MedCrave
Step into the World of Research
Journal of Lung, Pulmonary & Respiratory Research

Case Report

Open Access
CrossMark

Use of vacuum therapy in access port catheter extravasation of vesicant cytotoxic agents

Abstract

Extravasation of vesicant cytotoxic is a severe complication of chemotherapy. Although access port catheters are used to reduce extravasation, rates up to 4.7% have been reported. Complications can be severe with tissue necrosis or even organ failure and death. The principal cause is needle malpositioning. Treatment mostly includes immediate explantation of the port and subcutaneous lavage. We report two cases: one with conservative treatment with port explant and local wound care and another patient with aggressive treatment that included port explant, lavage and use of vacuum therapy to complete suction of any remnant vesicant cytotoxic.

Keywords: cytotoxic, extravasation, vacuum therapy, breast edema, surgical lavage

Volume 5 Issue 4 - 2018

Alejandro Gabriel Da Lozzo,[1] Alberto Daniel Giménez Conca,[2] Sung Ho Hyon,[3] María Paula Cardenas[2]

[1]Thoracic Surgery, Hospital Italiano de Buenos Aires, Argentina
[2]Hematology, Hospital Italiano de Buenos Aires, Argentina
[3]Minimally Invasive Surgery, Hospital Italiano de Buenos Aires, Argentina

Correspondence: Alejandro Gabriel Da Lozzo, Thoracic Surgery, General Surgery Service, Hospital Italiano de Buenos Aires, Argentina, Tel +54 911 34375357, Email alejandro.dalozzo@hospitalitaliano.org.ar

Received: July 19, 2018 | **Published:** August 06, 2018

Introduction

Access port catheters have been successfully employed in cancer therapy since first described in the 1980s.[1] They provide a way to administer drugs when peripheral venous access is not available or when a safer access is needed for irritants and vesicant drugs. Extravasation has decreased with the use of totally implantable access port catheters. However rates up to 4.7% have been reported.[2] Complications can be severe with tissue necrosis or even organ failure and death.[3] Prevention of extravasation is the most important strategy, so nursing care protocols based in patient safety with early warning are encouraged, especially with high risk drug administration. The principal cause of extravasation is needle malpositioning or secondary disconnection between the needle and the port.[4] Cytotoxic drugs are classified based upon their potential for local toxicity (Table 1). The distinction between irritant and vesicant chemotherapy drugs is not absolute.[5] Irritant agents cause local erythema and pain. Vesicant agents are frequently associated with chemical burns, resulting in painful water blisters on affected area and when severe, tissue necrosis.

Table 1 Description of drugs.

Vesicants	Irritants		
Daunorubicin	Bleomycin	Dacarbazine	Liposomal doxorubicin
Doxorubicin	Bortezomib	Docetaxel	Melphalan
Epirubicin	Busulfan	Etoposide	Mitoxantrone
Idarubicin	Carboplatin	Fluorouracil / floxuridine	Oxaliplatin
Mechlorethamine	Carmustine	Gemcitabine	Paclitaxel
Mitomycin	Cisplatin	Ifosfamide	Streptozocin
Vincristine & liposomal vincristine	Cladribine	Irinotecan	Teniposide
Vinblastine	Cyclophosphamide	Ixabepilone	Topotecan
Vinorelbine	Cytarabine	Liposomal daunorubicin	

Extravasation of a vesicant drug has the potential to cause tissue necrosis with a more severe and/or lasting injury. Vesicant extravasation may result in loss of the full thickness of the skin and if severe, also compromise underlying structures. Anthracyclines are among the most important cytotoxic chemotherapy agents that cause extravasation injury because of their widespread use in various chemotherapy regimens and their ability to produce severe tissue necrosis. In case of anthracycline extravasation, we use dimethyl sulfoxide (DMSO) 90-99% topic, 4 drops/10 cm^2 of cutaneous surface every 8h on the double of affected area (7-14 days), letting dry uncovered. Local cold for 1h, repeat three times a day after DMSO (3 days).[6]

Irritant drugs cause an inflammatory reaction with aching, burning, tightness, pain, and phlebitis at the needle insertion site or along the vein. Clinical signs include warmth, erythema and tenderness in the extravasated area but without tissue sloughing or necrosis.

