Original Article

Complications in the venous network of women with breast cancer during chemotherapy treatment*

Complicações na rede venosa de mulheres com câncer de mama durante tratamento quimioterápico

Complicaciones en la red venosa de mujeres con cáncer de mama durante tratamiento quimioterapéutico

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ABSTRACT

Objectives: To identify the reactions of the venous network and investigate the prevalence and characteristics of these reactions in women with breast cancer during chemotherapy treatment. **Methods:** It were evaluated 339 records of women undergoing chemotherapy, from 2003 to 2007. **Results:** During neo-adjuvant and adjuvant treatments (17.1% and 22.4%) the women presented several occurrences, the most common were: external infiltration, pain and alteration in skin color. The neo-adjuvant treatments most often cited were: use of cold packs (2.9%) and subcutaneous application of local glucocorticoid (3.5%), and the adjuvants were: local subcutaneous application of hydrocortisone (3.2 %), implementation of external infiltration protocol (6.2%) and use of ice packs (7.1%). **Conclusion:** The recording of occurrences and the nursing report are essential to supervise the venipuncture sites used during chemotherapy; also it is recommended measuring and record photographically the place of puncture.

Keywords: Breast neoplasms/drug therapy; Breast neoplasms/complications; Drug therapy/adverse effects

RESUMO

Objetivos: Identificar as reações da rede venosa, investigar a frequência e as características dessas reações em mulheres com câncer de mama durante o tratamento quimioterápico. **Métodos**: Foram avaliados 339 prontuários de mulheres submetidas à quimioterapia, de 2003 a 2007. **Resultados**: Durante os tratamentos neoadjuvantes e adjuvantes 17,1% e 22,4% mulheres apresentaram intercorrências registradas no prontuário, sendo as frequentes: extravasamento, dor e alteração na coloração da pele. As condutas mais citadas na neoadjuvância foram: utilização de compressas frias (2,9%) e aplicação de glicocorticoide subcutâneo no local (3,5%) e na adjuvância foram: aplicação de hidrocortisona subcutâneo no local (3,2%), aplicação do protocolo de extravasamento (6,2%) e utilização de compressas de gelo (7,1%). **Conclusão**: O registro das intercorrências e o relato da equipe de enfermagem são essenciais para o acompanhamento dos sítios de punções venosas utilizados durante o tratamento quimioterápico, além de mensuração e registro fotográfico do local.

Descritores: Neoplasias da mama/quimioterapia; Neoplasias da mama/complicações; Quimioterapia/efeitos adversos

RESUMEN

Objetivos: Identificar las reacciones de la red venosa e investigar la frecuencia y las características de esas reacciones en mujeres con cáncer de mama durante el tratamiento quimioterapéutico. **Métodos**: Fueron evaluadas 339 fichas de mujeres sometidas a quimioterapia, de 2003 a 2007. **Resultados**: Durante los tratamientos neo-adyuvantes y adyuvantes (17,1% y 22,4%) las mujeres presentaron ocurrencias registradas en fichas, siendo las más frecuentes: infiltración externa, dolor y, alteración en la coloración de la piel. Las conductas neo-adyuvantes más citadas fueron: utilización de compresas frías (2,9%) y aplicación de glucocorticoide subcutáneo en el local (3,5%), y las adyuvantes fueron: aplicación de hidrocortisona subcutánea en el local (3,2%), aplicación del protocolo de infiltración externa (6,2%) y utilización de compresas de hielo (7,1%). **Conclusión**: El registro de las ocurrencias y el relato del equipo de enfermería son esenciales para el acompañamiento de los sitios de punciones venosas utilizados durante el tratamiento quimioterapéutico, además se recomienda mensurar y registrar fotográficamente el local de punción.

Descriptores: Neoplasias de la mama/quimioterapia; Neoplasias de la mama/complicaciones; Quimioterapia/efectos adversos

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INTRODUCTION

In Brazil, as well as around the world, the incidence of cancer is increasing, accompanying the aging of the population due to increased life expectancy. It is a factor resulting directly from large global transformations, such as urbanization, new ways of life and consumption, exposing populations to more risk factors and altering the state of health[1]. The main cause of cancer death among women is breast cancer, accounting for about 1,050,000 new cases per year worldwide, with almost 80% of new cases originating from developing countries[1-2]. Estimates from the National Cancer Institute, for Brazil in 2010, showed 49,240 new cases of breast cancer and an estimated risk of 49 cases per 100,000 women. In the Southeast region, breast cancer is the most incident among women, with a risk estimate of 65 new cases per 100,000[1].

