Push dose vasopressor

Objective

Discuss the safety consideration of push-dose vasopressors
Pre-assessment question

What is the final concentration of push dose epinephrine?

A. 1 mcg/mL
B. 10 mcg/mL
C. 100 mcg/mL

Patient case

CC/HPI: RM is a 65 year old female with past medical history of hypertension. She presented to the emergency department with chief complaint of altered mental status. Her daughter reported that she may have accidentally taken an extra hydralazine tablet this morning.

Vitals: Temp 37C HR 112 BP: 75/48 RR: 20

BMP, CBC and blood sugar all within normal limit
Introduction

Intermittent administration of small doses of vasopressor such as epinephrine and phenylephrine has been reported in anesthesia literature1-2

This practice is commonly referred to as bolus-dose vasopressor, Neo-stick, Phenyl-stick etc.

Updated phenylephrine labeling for bolus dosage3
○ Direction: 40 - 100 mcg every 1-2 minutes prn (not to exceed 200 mcg)

Pharmacology and dosing of common push-dose vasopressors

<table>
<thead>
<tr>
<th></th>
<th>Epinephrine</th>
<th>Phenylephrine</th>
<th>Ephedrine</th>
</tr>
</thead>
<tbody>
<tr>
<td>Target receptors</td>
<td>α, β1, β2</td>
<td>α</td>
<td>α, β1</td>
</tr>
<tr>
<td>Onset (minutes)</td>
<td>Rapid</td>
<td>Rapid</td>
<td>Rapid</td>
</tr>
<tr>
<td>Duration (minutes)</td>
<td>5-10</td>
<td>10-20</td>
<td>60</td>
</tr>
<tr>
<td>Recommended dosing per dose</td>
<td>5-20 μg</td>
<td>40-200 μg</td>
<td>5-10 mg</td>
</tr>
<tr>
<td>Patient selection</td>
<td>Low cardiac output, anaphylaxis</td>
<td>Tachycardia, vasodilation</td>
<td>Usually used in the operation room due to long duration of action</td>
</tr>
</tbody>
</table>

Clinical considerations

• Indication: Urgent reversal of hypotension

• Temporary measure to limit inadequate perfusion of vital organs

• Does not replace appropriate resuscitation effort such as fluid bolus and vasopressor infusion

Possible scenarios

Before, during and after intubation
- 20-46% patient experienced hypotension
- Post-intubation hypotension was associated with increased in-hospital mortality

Post cardiac arrest with return of spontaneous circulation

Traumatic brain injury

Mixing instruction for push dose epinephrine

1 mL epinephrine (100mcg/mL)  
9 mL 0.9% Sodium Chloride  
10 mL syringe

Dosage: 0.5–2 mL (5–20 mcg) slow IV push every 1–5 minutes.

Commercially available phenylephrine syringe
Mixing instruction for push dose phenylephrine

1 mL phenylephrine (10mg/mL)  100 mL 0.9% sodium chloride IVPB

Final concentration ~100 mcg/mL*

*up to 10% overfill for IVPB

Dosage: 0.5–2 mL (50–200 mcg) slow IV push every 1–5 minutes

Safety risks

• Complex multi-step process that involves dose calculation, drug dilution and incremental push-dose administration

• Name confusion: “Neo-stick” vs Neostigmine

• Dosage administration error of push-dose vasopressor has been reported1-2

• Adverse effects reported: Cardiogenic shock with severe left ventricular dysfunction, chest pain with ST-elevation

Risk of extravasation

Analysis of 325 separate local tissue injury and extravasation events associated with vasopressor infusion

Location of local tissue injury

<table>
<thead>
<tr>
<th>Location</th>
<th>Local tissue injury % (n = 204)</th>
<th>Extravasation % (n=114)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distal</td>
<td>85.3</td>
<td>34.2</td>
</tr>
<tr>
<td>Saphenous vein</td>
<td>56.9</td>
<td>13.2</td>
</tr>
<tr>
<td>Hand</td>
<td>7.4</td>
<td>12.3</td>
</tr>
<tr>
<td>Forearm</td>
<td>8.3</td>
<td>5.3</td>
</tr>
<tr>
<td>leg</td>
<td>5.9</td>
<td>0.9</td>
</tr>
<tr>
<td>Proximal</td>
<td>9.8</td>
<td>11.4</td>
</tr>
<tr>
<td>Antecubital fossa</td>
<td>8.8</td>
<td>11.4</td>
</tr>
<tr>
<td>Neck</td>
<td>0.5</td>
<td>0</td>
</tr>
<tr>
<td>Not reported</td>
<td>4.9</td>
<td>54.4</td>
</tr>
</tbody>
</table>

*Each subject can have multiple sites of local tissue injury

Risk of extravasation

• Risk of local tissue injury / extravasation associated with administration of vasopressor is higher with peripheral access than central access

• Most extravasation event occurred after infusion of > 6 hours

• If possible, try to infuse push dose vasopressor via proximal intravenous access instead of distal access


Monitoring

• Must be monitored by licensed independent practitioner at bedside

• Measure heart rate and blood pressure at least every 5 minutes while administering and titrating

• Follow up with the establishment of vasopressor infusion

Post-assessment question

What is the final concentration of push dose epinephrine?

A. 1 mcg/mL  
B. 10 mcg/mL  
C. 100 mcg/mL

Patient case

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Vitals: Temp 37C HR 112 BP: 75/48 RR: 20

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Result:
- Emergency room department pharmacist prepared push dose phenylephrine
- Patient received 100mcg phenylephrine and blood pressure improved
- Fluid bolus and norepinephrine infusion is promptly set up and administered by nurse
References


