Journal of Gerontology & Geriatric Research

Emonet et al., J Gerontol Geriatr Res 2017, 6:3
DOI: 10.4172/2167-7182.1000426

Research Article OMICS International

Colitis Due to *Campylobacter jejuni/ coli*: Ceftriaxone is Not Effective

Stephane Emonet[1*], Betim Redzepi[1], Arnaud Riat[2], Abdessalam Cherkaoui[2], Benjamin A Lipsky[1], Frederic Ris[3] and Jacques Schrenzel[1,2]

[1]*Service of Infectious Diseases, Department of Internal Medicine, Geneva University Hospitals, Switzerland*

[2]*Bacteriology laboratory, Department of Genetics and Laboratory Medicine, Geneva University Hospitals, Switzerland*

[3]*Service of Visceral Surgery, Department of Surgery, Geneva University Hospitals, Switzerland*

[*]**Corresponding author:** Stephane Emonet, Service of Infectious Diseases, Department of Medical Specialties, Geneva University Hospitals, Gabrielle-Perret-Gentil 4, CH-1211 Geneva 14, Switzerland, Tel: +41022 3727323; Fax: +410223727312; E-mail: stephane.emonet@hcuge.ch

Rec date: May 08, 2017; **Acc date:** May 17, 2017; **Pub date:** May 20, 2017

Abstract

Background: Ceftriaxone is often prescribed empirically for patients hospitalized with abdominal pain and fever. If stools culture from such a patient yields *Campylobacter jejuni* or *Campylobacter coli* (*C. jejuni/coli*), clinicians ask about its susceptibility to ceftriaxone, to which it is not routinely tested. We report a case of *coli*tis that raised this question. As we couldn't find the answer in the published literature, we investigated the sensitivity of strains of *C. jejuni/coli* to ceftriaxone in our hospital.

Methods: We conducted a retrospective study of all strains of *C. jejuni* and *C. coli* isolated from specimens of infected patients seen in our tertiary care university-affiliated hospital in Switzerland between March 2009 and December 2010. *Campylobacter* strains were identified to the species level with matrix-assisted laser desorption ionization - time of flight (MALDI-TOF) mass spectrometry and antimicrobial susceptibilities were determined by E-test.

Results: Among 108 *C. jejuni* and 14 *C. coli* isolates, only 1.6% were fully susceptible to ceftriaxone. Overall, 95.9% of our strains were susceptible to erythromycin but 52.5% of *C. jejuni/coli* were resistant to ciprofloxacin.

Conclusion: Our results suggest that ceftriaxone should be considered ineffective for the treatment of *Campylobacter jejuni/coli* infections, the major cause of gastro-enteritis in Europe. In the light of increasing resistance to fluoroquinolones, cases of severe *Campylobacter* colitis or bacteraemia may require a short course of macrolides.

Keywords *Campylobacter*; Ceftriaxone; Antibiotic resistance; Abdominal pain; Gastroenteritis

Abbreviations

C. jejuni: *Campylobacter jejuni*; *C. coli*: *Campylobacter coli*; MALDI-TOF: Matrix-Assisted Laser Desorption Ionization - Time of Flight; HUG: Hospitals of the University of Geneva; CLSI: Clinical and Laboratory Standards Institute; MIC: Minimal Inhibitory Concentration; EUCAST: European Committee on Antimicrobial Susceptibility Testing

Background

A 25-year-old woman presented to our emergency department with abdominal pain, nausea and fever. She had previously been in good health and did not take any medication. A low- dose computed tomography scan of the abdomen (Figure 1) showed inflammation of the caecum and terminal ileum, making analysis of the appendix difficult. The patient was admitted to the visceral (general) surgery service for surveillance and was started on therapy with intravenous ceftriaxone and metronidazole. Her clinical condition improved, but blood cultures were positive for a *Campylobacter coli* after 48 hours. The attending surgeon contacted the infectious diseases specialist to ask if this pathogen was likely to be susceptible to ceftriaxone. Research of medical literature on human infection with *Campylobacter jejuni* or *coli* revealed a striking lack of data on this issue. Because our patient's *Campylobacter coli* isolate was resistant to both ceftriaxone and ciprofloxacin, she was treated 5 days with oral azithromycin for her bacteremia and discharged from the hospital.

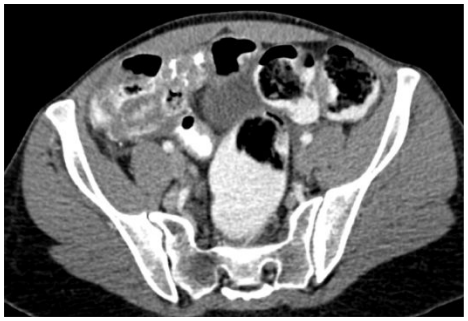

Figure 1: Image from the low-dose abdominal computed tomography scan showing inflammation of the caecum and terminal ileum.

