

# CASE REPORT

## DRUG ERROR: A CASE REPORT OF ACCIDENTAL DOPAMINE INTRAVENOUS BOLUS INJECTION

Biswajit Sutradhar<sup>1</sup>, S. B. Chakrabarti<sup>2</sup>

### HOW TO CITE THIS ARTICLE:

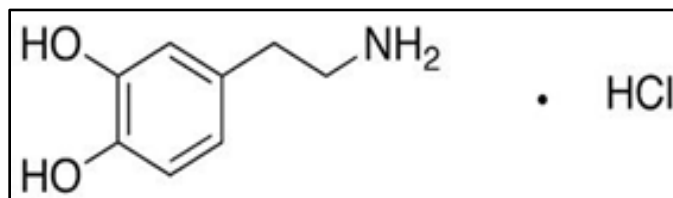
Biswajit Sutradhar, S. B. Chakrabarti. "Drug Error: A Case Report of Accidental Dopamine Intravenous Bolus Injection". Journal of Evidence based Medicine and Healthcare; Volume 1, Issue 11, November 17, 2014; Page: 1397-1403.

**ABSTRACT:** Dopamine is an inotropic agent used to treat hypotension, shock & usually kept in emergency kit. Accidental administration of dopamine is very rare as it is used by health professionals but it can occur as in this case. A 42 years female patient of ASA I with fibroid uterus was posted for total abdominal hysterectomy. During premedication accidentally IV dopamine was administered to her. Immediately the patient suffered from restlessness, palpitation, chest tightness, tachycardia, hypertension, excessive salivation, nausea & vomiting. The drug error was immediately detected. The patient was successfully managed with Inj furosemide, Inj esmolol, Inj glycopyrrolate, Inj ondansetron, I V fluid & 100% oxygen in the OT. Spo<sub>2</sub>, HR, NIBP, ECG & urine output were monitored. The case was followed up, surgery deferred but performed later on successfully. Dopamine toxicity among the chronic users is common but inadvertent dopamine injection is very rare. Acute dopamine toxicity needs emergency care. Phentolamine an  $\alpha$  blocker, is the antidote to dopamine but in the absence of phentolamine, aggressive diuresis with furosemide & maintenance of hemodynamic stability with appropriate agents can save the life of patient.

**KEYWORDS:** Drug error, Dopamine, Bolus I.V.

**INTRODUCTION:** Dopamine is a positive inotropic agent which acts on both  $\alpha$  &  $\beta$  adrenergic receptors, as well as on dopaminergic receptors. The drug is used in emergency situations like shock, severe hypotension etc. to maintain hemodynamic stability. It is kept in emergency tray along with other life-saving drugs. The ampule of dopamine contains 5 ml clear solution (total 200 mg with each ml contains 40 mg). In the present case, dopamine ampule was mistaken for Inj ondansetron ampule and was given IV to a patient accidentally during premedication who was posted for total abdominal hysterectomy.

**DRUG OVERVIEW:** Dopamine is an endogenous catecholamine, used as an inotropic vasopressor agent. Its chemical structure is 3, 4 dihydroxyphenethylamine hydrochloride



CHEMICAL STRUCTURE OF DOPAMINE HYDROCHLORIDE

# CASE REPORT

---

**INDICATIONS & USAGE:** Dopamine is indicated for the correction of hemodynamic imbalances present in the shock syndrome due to:

- Myocardial infarctions,
- Trauma,
- Endotoxic septicemia,
- Open heart surgery,
- Renal failure, and
- Chronic cardiac decompensation as in congestive failure.

Perioperatively the agent is used to correct hemodynamic instability in cases of:

- Hypotension,
- Low cardiac output,
- Poor perfusion of vital organs,
- Shock patients who remain hypotensive after adequate volume expansion.

## **DOSAGE & CLINICAL EFFECTS:**

- 1-5 mcg/kg/min IV (low dose): May increase urine output and renal blood flow
- 5-15 mcg/kg/min IV (medium dose): May increase renal blood flow, cardiac output, heart rate, and cardiac contractility.
- 20-50 mcg/kg/min IV (high dose): May increase blood pressure and stimulate vasoconstriction; may not have a beneficial effect in blood pressure; may increase risk of tachyarrhythmias.
- May increase infusion by 1-4 mcg/kg/min at 10-30 min intervals until optimum response obtained which may need to be titrated to desired response.

Strong dopaminergic, beta1-adrenergic and alpha-adrenergic effects are based on dosing rate:

- Dopaminergic effects: 0.5-2 mcg/kg/min.
- Beta1 effects: 2-10 mcg/kg/min.
- Alpha effects: >10 mcg/kg/min.

**ONSET & DURATION OF ACTION:** The effects of dopamine on systolic blood pressure are seen within 2 to 4 minutes after starting the infusion. The duration of action is less than 10 minutes after discontinuation of infusion.<sup>(1)</sup>

## **DRUG WARNINGS<sup>(2)</sup>:**

- Dopamine should be used with caution in patients with ischemic heart disease.
- The drug is contraindicated:
  - In patients with pheochromocytoma and
  - In patients with uncorrected tachyarrhythmias or ventricular fibrillation.
- Commercially available formulations of dopamine hydrochloride may contain sulphites that can cause allergic-type reactions.

