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Case Report

# Neonatal *Campylobacter* Infection: A Diagnosis that should be Borne in Mind

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## Abstract

*Campylobacter* infection is not frequent in industrialized countries but can be dangerous in extreme ages groups with risk of bacteremia. We report a clinical case of a newborn that presented with fever and breastfeeding refusal due to a *Campylobacter jejuni* infection. She met sepsis criteria so started empiric antibiotics. However, clinical improvement was only possible after known the stool culture and the targeted treatment implemented. She had a favorable outcome on follow-up.

**Keywords:** *Campylobacter* infection; Diarrhea; Neonatal; Newborn

## Introduction

*Campylobacter* infection is an important cause of gastroenteritis worldwide [1] but systemic infection in a healthy host is rare [2,3]. Although the rarity, infants are at increased risk of complications [2], moreover the newborns. Their immune system is immature, more susceptible to bacteraemia, and grossly bloody stools or fever may be the only manifestations of a serious disease [4].

The most common transmission is through contaminated food or water. However, fecal-oral transmission has also been reported, especially between household contacts, pre-school children in daycare and through household pets' infection [2]. There are some reported cases associated with pets, inclusive with the same infective microorganism identified by molecular studies [2].

This case was described in order to warn the importance of suspect a *Campylobacter* infection when a newborn present nonspecific symptoms, associated with stool changes. The prompt recognition of the microorganism is the key to start specific treatment and avoid the bacteremia and the bad prognosis.

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## Clinical Case Report

A healthy 17-days-old girl with fever and diarrhea was admitted to our department for evaluation. Personal history: Second singleton pregnancy of a healthy mother, which attended the antenatal consultations with no risk factors identified. Routine prenatal laboratory results were unremarkable except group B *Streptococcus* status, which was unknown. Three normal obstetric ultrasounds were performed (one for each trimester). Pregnancy was uneventful except for intermittent diarrhea, present at the delivery moment. Vaginal delivery at 41 weeks, rupture of membranes 40 minutes before. Weight 3135 gr, Apgar score 1'/5'/10': 9/10/10. Exclusive breastfeeding. Relevant family history: Healthy six-years-old sister; the family lives on a house with all habitability conditions, on a rural region near some farms; they had a dog.

The neonate was well until 18 hours before admission when she started fever, breastfeeding refusal and liquid, foamy, foul smelling stools with mucus but without blood. On physical examination she was ill appearing, grunting and febrile (37.8°C). She had tachycardia with a heart rate of 160 beats per minute, blood pressure of 95/57 mmHg, respiratory rate of 40 breaths per minute, and pulse oximetry of 97% on room air. A systolic ejection murmur was heard. She has poor capillary refill and a urine output of 0.7 ml/Kg/h. Blood, urine and Cerebrospinal Fluid (CSF) were obtained, including for cultures. Stools samples were obtained for culture and for exam of parasites and virus. Immediately started a crystalloid fluid bolus of 10 ml/Kg with a good response on the capillary refill and heart rate. Laboratory exams revealed hemoglobin 15.7 g/dL, 14,900/µL white blood cell with 75.4% neutrophils and 34.2% lymphocytes, platelets count 1,43,000/µL, C-reactive protein 21.1 mg/L, glycemia 53 mg/dL and metabolic acidosis (pH 7.18, pCO2 50 mmHg, HCO3-17 mEq/L). Coagulation profile was normal. The CSF showed no leukocytes, and biochemical values (glucose and protein) were normal. Urine evaluation was unchanged. Cardiologic examination revealed persistent foramen ovale without hemodynamic signification.

Although the cultures remained unknown, the diagnosis of late sepsis was assumed, based on examination and blood evaluation, and treatment was started with intravenous ampicillin (100 mg/Kg/day) and gentamicin (5 mg/Kg/day). Her clinical situation improved within 48 hours. At that time stools tests for virus and parasites were negative.

Twenty-four hours later there was worsening clinical situation with fever (38.4°C) and breastfeeding refusal. The laboratory exams were repeated and revealed hemoglobin 16.1 g/dL, 15,200/µL white blood cell with 70.2% neutrophils and 31.2% lymphocytes, platelets count 1,62,000/µL, C-reactive protein 19.2 mg/L, glycemia 93 mg/dL and capillary gasometry unchanged. At 5$^{th}$ day *C. jejuni* was identified in the admission stool culture with an antibiotic susceptibility test sensible for azithromycin, erythromycin, ciprofloxacin and gentamycin. The result was negative for other pathogens. The blood culture was negative. A control stool culture was obtained and treatment was changed to oral azithromycin for 5 days at 10 mg/kg/day, in order to treat the enteric infection. This treatment led to clinical improvement from the second day on, with good

vitality, no fever, breastfeeding tolerance and shaped stools. The second stool culture confirmed *C. jejuni* infection.

The girl was discharged after 16 days, asymptomatic, remaining well after two months of follow-up.

## Discussion

*Campylobacter* is a common cause of gastroenteritis worldwide and the most common symptoms are diarrhea, abdominal pain, fever and nausea [5]. The illness is usually over within a week, with almost all cases occurring as isolated, sporadic events, with no specific treatment requires or sequel [5]. The incubation period is usually about 2-5 days but could be up to 10 days [5].