Its early detection is very important, because this increases the chances of cure and survival. But mortality rates for breast cancer in Brazil are high, probably because the disease is still diagnosed in advanced stages[1]. With the diagnosis in advanced stages, the therapy is established taking into account the staging, the prognosis of the disease, location, size, tumor histological type, age of the woman and clinical conditions in surgery, radiotherapy and chemotherapy[3].

Chemotherapy consists of the application of drugs, singularly or in combination, which destroy the tumor cells, but also affect normal cells, especially those that reproduce rapidly, such as bone marrow, intestine and hair follicles[4]. The most commonly used route for chemotherapy is the intravenous and, therefore, venous access is indispensable. There is a propensity for complications of peripheral venous access routes, hindering the progress of treatment and necessitating the implantation of long term catheters, such as semi-implanted and fully implanted[4]. Venous access may be hampered by the previous administration of chemotherapeutic drugs and the disease evolution. Therefore, it is the responsibility of the nurse to provide adequate care, correctly selecting the site for drug therapy and ensuring the maintenance of peripheral venous access, in order to prevent and reduce local complications that may occur, such as extravasation.

Extravasation is the infusion of vesicant drugs or solutions outside the blood vessel. Vesicant drugs cause severe irritation with blistering and can cause tissue destruction, however, their consequences depend on the quantity and concentration of the drug, location of venipuncture, condition of the patient and the length of time between identification and treatment[4-5]. Although the registration of extravasation is a reaction little reported, a large number of patients are at risk of this occurrence, since vesicant drugs are often administered as chemotherapeutic agents[6]. Immediate reactions that may occur during or immediately after application of anticancer drugs are: pain, hives, burning, itching and increased sensitivity in the venous pathway. Delayed reactions, which appear after weeks or months, are: thrombophlebitis, which is inflammation of the peripheral vein and is associated with local thrombosis, hyperpigmentation, venous fibrosis and discoloration of the affected tissues[4,7].

Chemotherapy is a complex process in health care that requires adequate and continuous training of the oncology nursing team. Errors may constantly occur at various stages of this procedure, especially if there are communication barriers between team members and the client. These errors bring significant harm to patients already weakened by the disease and the treatment[8-9].

The damage caused by complications in the venipuncture procedure, combined with the need for peripheral venous access for the installation of chemotherapy with the lack of data in the national and international literature related to venous damage occurring in chemotherapy in breast cancer justify this study. The objectives of this study were: to identify reactions of the venous network and to investigate the frequency and characteristics of these reactions during chemotherapy in women with breast cancer.

METHODS

The project of this study was approved by the Ethics Committee of the Clinical Hospital of the Faculty of Medicine of Ribeirão Preto, University of São Paulo (HCFMRP-USP), under the number 8602/2007.

For the study, the medical records were reviewed of all women with breast cancer in the Outpatient Clinic of Mastology of HCFMRP-USP, who received chemotherapy between 2003 and 2007.

Initially, a list was obtained, from the Chemotherapy Centre of that hospital, of women undergoing chemotherapy during the study period, which consisted of 441 patients. In a first review of this list, 102 records of women undergoing chemotherapy for other types of gynecological cancer, such cervical and ovarian cancer, were excluded. In total 339 records were selected and reviewed, and data were collected, using a guiding instrument that contained personal information, information about cancer, chemotherapy and its complications.

RESULTS

The medical records were analyzed of 339 women who were aged 38-80 years, most of them white (83%).

The predominant diagnosis was invasive ductal carcinoma, with staging in grades II (39.5%) and III (36.3%).

The left breast was affected in 50.2% of cases, and 1.5% of women were diagnosed in both breasts. Besides chemotherapy, 75.5% of women underwent radiotherapy and 94.1% surgical procedures, with total mastectomy with axillary lymphadenectomy (29.8%) and lumpectomy with axillary lymphadenectomy (27.4%) the predominant types of surgeries. After chemotherapy, 144 women (42.47%) used oral hormone therapy as a complementary treatment for breast cancer.

