

Inadvertent Methylergometrine Administration to a Neonate with Underline Acyanotic Congenital Heart Disease

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Abstract

Background: Methylergometrine is an ergot alkaloid of ergonovine used to treat post-partum hemorrhage secondary to uterine atony. Mistaking methylergometrine for vitamin K with accidental administration to the neonate is a rare iatrogenic illness occurring almost exclusively in the delivery room setting. Complications of ergot alkaloids in neonates include respiratory depression, cyanosis, seizures, and death.

Case Report: A term male infant was inadvertently given 0.04 mg of methylergometrine intramuscularly. The error was only noted when the baby developed central cyanosis, after administration, identifying it as methylergometrine rather than vitamin K. The local poison center was notified, and the infant was transferred to the neonatal intensive care unit level III for observation. Few minutes after cyanosis, the infant was noted to have oxygen desaturations and prolonged apnea required oxygen via nasal cannula and ventilation as a respiratory support to maintain his oxygen. ECG and ECHO were done and ECG was normal and ECHO showed Large ASD secundum. Feeding was started by 48 hours of life, and the infant was discharged home in good condition after a 96-hour stay without further complications.

Discussion: Because of the potential for serious adverse events, Look- alike Sound- alike policy and precaution is required to be applied to prevent accidental administration of methylergometrine to the neonate as a result of possible confusion with vitamin K in the early post-partum period.

Keywords: Ergot; Methylergonovine; Methylergometrine; Methergine; Medication error; Infant, Newborn; Intensive care; Neonatal; Poisoning; Vitamin K

Abbreviation

MEM: Methylergometrine Maleate

Introduction

Medication error can happen not uncommonly and can cause morbidity and mortality [1]. Most of this error will not cause harm, although the administration of the wrong dose or the wrong medication may have life threatening effects. Methylergometrine (MEM), a semi-synthetic derivative of the amine-alkaloid group of ergot compounds has uterotonic and vasoconstrictive effects that has been widely used in the prevention of postpartum hemorrhage 60 years back [2]. It is usually kept in labor rooms for immediate parenteral use during the last stage of labor. Phytonadione (vitamin K) is used to prevent vitamin K deficiency bleeding in the newborn. Vitamin K usually administered shortly after birth as MEM postpartum for the bleeding. Literature reports exist of mistaking MEM for vitamin K administration to the neonate; however, these events are rare. While rare, such events are potentially serious as deaths that have been reported in some cases [3]. Few case reports was published about MEM exposures in newborn and one of that is review done from 1997 to 2008 using the California Poison Control System

database, which identified only two neonates exposed to MEM [4]. We report a case of a male neonate, who developed significant clinical toxicity, including cyanosis, respiratory depression, and tachycardia following the unintentional administration of MEM.

Case Report

A 2,85 kilogram, full term male infant was born by spontaneous vaginal delivery (SVD) after an uncomplicated pregnancy. The Apgar scores were 8, 9 and 10 at one, five and ten minutes respectively, he required initial steps for resuscitation at birth. Soon after birth a nurse administered 0.4 ml of methylergometrine (0.08 mg of ergometrine maleate) intramuscularly, believing it to be vitamin K. The error was recognized immediately as the baby developed cyanosis, the nurse informed the in charged nurse in the unit and OVR written. Within 30 minutes the infant became cyanosed centrally and peripherally, with shallow breaths and had an apneic event. He was referred to the neonatal intensive care unit (NICU) level II within an hour after the incident on account of respiratory distress. The nurse who brought the infant indorsed to a NICU staff that MEM was inadvertently given to the infant, but vitamin K was not given. The respiratory effort was shallow at 20 breaths per minute; heart rate 150 beats per minute, temperature 37.2 Celsius Centigrade and blood pressure 61/34 mmHg (mean 42 mmHg). He had irritability, weak cry; present moro reflex and normal sucking reflex. Baby required oxygen and bagging post apnea then necessitated endotracheal intubation and mechanical ventilation because of shallow breathing and desaturation and required

low parameters to maintain his saturation and cyanosis improved gradually. ECHO was done immediately and showed large ASD secundum shunting left to right, large PDA shunting left to right, moderate tricuspid regurgitation and high pulmonary pressure with PGE around 48 mmHg. Within 2 hours baby transported to higher-level NICU level III in another hospital. On arrival ECG was done which was normal and blood samples taken for complete blood counts, electrolytes, liver and renal functions which were within normal. At eight hours BP was 68/47 mmHg (mean 55 mmHg) and HR 160/minutes. He first passed urine at ten hours after birth, and urine output remained normal thereafter. He had no clinical seizures. The infant was ventilated for 18 hours. ECHO was repeated the second day and pulmonary pressure came down to 30 mmHg. A follow up complete blood count, electrolytes, liver and renal functions were done and all were normal except renal function was slightly deranged on second day (Urea 9 mmol/L, and creatinine 120 μ mol/L) but normalized before discharge. Neurological examination was normal on day three and his irritability disappears and he was breastfeeding after 48 hrs. The infant was discharged home on day five. ECHO before discharged showed normal pulmonary pressure with PG around 25 mmHg, small PDA, trivial tricuspid regurgitation and large ASD secundum. Outpatient follow-up at six weeks showed no abnormality and follow up given with cardiologist for the ASD.

