg/L in 64 NTS isolates, with a single resistant strain (MIC = 48 mg/L). Azithromycin also has an intermediate half-life, excellent tissue penetration and the advantage that it can be administered orally. All of it makes its use attractive, particularly in paediatric clinical practice, in which quinolones must be used with caution, under specific circumstances or as second-line treatment, and in which shorter courses of treatment would facilitate adherence. Nevertheless, studies need to be conducted to establish its efficacy and define clinical and/or epidemiological cut-off points to help select the best possible treatment.

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