Symptoms are usually of short duration and there are no long-lasting sequelae. Some irritants can cause tissue necrosis if large volumes of concentrated solutions are extravasated.

Over a 15 month period, from January 2017 to March 2018, we implanted 363 access port catheters at Hospital Italiano de Buenos Aires with a complication rate of 3.6%. As an average, 24.2 catheters per month were implanted (Table 2). The first case described in this paper occurred before the last 15 months so is not one of the 363 cases.

Table 2 Access Port Catheter Complications

Complication	Resolution
Infection (n=5)	Explant + Antibiotics
Catheter-port dislodgement (n=3)	Angiographic extraction & explantation
Catheter leak (n=2)	Explant
Malfunction, inadequate flow (n=1)	Explant
Pneumothorax (n=1)	Pleural drainage
Extravasation (n=1)	Explant + Lavage + Vacuum
Complication rate	3.6% (13/363)

Case 1: "Conservative" treatment approach

A 61 year-old female patient (ID 3265315) with T cell-lymphoma was on chemotherapy with cyclophosphamide, doxorubicin, vincristine, etoposid and metilprednisona (CHOEP). Her BMI was 34.7 and body surface area was 2m^2 (93kg; 162cm). A 7 French Bard M.R.I.® Low Profile Implantable Port was surgically placed on her right side.

She experienced an extravasation event after already receiving 4 cycles of chemotherapy treatment and the access port catheter was working correctly. Approximately 2 months later she was admitted for her 5th cycle of chemotherapy. CHOEP administration started at night. Extravasation was identified by her bedside-nurse on the next morning with the patient presenting with edema and pain. A chest x-ray revealed catheter dislodgement, and angiographic extraction was performed. Following angiographic removal of the catheter and surgical explantation of the port, wound lavage was performed and then the surgical field was closed. DMSO was applied on the extravasation site. A plastic surgeon continued with local wound care, but a chemical burn progressed (Figure 1) and silver sulfadiazine cream was used. In spite of this treatment, a skin ulcer developed (Figure 2). The patient was discharged home on day 16 of the extravasation. She was finally considered chemotherapy refractory and was admitted to a palliative treatment program and she died at home because of constrictive pericarditis 56 days after the extravasation episode.

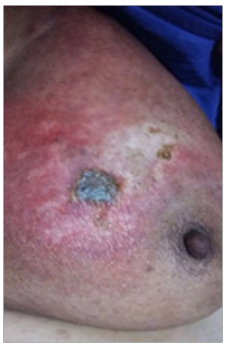

Figure 1 Breast Edema and Skin Ulcer (day 14).

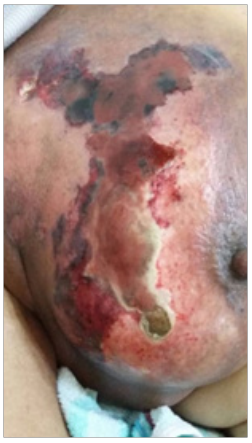

Figure 2 Skin Ulcer Progression (day 25).

Case 2: Vacuum treatment approach

A 33-year old female (ID 336965) with diagnosis of nodular lymphocyte-predominant Hodgkin's lymphoma was referred to the General Surgery Service to have an access port catheter implanted. Her BMI was 23.4 and body surface area was 1.5m^2 (54kg; 153cm). It was decided to implant a 7 French Bard M.R.I.® Low Profile Implantable Port on the right side. The port was used 4 days after implantation. CHOP chemotherapy was applied (Rituximab infusion was delayed because it was not provided on time by patient´s health insurance).

