Archives of Pediatrics
Bossi G, et al. Arch Pediatr 10: 322
www.doi.org/10.29011/2575-825X.100322
www.gavinpublishers.com

OPEN ACCESS

GAVIN PUBLISHERS

Case Report

Vibrio Alginolyticus Sepsis in a Pediatric Patient

Grazia Bossi[1*], Marta Corbella[2], Marta Vergani[3], Angela Kuka[2], Gaia Vanzù[3], Fausto Baldanti[2,4], Patrizia Cambieri[2] & Gian Luigi Marseglia[1,4]

[1]Pediatric Unit, Fondazione IRCCS Policlinico San Matteo, Pavia, Italy.

[2]Microbiology and Virology Unit, Fondazione IRCCS Policlinico San Matteo, Pavia, Italy

[3]Pediatric School of Specialization, University of Pavia, Pavia, Italy.

[4]Department of Clinical, Surgical, Diagnostic and Pediatric Sciences, University of Pavia, Pavia, Italy.

***Corresponding author**: Grazia Bossi, Pediatric Unit, Fondazione Istituto di Ricovero e Cura a Carattere Scientifico (IRCCS) Policlinico San Matteo. Viale Golgi 19, Pavia. Italy.

Citation: Bossi G, Corbella M, Vergani M, Kuka A, Vanzù G (2025) Vibrio Alginolyticus Sepsis in a Pediatric Patient. Arch Pediatr 10: 322. DOI: 10.29011/2575-825X.100322

Received Date: 17 March 2025; **Accepted Date:** 24 March 2025; **Published Date:** 26 March 2025.

Abstract

Apart from the well-known entero-pathogenic species, the *Vibrio* genus encompasses a hundred of different species of Gram-negative bacteria ubiquitously present in marine environments. Among them, *V. alginolyticus* is an emerging pathogen to humans, and its rapidly increasing incidence reported in the literature is mainly due to climate change and warming seas. It causes mostly infections of skin and mucosae after exposure to contaminated sea water or raw food. Invasive infections have been reported very rarely, exclusively in immunocompromised or sick adults living closer the oceans. To our knowledge, no pediatric case of invasive infections have been reported in Italian children so far.

Hereby we present a 4-year-old Italian male, immunocompetent, affected by post-surgical short bowel syndrome, and carrier of a central line for parenteral support, who developed a *V. alginolyticus* sepsis after repeated bathing in Liguria see. Luckily the strain showed an extensive susceptibility to antibiotics and the central line could be saved with ethanol lock-therapy.

Our experience demonstrates the emergence of new pathogens also in our country. Facing with children, also if immunocompetent, carrier of any kind of devices potentially able to expose body districts usually closed to environmental agents, pediatricians should carefully investigate any possible new environmental source of infection. In this kind of patients, a medical history of recent sea-bathing should give rise to the suspicion of a brackish water Gram-negative bacteria infection. Luckily *V.alginolyticus* still maintain a good sensitivity to the antibiotics, but in the current literature have been recently reported cases of multi-drug-resistant strains.

Keywords: Vibrio Alginolyticus; Sepsis; Children; Central line

Introduction

Vibrio alginolyticus is the second most common *Vibrio* species in the world, ubiquitously present in marine environments, mainly oceans or estuaries [1,2]. Despite such a widespread circulation, its pathogen potential on humans has been only recently recognized and the wide spectrum of *V.algynoliticus* associated diseases is still little known [2-5]. *V.algynoliticus* usually causes localized mild infections of skin and mucosal surfaces, such as gastroenteritis [6], otitis [7-9], conjunctivitis [10] and pyodermatitis [11-13], that come from the direct exposure of skin and mucosae to contaminated seawater. Invasive and severe infections, such as intracranial infection [14], necrotizing fasciitis and/or sepsis [15,16] have been rarely reported in the literature and only in adult patients, with different underlying conditions, living in the coastal zones or islands of the Asian continent. Although patients with central venous catheter (CVC), especially if immunocompromised, are at high risk of developing invasive infections from environmental bacteria, no case of sepsis by *V. alginolyticus* in this group of subjects is reported in the current literature.

Here we report the first case of sepsis caused by *V.alginolyticus* in an immunocompetent Italian child carrier of a central line.