Despite being a rare infection in industrialized countries [2], it could be dangerous in extreme age groups or in chronic diseases, mostly in cases of immunosuppression [1,3]. The spectrum of disease is variable from uncomplicated gastroenteritis to fulminant disease, and long-term complications are described, like arthritis and neurological disorders such as Guillain-Barré syndrome [3,5].

In newborns with unspecific symptoms, all the potential pathogens should be considered, due to the risk of bacteremia and invasive disease [1]. The enteric infection shouldn't be forgotten, moreover when diarrhea is present, in order to start the specific treatment as soon as possible, and avoid the complications and sequels, not only of the campylobacteriosis but also of a severe sepsis [6].

*Campylobacter* are widely prevalent in the gastrointestinal tracts of many animals, especially in farm animals, but even pets, such as kittens and puppies, that may be sources of human infection [5]. There are some transmission modes known, more or less frequent, but all of them possible in newborns. The mainly one is horizontal, through physical contact with an infected person, especially siblings, parents, or health care workers, or by ingestion of food or water contaminated with animal faeces [5,7]. This includes raw and undercooked poultry or pork, inadequately treated drinking water and raw milk and its products. However, any food contaminated with the bacteria can be the source of infection [8]. The person-to-person spread may occur especially among household contacts, pre-school children in daycare, the elderly and developmentally disabled persons living in residential facilities [5]. Transplacental transmission was also described [7,9], especially when mothers had diarrhea at delivery time, and is responsible for severe conditions such as abortion, premature labor and bacteremia or meningitis [5,7]. Although the *Campylobacter* are not one of the most frequent enteropathogenic transmitted during the passage through the birth canal, this mode can also occur [7].

In addition, pets with diarrhea, such as puppies, can be sources of infection. It was found an association between cases of *Campylobacter* infection in children younger than 5 years-old and a puppy in the household [1]. Some studies have shown that the prevalence of *Campylobacter* in puppies is higher than in adult dogs [1], more often if puppies had diarrhea, so the transmission is higher too, probably because of a lower immunity system of these animals. Transmission by cats to humans was also reported [10]. However, more studies are needed to confirm the transmission, especially molecular studies.

Usually, a large dose of organisms is needed to cause infection, but the infectious dose may be lower for certain susceptible groups such as children, the elderly and the immuno compromised [5]. Also the invasive properties of *Campylobacter* will affect the disease severity such as the leading to epithelial ulceration in colon and the production of cytotoxins. However, the clinical significance of the toxicity of these organisms is still unclear [7].

When we have a newborn with diarrhea, like in our case, we have to order a stool culture. Two blood-cultures should also be made if the newborn has fever and/or is ill appearing [9], because it's the only way of diagnosis' confirmation. Although in our case we don't have a positive blood culture, it has been reported in other studies [6] and it can be explained by the use of an automatic blood culture system, with an unknown sensitivity for *Campylobacter* detection [11]. On other way, the detection of *Campylobacter* on blood culture should requires a median growth rate exceeding 5 days - the standard incubation period for the blood culture bottles. Some authors suggest the culture of bottles content onto solid media, at the end of the standard incubation period, in order to increase the detection [11]. The molecular diagnostics tests are other way used nowadays to identify microorganisms, especially by Polymerase Chain Reaction (PCR), when blood culture was negative [11]. In our case, none of these methods was used because the organism was identified in the stool culture without isolation of any other agent, and a significant improvement, either clinical and laboratory, after start specific treatment, confirms the diagnosis.

After confirming the diagnosis, specific treatment should be implemented together with support therapy, which depends on the illness severity [7]. In newborns all the *Campylobacter* infections should be treated not only to treats the infection but also to eliminate the carrier state [12]. When we suspect a campylobacteriosis, the empiric treatment should be started with a macrolide or a fluoroquinolone and then adjusted for the antimicrobial sensibility test, for three-seven days [8,12,13]. Stringent hygiene measures at home by family, especially appropriate hand washing and alcohol-based hand sanitizer, but also diaper changing frequently and suitable food-preparation equipment, are the most efficient prophylactic measures [1,8]. Symptomatic people should neither handle food nor care for others until the diarrhea resolves, and everyone should use potable water and pasteurized milk [12].

The World Human Organization recommends control measures at all stages of food chain, from agricultural production, to processing, manufacturing and preparation of foods both commercially and domestically [1]. Prevention methods against infection in domestic kitchens are similar to those used against other food borne bacterial diseases. Bactericidal treatment, such as heating (e.g., cooking or pasteurization) or irradiation is the only effective method of eliminating *Campylobacter* from contaminated foods [1]. In Portugal the campylobacteriosis is a notifiable disease, which contributes to the prevention and control at the public health department (DGS) [14].

In families is even more crucial the importance of a careful hygiene to prevent the transmission of infectious disease. The WHO recommends to washing hands thoroughly and frequently using soap, especially when there are newborns at home, and in particular after contact with pets, or after having been to the toilet, especially other children [1]. When treatment is started on time the prognosis is very good [5], with symptoms typically last three to six days [1].

This case of neonatal sepsis is representative of the potential clinical severity of *Campylobacter* infection in newborns. This diagnosis should be always borne in mind on a newborn with

unspecific clinical symptoms, especially if there are risk symptoms and stools changes. It also draws attention to the importance of health education, particularly on family hygiene and hand washing, especially when there are pets and other children at home, like in our case.

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