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Calcium Chloride for the Prevention of Blood Loss During Intrapartum Cesarean Delivery: A Single Center Randomized Controlled Trial

Abstract

Postpartum hemorrhage (PPH) is the leading cause of maternal morbidity and mortality worldwide. Up to 80% of PPH is caused by uterine atony, the failure of the uterine smooth muscle to contract and compress the uterine vasculature after delivery. Laboratory and clinical studies show that low extracellular and serum calcium levels, respectively, decrease uterine contractility, and our own pilot work supports the hypothesis that intravenous calcium chloride may have utility in preventing uterine atony. The proposed research will establish the relationship between uterine tone and calcium through a clinical trial with a nested pharmacokinetic and pharmacodynamic (PK/PD) study. In a single center, 120-patient, randomized, placebocontrolled, double-blind trial, we will investigate the effect of 1 gram of intravenous calcium chloride, delivered in addition to a standard oxytocin regimen, upon quantitative blood loss and uterine tone in parturients with high risk of uterine atony due to requirement for intrapartum cesarean delivery. We will concurrently collect serial venous blood samples to measure ionized calcium concentration for PK/PD modeling in this pregnant study cohort. Obstetric anesthesiologists are uniquely suited to drive this clinical research based upon knowledge of the physiology of pregnancy, regular use of uterotonic medications, familiarity with intravenous calcium chloride, and resuscitation of patients with PPH. The experience garnered from completing these studies and my ongoing masters in clinical research and epidemiology will position me to achieve NIH funding and career success as an obstetric anesthesia clinical researcher focused on the problems of uterine atony and PPH. My foundation in PK/PD modeling will set me apart and allow me to meet NIH research priorities. High-quality clinical research and development of novel therapeutics to manage uterine atony are critical to reduce the high maternal morbidity and mortality from PPH.