Case presentation

A 4-year-old male was admitted at our emergency room with high spiking fever and sore throat for a day, right after his return from a seaside holiday in Liguria, region of Italy. His past medical history was remarkable for intra-uterine bowel volvulus, low-grade prematurity (GE 35 wk + 2), surgical resection of a atresic ileal tract and jejuna-ileal recanalization. Because of his short bowel syndrome (SBS), from the age of three months the child had been carrying a Broviac®/Hickman® central venous catheter (CVC) for parenteral support. On admission physical and neurological examination were normal, except for skin redness and purulent exudate around the CVC exit site. Blood tests showed mild hyperleucocytosis (WBC 14.860/mm^3) with neutrophilia (N. 87%), severe hyponatremia (129 mEq/L), low prothrombin (50%), slight increase in C-reactive protein (3.95 mg/dl; normal value, nv < 0.5), procalcitonin (0.62 ng/ml; nv < 0.5) and D-dimer (662 mcg/L, nv < 500). Parenteral nutrition via CVC was stopped and biological samples (blood from CVC and peripheral vein, urine, stool and pharyngeal swab) for cultures were promptly collected and processed. Together with ethanol 75% based CVC lock-therapy (ELT), a broad-spectrum empiric therapy (ceftriaxone, amikacin, teicoplanin) was administered using a peripheral access. Rapidly, from the blood CVC, incubated into BACTEC FX automated blood culture system (Becton–Dickinson and Company, Franklin Lakes, New Jersey, and United States) grew *V.alginolyticus*, identified with Matrix-Assisted Laser Desorption Ionisation Time-Of-Flight/MALDI-TOF (Bruker Daltonics GmbH, Bremen, Germany, equipped with Biotype version 3.0). Luckily the strain showed an extensive susceptibility (Kirby Bauer method. European Committee on Antimicrobial Susceptibility Testing, EUCAST, version 13.0 breakpoints) to penicillin's, cephalosporin's, quinolones, carbapenem and sulphonamides (Table 1).

	CTX S ≤ 1 R > 2	CAZ S ≤ 1 R > 4	CIP S ≤ 0.25 R > 0.5	MEM S ≤ 2 R > 8	TZP S ≤ 8 R > 16	ERY	STX	TE
	0.064 (S)	0.125 (S)	0.064 (S)	0.006 (S)	0.016 (S)	S	S	S

Table 1: Antibiotic susceptibility profile of the strain isolated; Legenda: Cefotaxime (CTX), ceftazidime (CAZ), ciprofloxacin (CIP), meropenem (MEM), piperacillin/tazobactam (TZP), ERY erythrocyclin and trimethoprim-sulfamethoxazole (SXT), TE teracyclines. S: susceptible, R: resistant.

At the same time, the peripheral blood culture tested positive for methicillin-susceptible *Staphylococcus aureus*. According to both antibiograms, amikacin and teicoplanin were discontinued and treatment with ceftriaxone alone was prosecuted for a total of 14 days. Fever subsided in five days and all the inflammatory and biochemical parameters returned normal within a week. CVC blood culture tested negative after five days of ELT and the parenteral support via CVC resumed as usual. More than one year later, our patient is in good health and his CVC is still in site and perfectly working.

Discussion

The *Vibrio* genus encompasses over 100 different species of brackish water niche Gram-negative bacteria spread worldwide [1]. *Vibrio* spp. include some well-known enteropathogenic species (*V.vulnificus*, *V. parahaemolyticus*, and *V.cholera*), but also other less known species, like *V.alginolyticus,* that have been isolated mainly from marine organisms (farm fish, shellfish, shrimp), but recently also from wild and domestic birds [2,17-18]. Very recently the presence of a *V.alginolyticus* diarrheogenic strain has been demonstrated also in non-saline potable water systems [19].

Climate change and marine traffic are the leading causes of the growing preponderance of *V.alginolyticus* even in temperate zones, such as the coastal areas of Europe [20]. In addition, along with the growing spread, an increasing pathogenic power has been reported and a multi-drug resistant *V.alginolyticus* strain, OS1T-47, was isolated from an offshore site in the Red Sea [21].

