

IMPLANTATION OF THE PORT-A-CATH WITH ONCOLOGIC PATIENTS - USAGE AND INFLUENCE ON THE QUALITY OF LIFE

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Abstract: Central vein catheters (CVC) have very important role in the treatment of patients with malignant diseases. CVCs are used for the application of chemotherapy and also for the extended usage of liquids, blood and blood derivatives, antibiotics, total parental nutrition as well as for common blood analysis. Port-a-cath vein catheters are closed systems and their purpose is to provide access to the central vascular system. The use of these systems is associated with decreased possibility of infection, simple maintenance of the port that is not in use, esthetic benefit and improved mobility of patients. In our clinic 16 port-a-cath vascular catheters were implanted to oncologic patients from January 2017 until 31st January 2018. There were no early complications and in 12,5% of patients late complications occurred. Subjective assessment of all the patients with implanted port-a-cath system is improved quality of life.

Key words: port-a-cath, oncologic patients, quality of life, chemotherapy

INTRODUCTION

Patients with malignant diseases need multidisciplinary approach and therapy that is often given intravenously. Central vein catheters (CVC) have very important role in the cure of these patients. They are used not only in the application of chemotherapy but also for the extended usage of liquids, blood and blood derivatives, antibiotics, total parental nutrition as well as for common blood analysis. There are different types of CVC: non-tunneled CVC, peripheral inserted PICC, tunneled and CVC with implantable port. For oncological patients the most adequate is CVC with implantable port due to relatively simple implantation and uses, low infection levels, safety and comfort that provides to patients [1,2,3,4]. In modern oncology these systems replace the tunneled catheters and short-term use. Chemotherapy is taken cyclically and to avoid reuse of CVC that leads to sclerosis of the blood vessel wall and as every invasive procedure takes its risks (infection, hematoma, pneumothorax...), there is a possibility of implementation port-a-cath catheter that improves lives to patients on long-term therapies [5].

PROCEDURE DESCRIPTION: PORT-A-CATH PLACEMENT

Port-a-cath is composed of the catheter and the chamber that is apart from the cytostatic treatment, antibiotics and painkillers also used for parental nutrition or for the blood sampling. The port is placed subcutaneously, mostly on the front of the chest, connected with the catheter positioned in superior vena cava above the confluence in right atrium.

Port-a-cath can stay placed for several months. To enable the route for therapy taking or blood sampling the special hollow needle (Huber needle) is implemented through the skin in silicon membrane of the port whilst the chamber is immobilized with fingers of non-dominant hand. The port puncture is always done in sterile conditions with application of aseptic technique on the skin with usage of sterile gloves to prevent infection [1]. It is recommended to rinse the port after each usage with heparin solution in concentration of 10-100 iu/ml. [6]

The procedure of port-a-cath catheter placement can be done in following ways: by surgery technique of the preparation of blood vessel, by the technique of direct vein puncture lead by ultrasound. The advantage of direct vein puncture is the possibility of performing the procedure in local anesthesia. Surgery placement of the port is to be done in the general or regional anesthesia. The potential places for insertion of CVC are cephalic and basilic vein, subclavian vein, vein jugular intern on the neck or vein jugular extern that can be used as the approach at children. The choice of the place of vein puncture is

usually determined on the basis of localization of the malignant disease (contralateral side at unilateral breast cancer), the presence of infection, vein thrombosis or previously placed pace – maker . The average length of the catheter to reach the wanted position (till cavoatrialjunction) when punctured jugular or vein subclavian is 18 cm on the right side and 22 cm on the left side. During the procedure EKG monitoring is necessary. After the procedure the position of the catheter is checked by the lung x-ray which excludes the presence of pneumothorax as well. [2]

The most common complication though and the most common reason of catheter explantation is infection and that is why the antimicrobial prophylaxis is necessary. [7]

Other complications can be divided according to time of origin as follows:

- complications during the intervention (puncture of artery, hematoma, air embolism, pneumothorax , heart arrhythmias, perforation of heart hollows and big blood vessels)
- complications related to catheter (dislocation, thrombosis, occlusion, rupture of catheter, narcosis of skin)
- vascular complications (thrombosis of vein vessel, arterial vein malformations)

Other division of complications related to the implantation of port-a-cath system is as follows:

- early (between 24 hours and 4 weeks from implantation)
- late (4 weeks after implantation) [3]

The purpose of the work was to present the experience of Clinical Hospital Center Bezanijskakosa related to implantation of port-a-cath catheter.

Method

Implantation of port-a-cath system presents the procedure that is performed in operation room under local anesthesia in aseptic conditions.

