

# The Injection of Intraarterial Vasodilator for the Treatment of Vasopressor Extravasation

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**Abstract** A patient receiving Norepinephrine infusion through a peripheral IV experienced vasopressor extravasation. Due to an unavailability of phentolamine in the hospital, it was decided to attempt a new method of extravasation treatment through intraarterial injection of nitroprusside, restoring blood flow to the affected area. To mitigate the recurrence of vasospasms given the short half-life of nitroprusside, ropivacaine was injected. This regime successfully alleviated the extravasation-induced vasospasm and the patient recovered full function.

**Keywords:** extravasation, norepinephrine, nitroprusside, ropivacaine, vasopressor complication

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## 1. Introduction

We described a case where vasopressor extravasation occurred and was mitigated immediately utilizing two novel techniques. This discussion highlights the importance of learning and understanding the rapid execution of treatment modalities in cases of subcutaneous extravasation of vasopressors.

A 67-year-old female with coronary artery disease, hypertension, anemia, and recurrent upper gastrointestinal bleeding presented to the emergency department after suffering cardiac arrest at her home. The patient was intubated and ACLS protocol was followed. The patient regained spontaneous circulation after 50 minutes. She was extremely hypotensive, so a Norepinephrine infusion was started in the right mid-forearm 20 gauge peripheral IV. The patient received three liters of fluid and antibiotics and was moved up to the ICU.

## 2. Case Description

When the patient arrived in the ICU, she was receiving 60 micrograms per minute through the IV. Her hand distal to the IV became cyanotic, indicating that Norepinephrine was extravasated and causing severe vasoconstriction. We stopped the infusion of Levophed and a central line was placed. We began to draw the Levophed into a syringe as we squeezed it out the forearm. Despite doing this, her right-hand fingers remained cyanotic which indicated that there was very low perfusion.

The next step to mitigate the effects of Levophed would be to infiltrate with phentolamine, an Alpha 1 blocker, in a circular manner around the extravasation site to counteract

the effects of Norepinephrine on the blood vessels. Unfortunately, our pharmacy did not have phentolamine, so we had to make a decision fast or risk the patient losing her arm.

We intentionally placed an arterial line distal to the site through the brachial artery. We injected nitroprusside, a direct vasodilator, through the arterial line which is very uncommon in the ICU as medications are usually injected through the vein, not the artery. We did this in order to deliver nitroprusside directly to the forearm and hand to dilate vessels. We injected 25mg of nitroprusside and the hand immediately turned red and restored circulation.

We anticipated severe delayed hypotension once nitroprusside makes it to the systemic circulation. To mitigate this risk, we prepared a milligram of epinephrine and after five minutes, the patient's blood pressure dropped to a systolic 70 mmHg. We immediately injected the epinephrine and the blood pressure stabilized.

Additionally, because the half-life of nitroprusside is extremely short, about 10-20 seconds at the most, whereas the half-life of Levophed is around 2-4 minutes, the patient was at high risk of recurrence. We performed a brachial plexus block by injecting 40cc of ropivacaine (0.5%) with the goal of blocking the sympathetic nerves which in turn stops the vessels from constricting so that we could have up to 16 hours of vasodilation. After this injection, the circulation was restored, and the patient did not experience any clinical sequela.

## 3. Discussion

Extravasation is a common manifestation, with an incidence of around 39% in adults, [1] occurs when an

infused drug leaks out of a blood vessel into the surrounding tissue, often leading to tissue damage and ischemia. [2] Vasopressor extravasation is a major problem in the ICU and the emergency department due to the frequent use of vesicants and vasoconstrictors. Subcutaneous infiltration of Phentolamine, the standard and only pharmacological treatment approved by the Food and Drug Administration for vasopressor extravasation is rarely available for use in hospital pharmacies and has varying degrees of success. [2]

Intracoronary nitroprusside, a vasoactive drug, has been used off-label for coronary vasospasms and is commonly used to treat congestive heart failure. [3] Nitroprusside can effectively dilate small arteries and veins, selectively relax vascular smooth muscle and reduce peripheral vascular resistance, temporarily change hemodynamic variables, reduce blood pressure, relieve the cardiac load, and increase cardiac output. [3] In the case of vasopressor extravasation, it is important to dilate the vessels in order to flush out the Norepinephrine. It is extremely difficult to perform randomized trials on vasopressor extravasation treatments due to the rare emergency nature and the non-uniformity in the methods of treatment. Although there is no literature on the use of nitroprusside as a treatment for vasopressor extravasation, its usage in our

patient's treatment was able to successfully, and safely, salvage her hand.

Intraarterial injection of vasodilators in the treatment of vasopressor extravasation is a novel approach with expected higher success rates. Sympathetic blocks achieved by plexus blocks offer a great additional treatment modality.

In our case report, we successfully used both intraarterial nitroprusside and brachial plexus block to achieve maximum sustained dilation of the upper extremity vessels. Further investigations may be necessary.

## References

- [1] Al-Benna S, O'Boyle C, Holley J. Extravasation injuries in adults. *ISRN Dermatol*. 2013 May 8; 2013: 856541.
- [2] Plum M, Moukhachen O. Alternative Pharmacological Management of Vasopressor Extravasation in the Absence of Phentolamine. *P T*. 2017 Sep; 42(9): 581-592. PMID: 28890646; PMCID: PMC5565133.
- [3] Guo, Binbin MMa; Yang, Tian MMa; Nan, Jinniing MDa; Huang, Qianghui MMb; Wang, Chenxiu MMC; Xu, Wenpeng MMd,\* Efficacy and safety of Shenfu injection combined with sodium nitroprusside in the treatment of chronic heart failure in patients with coronary heart disease, *Medicine*: February 19, 2021 - Volume 100 - Issue 7 - p e24414.



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