Chapter 233

Adverse event related to extravasation of vesicant solution in peripheral venous catheter

https://doi.org/10.56238/devopinterscie-233

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ABSTRACT
Objective: to describe the experience of a patient who experienced a moderate adverse event related to the extravasation of vesicant solution in a peripheral venous catheter. Method: Descriptive exploratory research, with a qualitative approach, established by Resolution 466/12 of the National Health Council, approved by the Ethics Committee in Research involving Human Beings of the Universidade do Oeste Paulista, opinion No. 3,633,405 and CAAE protocol No. 20222619.9 .0000.5515 and signature of the Free and Informed Consent Form. Result: The extravasation of vesicant medication results in several damages to the patient, such as an extension of hospitalization time, increasing risk of infection, reduced limb functionality, financial losses, physical and emotional suffering in addition to the support of the institution, the multidisciplinary team and the family were essential in this recovery process. Conclusion: It is up to the nurse to carefully assess the risks of phlebitis and extravasation of vesicant drugs in their patients, guiding them and managing the risks during this process, in addition, to training their entire team regarding these complications and proposing necessary preventive care.

Keywords: Patient Safety, Nursing, Peripheral Catheterization, Risk factors, Necrosis.

1 INTRODUCTION

Patient safety has been widely discussed around the world and is considered an important public health issue. Weakened care can cause significant damage to the patient, directly reflecting on the patient's experience, in addition to negatively affecting the image of care institutions and health professionals. [1]

An estimate was made that about 1,377,243 patients hospitalized in Brazil annually would be victims of at least one incident, between 1,000 and 400,000 deaths would be associated with these conditions, and the cost to health between R$ 5 billion and R$ 15 billion reais. [1]

In 2013, the Ministry of Health instituted the National Patient Safety Program (PNSP), through Ordinance 529, and later ANVISA published Resolution No. 36, both to promote promotion actions aimed at patient safety and improvement in the quality of health services from the creation of Patient Safety Centers (NSP). [2]

An incident can be defined as an event or circumstance that could have resulted, or resulted in unnecessary harm to the patient, and may come from intentional acts or not. When they do not reach the patient or are detected before, they are called *near miss*, when they hit him but do not cause discernible damage, they are called an incident without harm, and when they result in discernible damage, they are called incidents with damage or adverse event. [2]

Nursing is the main provider of care in the hospital context, both in the prevention, promotion, safety, rehabilitation, and well-being of patients. Among these precautions, the insertion of peripheral venous catheters (CVPs) stands out, as well as their maintenance and surveillance. [3]

CVPs are devices that assist in the intravenous administration of medications, solutions, and blood components and also for diagnostic purposes. However, this procedure is not exempt from the risks of complications, they can cause peripheral vascular traumas such as phlebitis and infiltration. [3]

Phlebitis refers to an inflammation of the intima layer of the vein, as a response to tissue injury caused by several factors associated with insertion, catheter use, and administered medications. It manifests itself through local pain, erythema, flushing, edema, and palpable venous cord. [3]

Infiltration is a type of vascular trauma, coming from an injury to the vein layers and perforation, resulting in the infiltration of non-vesicant solutions or drugs into the tissues near the insertion of the CVP. When the infiltration of solutions or drugs with vesicant characteristics occurs, it is called extravasation. Edema is the most frequent phlogistic sign and may be associated with skin pallor, pain, decreased temperature, and/or sensitivity at the site. Infiltration may also trigger circulatory involvement and tissue necrosis in the most severe cases. [3]

Thus, this study aims to describe the experience of a patient who experienced a moderate adverse event related to the extravasation of vesicant solution in a peripheral venous catheter.

Its relevance lies in the dissemination, among health professionals, about the nursing care provided to a client with vesicant solution extravasation in peripheral venous access, in addition to the monitoring of

interventions and results obtained in the face of this type of adverse event, considering it important for the improvement of clinical practice, care quality, and patient safety.

2 METHOD

Exploratory descriptive research was carried out, with a qualitative approach. Data were collected from April to June 2019, in a surgical hospitalization unit of a general hospital, located in the interior of Oeste Paulista. The research sample is composed of only one experience report of a patient who experienced an adverse event related to medication leakage. To this end, the information was collected through an interview, with the support of a semi-structured script, recorded and the information was completed with the medical record through a brief case description.