Campylobacter species (spp) are the most common cause of bacterial gastroenteritis in industrialized countries [1]. Infections due

to *C. jenuni/coli* are usually well tolerated and self-limited in immunocompetent patients. However, hospitalization is sometimes required because of severe *coli*tis, profuse diarrhea with kidney failure or bacteremia [2]. There are few published data on the susceptibility of *C. jejuni/coli* to ceftriaxone. Animal studies have described a high rate of resistance of *Campylobacter* spp to ceftriaxone [3,4]. A few human studies from Israel and Asia [5-8] have reported resistance to ceftriaxone, but we found no human cases reported from Europe (Figure 2).

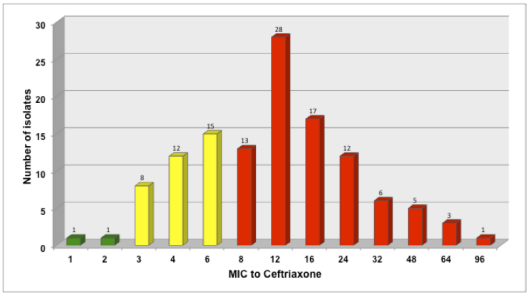

Figure 2: Distribution of mean inhibitory concentrations (MIC, in µg/ml) to ceftriaxone for 122 *Campylobacter jejuni/coli* isolates.

The Hospital of the University of Geneva (HUG) is the largest hospital in Switzerland, with 1900 beds. It serves as a secondary care center for the population of Geneva and as a tertiary care referral center for western Switzerland. To seek further information on the susceptibility of *C. jejuni/coli* to ceftriaxone in our setting, we performed a retrospective study on all of the isolates of *C. jejuni* and *C. coli* isolated in our hospital over almost 2 years.

Methods

During the 22 months, we isolated 122 strains, 108 of *C. jejuni* and 14 of *C. coli* on Karmali agar. *Campylobacter* strains were identified to the species level with MALDI-TOF mass spectrometry. Antimicrobial susceptibility testing was performed on Mueller-Hinton agar (+5% sheep blood) incubated at 37°C in a microaerobic atmosphere, as described in the Clinical and Laboratory Standards Institute (CLSI) guidelines supplement for fastidious bacteria (M45-A2, Second edition, August 2010). E-tests were used to determine the minimal inhibitory concentration (MIC) for ciprofloxacin, ceftriaxone and erythromycin [9-12]. Erythromycin and ciprofloxacin MIC's were interpreted according to CLSI cut-off values. Neither CLSI nor the European Committee on Antimicrobial Susceptibility Testing (EUCAST) has determined susceptibility breakpoints for ceftriaxone against *C. jejuni*. We found only two studies that defined the susceptibility breakpoint for ceftriaxone for species of *Campylobacter*: one [3] considered a MIC ≤ 8 µg/ml as susceptible, while the other [7] used ≤ 2 µg. Thus, we elected to consider strains with a MIC ≤ 2 µg/ml to ceftriaxone as fully susceptible, those with 3-6 µg/ml as intermediate and those with ≥ 8 µg/ml as resistant.

Results and Discussion

Among our *C. jejuni/coli* isolates, 8/122 (6.6%) were isolated in blood, the rest in stools. Only 2/122 (1.6%) were fully susceptible to ceftriaxone (see supplementary material for MIC values for all antibiotics and all strains). As shown in Fig. 2, more than two- thirds of the isolates had a MIC for ceftriaxone in the resistant range. Nearly all of our *C. jejuni/coli* strains (117/122; 95.9%) were susceptible to erythromycin, but, as described elsewhere [13-15], more than fifty percent (64/122; 52.5%) were resistant to ciprofloxacin.

This small retrospective study confirms the distressingly high resistance rate of human *Campylobacter* isolates to ciprofloxacin, an agent often used to treat this infection. The rate of resistance has been growing in the last decade [14], leading to restrictions on the use of fluoroquinolones in veterinary medicine [16].

Conclusion

Our study highlights the high level of resistance to ceftriaxone of *Campylobacter* spp causing human infections in a European setting. Based on our data, and the few published studies, patients treated empirically with ceftriaxone should benefit from a switch to macrolides when *C. jejuni/coli* are identified as the cause of the infection, especially if they have an invasive or non-resolving infection.

