Occurrence of phlebitis in patients on intravenous amiodarone

Ocorrência de flebite em pacientes sob utilização de amiodarona endovenosa

Renata de Fátima Suardi Martinho¹, Andrea Bezerra Rodrigues²

ABSTRACT

Objective: To investigate the occurrence of phlebitis in patients given amiodarone through a peripheral venous access, and to describe nursing interventions in patients with phlebitis following the use of this medication. Methods: A descriptive exploratory cross-sectional quantitative study was undertaken. Data were gathered from the files of patients of a cardiology intensive care unit in a general hospital. Results: Forty patients aged from 51 to 90 years, admitted into a cardiology intensive therapy unit, were included. Fifty-five percent of these patients presented phlebitis. Intrinsic factors such as age over 65 years (14.9%) and poor condition of veins (3.5%) were noted. Intrinsic factors included drug administration issues (13.9%) and lack of compliance to institutional protocols by nurses (7.8%). Conclusions: most patients who were given intravenous amiodarone at the Institution developed phlebitis. Intrinsic factors identified were patient age and vein status, and the extrinsic factors were drug administration methods and lack of compliance to institutional protocol by nurses.

Keywords: Nursing care; Education, nursing; Patient care; Phlebitis; Amiodarone

INTRODUCTION

Intravenous therapy (IVT) has become an indispensable tool for infusing large amounts of solutions, rapidly attaining a pharmacological effect, giving hypertonic or extreme pH substances, and for giving drugs that may be poorly absorbed by the gastrointestinal tract(1).

The most common causes of infusion failure are phlebitis, leaking, obstruction, and accidental removal of the device(2-3).

Phlebitis may be defined as venous cell inflammation where endothelial cells become rough and facilitate platelet adhesion(1).

The pathophysiology of phlebitis consists of local vessel vasodilatation, increased capillary permeability, which allows fluid leaking to the interstitial space, granulocyte and monocyte migration into tissues, and edema. Numerous tissue products activate the macrophage system, and within hours these cells begin to phagocytose destroyed tissues(1).
Associated signs and symptoms are erythema, local warmth and edema, a palpable fibrous cord along the vein, decreased infusion velocity, and increased baseline temperature. As a result, there is discomfort and pain, which may considerably increase during hospital stay\(^{(1-4)}\).

Some issues may affect the progression of phlebitis, such as catheter size/material and device insertion at the emergency room, which increases the risk compared to inpatient’s units. The length of hospital stay and routine peripheral vein catheter exchange procedures have also been associated with increased rates of phlebitis. Catheters should be replaced every 72 to 96 hours to reduce such risk. Another factor is the type of infusion; low or high pH solutions increase the risk. Among these solutions are potassium chloride, hypertonic glucose, amino acids, lipids, antibiotics, especially betalactamic drugs, vancomycin, and metronidazole. Infusion rates over 90 ml/h also increase the risk of phlebitis. Moreover, intrinsic patient factors such as poor quality veins, advanced age and individual biological vulnerability may also increase the risk of phlebitis\(^{(5)}\).

Phlebitis may be classified, according to its causes, as mechanical phlebitis, bacterial phlebitis, post-infusion phlebitis and chemical phlebitis.

Mechanical phlebitis may be due to inappropriate sized catheters or poor puncture technique\(^{(1,4-5)}\). An important factor in mechanical phlebitis is the type of device used for puncture. These devices may be conventional needle, over-the-needle, under-the-needle, mid-line, or double-lumen catheters\(^{(4-6)}\).

Bacterial phlebitis results from infection originating from the procedure due to inadequate asepsis, failure in detecting any intravenous device breakage and poor catheter insertion technique\(^{(1)}\).

Post-infusion phlebitis is inflammatory, becoming evident within 48 to 96 hours after the catheter is removed; it is facilitated by the material of which the catheter is made and the time it remains within the vein. Peripheral catheters remain patent up to 72 hours with appropriate care. It should be noted that if there are any signs or symptoms of complications, the nursing team is responsible for making decisions, such as removing the device before the intended period\(^{(1,6)}\).

Chemical phlebitis is usually related to irritating drugs or solutions, inappropriately diluted or mixed medication, excessively rapid infusion, or the presence of small particles in the solution\(^{(6)}\).

An important point is that drug and blood products should not be infused through the same route; the drug may cause indeterminate effects. There are also related complications, such as transfusion reactions, circulatory overload, potassium intoxication, hyponatremia or hypocalcemia\(^{(4)}\).

Amiodarone, an antiarrhythmic agent, is one of the drugs that cause high rates of phlebitis. This drug was developed in Europe in the early 1960s, and was used initially as an anti-angina drug, and afterwards as an antiarrhythmic medication. It is a benzofuran derivative, with a molecular weight of 643.3 (free base) or 681.8 in its saline form (hydrochloride). It is classified as an amphiphilic drug, since it contains polar and apolar nuclei in its molecule; it is thus both hydrolytic and lipophilic. About 37% of its weight is iodine\(^{(7-10)}\).

According to its main action mechanism, amiodarone is used for the treatment of ventricular and supraventricular arrhythmias, atrial fibrillation, flutter, and refractory ventricular tachycardia\(^{(9-10)}\).

At the hospital where the study was performed, amiodarone is available in 3-ml ampules containing 150 mg of the drug. Dilution must be done in 250 ml of 5% glucose solution; there are conflicting data about the compatibility between amiodarone and saline solution. Post-dilution stability is five days at room temperature – at 0.6 mg/ml – which is the maximum infusion concentration\(^{(11)}\).