Of the women selected, 23% received four cycles of neoadjuvant chemotherapy and 61.9% made use of the protocol with the drugs epirubicin and docetaxel, which are vesicant drugs. In the adjuvant treatment, 75.8% received the protocol with the drugs epirubicin and cyclophosphamide, the latter being irritating to the endothelium, frequently leading to pain and inflammation at the infusion site and in the venous pathway, with 31.8% of women receiving six cycles. During the neoadjuvant treatment, 91 (17.1%) women had complications documented in the records and during adjuvant therapy 120 (22.4%). The most frequent complications are described in Table 1.

Table 1 - Women with breast cancer undergoing chemotherapy, according to complications presented during chemotherapy, HCFMRPUSP, 2003-2007.

n=339

Complications	Frequency			
	Neoadjuvant		Adjuvant	
	n	%	n	%
Edema	8	2.4	14	4.1
Induration	11	3.2	10	2.9
Extravasation	13	3.8	20	5.9
Pain	14	4.1	24	7.1
Alteration in coloration	27	8.0	28	8.3

Table 2 - Women with breast cancer undergoing chemotherapy, according to procedures applied during chemotherapy, HCFMRPUSP, 2003-2007.

n=339

Procedures	Frequency			
	Neoadjuvant		Adjuvant	
	n	%	n	%
Warm compress	2	0.6	2	0.6
Mucopolysaccharide polysulfate	4	1.2	4	1.2
Essential fatty acids	5	1.5	-	-
Hydrocortisone	11	3.5	11	3.2
Extravasation protocol	5	1.5	21	6.2
Cold compress	10	2.9	24	7.1

The conduct of the professionals when faced with complications proved to be varied, both in the neoadjuvant therapy and in the adjuvant therapy, as shown in the data in Table 2.

During the chemotherapy, 2.9% of women presented an impaired venous network that made it difficult to obtain peripheral access for the infusion of drugs and required placement of a totally implanted catheter.

DISCUSSION

The prevalence of diagnoses of advanced stage breast cancer, which imposes the need for more complex and prolonged treatments with uncertain prognosis, is still frequent in Brazil[10]. This assertion was observed in the study group and predisposes women to invasive procedures and increased risk of complications arising from them. The surgical procedure was the most frequent therapeutic option, and among the procedures of choice mutilating surgery prevailed, such as mastectomy with axillary lymphadenectomy, the late diagnosis justifying such procedures. This procedure aims to eliminate the maximum amount of local tumor cells, aiming at an improvement in the prognosis and, consequently, seeks to increase the time free of the disease among treated women, and is complemented with systemic chemotherapy[11]. In this way, the protocols combine drugs with different characteristics including vesicant and irritant, which can damage the puncture site and the venous pathway of choice.

The infusion of vesicant and irritant drugs requires the special attention of the nursing team in choosing the site to be punctured, avoiding places such as the wrists, back of the hands, and sites near joints that, in cases of extravasation, could lead to ligament injuries and impaired joint movement. Besides these, venous access in the antecubital fossa should be avoided due to difficulty in the visualization of possible extravasation, increasing risks and possible tissue damage[12-13]. In this study, it was found that most of the puncture sites varied between the back of the hand and the wrist, justified in the register due to previously recorded venous compromise, such as venous fragility or difficult in visualizing the venous network. It can be inferred that such procedures considered as risky become necessary in the institution studied due to a lack of protocols that establish sites of priority choice and procedures of rotation. Moreover, the choice of suitable material for puncture is fundamental, opting, if possible, for plastic catheters, because metallic needles traumatize the venous network[12]. Among the medical records reviewed, it was observed that this conduct has not been routinely adopted, metal catheters being preferably used in the service, such use justified by the high cost of plastic

catheters, which are listed as a choice only in exceptional cases of extreme compromise of the venous network.

Complications at venous sites during neoadjuvant treatment may be considered high, especially when related to the consequences that these incidents can cause in aesthetic, physical, psychological and emotional terms. These aspects overlap with the fact that the women are facing a disease marked by the stigma surrounding their treatment and prognosis, emphasizing alterations in their self-image and self-esteem[14]. Extravasation may also result in loss of function of the affected limb, pain, necrosis, ulcers, the need for surgical intervention for skin grafting and increases the risk of developing squamous cell carcinoma[12].