Discussion

Ergot alkaloids possess mixed agonist and antagonist properties at serotonin, dopamine, and adrenergic receptors [5,6]. It stimulate smooth muscle contraction some are more selective for vascular smooth muscle, whereas others target uterine smooth muscle [3]. This results in an array of clinical effects including vasoconstriction. Methylergometrine, Methylergonovine and ergonovine belong to the amine alkaloid class and possess relatively specific utero-tonic activity. Currently, Methylergometrine maleate (Methergine) MEM is the ergot most commonly used for post-partum uterine atony. Typical effect in newborn as a side effect includes respiratory depression or distress, cyanosis, pallor, hypertension, vasoconstriction, hypoxia, and feeding intolerance decreased capillary refill, oliguria, and seizures [7-10]. Respiratory depression is the most common and immediately life-threatening manifestation, presenting in up to 55% of cases within six hours of intramuscular (IM) administration [2,9]. The high pulmonary pressure can be explained by smooth muscle vasoconstriction especially in pulmonary vasculature, which happened as in our case. Management of neonatal ergotism is generally supportive. Particular attention to the newborn respiratory status, which in some cases can be adequately treated with oxygen via nasal cannula whereas others, as in our case, require intubation and mechanical ventilation [2,11]. Several pharmacologic treatments have been described for neonatal ergotism, including naloxone, nitroprusside, midazolam, phenytoin, and phenobarbitone which we didn't require any of them. But it's not without side effect that can expose the newborn to serious morbidity like hypotension in nitroprusside and minimal effect was described in other reports. Intramuscular methylergometrine has variable duration of action. Peak plasma concentrations occur at approximately 0.5 hr, 9 and half-life ranges between 0.5 and 2 hr. In a retrospective review of seven newborns that mistakenly received ergometrine meant for the mother, the onset of clinical toxicity was within 0.25 – 3 hr as it was 0.5 hr in our case [12]. Neonatal ergotism event incidence in developing countries is unknown especially in Saudi Arabia. Internationally As previously mentioned, only two cases of parenteral ergot poisoning were reported in the US to the California Poison Control System from

1997 to 2008 and recently one more case published last year [4]. Neonatal ergotism usually iatrogenic and due to the confusion of vitamin K or hepatitis B with maternal ergot preparations with subsequent parenteral administration [13]. Because of the iatrogenic nature of this event, attention to minimize it through further education, intervention and awareness. This is particularly important as this is not a without significant morbidity and mortality which have been reported [14]. Health product mainly medications names often look and sound alike. These similarities sometimes cause clinicians or any health providers and patients to confuse one drug name for another. Confusion can occur at any stage of the drug use process in inpatient, outpatient, and self-care settings. Depending on when they happen, they can cause prescribing errors, transcription errors, dispensing errors, administration errors, and consumer health product selection errors. The end result of a name confusion error is that the patient gets the wrong product. Wrong medication errors harm patients by depriving them of the benefit of the correct treatment and by subjecting them to the adverse effects of the mistakenly selected medication. Such errors can and do cause serious harm, up to and including death. In order to prevent future exposures of this medication, efforts must be made to minimize medication administration errors. Inpatient hospital errors are happening, with medication errors being the most frequent type [15,16]. Early recognition and appropriate intervention with antidotes or supportive care is the corner stone in the management and the further intervention come after. The use of Look-Alike Sound-Alike (LASA) policy guidelines has been shown to reduce errors [17]. Look-alike Sound-alike (LA/SA) Health Product Names became effective in 2006 and adopted in many countries as part of their internal policy that include storing products with look-alike or sound-alike names in different locations. Besides the use of LASA there are other strategies to reduce medication errors, including the bar coding system, use of color coding on labels and premixed medication solutions made by the manufacturer [18]. In a hospital morbidity and mortality review of this incident, it became clear that the error occurred at both an individual and system level. While addressing human-level mistakes is important, and both personal and unit level education took place for this incident in order to reinforce the importance of existing policies, focusing only on the individual mistake is often ineffective at preventing future errors. Instead of that changes need to occur at other level, which is the systematic level. Given the extreme similarity of the vials for vitamin K and MEM and the fact that they are often given in the same physical location and within several minutes of one another, the main target for system level change in this case is to address the packaging of the medications. In response to this event, we have sent a letter to the regional quality health directorate to reinforce their hospitals whom include birth units to apply LASA policy and follow it in order to prevent this mistake from happening again in the future on the other hands a guideline policy was written and sent to the local poison center to be a reference for any future similar cases.

Conclusion

Methylergometrine toxicity in neonates after administration to the newborn has been commonly associated with significant respiratory depression, cyanosis and high pulmonary pressure necessitating ventilatory support, and even can cause death. The primary management of this problem first is prevention that happens by implementing a systems solution to avoid confusion of medications for mother and child, and proper medication administration with right patient identification prior to administration. Strict adherence and

follow-up to standardized procedures through clear guidelines and policy is mandatory for healthcare professionals in each health center to avoid such confusion.

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