All the patients needed frequent parental therapy taking and blood sampling for lab analysis and the indication for implantation of S port-a-cath system was set up by an oncologist or a surgeon. Due to compromised immunology status and prevention of the catheter infection all the patients got the prophylactic dose of antibiotics Ceftriaxon 2 g an hour before the procedure.

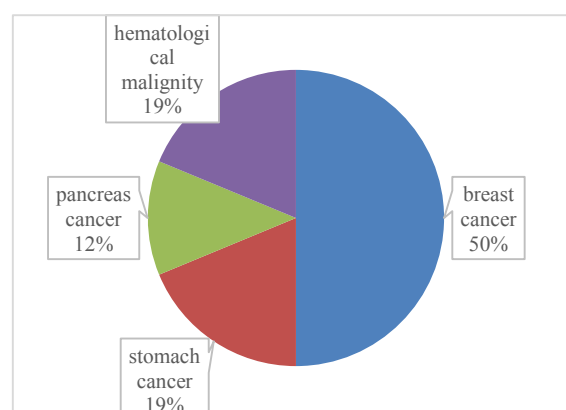
The placement mostly was set up in the right veinsubclavian whilst with the female patients that were exposed to total mastectomy port was placed on the opposite side. In the conditions of local anesthesia catheter was placed by the technique of direct puncture of vein on the basis of anatomy points. In front of pectoral muscle the pocket in subcutaneous tissue was made where the chamber was positioned and fixed. In the end of the procedure the chamber was rinsed with the solution of heparin in concentration of 100ij/ml. After the procedure the position of catheter was verified by the x- ray. The patients and the accompanied families were educated for the usage, rinse and infection prevention of the port-a-cath system.

Results

In our institution since January 2017 until 31st January 2018., 16 port-a-cath vascular catheters were implanted to oncologic patients.

The highest percentage of the patients got the therapy for the breast cancer [8], 3 patients were treated from the stomach cancer, 2 from pancreas cancer and bile ducts and 3 patients had hematological malignity (Figure 1). The patients in average were aged 48 (27 – 75).

Figure 1: Distribution of oncologic patients underwent the port-a-cath implantation



There were no early complications during the placing of the port. Two patients had late complications - dislocation of the catheter with one that led to renewed insertion of port and the other patient had the rotation of port chamber that was solved in the local anesthesia.

DISCUSSION

In developed countries the usage of these catheters is standard in the treatment of oncologic patients whilst in developing countries the data about the usage of these catheters is poor, probably due to inaccessibility and the high costs of the catheters.

Port-a-cath systems are closed and their purpose is to provide access to the central vascular system. It gives possibility to use the skin as a natural barrier against infection and to take out a puncture needle after each usage. The advantages of such a close system are decreased possibility of infection, simple maintenance of the port that is not in use, esthetic benefit of subcutaneously positioned chamber, providing the mobility of patients as well as doing their normal daily activities and decreased possibility of complications related to central and peripheral venous catheters. [1]

Infections, hematoma, malposition of the catheter, pneumothorax, thrombosis, embolization, catheter nicking are still important complications that follow the implementation of a port - a - chat catheter. During the last decade the reports indicate that the rate of complications has been reduced significantly due to improvement of the placing technique itself as well as the material of the catheter. Previously Hicman and Borivac catheters were used and nowadays port - a - chat catheters are used due to easy accessibility and lower rate of complications. [8,9]. As the technology of producing catheters and materials has been improved, nowadays catheters with implantable port are lighter, stronger and can support higher pressure of the liquids for frequent diagnostic procedures that the malignant patients are exposed to. [10-17]

In our experience, this procedure was accompanied with late complications occurred in 12.5% of patients. Dislocation of the catheter that led to renewed insertion of port occurred in 6.25% and also, in 6.25% of patients the rotation of port chamber occurred. These complications were resolved routinely and did not significantly affect the treatment protocol.

Advantages of this procedure were numerous. Reuse of standard CVC sometimes leads to sclerosis of the blood vessel. The veins of the patients with port-a-cath systems were protected and the reimplantation of CVC is avoided, except for one patient due to dislocation of the catheter. Also, using port-a-cath systems had benefits for medical care and other treatment procedures providing a greater comfort to medical staff by simple approach to vein route.

Subjective assessment of all the patients with implanted port-a -chat system is improved quality of life. The main advantages observed by patients were greater mobility and improved comfort.

CONCLUSION

Placing of port-a-cath system significantly improves the quality of life in the following ways: The veins of the patients were protected from sclerosis reimplantation of CVC is avoided. Medical staff has simple approach to the vein route for therapy giving or blood sampling for the lab analysis. Patients experienced greater mobility and comfort.