In spite of their spread, Europe lacks mandatory notification systems for *Vibrio*-associated illnesses other than those caused by *V.cholerae* O1/O139, and–current European guidelines for foodstuffs do not include their assessment in food. Humans *V.alginolyticus* infections typically occur through contact with contaminated seawater or consumption of raw or undercooked seafood. Most often *V.alginolyticus* causes gastro-intestinal infections, with diarrhea, abdominal cramps, vomiting and fever [5,6], but superinfection of skin lesions [11-13] and otitis [7-9] have also been described, the latter mostly in children with recent exposure to infested seawater around Europe and the Mediterranean, mainly in the warmer times of the year [22].

Very rarely, *V.alginolyticus* invasive infections, such as intracranial abscess [14], septicemia and necrotizing fasciitis [15,16], have been reported in immunocompromised or otherwise sick adults patients living outside the European continent. Although *Vibrio* spp. and V.alginolyticus have been increasingly isolated from mussels and other marine gastropods in the Mediterranean Sea [23,24], no cases of infection have been reported so far in Italy, neither in adults nor children.

To our knowledge, ours is the first pediatric case of a V.alginolyticus sepsis in an immunocompetent Italian child, affected by SBS and carrying a CVC for parenteral support. In our opinion, two are the key aspects of this case worth highlighting. First of all, our experience testifies the possibility of severe human infections sustained by bacteria, such as V. alginolyticus, hardly pathogenic until some time ago, that can benefit from warmer temperatures. This is undoubtedly another proof of the dangerous effects of climate change affecting our planet, expected to expose humans to increasing types of environmental risks hitherto unknown.

Besides that, due to the extraordinary progress in medicine, the population of adult and pediatric patients surviving severe and rare diseases is steadily increasing, thus causing a progressive increase in the number of subjects potentially susceptible to infections, as the result of the combined effect of the disease itself, the immunosuppression and the indwelling long-lasting devices.

As a consequence of above, also in our country, pediatricians facing febrile immunocompromised or immunocompetent children with devices should evaluate not only their medical history, but also investigate the possible recent exposure to environmental risks, such as bathing in the Mediterranean sea, bearing in mind the risk of multi-drug-resistant *V. alginolyticus* infection.

Conclusion

As our experience shows, *Vibrio alginolyticus* can be responsible for sepsis and other invasive infections also in immunocompetent patients carrying devices such as CVC that create a direct connection between blood and the environment. In this type of patients or in case of deep wounds, if fever or other clinical manifestations suggest the possibility of an ongoing invasive infection, a recent exposure to seawater, also in Italy, should be carefully investigated. If the risk of an invasive infection sustained by *V. alginolyticus* is high, an appropriate empiric antibiotic therapy should be promptly started. Due to the recent emergence of more pathogenic strains of *V. alginolyticus* with higher level of antibiotic resistance, treatment should be rapidly changed according to the antibiogram. Moreover, to better assess the actual environmental risk, it would be advisable to extend the European notification systems to all *Vibrio*-associated illnesses.

