

Refractory Hypotension Following Sublingual Isosorbide Dinitrate in the Postoperative Period in a Patient with Ischaemic Heart Disease

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Abstract

Anaesthetic management of patients with ischaemic heart disease for noncardiac surgery can be associated with many cardiovascular complications. Sublingual isosorbide dinitrate remains one of the mainstays of management in patients with angina and acute coronary syndrome. Here we present a case with ischemic heart disease, scheduled for non cardiac surgery, who received isosorbide dinitrate in the postoperative period and developed severe hypotension. The patient was known case of hypertension and ischemic heart disease which were controlled on medications. Dynamic hip screw fixation of left femur was done under spinal anaesthesia. There was one intraoperative episode of hypotension which was managed with vasopressor and inotrope. In the postoperative period, patient developed chest pain for which sublingual isosorbide dinitrate was given as per cardiologist's advice. He developed immediate drop of blood pressure which did not respond to fluid, blood transfusion or vasopressors. Later, she was transferred to intensive care unit where she required ventilatory support and correction of metabolic acidosis. After two days she was weaned off all vasopressor infusions and ventilatory support. This case report indicates that sublingual isosorbide dinitrate may cause

severe hypotension refractory to vasopressor in the postoperative period in patients with ischemic heart disease and coexisting anemia.

Keywords: Hypotension; Isosorbide dinitrate; Post-op period; Acute coronary syndrome

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Introduction

Anaesthetic management of a patient with Ischaemic Heart Disease (IHD) for non cardiac surgery is associated with risk of perioperative myocardial ischemia and infarction [1]. Management of such patients require careful manipulation of haemodynamic parameters to reduce of myocardial oxygen (O₂) demand, increase myocardial O₂ supply and maintenance Coronary Perfusion Pressure (CPP). Systemic hypotension can further reduce the already low CPP through the stenotic coronary blood vessels. Spinal anaesthesia is an attractive option for orthopedic surgery of lower limbs [2]. But it carries the risk of hypotension. Oral and sublingual nitrates are widely used for management of IHD and Acute Coronary Syndrome (ACS). But their use in the postoperative period in the setting of

hypotension and anaemia can lead to refractory hypotension adversely affecting the coronary flow. Here we present such a case of refractory hypotension following sublingual Isosorbide Dinitrate (ISDN) in the post operative period in a patient with IHD following Dynamic Hip Screw (DHS) fixation under spinal anaesthesia.

Case Report

A seventy-six year-old female patient was scheduled for DHS fixation for left sided intertrochanteric fracture of femur. She was a diagnosed case of hypertension and IHD (NYHA class II), and was on once daily oral amlodipine (5 mg), lisinopril (5 mg), atenolol (25 mg) and chlorthalidone (25 mg). Her daily low-dose aspirin was stopped one week before surgery. All systemic examinations were apparently within normal limits (Tables 1 and 2). All medications except lisinopril were continued till the morning of surgery. The patient was kept fasting overnight and was premedicated with alprazolam (0.25 mg orally) the night before and on the morning of surgery. Subarachnoid Block (SAB) was given in L [3, 4] intervertebral space with a 25 G Quincke spinal needle in the lateral lying position and 2.2 ml of 0.5% heavy bupivacaine was injected intrathecally and she was kept supine with slight reverse Trendelenburg tilt till sensory block up to the level of T [10] was established (to prevent excessive high up spread). Intra operatively period she developed hypotension (80/60 mmHg) associated with aggravation of ST-T wave changes. Boluses of intravenous fluid and ephedrine were administered which did not result in much response. After insertion of central venous access an infusion of dopamine was started and titrated to maintain a mean BP of more than 65 mmHg. Electrocardiographic changes reverted back to pre-operative state. Dopamine infusion was tapered off once her BP normalized. Estimated blood loss was roughly about 300 ml and was adequately replaced with crystalloid. After the surgery patient was transferred to High Dependency Unit (HDU). She was prescribed intravenous (IV) paracetamol (1 gm every 6 hourly) and morphine (4 mg as and when necessary) for post-operative analgesia.

Table 1: Preoperative Laboratory Investigations

Parameter	Measured Value	Normal Level
Haemoglobin (gm/dl)	11.1	10-14
Total Leukocyte Count	13.8 X 10 ⁹ /L	4-11 X 10 ⁹ /L
Blood Urea (mmol/L)	11.33	2.1-7.1
Serum Creatinine (μmol/L)	167	44-150
Serum Sodium (mmol/L)	139.2	135.0-145.0
Serum Potassium (mmol/L)	5.2	3.5-5.2

Table 2: Other Preoperative Investigations

Investigations	Findings
Chest X-ray	Within normal limits
ECG	2 mm ST segment depression in lead II, III & avF
Resting Echo cardiography	- Moderate Mitral Regurgitation (MR) - Left ventricular ejection fraction: 53.7% - Grade I diastolic dysfunction

