



## Successful Treatment of *Leuconostoc mesenteroides* Infection of the Broviac Catheter in a Patient on Home Parenteral Nutrition *via* Central Venous Access

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### Abstract

**Background:** Parenteral nutrition is an invasive treatment, which carries high risk of infection. Catheter related bloodstream infections are the most serious complications of parenteral nutrition therapy.

Contamination of the hub of a central line may cause bacteremia and sepsis. We present the case of *Leuconostoc mesenteroides* bacteremia in a parenteral-fed patient in the home-care setting. To our knowledge, it is the first described case of central line's salvage from this pathogen in an immunocompromised permanently parenterally fed adult patient.

**Case Presentation:** A 29-year-old man with features of malnutrition due to infection of a central line was admitted to the hospital on emergency. The patient reported abdominal pain, fever and symptoms of dysuria for 3 weeks. Standard tests were performed including blood for culture sampled from the central line and the peripheral vein. Blood cultures detected central line.

Parenteral nutrition administered *via* the peripheral venous route was introduced. Firstly, bacteremia was empirically treated with antibiotics such as vancomycin and imipenem+cilastatin, secondly switched to ampicillin according to the antibiogram and with Clindamycin administered to the central line followed by alcohol lock. Control cultures confirmed successful treatment. Parenteral nutrition was administered to the central line and transfusion went uneventful for two days.

**Conclusion:** Successful treatment of opportunistic CRBSI with catheter salvage can be feasible even in immunocompromised patients. In the central lines treatment it is important to consider risks and benefits resulting from its removal.

**Keywords:** Central venous catheter; *Leuconostoc*; Home parenteral nutrition; Sepsis

### Introduction

*Leuconostoc* species are Gram-positive, non-motile bacteria placed within the family of Streptococcaceae [1]. Species of this kind are hard to identify in clinical studies; by virtue of similar phenotype they are sometimes incorrectly reported as a.o. *Streptococcus*, *Lactococcus* or *Enterococcus* species [2]. *Leuconostoc* spp. is widespread in the natural environment. They were also identified in human's gastrointestinal tract, oral mucosa and reproductive organs. Until recently were considered to be non-pathogenic for humans and animals, whereas they are a rare cause of infection [1-4]. Now they have been recognized as a potential pathogen causing infection mainly in immunocompromised patients, patients with central venous catheters or patients undergoing long-term treatment with antibiotics [5].

### Infection problem in parenteral nutrition

Parenteral nutrition is an invasive form of treatment which carries a risk of serious complications. These complications when diagnosed too late or misdiagnosed and treated poorly might lead to the death of a patient. It is estimated that complications of central venous catheters might occur in one patient in ten. Often, the number of catheter-related septic complications is expressed as "catheter days". Acceptable CRBSI (Catheter-related bloodstream infection) rates have been variably reported as 0.35-2.27 episodes/1000 catheter days [6-8].

When a significant bacterial or fungal growth occurs, microbes disseminate into the blood

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stream and clinical symptoms manifested by sub febrile states or fever with chills, tachycardia, shortness of breath and overall deterioration of patient's state occur [9]. When disseminated infection is suspected the culture for fungus, aerobic and anaerobic bacteria is performed from the blood collected from the catheter or from the peripheral vein. Culture is also performed for urine, feces and skin around the exit of the catheter [10].

During the waiting period for blood culture results, empiric antibiotic therapy against Gram-positive (vancomycin) and Gram-negative bacteria (carbapenem) is implemented, which then is modified according to antibiograms. A type of vascular access should also be considered during the course of treatment: in case of non-tunneled catheters the consideration of risks and benefits from catheter removal is advisable. In case of permanent tunneled catheters a local treatment while keeping a catheter is recommended, if the infection is not caused by pathogens from a *Staphylococcus aureus*, *Pseudomonas aeruginosa*, *Mycobacterium* group. Fungal infections, multi-resistant bacteria, opportunistic microorganisms, immunocompromised patients or valved catheters (Groshong) are considered as not suitable for successful salvage. Infection caused by shall also not be treated [11].

## Case Presentation

A 29-year-old male was urgently admitted to the ward because of a 39°C fever, abdominal pain and symptoms of dysuria persisting for 3 weeks. The patient was permanently parenterally-fed *via* a tunneled catheter in home settings and presented with features of malnutrition, atrophy of subcutaneous tissue and BMI 16. Before admission to the hospital a primary physician administered Sulfamethoxazole plus trimethoprim which led to a partial improvement in the following symptoms: abdominal pain and dysuria symptoms stopped, while fever without chills persisted.

Medical history was as follows: Crohn's disease, Perianal fistula with chronic colonization of *Klebsiella pneumoniae* MBL (+), short bowel syndrome due to multiple extended surgical resections, drug induced liver and bone marrow damage after immunosuppressive treatment, hypertension, and prerenal acute kidney injury. At the admission, 100 mg of azathioprine was administered by oral route to sustain immunosuppression for several months. On the day of the admission patient's temperature was 37.6°C, blood pressure 103/63 mmHg, heart rate of 108 beats per minute with regular heart rate. Patient's general condition was good. Laboratory results: WBC: 9,06 K/ $\mu$ L [4,0 -10,0]; RBC: 2,86 M/ $\mu$ L [4,3- 5,9]; HGB: 8,7 g/dL [13,6-17,2]; CRP: 61,42 mg/l [0,00-10,00].

