Extravasation injury due to dopamine infusion leading to dermal necrosis and gangrene

Sir,

Extravasation in the intensive care settings is a frequent and potentially dangerous complication but is underreported. We describe extravasation injury in two patients of renal failure receiving dopamine infusion.

A 16-year-old man with chronic glomerulonephritis and chronic renal failure, on twice a week regular hemodialysis, was admitted to the hospital with complaints of frequency of stools, vomiting, and generalized weakness. On examination, the patient had fever (39°C), pulse rate was 110/min, and blood pressure 84/58 mmHg. To overcome the hypotension, dopamine infusion was administered, using a microdrip set through a cannula inserted in the antecubital fossa. The rate of infusion was 5 mcg/kg/min initially and it was later increased to 10 mcg/kg/min. Two days later, his dressing over the cannula was found soaked on inspection. Upon removal of the dressing, his elbow was found to be swollen at the cannula insertion site. The cannula was removed and a central venous catheter inserted for delivery of drugs. The site of extravasation turned purplish within 24 hours. Over the next few days, skin necrosis occurred involving an area of 4×5 cm [Figure 1]. The patient was treated for 4 days with antibiotics and infusions of dopamine and noradrenaline through the central venous catheter. On improvement, the patient was taken for skin debridement and grafting.

A 45-year-old man was transferred from a smaller peripheral hospital to our hospital with acute renal failure, malaria, and septic shock. He was on dopamine infusion through a simple

![Dermal necrosis at elbow due to dopamine extravasation](image1)

![Gangrene of left hand produced by dopamine extravasation](image2)
intravenous set at a rate of 5 mcg/kg/min through a cannula placed on the dorsum of the left hand. On admission, his temperature was 39.5°C, pulse 124/min, RR 40/min, and BP 80/52 mmHg. An extravasation at the cannula site was noted as there was acrocyanosis along with swelling of the left hand. The cannula was removed immediately and was replaced with a central venous catheter. The patient was put on mechanical ventilation and vasopressor support through central venous catheter. The following day, the patient’s hand turned cold and dusky with changes suggestive of gangrene [Figure 2]. Peripheral Doppler examination of the left forearm and hand showed spasm of left radial artery but there was sufficient collateral flow. The patient was managed conservatively with application of topical nitroglycerine ointment. The hand improved slowly over next week without any surgical intervention. Inotropic support, dialysis and other supportive management were continued for 7 days. The patient improved with treatment.

Healthcare providers need to be aware of the potential complications associated with extravasation. Most adverse effects of dopamine are due to peripheral vasoconstriction after use of high dose dopamine infusion.1 Even in low doses, extravasation of the drug leads to high local concentrations and can cause severe vasoconstriction and tissue ischemia. Severe dermal ischemia has been reported after 3 mcg/kg/min dopamine infusion in an infant.2 In the cases reported, skin necrosis occurred in first case while acrocyanosis leading to gangrene occurred in the second case. Tissue necrosis can also occur due to embolic complications of disseminated intravascular coagulation and hypovolemia.3

Local tissue damage caused by extravasation of dopamine is associated with dopamine infusion though a small peripheral vein.1 A central venous access is recommended for vasopressor infusion, whenever possible. However, extravasation in central venous catheters, although less frequent, is potentially more dangerous because of delayed diagnosis and proximity to vulnerable anatomical structures.4 It can occur when a central venous catheter is inadvertently withdrawn so that proximal port lies extravasal.4 If extravasation is suspected, prompt infiltration of the area with phentolamine and/or application of topical nitroglycerine should be performed to counter the vasoconstriction.2,5

Precautions to avoid such complications include a sterile gauze or sterile transparent dressing at the catheter insertion site;6 daily palpation over intact dressing for signs of phlebitis is essential;6 if there is tenderness, warmth or swelling on daily surveillance, direct inspection of the site is essential; and if there are signs of phlebitis, infection, or malfunction, intravenous catheters should be replaced.

Multiple punctures of same vein, high infusion pressures, intravenous access sites close to tendons, nerves, or arteries should be avoided.4

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