Maintenance of the Totally Implanted Catheter

Claynner Paccely Oliveira Bessa

Oncocentro Belo Horizonte, Oncoclinicas Group of Brazil, Belo Horizonte 30360-680, Minas Gerais, Brazil

Abstract: Cancer is the second cause of death in Brazil and it is estimated that, for the year 2015, there would be about 576 new cases of cancer in the country, according to data of INCA (National Cancer Institute). All cancer patients who get chemotherapy for a longer period, at some time, will present a vascular peripheral fragility. The TIVAD (totally implanted venous access device), also called “Port”, is a good option for these patients since it facilitates a safe access for the treatment. The Port’s permeability maintenance is done with a saline solution after any infusion and at the end of the infusion.

Key words: TIVAD, oncologic patient, maintenance.

1. Introduction

The use of TIVAD (totally implanted venous access device), also called “Port”, was introduced in 1940s and it has become essential to healthcare since then. Although this device is directly related to bacteremia, which in turn promotes expressive morbidity rates and high hospital costs, it provides a rapid access to blood flow [1].

The use of TIVAD demands a lot of care and complications, which are related to its handling, as well as maintenance. Infection is one of the most common complications, leading to a high rate of morbidity and mortality, putting immunosuppressed patients at risk and worsening conditions with low immunity. Infection is also one of the causes of re-admittance of patients who have the catheter implant [2].

A variety of factors influence the infection rates: place and insertion technique, kind of TIVAD, time of stay, patients’ intrinsic factors, kind of solution infused and the skills of nursing team handling. The blood flow incidence in Brazil varies. These infections comprise cases, in which the same isolated microorganism in culture of a specific catheter segment is identified in blood flow, not showing any other apparent source for bacteremia [3].

The care required with procedures involving venous access must include a multi- and inter-disciplinary team, in order to prevent intercurrent. The specialists may use educational actions, explaining to the patient, as well as to his family, the correct way to carry out catheter’s hygiene and how to recognize signs of infection and if detected, immediately look for a medical help to deal with the problem and eliminate it [4].

The specialist nurse makes both the peripheral and central accesses assisted by a doctor. Both of them must have had technical and scientific knowledge not to cause any harm to the patient and provide high quality service. Since the nurse is in direct charge of long-term catheter, he must know deeply about the procedure, as well as being up-to-date, always aiming avoiding intercurrents due to the use of the catheter [5].

Knowing the proper actions to be taken while taking care of the long-term catheter, the nurse team has the possibility to minimize or even prevent risks to the patient, mainly when it comes to complications caused by catheter implant.

The objective of this study is to show practices that permit maintenance of totally implanted catheter permeability evidencing the recommended nursing care for patients with long-term totally implanted catheters, showing effective evidence of TIVAD’s

Corresponding author: Claynner Paccely Oliveira Bessa, nurse, research field: clinical oncology.

maintenance using saline solution and showing the standard procedure of totally implanted catheter maintenance.

2. Metodology

This study was performed from research on websites and publications being its descriptor: TIVAD in oncologic treatment and of specialist nurse team challenge. Through this research, the use of TIVAD increased patients' adhesion to chemotherapy treatment and showed an improvement in their life quality.

This study was performed with a selection of texts to guide the present work, representation of the original research, information analysis, results' interpretation and review.

The bibliographical research was performed from April 2015 to June 2015. The search for articles happened through key words combinations: long-term catheter port-a-caths, nursing care and infection. Only published research between January 2013 and January 2015 was selected.

After the selection, the articles were listed, as well as information about article identification and authors, location, objectives, data analysis, results, discussion and recommendations for nursing practices. I selected 63 articles, but 24 were excluded due to having been published prior to 2003. After, summaries of the pre-selected were read, leaving out 9, since they did not refer the proposed subject. After reading, the excluded selected articles and other 18, because they did not match the objective of this work. Hence, the final sample was composed of 12 scientific articles produced by nursing professionals or with their participation and 3 books, which discuss nursing assistance, catheter care and scientific methodology.