The symptoms of extravasation can vary, from a limited pain at the affected site, local inflammation of the tissue to extensive lesions with necrosis. The periods between the occurrence of extravasation and the onset of injury are varied and can take hours or even weeks, depending on the concentration of the drug, the volume extravasated, the time between extravasation and its identification by the nurse[13].

In this study, the occurrence of extravasation reported is consistent with the incidence of extravasation identified in other studies which range from 0.1% to 6% in peripheral venous access[12-13]. It is believed, however, that the rate tends to be higher, because the protocols of treatment for breast cancer involve vesicant and/or irritant drugs that increase the risk for possible complications, especially in services where administration protocols are rarely used. Preliminary results of a prospective study conducted in the same department show higher rates than those registered in the medical records[15].

The conservative procedure, adopted in most instances of extravasation observed in this study, is confirmed in a study on the handling of the consequences of chemotherapy extravasation, which found that in 76.1% of those with extravasation the lesions healed spontaneously and only 23.8% needed surgical intervention to remove necrotic tissue and skin grafting[15]. This demonstrates that the professionals try to proceed as conservatively as possible, avoiding unnecessary invasive procedures and minimizing the suffering for individuals undergoing cancer treatment, using surgical intervention only in cases of greater compromise of the affected site. But it is necessary to consider the record of extravasation and the extravasated drug, since the characteristics of the drugs used imply different procedures, which must be defined in the administration of chemotherapy protocol and in the extravasation procedure.

The erythema and induration of the venous network, late signs of extravasation, can take days or even weeks to appear. In this study, there were records regarding these. The occurrence of these effects on venous network can compromise it for future punctures and it is important that the nursing staff carry out an assessment to the site previously punctured, with subsequent client orientation, seeking to recognize changes in color, temperature and appearance of the access site of earlier peripheral venous access, so that there is correct management of any complications[5].

In the management of venous complications, records were found of the use of ice packs on the site and the orientation of the women regarding later use in the domicile for a period of 24 hours. Ice is used in order to restrict the action of the drug at that site, decreasing its vesicant and/or irritant potential, seeking to inactivate the destructive capacity of the drug. For the drugs used in the protocols studied, this approach is internationally recommended[16].

The use of essential fatty acids was another indicated procedure in the management of extravasation, and the principle for their use is defined by being a compound used for site hydration, avoiding the disruption of the skin and, in the case of injury, can be used to promote a humid environment, assisting in cell proliferation and autolytic debridement, facilitating healing[17].

It was observed that the complete protocol of extravasation instituted in the service was used in the minority of the cases identified and consisted of stopping the infusion, promoting the aspiration of the drug at the site of venous access, subcutaneous administration of hydrocortisone and sodium bicarbonate plus the intramuscular administration of glucocorticoid, and the use of cold compress on the site, aimed at neutralizing the effects of the drug in the tissues affected.

The application of hydrocortisone subcutaneously at the site constitutes the protocol of the institution, aiming to prevent or minimize inflammatory reactions. However, the use of glucocorticoids has not been widely accepted, because the occurrence of local inflammatory reaction is not always established, possibly leading the lesion to evolve directly into the formation of necrotic tissue, which would make the procedure unnecessary and without benefits in the management of extravasation[16].

Research shows that sodium bicarbonate has been proposed as a potential antidote, based on its alkalinizing effect on local pH and the rapid power of removal of the drug, but evidence of its efficacy is still controversial regarding the clinical benefits[4,13]. However, the use of bicarbonate in the service studied has not been questioned and there is no record of monitoring the progress of the implementation of this protocol, suggesting a greater rigor in its evaluation

CONCLUSIONS

The results showed that the registration of venous complications by nursing staff is essential for monitoring the evolution of the site of venous access used for chemotherapeutic treatment, with the measurement and photographic registration of the site being predominant. The complete process of chemotherapy, from the preparation of the drug until the end of the infusion, should be documented at each cycle, in order to certify the precision of the procedures, evaluation of possible complications and to provide a source of data for scientific research, as well as to ensure legal support for the actions performed.