Extravasation (>50mL) was reported (Figure 3) by both the patient and nurse following CHOP (doxorubicin, cyclophosphamide and vincristine) administration. Port explantation and surgical lavage was performed 3 hours after identification. Upon further lavage with dimethyl sulfoxide (DMSO) solution, the Smith & Nephew RENASYS GO Negative Pressure Wound Therapy system[1] was placed in the open wound (Figure 4). A second surgical lavage was performed and the vacuum system continued for 2 days (Figure 5). The patient was discharged home the following day. The vacuum system was retired and the wound was sutured closed 10 days after explantation (Figure 6). At approximately two months post event, the patient was thought to have an acceptable cosmetic result (Figure 7) and she continued chemotherapy with a new access port catheter placed on the left side.

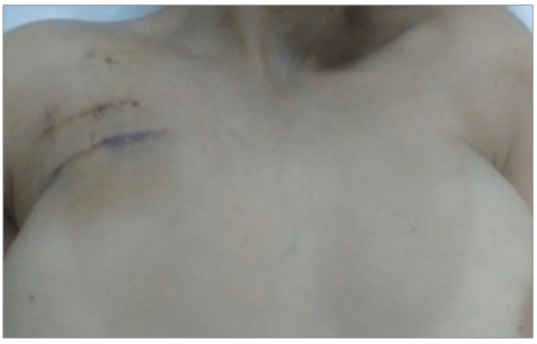

Figure 3 Access Port Catheter wound immediately after extravasation.

[1]http://www.smith-nephew.com/key-products/advanced-wound-management/wound-therapy-areas/negative-pressure-wound-therapy/

[2]http://www.bardaccess.com/products/ports/mri-low

[3]http://www.bardaccess.com/products/ports/ti-port

Citation: Da Lozzo AG, Giménez Conca AD, Hyon SH, et al. Use of vacuum therapy in access port catheter extravasation of vesicant cytotoxic agents. *J Lung Pulm Respir Res.* 2018;5(4):121–124. DOI: 10.15406/jlprr.2018.05.00175

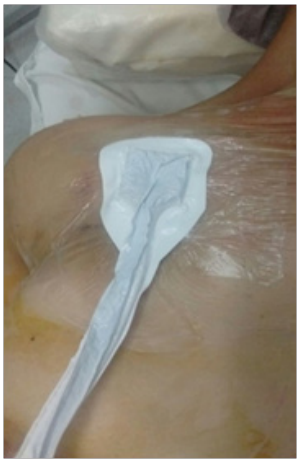

Figure 4 Vacuum System applied after lavage.

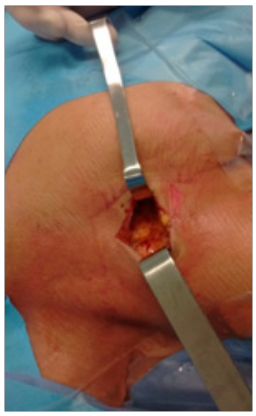

Figure 5 Surgical Lavage (day 2).

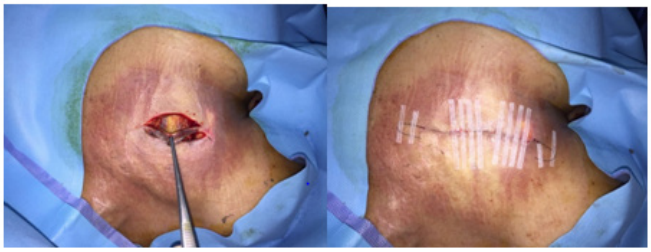

Figure 6 Surgical Toilet (day 10). Wound Closure. It was necessary to remove devitalized skin from the wound.

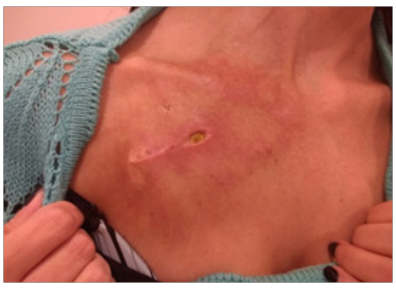

Figure 7 Long term result (day 60).