This study followed the guidelines established by Resolution 466/12 of the National Health Council and was approved by the Ethics Committee in Research involving Human Beings of the Universidade do Oeste Paulista with Opinion No. 3,633,405 and CAAE Protocol No. 20222619.9.0000.5515. The participant signed the Informed Consent Form in two copies, and to ensure anonymity, the person in charge of the hospital signed the declaration of authorization for the use of **medical records and documents and the declaration of** infrastructure and authorization for its use.

3 CASE DESCRIPTION

A 62-year-old female patient was admitted to the emergency room of a general hospital in the interior of Oeste Paulista at 3 p.m. on April 7, 2019, from the emergency room of her municipality, transported by ambulance, with a clinical picture of heart failure and hypertension. Calm, conscious, oriented with dialogue, venous access on the back of the left hand, bladder probe delayed, accommodated on the stretcher, elevated guardrails, installed cardiac monitor, pulse oximetry, vital signs measured, electrocardiogram (ECG) performed, oxygen therapy installed for 2 liters per minute. Evaluated by the on-call physician, laboratory tests, chest X-ray, and cardiology evaluation were requested, requesting a vacancy in the Intensive Care Unit (ICU) and later programming of cardiac surgery.

On the same day, she was admitted to the ICU, maintaining the use of the medication Nipride at 3ml/h controlled by an infusion pump in CVP. During his stay in the unit, it was necessary to several venipunctures, due to the capillary fragility of the veins, after 5 days they presented hyperemia, and hematoma in the region of the right upper limb (MSD), referring to a lot of pain in the arm, remained observed. On the same day, cardiac surgery was referred for mitral and aortic valve replacement by biological prosthesis, still at dawn presented a cardiorespiratory arrest, being reversed.

On the following day, according to information in the nursing report, the patient presents a lesion with the appearance of a burn and bloody blister in MSD (figure 1), where a peripheral venipuncture was passing Nipride, evaluated by the nurse who requested to administer Silver Sulfatiazide, occlude with gases and crepe bandage. After a few days, it was necessary to start hemodialysis, and on this day he went into

cardiorespiratory arrest, performing resuscitation maneuvers patient returned to normal hemodynamic parameters.

On April 24, she was discharged from the ICU and referred to the surgical ward accompanied by the nurse and family member. Maintaining renal therapy treatment (hemodialysis) and dressing in MSD and in the surgical incision in the external region of the chest.

Until day 30, she maintained the therapeutic approach of the dressing, but it was observed that she does not hear an improvement, presents pale and necrotic tissue (figure 2), requested an evaluation by the plastic surgeon, and indicated surgical debridement procedure (figure 3). After 6 days later, a new debridement was performed in MSD due to the presence of adipose tissue and splinter (figure 4). A dressing was established once a day with Calcium and Sodium Alginate (figure 5). In this period the lesion evolved to gradual improvement, until maintaining the wound bed completely with granulation tissue.

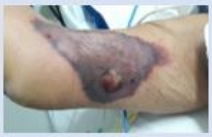
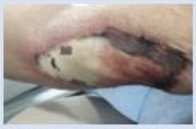
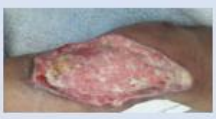
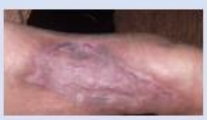
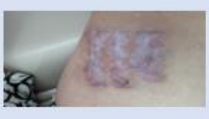
On May 25, she was submitted to perform the graft in MSD (figure 6), on the 10th day of the graft, applied topical ointment of Neomycin Sulfate and Zincic Bacitracin, maintaining a clean and dry aspect of granulation tissue.

The patient remained under observation in the ward. During hospital discharge scheduling, medication administration management and daily dressing were performed. Support was requested from the reference family health strategy for the follow-up of the dressing.

During this period, Disclosure was developed with the family members, the following were present: husband, three children, nursing manager, quality and ICU coordinator, care nurse, and psychologist, being explained and being attentive to the adverse event caused in the institution, clarifying the treatment, planning for discharge and rehabilitation of the patient. He was discharged from the hospital, aged two months and seven days.

