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## **Management of blood infection caused by colonization of the vascular port with klebsiella variicola in case of patient treated with palliative chemotherapy**

### **Postępowanie w zakażeniu krwi spowodowane kolonizacją portu naczyniowego bakterią klebsiella variicola u pacjentki leczonej chemioterapią paliatywną**

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#### **Abstract**

Klebsiella variicola is a bacterial species that was originally identified as a mild endosymbiont in plants, it occurs in humans and cattle. It is a bacterium that has been discovered relatively recently and research on the broader understanding of the pathogen is still underway. Vascular catheters are very often used to receive chemotherapy by patients. The purpose of this work was to present the management of blood infection caused by colonization of the vascular port with klebsiella varicola. The material described can be used to conduct patient pharmacotherapy. Care for a patient with a vascular port should be developed. There is a need to conduct staff training on: proper care and use of the vascular port and Huber needle for pharmacotherapy. Huber needles could be standard material in the list of required equipment in hospital wards to improve patient care with a vascular port.

#### **Streszczenie**

Klebsiella variicola to gatunek bakterii, który pierwotnie został zidentyfikowany jako

łagodny endosymbiont w roślinach, występuje u ludzi i bydła. Jest to bakteria stosunkowo niedawno odkryta, w dalszym ciągu trwają badania dotyczące szerszego poznania patogenu. Cewniki naczyniowe są bardzo często stosowane do przyjmowania chemioterapii przez pacjentów. Celem poniższej pracy było przedstawienie postępowanie w zakażeniu krwi spowodowanym kolonizacją portu naczyniowego bakterią *klebsiella variicola*. Opisany materiał może być wykorzystany w prowadzeniu farmakoterapii pacjenta. Opieka nad pacjentem z portem naczyniowym powinna być rozwijana. Istnieje potrzeba prowadzenia szkoleń personelu dotyczących: prawidłowej pielęgnacji i wykorzystywania portu naczyniowego i igły Hubera do farmakoterapii. Igły Hubera mogłyby być standardowym materiałem w wykazie wymaganego sprzętu na oddziałach szpitalnych, aby usprawnić opiekę nad pacjentem z portem naczyniowym.

**Key words:** *klebsiella variicola*, central vascular catheters, Huber needle

**Słowa kluczowe:** *klebsiella variicola*, centralne cewniki naczyniowe, igła Hubera

## Introduction

Central vascular (venous) catheters are devices introduced into the central vein by breaking the skin and the walls of the blood vessel in order to achieve constant contact with its light. The central veins are the direct inflows of the upper and lower vena cava [1,2]. Currently, the most common way of obtaining central access is cannulation of the internal jugular and subclavian vein [3]. Currently, we distinguish the following types of central vascular catheters: peripheral central catheters, centrally introduced central catheters, tunneled or non-tunneled, fully implanted central vessel ports [1,4, 5,6,7].

The central vascular port is a subcutaneous implant system built of a chamber with a slygone membrane and a catheter [3]. Usually the ventricle is located in the right subclavian area and the catheter tip is located on the border of the superior vena cava and the right atrium. Fully implanted ports for central vessels are the most convenient and safest way to conduct long-term intravenous therapy with frequent drug administration. Chemotherapy is the basic indication for its implantation, the use of central peripheral catheters allows peripheral veins to be protected against the toxic effects of the drug [4,5].

The incidence of infections associated with the presence of a central venous catheter is approximately 0.8 - 16% [3,5,8,9]. There are local infections, port/tunnel pocket infection and catheter blood infections [5]. The most common pathogens that cause catheter blood

infections are: coagulase-negative staphylococci (including *Staphylococcus epidermidis*, *Staphylococcus haemolyticus*), *Staphylococcus aureus*, *Pseudomonas aeruginosa* and yeast (*Candida* spp.) [5,7,10]. We suspect blood catheteric infections when a patient who has a central catheter inserted peripherally for more than 48 hours has malaise, fever, chills, hypotension, nausea, vomiting and disturbed consciousness [4,11]. For diagnosis of catheter blood infection, peripheral blood and port blood should be collected prior to antibiotic activation. The port membrane can only be punctured with the Huber needle. It is a special needle with a spoon-like cut, which pushes the fibers of the membrane apart and does not cut holes in it [3,5]. Diagnosis criteria: the number of colonies grown from port blood is three times higher than the number of colonies grown from peripheral blood and/or: the same pathogen was grown in the material from the port and peripheral blood > 15 CFU/ml (semi-quantitative method) or > 103 CFU (quantitative method); and/or: the bacterial cultures in the port blood have grown at least two hours earlier than the bacterial cultures in the peripheral blood [5,11,12,13].