3. Discussion

The catheter may be described as a device; surgically implanted or not, aiming to assure a quick and safe access to: infusions and blood collection for laboratory

tests of patients who need prolonged treatment and/or show precarious venous access. The cat-a-caths catheters are some of the most long-term devices used. They are made of polyethylene and polyvinyl, having distal extremity which couple to a puncturable camera that must remain implanted subcutaneously implanted on the thoracic region, over a protuberant bone. The indication for this kind of catheter varies according to the institution's protocol and the peripheral venous networks' conditions of the patient [6].

A surgeon implants the device, and its handling is performed by a specialist nurse. Therefore, the nurse must have technical and scientific knowledge to make procedures in order to avoid possible complications that could lead to the device's removal and mainly to prevent infections that can, many times lead to patient's death [7].

It may be implanted in the internal and external jugular, in cephalic, in the armpit, in subclavian, in saphenous and femoral and this procedure must be performed in surgery rooms and using antimicrobial prophylaxis. These kinds of catheters can be implanted on individuals at any age group because of the comfort since they avoid a successive access punctures, mainly in long-term treatments. Likewise, there are various advantages to the patient as well as for his caretakers since home care is not required for the device and exteriorization of it does not occur, which enables the patient more autonomy and mobility. When compared to short-term devices, they present lower risk of complications [8]. Nevertheless, if the insertion technique is done incorrectly, it may cause an increase in patients' morbidity and mortality, mainly on whose health is debilitated, such as the immunosuppressed [6].

This kind of catheter has its advantages, but there may be some immediate complications and among them, we can point out bruises, venous lesion, heart rate alterations, gaseous embolism, cardiac buffering, and intolerance to the device as well as the anesthetic used. Besides the long-term complications, such as

stenosis or thrombosis of the internal jugular vessel, catheter obstruction, catheter disconnection of receptacle with consequent liquid overflow, exteriorization and rupture of one of its components. It is important to highlight that there are not only physical disadvantages but also emotional since it requires the percutaneous puncture continuation that can lead to stress, discomfort and tension, mainly in children [9].

Infection is the most acute complication associated to the use of the catheter, occurring in approximately 19% of users, being 7% local infections and the rest of them of bacteremia associated to the catheter. The TIVADs present lower infection rate when compared to semi-implantable, because they do not have any exteriorized part, nevertheless call for full attention to prevent the occurrence of any contamination [3].

3.1 Nursing Assistance

The nursing professional is of vital importance during the therapeutic process because it is he who is in direct contact with the patient, who handles the catheter system, bandages, punctures and many other procedures. Aside from the time spent at the implanting process it is crucial that the team of specialists nurse team provide high quality assistance at long-term maintenance, aiming to eliminate associated complications to this device. The specialist nurse performance as an educator is highlighted, since it is he who has to explain the importance of proper asepsis, for his team and all involved in assisting the patient, as well as the use of a clear way of communication to get patients' most comprehension, listening and paying attention to their doubts and fears. Knowing that blood damages the catheter lifetime, an infusion of blood and derivatives must be avoided and when needed the nursing professional should wash it with saline infusion every time the infusion is done. When it is chemotherapeutic infusion, always avoid handling the patient, aiming lowering the cutaneous overflow risk [1].

Each specialist nurse has specific skills at handling

the catheter and the nurse must know the kind of catheter to be implanted and have a care plan for handling the device properly. The specialist nurse must guide the team about the correct procedures to be used, observe the medication infusion, perform bandages; whenever needed, help the team get the catheter through, provide all necessary material, observe signs of infection and orient the family and the patient about the procedure. The auxiliary or nursing technician must always be aware of the nurse's orientation, following a care plan made by the nurse, perform hands sanitation before and after handling the catheter, being skilled of all technique involving the procedure and medication used, as well as inform the nurse in charge of any intercurrent [10].