Four hours later, she started complaining of chest pain. Her BP at that time was 90/65 mmHg. Her electrocardiogram revealed 5 mm ST depression in lead I and V [3-6]. Cardiologist reviewed the patient and advised sublingual ISDN (5 mg) as treatment of ACS. After about five minutes her BP crashed to 66/40 mmHg. 500 ml of hydroxy ethyl starch was infused without much improvement. Dopamine infusion was restarted. The patient started to become irritable and disoriented. Noradrenalin infusion was started at this point. Another fluid bolus of 500 ml hetastarch was given. There was no external sign of blood loss in dressings or drain. But the patient was pale and tachycardic (HR 112), so one unit of packed Red Blood Cell (RBC) was transfused empirically. Arterial Blood Gas (ABG) analysis, Troponin I, cardiac enzymes were sent to laboratory. Details of her postoperative investigations are

mentioned in table 3. The patient was transferred to Intensive Care Unit (ICU). Metabolic acidosis was thought as the cause of refractoriness to vasopressors. As the patient was still alert with good respiratory effort, 50% correction of metabolic acidosis was done with sodium bicarbonate. Based on clinical and laboratory parameters two more units of packed RBC were transfused. But, the patient did not respond to above therapy and became tachypnoic and disoriented. So, she was intubated and put on ventilator. ABG was still showing metabolic acidosis. Further dose of sodium bicarbonate was given. With ventilatory support and correction of metabolic acidosis, patient improved clinically. After 18 hours, the patient became conscious, having stable BP only on dopamine infusion. ABG became normal. Electrocardiogram and initial high blood Troponin I level gradually returned to baseline. All other metabolic parameters returned to normal limits except renal parameters, which showed a continuous deterioration. She was tapered off all inotropes on day two of ICU admission. She was weaned and extubated on next day and discharged to general ward a day after. Rest of her hospital stay was uneventful and she was discharged later.

Table 3: Postoperative Laboratory Investigations

Parameter	Measured Value	Normal Level
Haemoglobin (gm/dl)	6.2	10-14
Blood Urea (mmol/L)	11.57	2.1-7.1
Serum Creatinine (μ mol/L)	167	44-150
Serum Sodium (mmol/L)	134	135-145
Serum Potassium (mmol/L)	4	3.5-5.2
Creatinine Phosphokinase (CPK) (IU/L)	202	20-172
CPK-MB (IU/L)	8	0-7
Troponin I	0.5	<0.04 μ g/ml
Arterial Blood Gas (ABG)	P ^H - 7.262 PaCO ₂ - 3.84 kPa HCO ₃ - 14.8 mmol/L	7.35-7.45 4.7-6 kPa 23-28 mmol/L

Discussion

Non cardiac surgery in a patient with IHD is often associated with morbidity and mortality. Regional anaesthesia is preferred in such patients for the surgery whenever appropriate [2-4]. Spinal anaesthesia remains an attractive option for lower limb surgeries in geriatric population in spite of the risk of hemodynamic instability resulting from high spinal blockade [2, 3]. Though combined spinal epidural anaesthesia would have been most appropriate for our patient with IHD, single shot spinal anaesthesia was selected for the surgery due to the duration, cost effectiveness and acceptable cardiac status.

We as well as the cardiologist did not feel the need for stress echocardiography or thallium scan as she was a diagnosed case of chronic stable angina adequately controlled on oral medications without any recent deterioration. There were some ischaemic changes in electrocardiogram and her echocardiogram showed good ejection fraction with only mild diastolic dysfunction. Lisinopril was omitted on the day of surgery as Angiotensin Converting Enzyme Inhibitors (ACEI) are known to be associated with exaggerated perioperative hypotension [5]. Her renal parameters were deranged with good daily urine output corroborating with long standing hypertension and old age. No extra precaution was taken other than adequate hydration and avoidance of nephrotoxic drugs.

Low dose of local anaesthetic was used for the SAB to prevent precipitous fall in BP [6, 7]. Head up tilt was maintained after SAB to limit the upward spread of local anaesthetic. Initially hypotension managed with intravenous fluids and ephedrine boluses. As the effect was short lasting, dopamine infusion was started and she remained stable in the intra-operative period.

In the HDU, she developed chest pain with fresh ischaemic changes in ECG, mild hypotension (90/65mmHg) and tachycardia. The timing (approximately six hours after SAB) coincided with onset of postoperative pain due to weaning of the block pointed towards a diagnosis of angina or ACS. Hypotension could have been the cause of angina/ACS or vice versa and is a well known contraindication for use of nitrates specially the long acting preparations [8], one of which was

advised in our case by cardiologist. The coronary ischemia was further worsened by refractory hypotension caused by sublingual ISDN. It's difficult to explain the drop of blood haemoglobin value by almost 50% by infusion of colloids and crystalloids to manage hypotension and miscalculation of intra-operative blood loss could be a possibility. Occult blood loss also cannot be ruled out. Hypoperfusion and anaemia added to the severe metabolic acidosis making the hypotension refractory to vasopressors [9]. Patient's haemodynamics stabilized when the effect of ISDN weaned off and his anaemia as well as acidosis was corrected. Sublingual ISDN takes approximately thirty minutes to show any significant reduction in BP in patients having angina without congestive cardiac failure and duration of action varies from thirty minutes to four hours [10]. Oral nitrate preparation like ISDN can thus lead to prolong and resistant hypotension and can persist till the duration of the ISDN. It can have more intense and unpredictable effect in patients with borderline cardiac performance or congestive cardiac failure [11]. Blood loss, hypovolemia and poly pharmacy will add to its unpredictability in perioperative period. Under these circumstances, IV Glyceryl Trinitrate (GTN) can be more advantageous due to its rapid and short duration of action and its use has been described in literature in a cautious and controlled manner for control of perioperative angina by improving the CPP [12]. This case report once again proved that to intra operative ischemic event intravenous GTN should be used and titrated to effect, rather than oral or sublingual ISDN.

Conclusion

Use of sublingual isosorbide dinitrate may cause severe hypotension refractory to vasopressors in the postoperative period in patients with ischemic heart disease and co-existing anemia. In such circumstances better GTN should be used as intravenous infusion.

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