The facts evidenced the complete remission of the lesion, and the integrity of the dermis was reestablished, demonstrating efficiency in the methods adopted by the care team, in favor of resolving the damage caused by vasodilator extravasation. Here are the photos accompanying the evolution of the lesion:

Chart 1: Follow-up through photos of the lesion by extravasation of intravenous medication

 Figure 1: Right forearm; onset in the lesion, next day after leakage of vesicant solution.	 Figure 2: Days later, he presents a non-classifiable tissue lesion.	 Figure 3: 1st day after surgical debridement, with presence of adipose tissue.	 Figure 4: After the second surgical debridement, with the presence of granulation and splinter tissue. Daily dressing with Calcium Alginate and Sodium.
 Figure 5: Days after performing daily dressing with Calcium Alginate and Sodium.	 Figure 6: 10 days after grafting. Neomycin Sulfate dressing.	 Figure 7: One month after grafting. Neomycin Sulfate dressing.	 Figure 8: Right thigh, graft removal site.

Source: Authors themselves, 2019.

4 DISCUSSION

According to the interview, the patient states that when she was admitted to the institution, she partially knew about her clinical condition.

> "Sabia that I was going to operate from the heart, I felt very bad, two valves were clogged, the aorta and the mitral, so I needed to operate, I had been sick for months."

Aortic dissection is a frequent and serious event in society, with an incidence of 2.6 to 3.5 people per 100,000 inhabitants/per year. It usually occurs in men between 60 and 80 years and when it occurs in women it presents later at 67 years. [4th]

Acute aortic dissection is a surgical emergency, due to the rapid complications and risk of death of the individual, it is caused by single or multiple lesions in the intimate layer of the aorta that submitted to blood under pressure dissects the middle bed giving rise to a false lumen, compromising systemic arterial irrigation. The surgical act consists of a rapid restoration of normal blood flows through the true lumen, preventing complications, especially ischemia of target organs. [5] As already reported, she was admitted to the unit by ambulance, admitted to the emergency room, and later transferred to the coronary intensive care unit.

> "During the time I was in the ICU, I was treated very well, only there was a problem in with my arm, I had to clean and scrape. I thought I was going to lose my arm."

The diagnostic communication of a serious disease or complications that occur during the treatment process as an adverse event constitutes a critical event for the patient, receiving such news represents a condition of threat to the continuity of life, which can trigger changes that anticipate the challenges that the person will have ahead. [6th]

In some cases, patients may present crisis, emotional fragility, anguish and despair, uncertainties, and insecurities during treatment. This new reality can trigger an anticipatory grief reaction, with a bleak prospect that you may not be able to realize your future dreams and projects or overcome the present. It is important that the patient feels welcomed and supported in this delicate period of his life. [6th]

It was requested to comment on how the intercurrence occurred:

> "My arm was normal, then they applied a serum and I think the serum vasoted, serum co m medication, and made this wound, I warned that I was in pain, more they told me that it was normal, that because of the medication, it hurt, started at eight and a little in the morning and went to see only eight and a little at night. It was hurting the whole time. It was red on the arm and popping, then when it went to stir was already the baianada made, it was where the vein was caught, and more was already out of the vein. My husband also went there at the counter to warn that it was hurting and red, but did not move, was stirring was already eight and little at night. They didn't let my husband see, and neither did I, when he came back it was all bandaged."

In the hospital environment, intravenous drug therapy is the most widely used, but it can cause complications at the catheter insertion site. Phlebitis is one of the complications, consisting of inflammation

of the blood vessel, flushing, pain, and local edema. It is classified as chemical phlebitis, related to the administration of medication; mechanical phlebitis, trauma caused by the catheter in the vessel wall; and infectious phlebitis due to contamination of the material. [7] Ads

High incidence rates of phlebitis can trigger several problems, such as septicemia, pain, increased length of stay and treatment, spending on health services, and increased workload of the nursing team. [7] Nursing professionals should be attentive to the reports and phlogistic signs presented by the patient, not disregarding any complaint, but rather evaluating the site and whether any immediate action needs to be taken.