The chest X-ray and abdominal ultrasonography has not revealed any important abnormality. Patient with normal peristalsis and stoma output in the left mid-abdominal region, with two fistulas on the right side and no abdominal signs. A Broviac catheter on the right side of the chest, the area around the exit of the catheter was normal.

Total Parenteral Nutrition (TPN) was administered into the peripheral venous catheter. Nil per os was recommended. Empiric antibiotic therapy was implemented: vancomycin 2  $\times$  1.0 g i.v., imipenem+cilastatine 3  $\times$  0.5 g i.v. On the following day, patient's body temperature was normalized and pain regressed. Blood for culture from permanent catheter revealed *Leuconostoc mesenteroides*.

Despite the opportunistic character of infection and poor immunological patient's status, an attempt to heal the central line was

taken. By the tenth day of hospitalization ampicillin was administered according to the antibiogram 4  $\times$  0.5 g i.v. (for 7 days). Catheter lock with 1.5 ml of 90% alcohol (for 4 following days) was applied.

On day 13 catheter lock of Clindamycin 150 mg for the following 4 days was administered *via* VCS according to an antibiogram while continuing the previous systemic antibiotic therapy. At the end of the treatment a peripheral blood and central catheter cultures confirmed successful treatment and catheter salvage. A nutrition mixture was administered to the central line and was uneventful. On the 18<sup>th</sup> day of hospitalization the patient was discharged. In the control test 8 weeks and 3 months later no recurrence of infection was found.

## Discussion

The reported case comes from the largest parenteral home-feeding centre in Poland, the member of a Polish Network of intestinal insufficiency treatment. Annually about 340-356 patients are fed parenterally. A diligent training program on using a central venous catheter for patients and families resulted in the fixed number of incidence of infections at a rate of 0.45 incidents per 1000 catheter days. The authors in Winkler's work presented prevalence of blood infections linked with the use of a central line in parenterally-fed patients (CRBSI) at the rate of 0.38-4.58 incidence per 1000 catheter days [12]. Other reports oscillate in the rate of 0.34 and 2.68 incidence per 1000 catheter days [13,14]. Average frequency of CRBSI in Europe is 1.5 to 2 incidents per 1000 catheter days. Longer time of catheterization causes a higher risk of infection [15].

Recommended antibiotics used for treatment of the *Leuconostoc* spp. infections are  $\beta$ -lactams. Penicillin and ampicillin are more active than cephalosporins and are used as first line therapy. Carbapenems (e.g. imipenem) are effective, although there is a documented incident resistance to this group of antibiotics in case of a patient with postoperative meningitis. *Leuconostoc* spp. bacteria is also susceptible to Clindamycin, Tobramycin, Erythromycin, Minocycline with variable susceptibility for Quinolones, Cephalosporins and Trimethoprim/Sulfamethoxazole (TMP/SMX) [2,16].

These microbes are characterized by self-resistance to glycopeptides such as Vancomycin (VCM) because of modified peptidoglycan precursor's production. Modified precursors are characterized by reduced affinity for vancomycin.

In the presented case antibiogram suggested susceptibility of *Leuconostoc mesenteroides* to 3 antibiotics: Ampicillin, Meropenem and Vancomycin. Ampicillin was introduced; because literature suggests that *in-vivo* resistance for two other antibiotics may appear. During the targeted therapy, when choosing an antibiotic, the penetration capacity of the infection site, proper dose and the route of administration was considered as well [17].

There are only a few cases of *Leuconostoc* spp. bacteremia described in literature. Ho et al. [18] describe the case of female patient with squamous cell carcinoma and sepsis was successfully treated with antibiotic therapy and central line was maintained. Due to initial blood cultures revealing Gram-positive cocci empiric antibiotic therapy was administered (vancomycin and piperacillin with tazobactam). According to antibiogram antibiotics were changed to ampicillin 2 g i.v. every 6 h. After 2-week treatment blood culture results came out negative [18].

Ishiyama et al. [19] presented a case of a female patient with myeloblastic leukemia who developed moderate fever during

chemotherapy. In the blood culture Gram-positive cocci were found and vancomycin was implemented. Having proven that it was *Leuconostoc* bacteria, VCM was ceased. On the basis of medicine susceptibility imipenem/cilastatin and gentamicin were implemented. When treatment was not successful and fever went up, gentamicin was changed to sulfamethoxazole/trimethoprim. The therapy proved to be effective [19].

In the other case of 26-year-old male patient in who blood culture found *Leuconostoc* spp. a result of antibiogram test showed susceptibility to clindamycin, ampicillin, gentamicin and penicillin. He was successfully treated with clindamycin [20].

Another publication presents the case of a patient with a 38.8°C fever. *Leuconostoc mesentroides* bacteria susceptible to penicillin and aminoglycoside were isolated from peripheral blood. For 6 days the treatment included ampicillin (6 g/day i.v.), then it was switched to amoxicillin (3 g/ per os.). Decrease in fever was reported. Blood control results came out negative [21].

In another publication presented by Huber et al. [22] a male with lung mycobacteriosis, parenterally-fed *via* central line, was diagnosed with *Leuconostoc* bacteria susceptible to: Penicillin, Ampicillin, Imipenem, Erythromycin, Clindamycin, and Gentamicin and resistant to Vancomycin found in a blood culture from the tip of a catheter. The catheter was removed which led to the reduction of infection [22].

## Conclusion

Although *L. mesenteroides* is an opportunistic pathogen, it was successfully treated with catheter salvage. It is feasible to treat catheters even with pathogens considered to be at high risk of treatment failure. To the attempt for treatment with catheter preservation, good condition and close monitoring of the patient is mandatory.

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