References

1. Onohuean H, Agwu E, Nwodo UU (2022) A global perspective of *Vibrio* species and associated diseases: three-decade meta-synthesis of research advancement. Environ Health Insights 16: 1-14.
2. Baker-Austin C, Oliver JD, Alam M, Ali A, Waldor MK et al. (2018) *Vibrio* spp. infections. Nat Rev Dis Primers 4:1-19.
3. Yu Y, Li H, Wang Y, Zhang Z, Liao M, et al. (2022) Antibiotic resistance, virulence and genetic characteristics of *Vibrio* alginolyticus isolates from aquatic environment in costal mariculture areas in China. Mar Pollut Bull 185: 114219.
4. Wang J, Ding Q, Yang Q, Fan H, Yu G, et al. (2021) *Vibrio* alginolyticus triggers inflammatory response in mouse peritoneal macrophages via activation of NLRP3 inflammasome. Front Cell Infect Microbiol 11: 769777.
5. Slifka KMJ, Newton AE, Mahon BE (2017). *Vibrio* alginolyticus infections in the USA, 1988-2012. Epidemiol Infect 145:1491-1499.
6. Muzembo BA, Kitahara K, Hayashi C, Mashino S, Honda J, et al. (2024) Non-cholera *Vibrio* infections in Southeast Asia: asystematic review and meta-analysis. J Infect Public Health17: 102564.
7. Khan A A, Linkous B K, Lanza J T (2024) *Vibrio* alginolyticus: A rare cause of otitis externa off the coast of Florida. Cureus 16: e61524.
8. Citil BE, Derin S, Sankur F, Sahan M,Citil MU, et al. (2015) *Vibrio* alginolyticus associated chronic myringitis acquired in mediterranean waters of Turkey. Case Rep Infect Dis 2015:187212.
9. Feingold MH, Kumar LK (2004) Otitis media associated with *Vibrio* alginolyticus in a child with pressure-equalizing tubes. Pediatr Infect Dis J 23: 475-476.
10. Penland RL, Boniuk M, Wilhelmus KR (2000) *Vibrio* ocular infections on the U.S. gulf coast. Cornea 19: 26-29.
11. Campanelli A, Sanchez-Politta S, Saurat JH (2008) Cutaneous ulceration after an octopus bite: infection due to *Vibrio* alginolyticus, an emerging pathogen. Ann Dermatol Venereol. 135: 225-227.
12. Carroll A, Chowdhury M, Zheng C, Ghazali S, Palanivel S, et al. (2024) Stingray injury complicated by *Vibrio* alginolyticus wound infection and posterior tibial artery pseudoaneurysm in a returning traveler. Am J Trop Med Hyg 112:709-712.
13. Sganga G, Cozza V, Spanu T, Spada PL, Fadda G (2009) Global climate change and wound care: case study of an off-season *vibrio* alginolyticus infection in a healthy man. Ostomy Wound Manage 55: 60-62.
14. Opal SM, Saxon JR (1986) Intracranial Infection by *Vibrio* alginolyticus following injury in salt water. J Clin Microbiol 23: 373-374.
15. Hong GL, Dai XQ, Lu CJ, Liu JM, Zhao GJ, et al. (2014) Temporizing surgical management improves outcome in patients with *Vibrio* necrotizing fasciitis complicated with septic shock on admission. Burns 40: 446-454.
16. Gaüzère BA, Chanareille P, Vandroux DM (2016) Post nearly drowning *Vibrio* alginolyticus septicemia acquired in Reunion (Indian Ocean). Bull Soc Pathol Exot 109: 151-154.
17. Ramamurthy T, Chowdhury G, Pazhani GP, Shinoda S (2014) *Vibrio* fluvialis: an emerging human pathogen. Front Microbiol 5: 91.
18. Ayala AJ, Ogbunugafor CB (2023) When *vibrios* take flight: a meta-analysis of pathogenic Vibrio species in wild and domestic birds. Adv Exp Med Biol 1404: 295-336.

19. Saha S, Mookerjee S, Palit A (2024) Existence of thermotolerant and salt loving diarrheagenic Vibrio alginolyticus in non saline potable water system: a novel finding from India. Curr Microbiol 81: 443.

20. Oberbeckmann S, Wichels A, Maier T, Kostrzewa M, Raffelberg S, et al (2011) A polyphasic approach for the differentiation of environmental Vibrio isolates from temperate waters. FEMS Microbiol Ecol 75: 145-162.

21. Yasir M, Ullah R, Bibi F, Khan SB, Sofyani AA, et al. (2020) Draft genome sequence of a multidrug-resistant emerging pathogenic isolate of Vibrio alginolyticus from the Red Sea. New Microbes and New Infect 38: 100804.

22. Mukherji A, Schroeder S, Deyling C, Procop GW (2000) An unusual source of Vibrio alginolyticus-associated otitis: prolonged colonization or freshwater exposure? Arch Otolaryngol Head Neck Surg 126: 790-791.

23. Castello A, Alio V, Cammilleri G, Sciortino S, Macaluso A, et al. (2024) Microbiological and toxicological investigations on bivalve molluscs farmed in Sicily. Mar Drugs 19: 304552.

24. Bacchiocchi S, Campacci D, Siracusa M, Dubbini A, Leoni F, et al. (2021) Tetrodotoxins (TTXs) and Vibrio alginolyticus in mussels from central Adriatic sea (Italy): are they closely related? Marine Drugs 19: 304.