The following measures should be applied when administering this medication to avoid phlebitis. Use of correct venous puncture technique, which reduces microorganism transmission: water and antiseptic soap hand washing or alcohol gel use; choice of vein to be punctured; patient’s clinical status and veins; use of gloves for the procedure; skin antisepsis for decreasing contamination by pathogens; and dressing and catheter fixation\(^{(12)}\).

Flushing with 10 ml of 0.9% saline solution should be done after the drug is given to keep the catheter patent when drugs are administered intermittently. The catheter should be removed immediately if there are infusion problems, signs or symptoms of phlebitis\(^{(12)}\).

Constant supervision of the puncture area is needed if the dermis and epidermis show any signs of change; additionally, care should be taken to avoid infection and to identify possible risks, such as poor immunity. The insertion site should also be monitored routinely\(^{(13)}\).

Frequent exposure to this drug has raised an important issue for the work of nurses\(^{(14)}\), since phlebitis may often occur, which increases the risk of infection and may prolong hospital stay, reducing patient’s satisfaction and the quality of service.

**OBJECTIVE**

The purpose of this study were to verify the occurrence of phlebitis in patients given amiodarone through a peripheral venous access route, to identify intrinsic and extrinsic factors of phlebitis in patients given intravenous amiodarone, and to describe nursing interventions in these patients.
METHODS

We conducted a quantitative, descriptive, exploratory, retrospective study. Data were obtained from the charts of patients of an adult cardiology intensive care unit at a major private general hospital in São Paulo. The sample consisted of patients admitted to hospital from January 2006 to January 2007 who were given amiodarone by a peripheral venous catheter. A semi-structured script written by the authors was used for gathering data. It consisted of questions for characterizing the sample; questions about amiodarone, such as drug dosage, dilution, infusion velocity; questions about intrinsic and extrinsic factors that might increase the risk of phlebitis, such as the type and gauge of the vein puncture device, the duration of vein puncture; the use of other potentially phlebitis-causing solutions, such as hypertonic solutions, antibiotics and parenteral nutrition, and signs of phlebitis and prescribed nursing interventions. The Research Ethics Committee of the hospital in which data were gathered approved this study.

RESULTS

There were 687 charts in which patients were given amiodarone intravenously within the study period. Of these patients, 60.8% received this drug by a central venous catheter. Forty of the sample patients were given the medication by a peripheral venous route.

Most of the sample (n = 40) consisted of male patients (55%) aged from 51 to 90 years (87.5%), who were admitted to the cardiology intensive care unit (45%).

Figure 1 shows that most of the 40 patients who were given amiodarone by a peripheral vein developed phlebitis (55%).

Figure 2 shows the incidence of phlebitis and its relation with extrinsic and intrinsic causal factors in patients who was given amiodarone. Intrinsic factors included age over 65 years (14.9%), and poor vein condition (3.5%). Extrinsic factors included errors in amiodarone dilution, the use of other potentially phlebitis-causing drugs together with amiodarone (13.9%), and inadequate nursing care in intravenous therapy (7.8%).

Table 1 shows the nursing interventions related to phlebitis. Only 37.3% of the charts described nursing interventions that abided by the institutional protocol for treating phlebitis; in 35.3%, no nursing interventions were described for detected phlebitis. Inadequate approaches in nursing care were found in 7.8% of cases, such as applying ice bags on patients with phlebitis, contrary to the institutional recommendation of applying warm compresses for 15 minutes every eight hours and keeping the affected limb elevated in relation to the body.

DISCUSSION

Most patients who were given amiodarone by a peripheral venous access route within the study period developed phlebitis.
Predisposing factors for phlebitis in the sample were age over 65 years (considered in the literature as an intrinsic causing factor of phlebitis), incorrect dilution of the drug (where dilution errors could be up to six times the recommended dilution), dilution using 0.9% saline solution, and the use of other drugs that could potentially cause phlebitis (such as amikacin, cefazolin, gentamicin and morphine).

The recommended amiodarone dilution is 150 mg (one ampoule) for each 250 ml of 5% glucose solution. The manufacturer states that there are conflicting data about the compatibility between this drug and saline solution.

The pH of amikacin is 4.5; the pH of cefazolin ranges from 4.5 to 5.5; the pH of gentamicin ranges from 3.0 to 5.5; and the pH of morphine ranges from 3.0 to 6.0. It is important to know these pH levels to minimize the risk of phlebitis, and to dilute these drugs as much as possible within clinically tolerable levels. Continuous evaluation, as recommended by the Intravenous Nursing Society, should be done when using these drugs, to minimize the risks of phlebitis.

Nursing interventions in these patients were not always adequate in this context, such as applying cold bags and Hirudoid® on the phlebitis area, and not following institutional guidelines (use of warm compresses during at least 15 minutes each time). There were few nursing interventions for preventing or detecting phlebitis in this group of patients.

CONCLUSIONS

In this sample, 55% of patients given endovenous amiodarone developed phlebitis.

The main intrinsic factor in these patients was age over 65 years.

The main extrinsic factors in this group of patients were inadequate drug dilution, the use of the same venous route for other drugs that would potentially induce phlebitis, and inadequate nursing care in intravenous therapy.

There was a small proportion of nursing interventions for the prevention of phlebitis (37.3%); in some cases (7.8%) non-recommended interventions were taken.

REFERENCES