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RESEARCH ARTICLE

THE USE OF RITODRINE IN A PREGNANT WOMAN WITH BURNS: A CLINICAL CASE REPORT

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ABSTRACT

Premature labor is well known complication of burns in pregnant women. Ritodrine is a beta-adrenergic receptor agonist that is commonly used to arrest premature labor. A case of burn in pregnancy in which ritodrine resulted in tachycardia, hypokalemia and hyperglycemia is presented. Other side effects of ritodrine are discussed to increase the awareness of burn surgeons to these side effects.

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INTRODUCTION

Premature labor is a well-known complication of burns in pregnant females. (Akhtar *et al*., 1994; Bennier *et al*., 1994; Srivastra and Bang, 1998) When premature labor results in delivery prior to 32 weeks' gestation the preterm infant has a high risk of developing respiratory distress syndrome because of lung immaturity. This risk is significantly reduced if premature labor is arrested and the mother given intramuscular dexamethasone; which will accelerate lung maturation in-utero. The drug ritodrine (JAI Radhe Sales, India) is a beta-adrenergic receptor agonist which is commonly used to arrest preterm labor (i.e., a tocolytic drug). (Merkatz *et al*., 1980) Ritodrine has a several metabolic side effects and the following case report is presented to increase the awareness of burn surgeons to these side effects.

Case Report

A 30-year-old pregnant female (30-weeks' gestation) was admitted to hospital with premature labor and hot water scald burn involving the upper limbs (the total body surface are burnt was 6%). The obstetrician examined the patient and confirmed the presence of premature labor and the well-being of the baby. Amniotic membranes were intact and the patient was started on intravenous infusion of ritodrine (0.15 mg/min) to arrest labor as well as intramuscular dexamethasone (6mg every 12 hours for a total of 2 days) to accelerate fetal lung maturity. The plastic surgeon was consulted and the patient was started on daily fucidin ointment. Since the total body surface area of burnt was only 6%, ringer's lactate solution was not used. Instead, the patient was started on intravenous 5% dextrose – half normal saline infusion at a rate of 150 cc/hr. On admission (prior to the administration of any medications and fluids), serum electrolytes and random blood glucose levels were normal (Table 1). Overnight, the patient required continuous infusion of ritodrine and her vital sign were stable except for mild tachycardia (heart rate of 100/min) which was attributed to the beta receptor effect of ritodrine on the heart. The next day, serum electrolytes and glucose results showed hypokalemia and hyperglycemia (Table 1). Intravenous fluids were changed to normal saline with potassium chloride (40 mmol/liter). This corrected the electrolytes and glucose level abnormalities (Table 1). The preterm labor was completely arrested after two days of therapy and she was discharged on the fourth day. The burn wound healed with conservative management in 10 days. The patient underwent a glucose-challenge test at 32 weeks of gestation and she was not found to have any gestational diabetes. At 38 weeks of gestation, the patient delivered a normal baby vaginally with no problems.

DISCUSSION

Burn surgeons have to be aware of the potential side effects of ritodrine and these are listed in Table 2. There were two classes of beta-adrenergic receptors. The beta1 receptors are dominant in the heart and intestines, while the beta 2 receptors are

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dominant in the myometrium, blood vessels and bronchioles. Ritodrine is a beta-receptor agonist, which has been shown to exert a preferential effect on uterine adrenergic receptors (Merkatz *et al*., 1980); and hence it helps to arrest preterm labor.

Table 1. Electrolyte and glucose levels in the patient

	Levels on Admission	Levels 24 hours after Admission	Levels 48 hours after Admission
Na^+ (N=135-148)	143	142	141
K^+ (N=3.5-5.0)	4.7	2.7	3.8
$C1^-$ (N=98-111)	98	96	97
CO_2 (N=21-31)	30	29	30
Urea (N=1.8-8.0)	6.7	5.1	5.5
Random Glucose (N=4-10)	6	13	7

N= Normal laboratory range in mmol/L

Table 2. Potential side effects of intravenous ritodrine

1.	Maternal and fetal tachycardia
2.	Decreased maternal diastolic blood pressure
3.	Hyperglycemia
4.	Hypokalemia
5.	Nausea and vomiting
6.	Nervousness, hallucinations
7.	Pulmonary edema
8.	Rhabdomyolysis
9.	Neutropenia

Beta-adrenergic stimulation in other body systems may lead to some cardiovascular or metabolic effects. Following intravenous administration of ritodrine, 80 to 100% of patients develop tachycardia and reduction of diastolic blood pressure. (Merkatz *et al*., 1980) Common metabolic side effects of the drug include hyperglycemia and hypokalemia which were also observed in our patient. Other occasional side effects include nausea, vomiting, nervousness, and hallucinations. A rare but a serious side effect of ritodrine is pulmonary edema. The cause of pulmonary edema appears to be multifactorial and maybe related to sodium and water retention as well as an increase in capillary permeability in the lung. (Wilkins *et al*., 1988) Major burn patients may develop pulmonary edema secondary to fluid over-load; and this will be exacerbated by the use of ritodrine. The use of ritodrine in mothers with mild phenotypes ofmotonic dystrophy can result in acuterhabdomyolysis. (Ogoyama *et al*., 2017) Rhabdomyolysis is also a known complication of electric burns. Finally, ritodrine-induced neutropenia is a well-known entity that may treated with granulocyte-colony stimulating factor. (Wang *et al*., 2016) The burn surgeon should differentiate betweenritodrine-induced neutropenia and silver sulfadiazine-induced neutropenia. Silver sulfadiazine is the most commonly used topical cream in burns. More recently, newer tocolytics have become available for use to arrest premature labor. Atosiban (Tratocile, Ferring Pharmaceuticals, Sweden) is a competitive oxytocin receptor antagonist. A multicenter randomized study comparing atosiban versus ritodrine showed that the former shows significantly better tocolytic efficacy with significantly less maternal side effects (Shim *et al*., 2006). Ritodrine is not currently used in the U.S.A., but it is still used in other parts of the world.

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