Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Elsevier hereby grants permission to make all its COVID-19-related research that is available on the COVID-19 resource centre - including this research content - immediately available in PubMed Central and other publicly funded repositories, such as the WHO COVID database with rights for unrestricted research re-use and analyses in any form or by any means with acknowledgement of the original source. These permissions are granted for free by Elsevier for as long as the COVID-19 resource centre remains active.
Campylobacter Jejuni and Cytopenias

Ami Schattner, MD
Department of Medicine, Kaplan Medical Centre, Rehovot, Hebrew University and Hadassah Medical School, Jerusalem, Israel.

ABSTRACT

BACKGROUND: Leukopenia and thrombocytopenia in a febrile patient are not uncommon and may be a diagnostic clue in patients without an alternative explanation for cytopenias. This has not been reported in Campylobacter jejuni infections.

METHODS: A healthy patient with fever, rigors, and an acute diarrheal illness was noted to have a white blood cell count of 2.65 × 10^9/L and platelet level of 125 × 10^9/L. Retrospective chart review of all adult C. jejuni stool-positive cases admitted over 1 year revealed leukopenia in 6 of 20 (30%), thrombocytopenia in 5 of 20 (25%), and both in 1 of 20 (5%).

RESULTS: Cytopenias were mild, transient, and not associated with prolonged hospital stay or complications.

CONCLUSIONS: Acute C. jejuni infections should be added to the differential diagnosis of acute febrile illnesses that may be associated with leukopenia or thrombocytopenia. Cytopenias can be an important diagnostic clue in febrile illnesses, and their differential is presented.

© 2013 Elsevier Inc. All rights reserved. • The American Journal of Medicine (2013) 126, 1020-1021

KEYWORDS: Campylobacter jejuni; Leukopenia; Thrombocytopenia

An acute febrile illness associated with leukopenia and thrombocytopenia in a patient without a prior condition causing cytopenia (eg, chemotherapy or chronic liver disease) has a broad differential diagnosis that ranges from benign to immediately life-threatening conditions (Table 1).

A self-limited intercurrent viral infection is the most common cause,¹ but an erroneous designation on presentation of septicemia or toxic shock syndrome as a viral infection may be dangerous. Thus, a timely accurate diagnosis of this not unusual

presentation and recognition of its many causes are mandatory.

A healthy (except for hypertension) 80-year-old man was admitted with a 5-day history of fever, rigors, and painless watery diarrhea associated with fecal incontinence and marked lassitude. Examination was noncontributory. Hemoglobin was 12 mmol/L, white blood cell count was 2.65 × 10^9/L (neutrophils 1.8, lymphocytes 0.4), and platelet count was 125 × 10^9/L, associated with pre-renal azotemia, C-reactive protein 127 mg/L, and serum albumin 2.7 g/L. Urinalysis and blood cultures were negative. Campylobacter jejuni was identified in the stools, and the patient fully recovered with intravenous fluids and fluoroquinolones. His blood count on discharge was normal.

C. jejuni infection is a prominent cause of acute diarrheal illness in the general population and in travelers worldwide.² However, the literature focuses on its clinical manifestations or its more “exotic” late-onset complications: reactive arthritis, Guillain-Barré syndrome, and thrombotic

Funding: None.

Conflict of Interest: None.

Authorship: The author is solely responsible for the content of this manuscript.

Requests for reprints should be addressed to Ami Schattner, MD, Department of Medicine, Hebrew University and Hadassah Medical School, Kaplan Medical Centre, POB 1, Rehovot 76100, Jerusalem, Israel.

E-mail address: amiMD@clalit.org.il

http://dx.doi.org/10.1016/j.ajmmed.2013.07.003
**Viral infections**
- Herpes viruses: EBV, CMV, HHV6, VZV, HSV
- Measles, rubella
- Hepatitis viruses A and B
- HIV infection and AIDS
- Parvovirus B19
- Dengue virus infection†
- Severe acute respiratory syndrome coronavirus†
- Influenza viruses
- Nonspecific viral infections/postinfectious
- Post-viral vaccines

**Bacterial infections**
- Overwhelming sepsis, any organism (especially Gram-negative)
- Toxic shock syndrome (staphylococcal, streptococcal)
- Typhoid fever (*Salmonella typhi* and *paratyphi*)
- *Shigella enteritis*
- *Campylobacter* infections
- Rickettsial infections† (spotted fevers, typhus)
- Human ehrlichiosis and anaplasmosis†
- *Coxiella burnetii* infections† (Q fever)
- Bartonella infections† (cat scratch disease)
- Brucellosis†
- Leptospirosis†
- Tularemia†
- Lyme disease† (*Borrelia burgdorferi*)
- Relapsing fever† (*Borrelia sp.*)
- Tuberculosis (*Mycobacterium tuberculosis*)
- *Mycoplasma pneumoniae* infection

**Parasitic infections**
- Toxoplasmosis†
- Malaria
- Visceral leishmaniasis†

**Varied conditions**
- Sarcoidosis
- Systemic lupus erythematosus
- Lymphoma or leukemia (eg, LGL syndrome)
- Felty’s syndrome
- Hemophagocytic syndrome