# CASE REPORT

---

- Caution should be used to avoid extravasation of the drug which may cause intense vasoconstriction.

## **SIDE EFFECTS<sup>(2)</sup>:**

Dopamine may cause:

- Ectopic heartbeats,
- Tachycardia,
- Angina,
- Palpitation,
- Vasoconstriction,
- Hypotension,
- Dyspnoea,
- Nausea,
- Vomiting, and
- Headache.

## **Other less frequent adverse effects include:**

- Cardiac conduction abnormalities,
  - Widened QRS complex,
  - Bradycardia,
  - Hypertension,
  - Azotemia,
  - Anxiety, and
  - Piloerection.
- 
- Ventricular arrhythmias may occur with very high doses.
  - Dopamine may cause elevations in serum glucose although the concentrations usually do not rise above normal limits.
  - A few cases of peripheral cyanosis also have been reported in patients receiving dopamine.
  - Gangrene of the extremities has occurred when high doses of dopamine were administered for prolonged periods and in patients with occlusive vascular disease
  - Extravasation of dopamine may result in tissue necrosis and sloughing of surrounding tissues.

## **CASE OVERVIEW:**

Reg No: 32596/13.

Age: 42 yrs.

Sex: Female.

Religion: Hindu.

Occupation: Housewife.

Address: Agartala.

# CASE REPORT

---

## PATIENT'S HISTORY:

### Chief Complaints:

1. Excessive and irregular menstrual bleeding for six months.
2. Pain in lower abdomen-one week.

**Past History:** Not significant

**Menstrual History:** Irregular, frequent menstrual bleeding for past one year.

**Family History:** Not significant

**USG:** Multiple Fibroid uteri.

Her provisional diagnosis was fibroid uterus with dysfunctional uterine bleeding and operation proposed for her was total abdominal hysterectomy

## PRE-ANESTHETIC CHECK UP:

**General Appearance:** 42 years female with average built.

**Vitals:** No pallor, jaundice, cyanosis, oedema, clubbing or koilonychias. Temperature-98.4F PR-72 bpm, regular, RR 14pm, BP 124/82 mm of Hg.

**CVS:** S1 S2 audible, regular rate and rhythm, no murmur.

**Neurologic:** Alert, oriented to time, place& person.

**Chest:** Vesicular breath sound, no added sound.

**Abdomen:** No organomegaly, normal bowel sounds.

**ASA Status:** Grade I.

**Airway:** Adequate, MP- I.

**Spine:** No abnormality found.

## INVESTIGATIONS:

**Routine Blood:** TLC-8400 cells/cu mm, DLC- neutrophils 53% lymphocytes 40% monocytes 4% eosinophils 3% basophils 0% Hb- 11.7 gm/d, I ESR- 35mm/ 1st hour

**BT:** 2 minutes CT- 3 minutes 45 seconds

**FBS:** 70 mg/dl PPBS – 126 mg/dl

**Blood Urea:** 22 mg/dl serum creatinine - 0.78 mg/dl.

**LFT:** Serum bilirubin 0.74mg/dl (conjugated 0.16mg/dl unconjugated 0.58 mg/dl SGOT 12 IU/ml SGPT 16 IU/ml serum alkaline phosphatase 42 U/L total protein 6.7 gm/dl serum albumin 4.2 gm/dl serum globulin 2.5 gm/dl A/G ratio 1.7

**Urine for RE/ME:** Normal

### Thyroid function Test:

T3- 1.28ng/ml, T4- 10 µgm/dl

TSH- 3.43 µ IU/ml

Serum Na – 142 meq/l, K – 4.1 meq/l

CXR – within normal limits

ECG – within normal limits

# CASE REPORT

---

**PERIOPERATIVE COURSE:** Patient was given tab alprazolam 0.05 mg and tab ranitidine 300 mg at night before operation and kept on fasting for 6 hours.

30 minutes prior to the operation:

- Preloading was done with 1000 ml of Ringer lactate solution
- Premedication was done with in. Pantoprazole 40 mg iv.

During premedication accidentally IV dopamine 5ml (40mg/ml) was administered to her instead of Inj ondansetron 4ml (8mg).

Immediately the patient suffered from restlessness, palpitation, chest tightness, tachycardia, hypertension, excessive salivation, nausea and vomiting. The patient was then immediately shifted to OT.

The drug error was immediately detected from the level of broken ampule. The patient was managed in OT with:

- Inj furosemide 40 mg IV.
- Inj esmolol 30 mg IV bolus followed by 10mg after 10 minutes.
- Inj glycopyrrolate 0.2 mg IV.
- Inj ondansetron 8mg IV.
- IV fluid – 5D &RL 1 bottle each in flush.
- 100% oxygen.