The clearance and sanitation of totally a TIVAD demand great attention from the nursing team as well as of the multi professional team involved in the process. They have to be washed with serum after infusion of any kind of medication to avoid residue or formation of precipitates. The obstruction of the catheter is a very common problem to this kind of device, which can occur by infusion of hemoderivatives in large scale and infusion of several other drugs concomitantly. That is why it is so crucial a rigid control of the infusion speed and the catheter salinization after blood transfusion in order to avoid catheter obstruction [1].

3.2 Length of Catheter Permanence

The average time of a TIVAD is 227 days on a trial with children. In an adult group it shows a considerable variation of catheter stay, being average length from 153 to 453 days [4].

3.3 Complications and Related Nursing Care Recommended for Patients Using Totally Implanted Long-Term Catheters

The most found complications were infection, obstruction, overflowing and port exteriorization. The most reported complication on the articles used as

sample for this study was infection. It can occur both in the subcutaneous area where the catheter is inserted, as well as along the subcutaneous tunnel, putting the patient at sepsis risk due to catheter direct contact with the central circulation [11].

The nursing professional may prevent this complication using a sterile technique while handling the catheter and also be extra alert to established time for changes of needles, equipment and connections related to this device [5].

For the catheter infection treatment, the nurse must adopt comparison standards between blood culture taken from the catheter and hemoculture collected from catheter, collected peripherally and only after identification of infection site and of the microorganism an effective antibiotic therapy may be selected by the doctor in charge. In case the patient does not respond to the therapeutic, the removal of the catheter may be recommended [12, 13].

The specialist nurse works in an effective way and has the necessary knowledge to avoid the infection and eventual withdrawal of the catheter caused by infection. Catheter obstruction comes from thrombus formation, fibrin or medicine precipitation. In this case, the nurse must adopt procedures to prevent this complication, which is to wash it regularly using 20 mL of saline solution between the administering of two or more drugs and after using the device, followed by heparinization. In cases of confirmed obstruction, fibrinolytic therapy is the only possible treatment, which is to be determined by the institution, the most appropriate fibrinolytic, the therapeutic dosage as well as the catheter unblocking technique [5].

The most found frequent causes for overflowing were fibrin formation or thrombus at the edge of catheter and rupture of device, being responsible for 1% to 3% of interurrences. The other causes were incomplete insertion of needle in the catheter, the displacement of needle due to the patient's position changes and frequent manipulation. The author states that the overflow incidence rate varies from 0.4% to

4.5% and it may increase due to no reporting of events. To prevent or minimize catheter overflowing, the nurse and the multidisciplinary team must be sure, that the needle type Huber is totally inserted and that it is the proper size for insertion [9].

A not-so-frequent complication in long-term totally implanted catheters is exteriorization, which leads to believe it is rare, though unknown. The occurrence is because the skin lesion over the port and surrounding structures of device, mainly due to repeated punctures at the same place or loss of tissue viability over the device that can happen because of severe weight loss. Other complications from catheter use are venous thrombus, phlebitis, misplacement and catheter migration. Besides, the vascular access is more comfortable to the patient, be it implanted on the thorax region or the arm [14].

After implantation, the nurse must have his attention back to observation of bleeding, secretion or bruise on insertion place. It is the nurse's work to identify any uncommon sign during the handling of device besides recording the skin conditions at the insertion point and the flux of blood reflux. Another crucial care is asepsis and the skin preparation; And to prevent infection, he must perform three applications of alcoholic PVP-I performing spiral movements on the skin over the catheter followed by three applications of alcohol 70% also using spiral movements. The need for a totally dry skin for puncture must be highlighted [4].

Most of the authors mentioned in this work support that the nursing care includes pre and post operation assistance, bandaging and handling of device, medication administering and permeability maintenance. Besides this, it is important to point out the importance of a trinomial relationship, nurse/patient/family at handling the catheter for its stay and meeting the therapeutic goals. The nurse must also provide emotional assistance to the patient, since the main complaints are related to the discomfort during needle insertion and the change in body image caused by catheter implanting. The anxiety associated to the

puncture pain and the difference perceived by the patient at the moment of implantation is noticeable through nonverbal language. At this time, the nurse must, before the procedure, explain it clearly and listen to the patient to try to minimize his anguish [2-10, 15].