---

**Table 1 Differential Diagnosis of Acutely Ill Febrile Adult Patient with Noniatrogenic Leukopenia and Thrombocytopenia***

| Diagnosis                                                                 | Example |
|----------------------------------------------------------------------------|---------|
| **Viral infections**                                                      |         |
| Herpes viruses: EBV, CMV, HHV6, VZV, HSV                                    |         |
| Measles, rubella                                                          |         |
| Hepatitis viruses A and B                                                 |         |
| HIV infection and AIDS                                                    |         |
| Parvovirus B19                                                            |         |
| Dengue virus infection†                                                    |         |
| Severe acute respiratory syndrome coronavirus†                            |         |
| Influenza viruses                                                         |         |
| Nonspecific viral infections/postinfectious                               |         |
| Post-viral vaccines                                                       |         |
| **Bacterial infections**                                                  |         |
| Overwhelming sepsis, any organism (especially Gram-negative)              |         |
| Toxic shock syndrome (staphylococcal, streptococcal)                      |         |
| Typhoid fever (*Salmonella typhi* and *paratyphi*)                        |         |
| *Shigella enteritis*                                                      |         |
| *Campylobacter* infections                                                |         |
| Rickettsial infections† (spotted fevers, typhus)                          |         |
| Human ehrlichiosis and anaplasmosis†                                      |         |
| *Coxiella burnetii* infections† (Q fever)                                 |         |
| Bartonella infections† (cat scratch disease)                              |         |
| Brucellosis†                                                              |         |
| Leptospirosis†                                                            |         |
| Tularemia†                                                                |         |
| Lyme disease† (*Borrelia burgdorferi*)                                    |         |
| Relapsing fever† (*Borrelia sp.*)                                         |         |
| Tuberculosis (*Mycobacterium tuberculosis*)                               |         |
| *Mycoplasma pneumoniae* infection                                         |         |
| **Parasitic infections**                                                  |         |
| Toxoplasmosis†                                                            |         |
| Malaria                                                                   |         |
| Visceral leishmaniasis†                                                   |         |

*AIDS = acquired immunodeficiency syndrome; CMV = cytomegalovirus; EBV = Epstein-Barr virus; HHV6 = human herpesvirus 6; HIV = human immunodeficiency virus; HSV = herpes simplex virus; LGL = large granular lymphocyte; VZV = varicella zoster virus.

†Excluding patients with prior cytopenias due to cancer/cancer treatment, portal hypertension, autoimmune disease, or ethnic leukopenia. White blood cell count occasionally may be normal despite high fever ("relative" leukopenia).

‡Zoonosis.

---

Thrombocytopenic purpura. Data on patients’ blood counts in uncomplicated cases (the majority) were hard to find. One publication noted a left shift (>10% band forms) in 55% of patients with stool cultures positive for *Campylobacter*, and 27.4% had a white blood cell count <10 × 10⁹/L associated with a left shift.⁴

To examine the prevalence of leukopenia or thrombocytopenia in *C. jejuni* infection, we performed a retrospective chart review of all stool-positive cases in adults (mean age, 54.2 years; range, 20-87 years) admitted over the last year to the department of general medicine in a single academic hospital.

Stool cultures were done by plating on *Campylobacter* agar (containing several antibiotics to inhibit normal stool flora) and incubating at 42°C in a microaerophilic environment for 48 to 72 hours.

Twenty *Campylobacter*-positive patients were found. Four additional patients had preexisting cytopenias secondary to underlying diseases or chemotherapy and were excluded. Six (30%) of 20 patients with *C. jejuni* gastroenteritis had leukopenia (<4.0 × 10⁹/L), 5 patients (25%) had thrombocytopenia (<130 × 10⁹/L), and 1 patient (reported) had both (5%). The cytopenias were mild (mean white blood cell count 3.15 × 10⁹/L, mean thrombocyte count 123 × 10⁹/L), rapidly transient in all cases (1-2 days), and not associated with prolonged hospital stay or complications. None of the patients developed late-onset complications.

*C. jejuni* infections should be added to the differential diagnosis of acute febrile illnesses that may be associated with leukopenia (or “relative” leukopenia) and thrombocytopenia (Table 1). This clinical presentation is not uncommon. It can be an important clue in diagnosis, and its differential should be better known.

---

**References**

1. Dinauer MC, Coates TD. Disorders of phagocyte function and number. In: Hoffman R, Benz EJ Jr, Shattil SJ, et al, eds. Hematology. Basic Principles and Practice. 4th ed. Philadelphia, PA: Elsevier; 2005:787-829.

2. Peterson MC. Clinical aspects of campylobacter jejuni infections in adults. *West J Med.* 1994;161:148-152.

3. Hou FQ, Sun XT, Wang GQ. Clinical manifestations of campylobacter jejuni infection in adolescents and adults, and change in antibiotic resistance of the pathogen over the past 16 years. *Scand J Infect Dis.* 2012;44:439-443.

4. DeWitt TG, Humphrey KF, Doern GV. White blood cell counts in patients with campylobacter-induced diarrhea and in controls. *J Infect Dis.* 1985;152:427-428.