In the empirical treatment of catheter blood infection in the first line we use vancomycin. If sepsis is suspected, an antibiotic effective for Gram-negative bacteria should be added (e.g. carbapenems, e.g. imipenem, 4th generation cephalosporins or beta-lactam antibiotics with beta-lactamase inhibitors in combination with or without aminoglycoside). After receiving the culture results, we give the antibiotic according to the antibiogram. In the case of peripheral central catheter colonization (positive result of a blood sample taken from the port) by *Staphylococcus aureus*, *Mycobacterium* spp. or fungi, removal of the port is recommended [5,7,14]. In other cases of port colonization, alcohol or antibiotic cork should be used [5,15,16]. If bacteraemia persists despite adequate antibiotic therapy for 48-72 hours, the port must be removed. Removal of the intravenous port is also recommended when severe sepsis, infected venous thrombosis, infective endocarditis, tunnel infection, port abscess [5,7,14]. The risk of relapse from catheter blood infection is about 7.3-16% [3,17]. To prevent infection, the port should be operated under aseptic conditions (chlorhexidine and alcohol solutions are recommended for disinfection), only by trained nursing and medical personnel [5].

## **Case report**

A 52-year-old woman diagnosed with malignant pancreatic cancer was urgently admitted to the Geriatrics Clinic. Patient independent in self-care. Main ailments of the patient: weakness, chills, fever. The elevated temperature has been sustained since the next dose of chemotherapy - about twelve days before hospitalization. In the history of each dose of chemotherapy, feverish conditions lasting about three days, disappearing after antipyretics. The patient was taken metamizole. Patient allergic to ibuprofen and aspirin. Patient after complete pancreatectomy due to pancreatic adenocarcinoma diagnosed in February 2019. Currently, hepatic metastases, the patient receives palliative chemotherapy through the port (central catheter introduced peripherally). So far, treated with Creon in dose 25,000 three times a day and with NovoRapid and Insulatard insulins due to secondary deficiency of

hormones and enzymes as a result of pancreas removal. In recent days, the demand for insulin increased, despite a decrease in appetite and a decrease in the amount of food consumed. The skin was yellow, white-gray coating on the tongue, palpable vascular port palpable in the right subclavian region, pancreatectomy scar on the abdomen.

On the first day of hospitalization, urine and peripheral blood were collected. Suspecting that the source of infection may be a vascular port, it was also decided to collect blood for microbiological testing directly from it. This gave rise to numerous questions and technical difficulties, including which needle should we use? How to properly perform the collection but avoid catheter damage? Where to get the Huber needle? Can the antibiotic be given directly through the port? How many days can the needle be left in port? Individual personnel who had previously had contact with the ports served the patient's port. Obtaining a needle at the hospital was troublesome because it is not a required material in most departments. The needle handling staff also did not know how to transport the material. Huber's needle was transported from the Children's Hematology Clinic.

Ceftriaxone intravenously via the port at a dose of 1x2 g was empirically used. In addition, anticoagulant prophylaxis - Clexane 1x0.2ml intradermally, Nystatin suspension six times daily topically applied to the tongue, insulin NovoRapid and Insulatard intradermally according to glycemic profile, Kreon in dose 25,000 capsules orally, three times a day. The patient's condition did not improve, she was still feverish and had elevated need for insulin. Based on laboratory tests, metabolic acidosis, anemia and iron deficiency were found - Hemofer prolongatum 1 tablet daily was added.

A cardiac echo was performed in which the presence of bacterial and fungal vegetation on the valves was excluded. G (-) Klebsiella variicola multi-drug strain was bred from blood collected from the periphery and the port. After consultation with the microbiologist, cefuroxime was discontinued and targeted antibiotic therapy - piperacillin / tazobactam (Tazocin) at a dose of 3x4.5 mg intravenously through the port was started. The next day the patient's condition worsened, there was worsening of weakness, nausea, lack of appetite, metoclopramide was used three times 10 mg orally. In the following days, the patient's condition gradually improved, the fever subsided, the inflammatory markers decreased. After completion of antibiotic therapy, control blood cultures were collected. Transient ionic disorders occurred - initially hyperkalemia, then hypernatraemia, Due to cachexia, high-protein dietary supplements were recommended - Protifar three times two scoops and Nutridrnk 125 ml. The patient was consulted by a palliative medicine doctor - it was recommended to gradually discontinue Pabi Dexamethason, switch on Magelia 20 ml daily, Espumisan and Supliride. The patient's condition slowly improved, she was discharged from the Clinic in a stable general condition.

## Conclusions

*Klebsiella varicola* is a relatively recently discovered bacterium and research on a broader understanding of the pathogen is ongoing. The above discussed symptoms and management can be used to conduct pharmacotherapy of the patient. Care for a patient with a vascular port should be developed. There is a need to conduct staff training on: proper care and use of the vascular port and Huber needle for pharmacotherapy and appropriate transport of Huber needle (in the absence of material in the home ward). Huber needles could be standard material in the list of required equipment in hospital wards to improve patient care with a vascular port.

## Conflict of interests

Authors declare no conflict of interest.

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