Methanol toxicity following esmolol infusion in a post-operative case of pheochromocytoma resection

Sir,

Esmolol is an ultra-short acting beta-adrenergic receptor blocker used in anesthesia for its cardio-selective anti-adrenergic effects.[1,2] It is known that esmolol is metabolized by plasma and red blood cell esterase to methanol in a low concentration.[1] We are reporting herein a case of inadvertent methanol toxicity following esmolol infusion in a postoperative case of pheochromocytoma. The patient's family reviewed this report and gave written consent for publication.

A 14-year-old girl with a diagnosed case of right-sided adrenal pheochromocytoma (sporadic) was posted for open resection [Figure 1]. Preoperatively, she was of American Society of Anesthesiology physical status class II (hypertensive) on oral antihypertensive medication (prazocin 3 mg and metoprolol 50 mg, twice daily). Preoperative electrocardiogram (ECG) showed sinus tachycardia and left ventricular hypertrophy. Transthoracic echocardiography (TTE) showed hypertrophic left ventricle with 50% left ventricular ejection fraction.

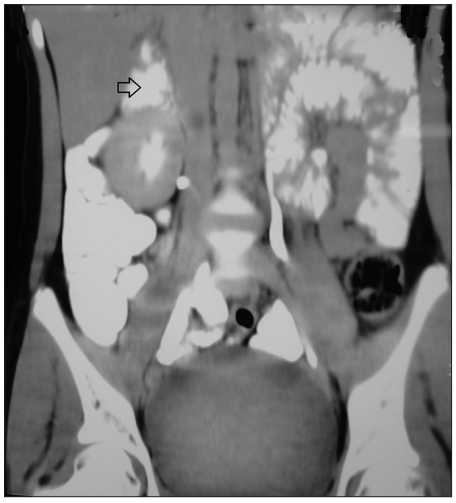

Figure 1: Contrast-enhanced computed tomography scan of abdomen of the patient showing right adrenal pheochromocytoma (arrow)

She was premedicated with previously prescribed drugs and alprazolam 0.25 mg. Under basic monitoring (ECG, non-invasive blood pressure, pulse-oximetry), thoracic epidural was placed at T10-11 level. Arterial line was

placed in the right radial artery under local anesthesia. The patient was induced with propofol 80 mg, fentanyl 100 μg, esmolol 30 mg, and intubated endotracheally with vecuronium 8 mg. We inserted an ultrasound-guided right internal jugular vein cannula postinduction. She was monitored with basic monitors plus invasive arterial blood pressure, central venous pressure, and train-of-four (TOF). We controlled patient's heart rate, blood pressure during tumor manipulation with nitroglycerine (NTG) and esmolol (total 300 mg) infusion. Tumor resection was prolonged due to local adherences. After adrenal venous clamping, esmolol and NTG were stopped and noradrenaline was started for hypotension. Perioperative arterial blood gas (ABG) showed mild acidosis (pH 7.34). Blood loss was around 600 ml and required a packed cell transfusion. The patient could be extubated with minimum noradrenaline support.

She was shifted to the postoperative ward and, 1 hour after extubation, she complained of blurring of vision and gradually developed tachypnea, altered level of consciousness, and increasing acidosis (pH 7.01, base deficit 14, anion gap 24) with normal electrolytes. She was re-intubated and put into mechanical ventilation and vasopressor support was increased. On investigation, renal functions and serial lactates were normal. In view of high osmolal gap, we suspected methanol toxicity and plasma methanol level was found 10 mmol/L (n=6.5 mmol/l). Ophthalmoscopy view revealed hyperemia and edematous optic disc and mild macular edema. Cabin was turned into dark room. Acidosis was corrected by sodium bicarbonate infusion and hemodialysis.[3] Folic acid tablets, thiamine (100 mg) injections were added in the treatment. Her acidosis started improving and her noradrenaline requirement was reduced. Postdialysis plasma methanol level was 4 mmol/L. She could be extubated and successfully discharged from the hospital without any sequel.

By plasma and red blood cell esterase, esmolol is rapidly metabolized to an acid metabolite and methanol.[1,2] These esterases cannot be saturated so that esmolol metabolism could occur fast.[1] It is usually stated that the methanol level from ethanol is <2% of the threshold of toxicity.[1,2] It is also known that this methanol is excreted in urine.[1] Extensive literature search does not clearly reveal about the amount of methanol produced with continuous infusion of esmolol. We feel that methanol toxicity in our case occurred due to continuous infusion of esmolol. Methanol excretion from medically diseased (hypertensive) kidney (though renal functions were normal) may also be a factor. Timely hemodialysis helped us along with other acidosis correction measures and supportive therapy. We did not use ethanol or fomipazole (due to non-availability).

To our knowledge, it is the first case report of methanol toxicity following esmolol infusion.

We suggest methanol toxicity can be suspected in patients after prolonged esmolol infusion with unexplained metabolic acidosis with a high anion gap and high osmolal gap. Especially in such patient with vision disturbances or neurological deterioration in postoperative period, this possibility should always be kept in mind.

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Quick Response Code:	Website: www.saudija.org
	DOI: 10.4103/1658-354X.121062