Discussion

Approximately 24 access port catheters are implanted monthly at our medical center, and typically 400 chemotherapies are administered utilizing these ports during the same time period. We use Bard M.R.I.® Low-Profile Implantable Port[2] and Bard Titanium Implantable Port[3] as a first choice, based on patient BMI and corporal surface (when BMI≥30 or corporal surface≥2m^2, a not low profile port is preferred) or when need for M.R.I. is anticipated (i.e. breast cancer). Catheters are implanted with local anesthesia with ultrasound and radioscopic guidance. Patients are instructed to use oral anti-inflammatory drugs for pain and to apply local cold compresses for the first two days to prevent hematoma. We try to wait for at least one week after catheter implantation before use, however we prioritize urgent need of treatment.

Minimal, peripheral extravasation can be managed with DMSO local administration only. However, when extravasation occurs in the subcutaneous pocket of the port, especially when recently implanted, drug remains there and damage could exponentially increase. Surgical lavage as well as port and catheter explantation is the best option in cases of severe extravasation. The use of negative pressure wound therapy is performed to keep the wound open so that remnant drug can be drained outside and posterior lavage can be done and so that continuous aspiration may help drug and free radicals to be eliminated from fat tissue.

As illustrated here, the "conservatively" treated example shows that even when the port was removed and surgical lavage was done, it was not sufficient. After lavage the skin was closed and remnant drug or free radicals may have remained within the fat tissue, continuing tissue damage. The more "Aggressively" treated example, using vacuum therapy, resulted in a better outcome. Although we are not certain whether the vacuum therapy was crucial, we believe it may have played a role in the favorable outcome.

We recognize two extra possible reasons that could increase possibility of extravasation. In case 1, although the size and body surface area of the patient was low, the BMI was high and the use of an 8-french Titanium Implantable Port (not low profile type) would have been better. In case 2, the use of access port catheter before the first week of implantation could help to extravasation because hematoma on implantation site increases the distance between the skin and the port.

Conclusion

Extravasation of vesicant chemotherapy drugs associated with the use of fully implantable access ports are fortunately a rare event. However, when they occur, this could cause severe tissue damage or even death. In our experience, aggressive treatment seems to be the best option to prevent severe extravasation complications. Use of vacuum therapy could be an accessible and safe option for patients with implantable catheter extravasation complications.

Acknowledgments

None.

Conflict of interest

The author declares that they have no conflicts of interests.

References

1. Niederhuber JE, Ensminger W, Gyves JW, et al. Totally implanted venous and arterial access system to replace external catheters in cancer treatment. *Surgery*. 1982;92(4):706–712.

Citation: Da Lozzo AG, Giménez Conca AD, Hyon SH, et al. Use of vacuum therapy in access port catheter extravasation of vesicant cytotoxic agents. *J Lung Pulm Respir Res.* 2018;5(4):121–124. DOI: 10.15406/jlprr.2018.05.00175

2. Haslik W, Hacker S, Felberbauer FX, et al. Port-a-Cath® extravasation of vesicant cytotoxics: Surgical options for a rare complication of cancer chemotherapy. *Eur J Surg Oncol*. 2015;41(3):378–385.

3. Vasconcelos I, Schoenegg W. Massive breast necrosis after extravasation of a full anthracycline cycle. *BMJ Case Rep*. 2013: bcr2013201179.

4. Azaïs H, Bresson L, Bassil A, et al. Chemotherapy drug extravasation in totally implantable venous access port systems: how effective is early surgical lavage? *J Vasc Access*. 2015;16(1):31–37.

5. Pérez Fidalgo JA, García Fabregat L, Cervantes A, et al. Management of chemotherapy extravasation: ESMO-EONS Clinical Practice Guidelines. *Ann Oncol Off J Eur Soc Med Oncol*. 2012;23(Suppl 7):167–173.

6. Lebredo L, Barrie R, Woltering EA. DMSO protects against adriamycin-induced tissue necrosis. *J Surg Res*. 1992;53(1):62–65.

Citation: Da Lozzo AG, Giménez Conca AD, Hyon SH, et al. Use of vacuum therapy in access port catheter extravasation of vesicant cytotoxic agents. *J Lung Pulm Respir Res.* 2018;5(4):121–124. DOI: 10.15406/jlprr.2018.05.00175