Some vesicant drugs may increase the risk of incidents, the sodium nitroprussate (Nipride) used by the patient has an important therapeutic efficacy in its treatment of heart failure. The administration should be by intravenous infusion with the use of infusion pump equipment, Nipride is a potent vasodilator, and its effect on blood vessels begins immediately after the start of the infusion. As all medication has possible adverse reactions such as a flush or; irritation at the site of application; skin ruptures, r reduction of platelet aggregation, nausea; vomiting; sweating; Pharealand; vertigo; palpitations; muscle rowers; retrosternal comfort and abdominal pain; tachycardia, so care should be redoubled to this class of medication [8].

During his stay in the ICU, he had not seen the dressing, only when he was referred to the hospitalization unit that monitored the evolution of the lesion daily.

> "When I got to the room it was the first time I saw the bandage, I felt a desperation, I thought I would lose my arm, I was desperate, I cried a lot, I had a lot of pain, fear, I didn't understand what was happening, when they said it was injury by leakage, phlebitis."

The use of technical terms in the act of communication of a diagnosis or treatment can have the same effect as non-communication: the message is not transmitted or gives rise to ambiguous interpretations. In this context, patients become desperate and anxious, preventing them from understanding the therapeutic benefits. [6th]

In addition, patients who were victims of some adverse event together with their families always await an apology, empathy, and help, as well as a coherent clarification of how the occurrence happened and what measures will be taken in the context, and how it will be prevented in the future.

Through the daily evaluations of the dressing by nursing, changes in conduct were necessary for better results.

> "Done dressing, done scraping with the Doctor, then continued in the dressing. I went to the operating room three times with the doctor, twice to do the scraping and the other graft. The more I thought I would lose the arm, which is out the outside, has only a little piece out, the more he did the graft and was good. "

In extravasation lesions, initially, the treatment is conservative, with dressings, in some cases requiring surgical procedures. Debridement is the method used to remove all unviable tissue, keeping only the unaffected and well-perfused tissue. Often, multiple debridements are required to remove all necrosis

and infectious focus. In these cases, sequential debridement is necessary until an adequate bed is obtained for the definitive closure of the wound by graft or flap, increasing the length of stay and treatment costs. [9th] Ads

Partial skin grafting consists of a reconstructive technique that has many benefits, including accelerating the healing of burns, trauma, ulcers, and other wounds, and reducing the occurrence of extensive scarring. The partial skin collection technique involves the excision of the epidermis and part of the dermis, leaving a wound in the donor area[10], a technique that is applied in this case.

At first, the patient confused graft with amputation of the arm, which made her more apprehensive, until her doubts were clarified.

> "I thought it ripped off my arm, I didn't know it was like that, I was desperate. From the view it was, it was getting good more comfortable."

Any medical care procedure must be provided for the obtaining of the free and informed consent form through Decree No. 44,045, of July 19, 1958, and by Law No. 11,000, of December 15, 2004, which consists of the act of decision, agreement, and approval of the patient or his representative, after the necessary information and explanations, under the responsibility of the physician, regarding the diagnostic or therapeutic procedures that are indicated to him. [11th]

It was also questioned how was the support of the hospital institution and the multidisciplinary team in the face of this serious event occurred.

> "It was very good, they treated me very well, and it helped very well. If it wasn't for the team we were in direct despair, which we don't understand, so it helps a lot in these parts. If it weren't for you and god bless the hands of doctors, what would become of us!"

> "Very important the presence of the cardiologist, she came to visit me even on the day of her daughter's birthday, it gives more confidence."

It is worth mentioning that health professionals are closer to making mistakes, the challenge to reduce risks and damages in health care will depend on the change of culture of professionals for safety, aligned with patient safety policy. [12th]

The professionals of the multidisciplinary team (nurses, doctors, physiotherapists, and nutritionists) should perform preventive actions aimed at reducing occurrences. Thus, investing in system change, improvement of the health team, use of good practices, improvement of technologies, and improvement of work environments are essential issues to achieve the best results and prevent adverse events, even with all actions still occurring the event, it is essential the support of the institution and the multidisciplinary team to the patient and the family in this difficult moment. [12th]

The information is essential for the patient and his family, to reduce the uncertainty, and clarification of the functioning of a certain procedure minimizes anxiety. She affirms the importance of the information reaching her.