Declarations

Ethics approval and consent to participate

No collection of clinical data for this study. For this type of study, formal consent is not required. Consent for publication Was not searched for as the case description does not contain any picture or specific information that could lead to the identification of the patient.

Availability of data and material

Please refer to "Supplementary Material" where you'll find the complete Excel table with all the data on which the conclusions of our manuscript rely.

Authors' contributions

SE was the ID specialist implicated in the clinical case. He conceived the study, performed the statistical and clinical analysis and drafted the manuscript. BR and BL participated to the analysis of the data and to the redaction of the manuscript. AR, AC and JS contributed to the acquisition of the data and laboratory analysis, and participated to the redaction of the manuscript. FR was the surgeon in charge of the patient and participated to the redaction of the manuscript. All authors read and approved the final manuscript.

Acknowledgement

We thank Nouria Azam for her help in performing antimicrobial susceptibility testing on these strains of *Campylobacter* spp.

References

1. Blaser MJ (1997) Epidemiologic and clinical features of Campylobacter jejuni infections. J Infect Dis 176: S103-S105.
2. Feodoroff B, Lauhio A, Ellstrom P, Rautelin H (2011) A nationwide study of Campylobacter jejuni and Campylobacter coli bacteremia in Finland

over a 10-year period, 1998-2007, with special reference to clinical characteristics and antimicrobial susceptibility. Clin Infect Dis 53: e99-e106.

3. Bester LA, Essack SY (2008) Prevalence of antibiotic resistance in Campylobacter isolates from commercial poultry suppliers in KwaZulu-Natal, South Africa. J Antimicrob Chemother 62: 1298-1300.
4. Voidarou C, Alexopoulos A, Plessas S, Stavropoulou E, Fotou K, et al (2011) Hygienic quality and antibiotic resistance profile of sliced butchery. Anaerobe 17: 344-350.
5. Leibovitz E, Janco J, Piglansky L, Press J, Yagupsky P, et al (2000) Oral ciprofloxacin vs. intramuscular ceftriaxone as empiric treatment of acute invasive diarrhea in children. Pediatr Infect Dis J 19: 1060-1067.
6. Tjaniadi P, Lesmana M, Subekti D, Machpud N, Komalarini S, et al (2003) Antimicrobial resistance of bacterial pathogens associated with diarrheal patients in Indonesia. Am J Trop Med Hyg 68: 666-670.
7. Liao CH, Chuang CY, Huang YT, Lee PI, Hsueh PR (2012) Bacteremia caused by antimicrobial resistant Campylobacter species at a medical center in Taiwan, 1998-2008. J Infect 65: 392-399.
8. Monselise A, Blickstein D, Ostfeld I, Segal R, Weinberger M (2004) A case of cellulitis complicating Campylobacter jejuni subspecies jejuni bacteremia and review of the literature. Eur J Clin Microbiol Infect Dis 23: 718-721.
9. Baker CN (1992) The E-test and Campylobacter jejuni. Diagn Microbiol Infect Dis 15: 469-472.
10. Van der Beek MT, Claas EC, Mevius DJ, Van Pelt W, Wagenaar JA, et al. (2010) Inaccuracy of routine susceptibility tests for detection of erythromycin resistance of Campylobacter jejuni and Campylobacter coli. Clin Microbiol Infect 16: 51-56.
11. Lehtopolku M, Kotilainen P, Puukka P, Nakari UM, Siitonen A, et al (2012) Inaccuracy of the disk diffusion method compared with the agar dilution method for susceptibility testing of Campylobacter Spp. J Clin Microbiol 50: 52-56.
12. Lehtopolku M, Kotilainen P, Puukka P, Nakari UM, Siitonen A, et al (2013) Disk diffusion method for erythromycin and ciprofloxacin susceptibility testing of Campylobacter jejuni and Campylobacter coli. J Clin Microbiol 51: 381.
13. Nachamkin I, Ung H, Li M (2002) Increasing fluoroquinolone resistance in Campylobacter jejuni, Pennsylvania, USA,1982-2001. Emerg Infect Dis 8:1501-1503.
14. Cody AJ, Clarke L, Bowler IC, Dingle KE (2010) Ciprofloxacin-resistant campylobacteriosis in the UK. Lancet 376: 1987.
15. Uzunovic-Kamberovic S (2003) Antibiotic susceptibility of Campylobacter jejuni and Campylobacter coli human isolates from Bosnia and Herzegovina. J Antimicrob Chemother 51: 1049-1051.
16. Nelson JM, Chiller TM, Powers JH, Angulo FJ (2007) Fluoroquinolone-resistant Campylobacter species and the withdrawal of fluoroquinolones from use in poultry: a public health success story. Clin Infect Dis 44: 977-980.