4. Conclusions

This work was performed using available bibliographical evidences on the subject; concerning nursing care professionals handling long-term catheters, focusing on totally implant catheters. We found there is not much published material in our country about the subject, even though this subject is usually mentioned by medical publications. So this work suggests nurses make more studies about the matter since this professional it is of vital importance to daily practice at working together with catheter user patients, being him the professional who most handles the long-term catheter and it is he who is in direct contact with the patient.

References

- [1] Bruzi, L. M., and Mendes, D. C. 2011. "The Importance of Nursing Assistance at Handling Complication Related to Totally Implanted Catheter." *Rev. Esc. Enferm. USP*. 45 (2): 522-6. (in Portuguese)
- [2] Souza, M. T., Silva M. D., and Carvalho, R. 2010. "Integrative Review: What It Is and What to Do." *Einstein* 8: 102-6. (in Portuguese)
- [3] Neves, M. A., Melo, R. C., Goes, A. M. O., Protta, T. R., Almeida, C. C., Fernandes, A. R., et al. 2010. "Infections on Long-Term Central Venous Catheters: A Literature Review." *J. Vasc. Bras.* 9 (1): 46-50. (in Portuguese)
- [4] Pianucci, A. 2004. *Know How to Care: Basic Nursing Procedures*. 4th ed. São Paulo: Senac. (in Portuguese)
- [5] Nishinari, K., and Wolosker, N. 2007. *Complicações Infeciosas do Cateter*. 3rd ed. São Paulo: Atheneu. (in Portuguese)
- [6] Coutinho, R. M. 2009. "Facing a World of Procedures and Concerns: A Child's Experience with Port-a-Cath." *Acta Paul Enferm* 22: 935-41. (in Portuguese)
- [7] Perry, P. 2012. *Complete Guide of Procedures and Nursing Skills*. 7th ed. Rio de Janeiro: Elsevier. (in Portuguese)
- [8] Moreira, R. C. R., and Batista, J. C. 2003. "Long-Term Central Venous Catheters Complications." *Rev. Col. Bras. Cir.* 25 (6): 403-8. (in Portuguese)
- [9] Ferreira, M. V. F., Andrade, D., and Ferreira, A. M. 2011. "Infection Control Related to Central Venous Catheter with Antiseptics: Integrative Review." *Rev. Esc. Enfer. USP* 45 (4): 1002-6. (in Portuguese)
- [10] Gomes, I. P., Reis, P. E. D., and Xavier, T. G. M. 2008. "Chemotherapeutical Central Venous Catheter: Problems and Frequency." *Rev. Enferm. UNIEURO* 2 (1): 2-21. (in Portuguese)
- [11] Gasparino, R. C. 2013. "Complications Associated to the Use of Totally Implanted Catheter in Children and Adolescents." *Revista Brasileira de Cancerologia* 59 (1): 51-6. (in Portuguese)
- [12] Rosado, V., Romanelli, M. C., and Camargos, P. A. M. 2011. "Risk Factors and Preventive Measures of Infections Associated to Central Venous Catheters." *Journal de Pediatria* 87 (6): 469-77. (in Portuguese)
- [13] Bonvento, M. 2007. "Vascular Access and Infections Related to Catheter." *Rev. Bras. Ter. Intensiva*. 19 (2): 227-30. (in Portuguese)
- [14] Araújo, A. D., Rosanelli, C. L. S. P., Loro, M. M., Stumm, E. M. F., and Kolankiewicz, A. B. 2010. "Oncologic Patient's Complications Due to Use of Long-Term Catheter." *Rev. Enferm. UFPE* 18 (1): 42-7. (in Portuguese)
- [15] Santos, N. C. M. 2008. *Hospital Infection: Nursing Prevention and Control*. 3rd ed. São Paulo: Iátria. (in Portuguese)