LITERATURE:

1. Gonda SJ, Li R. Principles of subcutaneous port placement. *Tech Vasc Interv Radiol.* 2011;14(4):198-203.
2. Teichgräber UK, Pfitzmann R, Hofmann HA. Central venous port systems as an integral part of chemotherapy. *Dtsch Arztebl Int.* 2011;108(9):147-53.
3. Teichgräber UK, Gebauer B, Benter T, Wagner HJ Central venous access catheters: radiological management of complications. *Cardiovasc Intervent Radiol.* 2003; 26(4):321-33.
4. Torro A, Shembari E, Mattone E, Di Carlo I Which is better for patients with breast cancer : Totally implanted vascular access device or peripheral inseted central catheter (PICC)? *World J Surg.* 2020;44(3):1004-1005. doi: 10.1007/s00268-019-05196-4
5. Di Carlo I, Pulvirenti E, Mannino M, Toro A. Increased use of percutaneous technique for totally implantable venous access devices. Is it real progress? A 27-year comprehensive review on early complications. *Ann Surg Oncol* 2010;17:1649-1656.
6. Teichgräber UK, Gebauer B, Benter T, Wagner Jrofo. Long-term central venous lines and their complications. *2004;176(7):944-52.*
7. Gebauer B, Teichgräber U, Werk M, Wagner HJ Rofo. Periinterventional prophylactic antibiotics in radiological port catheter implantation. *2007;179(8):804-10.*
8. Bleasdale SC, Trick WE, Gonzalez IM, Lyles RD, Hayden MK, Weinstein RA. Effectiveness of chlorhexidine bathing to reduce catheter-associated bloodstream infections in medical intensive care unit patients. *Archives of Internal Medicine* 2007;167(19):2073-9. [PUBMED: 17954801]

9. Boonyasiri A, Thaisiam P, Permpikul C, Judaeng T, Suiwongsa B, Apiradeewajaset N, et al. Effectiveness of chlorhexidine wipes for the prevention of multidrug-resistant bacterial colonization and hospital-acquired infections in intensive care unit patients: a randomized trial in Thailand. *Infection Control and Hospital Epidemiology* 2016;37(3):245-53. [PUBMED: 26894621]
10. Walser EM. Venous access ports: indications, implantation technique, follow-up, and complications. *Cardiovasc Intervent Radiol.* 2012;35(4):751-64.
11. Xing, Lei, Wu Kainan. Diagnosis and treatment of peripherally inserted central catheters (PICC)-related sepsis in breast cancer for chemotherapy. *The Chinese-German Journal of Clinical Oncology.* Pub Date : 2012-02-08. DOI: 10.1007/s10330-011-0912-6.
12. Lewis SR, Schofield-Robinson OJ, Rhodes S, Smith AF. Chlorhexidine bathing of the critically ill for the prevention of hospital-acquired infection. *Cochrane Database Syst Rev.* 2019;8(8):CD012248. doi: 10.1002/14651858.CD012248.pub2.
13. Oksza M, Oyama K, Kinoshita J, et al. Incidence of and risk factors for totally implantable vascular access device complications in patients with gastric cancer: A retrospective analysis. *Mol Clin Oncol.* 2019;11(4):343-348. doi: 10.3892/mco.2019.1897. Epub 2019 Jul 15.
14. Goltz JP, Noack C, Petritsch B, Kirchner J, Hahn D, Kickuth R. Totally implantable venous power ports of the forearm and the chest: Initial clinical experience with port devices approved for high-pressure injections. *Br J Radiol.* 2012;85:e966-e972. doi: 10.1259/bjr/33224341.
15. Schiffer CA, Mangu PB, Wade JC, Camp-Sorrell D, Cope DG, El-Rayes BF, Gorman M, Ligibel J, Mansfield P, Levine M. Central venous catheter care for the patient with cancer: American Society of Clinical Oncology clinical practice guideline. *J Clin Oncol.* 2013;31:1357-1370. doi: 10.1200/JCO.2012.45.5733
16. Li Y, Cai Y, Gan X, Ye X, Ling J et al. Application and comparison of different implanted ports in malignant tumor patients. *World J Surg Oncol.* 2016;14:251. doi: 10.1186/s12957-016-1002-6.
17. Ji L, Yang J, Miao J, Shao Q, Cao Y, Li H. Infections related to totally implantable venous-access ports: Long-term experience in one center. *Cell Biochem Biophys.* 2015;72:235-240. doi: 10.1007/s12013-014-0443-1