

CASE REPORT

Topical nitroglycerin for management of peripheral extravasation of vasopressors: a case report

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Abstract

Peripheral route for administration of vasopressors is often opted due to resource limitations or as a rescue until central venous access is established. This, however, is not devoid of complications, the most common being extravasation and tissue injury. Phentolamine is the only drug approved for management of vasopressor extravasation; however, successful use of other agents has been reported. Here we report a case of peripheral extravasation of vasopressors, successfully managed with topical nitroglycerin in intensive care unit in Kathmandu. To our knowledge, this is the first report of such kind from Nepal.

INTRODUCTION

The use of vasopressor medications is the mainstay in management of patients with distributive shock in intensive care unit (ICU). Due to concern of potential extravasation and local tissue injury, central venous catheter (CVC) is the preferred route for vasopressor administration [1]. Despite this concern, vasopressors are administered via peripheral lines, often in resource-limited settings such as ours where financial constraints play a major role in patient management. Although rare, vasopressor extravasation can lead to tissue damage, ischemia and necrosis of the affected area. Among the current treatment options, phentolamine is considered standard for management of extravasation, which is often unavailable. Other options include topical nitroglycerin and subcutaneous terbutaline [2]. Here we report a case where topical nitroglycerin (GTN) was successfully used in the treatment of tissue changes caused by peripheral extravasation of vasopressors.

CASE REPORT

Our patient was a 72-year-old gentleman, who presented to the hospital with fever with chills, cough and chest pain. Total leucocyte count was 37 100/mm³. Chest radiograph revealed consolidation in the right lung. He was well oriented and obeying commands. However, the blood pressure was low, which did not respond to fluid resuscitation. He was transferred to the ICU with the diagnosis of pneumonia with septic shock.

In the ICU, noradrenaline (NA) infusion was started at the rate of 0.1 mcg/kg/minute via a peripherally placed 18G intravenous (IV) cannula, which was placed on the dorsum of the left hand. With broad-spectrum antibiotics, fluid resuscitation and vasopressor support, the blood pressure stabilized, and gradually the vasopressor began to taper off after about 2 hours of therapy. As the patient was stable and vasopressor was being tapered off, CVC placement was not attempted. The next morning, about 12 hours after NA infusion, we noticed swelling over the dorsum

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Figure 1: Skin changes associated with vasopressor extravasation.



Figure 2: Skin changes after 48 hours of topical GTN.

of the left hand with purplish discoloration (Fig. 1). The infusion was stopped immediately, and the IV cannula was removed. Another IV cannula of 18G was placed in the volar aspect of the right forearm. The NA infusion was tapered off and stopped completely after about 4 hours. Topical nitroglycerin 2% was applied on and repeated every 4 hours. The hand was kept elevated. Phentolamine was not available in our setup and neither was terbutaline.

We continued care of the left hand with elevation, heat application and application of 2% topical GTN. The swelling and discoloration gradually improved without further damage to the surrounding tissues. Within 48 hours of topical nitroglycerin treatment, the swelling subsided, and the skin texture was near normal (Fig. 2).

DISCUSSION

Extravasation of vasopressors is a rare but serious complication of administration of vasopressors via peripheral veins. The severity of injury is not always predictable and is often underestimated [3]. The extent of damage depends on dilution, volume, duration of infusion and the location of the peripheral catheter [4]. Direct α -adrenergic-mediated vasospasm of the

smaller veins and the vasa vasorum leads to inadequate distribution of blood flow. Subsequent increase in hydrostatic pressure of the venous circulation leads to further effusion of vasoconstrictors into the tissues. This hydrostatic pressure also leads to backflow into the arteriolar capillaries. Ultimately ischemia ensues, leading to necrosis of the adjacent tissues [5]. Common features are localized pain, swelling and color change. The tissue damage results from intense vasoconstriction and ranges from mere discoloration to ischemic necrosis of the affected part. Management requires immediate discontinuation of the vasopressor infusion and administration of a potent vasodilator [6].

Phentolamine mesylate is the only pharmacological treatment for vasopressor extravasation approved by the Food and Drug Administration [2]. However, this drug is not easily available as its use for other purposes has become obsolete. Other treatment options have also been mentioned, albeit in case reports. No randomized controlled trials exist about the management of extravasation injuries [7].

Nitroglycerin is an organic nitrate that releases nitric oxide, which causes arterial and venodilatation [2]. The use of 2% topical GTN ointment for extravasation and tissue ischemia successfully has been described in several case reports. Topical application of 2% nitroglycerin along with phentolamine has been shown to initiate reperfusion [8]. Although we did not come across any reports where extravasation injuries due to NA were managed with topical GTN alone, there are reports of the use of topical GTN as a single agent for successful management of extravasation injuries due to epinephrine and dopamine. As NA has more affinity towards the α -adrenergic receptor than epinephrine or dopamine [9], the difference in receptor affinity could be one reason why an α -blocker is required in addition to noradrenaline extravasation to obtain good results. In our case, however, additional factors, such as the use of low concentration of NA for infusion (40mcg/ml), prompt recognition of extravasation and removal of IV cannula, limb elevation and care and heat application, could have contributed in addition to topical GTN for the rapid resolution of the injury.

It is always better to opt for CVCs for infusion of vasopressors. However, in circumstances where peripheral lines are used for such infusions, one must be aware of the potential extravasation and the resulting injuries. Although larger trials haven't been conducted regarding pharmacological management of extravasation injuries, the existing reports, including ours, suggest that topical nitroglycerin is a very effective alternative. In order to establish its efficacy, larger studies are warranted. Since the practice of peripheral infusion of vasopressors is declining, we might not get studies large enough to have a drug recommendation for extravasation injuries resulting from vasopressors.

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CONFLICT OF INTEREST STATEMENT

None declared.

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CONSENT

Written informed consent taken from the patient.

GUARANTOR

Ninadini Shrestha is the nominated guarantor for this case report.

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