> "Yes, I had information, especially from the nurse at the clinic, I did the dressings every day, I took pictures, to follow up, I sent it to the doctors, and what they passed on to her, I laughed and passed them later, made a bond of trust."

Communication is a very important tool in care, directs health professionals to care with higher quality and in a humanized way, and prioritizes the opinion and desires of the patient, creating an effective bond between both. Effective communication, when carried out properly, facilitates the identification of errors. [13th]

The next speech demonstrates the family inserted in the context of care, the financial and emotional losses.

> "My husband abandoned everything, our site, our milk cows that takes 50 to 55 liters, per day, powder month of more than 3 thousand liters, we are at a loss, to go there and return is always spent, it is not every time that has money, squeezed us, he had to sell 3 heads of creation to pay the debts, we had a meeting in the hospital with the administration, they couldn't do anything. We had a financial, emotional, and sentimental losses. We are asking others to take care. We went to the ombudsman's office, and so far we have had no return. "

Any adverse event that occurs regardless of its severity generates problems for the patient, family members, and institutions, hindering the patient's recovery, prolonging hospitalization, increasing the risk of infection, reducing the functionality of patients in performing daily activities, and especially physical and emotional suffering. [14th]

In the speech above, she elucidates the issue of seeking the ombudsman, as a communication channel to solve all the losses they had during their hospitalization. The ombudsman service evaluates the services provided by the health system, which consists of offering users the opportunity to evaluate the public health service provided, through the exchange of information: complaints; of complaints; of suggestions, and compliments. [15th]

Family and religion are emotional support for the patient according to her account.

> "The brothers prayed directly, even the Campinas class prayed for me and Martinopólis as well, to make everything right, and bless the hands of the doctors and nurses. Without God I would have no strength, I just thought I would take my arm off, and I prayed straight in fear. When they told me I didn't need to take my arm off I was happier, happier, he thought about taking my arm off, hard, I imagine a lot of things, I didn't even sleep the night right, they had to give me medicine to sleep."

Religious and spiritual practices are fundamental in the life of the human being, especially in difficult moments, and provide coping skills, better health outcomes, and reduce anxiety.

Religion in the hospital environment when associated with the adverse event helps to overcome emotional pain and self-confidence in dealing with several other circumstances, such as understanding the disease and the state of health in which it is, so the patient seeks mechanisms that serve as strategies to increase self-empowerment and protection. In this aspect, religion and spirituality can be an element of support in the process of illness. [16th]

At the end of the interview, the patient was asked to leave a message for the health team.

> "They should have more attention, when we complain, give more attention, on the part of all employees and doctors, they make reports should look at things, listen more to the patient. If they had looked the first time I complained this would not have happened, after I left the ICU I would stay another 6 days in the clinic and then home, now to almost two months hospitalized, after heart surgery."

Through this message, it is clear the importance of the professional listening to the patient's complaints, and a word that defines this attitude is empathy, which means putting oneself in the place of the other before the circumstance experienced. It is a skill that can be performed with the client verbally and non-verbally. Your development is extremely important when you set out to help someone. [17th]

The nurse is a qualified professional, with emotional stability and self-knowledge, empathy is part of their professional competence, composes the therapeutic process, providing individualized care, and respect for the culture, beliefs, and values of the person. The nursing professional must find the balance between the knowledge and practice of humanistic behavior. [16th]

As a limitation of the study, the sample of only one experience report is presented. The contributions to the care practice are directed to preventive measures and patient safety related to the management of vesicant drugs.

5 CONCLUSION

It is up to the nurse to carefully evaluate the risks of phlebitis and leakage of vesicant drugs in their patients and should guide them and manage the risks during this process, whether during venipuncture, maintenance, and daily evaluation of the device, in addition, train their entire team regarding these complications and propose necessary preventive care. Therefore, nurses must provide quality care based on the best available scientific evidence.

It is believed that from this case report, it will be possible to instigate nursing professionals to reflect on the theme presented but mainly to practice empathy, and listen to patients' reports. The importance of strengthening a culture of quality and patient safety involving the entire multidisciplinary team is also highlighted.

Thus, the development of more scientific studies on this theme is essential so that, thus, we can expand the existing knowledge for the prevention and care of intravenous complications, such as phlebitis and leakage of vesicant drugs.

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