Spo<sub>2</sub>, HR, NIBP, ECG & urine output were monitored regularly. Tachycardia & hypertension were persistent and increasing till 10 minutes from the injection. Heart rate went up to 180beats/min and BP raised by 240/140 mm of Hg. ECG showed sinus tachycardia followed by SVT for a brief time period (1.5 minutes). After about 12 minutes HR & BP started to decline and became near baseline within 18 minutes from the injection and ECG became normal tracing. Urine output was maintained throughout this time period. Patient recovered from restlessness and became calm after about 15 minutes. There were no episodes of altered sensorium.

The case was postponed and followed up for 3 days and investigated for insults to vital organs and found to have no abnormality. The surgery was performed successfully after 7 days.

**DISCUSSION:** Dopamine toxicity among the chronic users (e.g. Parkinson's disease, occlusive vascular disease) is common but accidental bolus dopamine injection is quite rare. Acute dopamine toxicity needs emergency care.

In the event of an overdose, supportive and symptomatic measures should be used. Since the duration of action of dopamine is quite short (<10minutes),<sup>(1)</sup> no additional remedial measures are usually necessary. If blood pressure fails to lower, a short-acting alpha adrenergic blocking agent, such as phentolamine, may be administered as stated by United States Pharmacopeial Convention, 2008.<sup>(3)</sup>

Currance, P.L. et al suggested immediate first aid as - ensure that adequate decontamination has been carried out. If patient is not breathing, start artificial respiration, preferably with a demand valve resuscitator, bag-valve-mask device, or pocket mask, as trained.

# CASE REPORT

---

Perform CPR if necessary. If vomiting occurs, lean patient forward or place on the left side (head-down position, if possible) to maintain an open airway and prevent aspiration. Keep patient quiet and maintain normal body temperature.<sup>(4)</sup>

Dopamine exerts dopaminergic,  $\beta$  receptor and  $\alpha$  receptor agonist activity chronologically with graduated doses up to 50 $\mu$ g/kg/min. Within this therapeutic range, the different receptors for dopamine seem to exert affinity for dopamine according to its dose – low dose up to 5 $\mu$ g/kg/min shows affinity for dopaminergic receptors, between 5-10 $\mu$ g/kg/min it shows its affinity for  $\beta$ 1 receptors and beyond 10 $\mu$ g/kg/min for  $\alpha$  receptors.

In the present case, we witnessed the side effects which were due to the results of  $\beta$  &  $\alpha$  agonistic effects of dopamine, but no fatal consequences were there may be because 1).the patient belonged to ASA-I, The drug error was detected promptly and 3).patient was managed with emergency care immediately in the operation theatre.

As the duration of action of dopamine is quite short, prompt supportive and symptomatic measures may prevent the fatal outcome. Phentolamine is the antidote for  $\alpha$  agonistic effect of dopamine. But in the absence of phentolamine, aggressive diuresis with furosemide along with maintenance of hemodynamic stability can save the life of patient as it happened in present the case scenario.

**CONCLUSION:** Dopamine ampule should be kept away from similar kind of ampules, preferably in emergency kit. It is suggested that, all the emergency drugs including dopamine should have different leveling style which can separate them from other commonly used drugs. Drug error should be timely detected & managed with emergency care to prevent fatal consequence.

## REFERENCES:

1. David Horwitz, Samuel M. Fox III and Leon I. Goldberg Effects of Dopamine in Man Circ Res. 1962; 10: 237-243. Journal of American Heart Association.
2. <http://circres.ahajournals.org/content/10/2/237>.
3. American Society of Health System Pharmacists; AHFS Drug Information 2009. Bethesda, MD. (2009), p. 1346.
4. United States Pharmacopeial Convention, Inc (USP); MSDS Database Online; Material Safety Data Sheet: Dopamine Hydrochloride; Catalog Number: 1225204; (Revision Date: December 19, 2008).
5. Currance, P.L. Clements, B., Bronstein, A.C. (Eds.); Emergency Care For Hazardous Materials Exposure. 3Rd edition, Elsevier Mosby, St. Louis, MO 2005, p. 160.

# CASE REPORT

---

**AUTHORS:**

1. Biswajit Sutradhar
2. S. B. Chakrabarti

**PARTICULARS OF CONTRIBUTORS:**

1. Assistant Professor, Department of Anaesthesiology, Agartala Government Medical College, Agartala, Tripura.
2. Assistant Professor, Department of Obstetrics and Gynaecology, Agartala Government Medical College, Agartala, Tripura.

**NAME ADDRESS EMAIL ID OF THE CORRESPONDING AUTHOR:**

Dr. Biswajit Sutradhar,  
A. K. Road, Opposite Police H.Q,  
P. O. Ramnagar,  
Agartala-799002, Tripura.  
E-mail: rupadatta.1911@rediffmail.com

Date of Submission: 29/10/2014.  
Date of Peer Review: 30/10/2014.  
Date of Acceptance: 04/11/2014.  
Date of Publishing: 12/11/2014.