In this study, it was found that most complications had no posterior evaluation, demonstrating a lack of records on the development of complications and procedures performed. With the underreporting in the medical record, there is discontinuity of the care provided, not being possible to evaluate the consequences of a particular event or identify factors detrimental to the women.

The orientation of the women at the time of infusion is also a key point in the early identification of local changes, as, if they have an understanding of the importance of this procedure, they will be able to communicate to the team any symptoms noticed, such as: local pain, burning, swelling, change in skin color, facilitating the rapid implementation of measures aimed at its control and avoiding more serious consequences.

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REFERENCES

1. Brasil. Ministério da Saúde. Secretaria de Assistência à Saúde. Instituto Nacional de Câncer. Coordenação de Prevenção e Vigilância de Câncer. Estimativa 2010: incidência de câncer no Brasil. Rio de Janeiro: INCA; 2009.
2. Schunemann Júnior E, Urban CA, Budel VM. Quimioterapia neoadjuvante em câncer localmente avançado do colo do útero. Rev Bras Ginecol Obstet. 2002;24(10):675-80.
3. Frigato S, Hoga LAK. Assistência à mulher com câncer de colo uterino: o papel da enfermagem. Rev Bras Cancerol. 2003;49(4):209-14.
4. Bonassa EMA, Santana TR. Enfermagem em terapêutica oncológica. 3a. ed. São Paulo: Atheneu; 2005.
5. Tripathi S, Kaushik V, Singh V. Peripheral IVs: factors affecting complications and patency—a randomized controlled trial. J Infus Nurs. 2008;31(3):182-8.
6. Wengström Y, Margulies A; European Oncology Nursing Society Task Force. European Oncology Nursing Society extravasation guidelines. Eur J Oncol Nurs. 2008;12(4):357-61.
7. Phillips DP, Bredder CC. Morbidity and mortality from medical errors: an increasingly serious public health problem. Annu Rev Public Health. 2002;23:135-50.
8. Apkon M, Leonard J, Probst L, DeLizio L, Vitale R. Design of a safer approach to intravenous drug infusions: failure mode effects analysis. Qual Saf Health Care. 2004;13(4):265-71.
9. Husch M, Sullivan C, Rooney D, Barnard C, Fotis M, Clarke J, Noskin G. Insights from the sharp end of intravenous medication errors: implications for infusion pump technology. Qual Saf Health Care. 2005;14(2):80-6.
10. Thuler LCS, Mendonça GA. Estadiamento inicial dos casos de câncer de mama e colo do útero em mulheres brasileiras. Rev Bras Ginecol Obstet. 2005;27(11):656-60.
11. Menke CH, Biazús JV, Xavier NL, Cavalheiro JA, Cericatto R. Tratamento cirúrgico do câncer de mama. In: Boff RA, Wisintainer F, editores. Mastologia moderna: abordagem multidisciplinar. Caxias do Sul: Mesa Redonda; 2006. p.139-54.
12. Sauerland C, Engelking C, Wickham R, Corbi D. Vesicant extravasation part I: Mechanisms, pathogenesis, and nursing care to reduce risk. Oncol Nurs Forum. 2006;33(6):1134-41.
13. Ener RA, Meglathery SB, Styler M. Extravasation of systemic hemato-oncological therapies. Ann Oncol. 2004;15(6):858-62.
14. Fontes CAS, Alvim NA. A relação humana no cuidado de enfermagem junto ao cliente com câncer submetido à terapêutica antineoplásica. Acta Paul Enferm. 2008;21(1):77-83.
15. Martins EZ, Friedrich N,Gozzo T, Panobianco MS, Almeida AM. Intercorrências na rede venosa relacionadas à quimioterapia no câncer de mama: um estudo piloto. In: Simpósio Internacional de Iniciação Científica da USP – SIICUSP, 16, 2008, Ribeirão Preto. São Paulo: USP; 2008.
16. Langstein HN, Duman D, Seelig D, Butler CE, Evans GR. Retrospective study of the management of chemotherapeutic extravasation injury. Ann Plast Surg. 2002;49(4):369-74.
17. Franco D, Gonçalves LF. Feridas cutâneas: a escolha do curativo adequado. Rev Col Bras Cir. 2008;35(3):203-6.