Mechanisms, Equipment, Hazards

The Effect of Co-administration of Intravenous Calcium Chloride and Oxytocin on Maternal Hemodynamics and Uterine Tone Following Cesarean Delivery: A Double-blinded, Randomized, Placebo-controlled Trial

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Topic: Pharmacology

Oxytocin administration following cesarean delivery may be associated with significant adverse effects, such as cardiovascular instability (hypotension, tachycardia, myocardial ischemia). Intravenous (IV) calcium chloride (CaCl2) has been shown to increase mean arterial pressure (MAP) and cardiac contractility in patients undergoing anesthesia. Consequently, the authors of the present study hypothesized that IV co-administration of CaCl2 with oxytocin 5 U IV bolus would reduce the risk of hypotension and improve uterine tone in women undergoing elective cesarean delivery under spinal anesthesia. The primary outcome studied was blood pressure change after study drug administration. Secondary outcomes included the effect of CaCl2 on heart rate, uterine tone, need for additional uterotonic agent, vasopressor use, and blood loss.

This was a randomized, double-blinded, placebo-controlled study in which 59 patients scheduled for elective cesarean delivery under spinal anesthesia received 5 U IV oxytocin with either 200 mg IV CaCl2, 400 mg IV CaCl2, or placebo (groups called CA-200, CA-400, or control, respectively) immediately after delivery of the infant and umbilical cord clamping. The study drug was diluted in all groups to 8 mL, and the solution was administered at a rate of 2 mL/min. Thus the 5 U oxytocin along with CaCl2 or placebo was administered over 4 minutes. Blood samples were drawn 20 minutes following injection of the study solution and were analyzed for ionized Ca2+ (iCa2+) and hematocrit levels. The uterus was exteriorized and massaged before hysterotomy closure, during which uterine tone was assessed by the obstetrician using a scale of 0 to 10 where 0 = completely atonic and 10 = fully contracted. Additional uterotonic agents were given as needed. Systolic and diastolic blood pressures (SBP and DBP) were measured at 3-minutes intervals before and after and at 1-minute intervals during uterine exteriorization. Hypotension was defined as SBP <20% baseline or <100 mm Hg. Blood loss was estimated by visual examination of suction jars, surgical sponges and drapes, and the operating room floor.

Results of the study found that plasma iCa2+ levels were significantly elevated after CaCl2 infusion in the CA-200 and CA-400 groups compared with the placebo group (P = 0.001). Hematocrit values were decreased significantly in all 3 groups (CA-200, P < 0.001; CA-400, P < 0.01; placebo, P = 0.03) with no significant between-group differences. SBP, DBP, and MAP decreased with time in all groups (SBP, P = 0.0005; DBP, P < 0.0001; MAP, P < 0.0001) with no between-group differences compared with the placebo group. Heart rate was unchanged over time in all groups (P = 0.80) with no between-group differences. Overall vasopressor use was similar among the 3 groups and no differences in estimated blood loss were found among groups. There were also no differences in uterine tone among the groups based on the assigned uterine tone scores at all time points (P = 0.073). Only 4 patients received additional uterotonic agents—1 in the placebo group and 3 in the CA-200 group.

Overall, this study found that co-administration of intravenous CaCl2 (200 or 400 mg) with oxytocin (5 U) resulted in elevated iCa2+ plasma levels in patients receiving CaCl2 when compared with placebo. However, in terms of hematocrit, SBP, DBP, MAP, uterine tone, heart rate, blood loss, and uterotonic agent and vasopressor use, co-administration of CaCl2 did not have a significant effect. Oxytocin-related hemodynamic changes were thus not attenuated by the administration of low-dose calcium.

Adverse Childhood Experiences Influence Development of Pain During Pregnancy

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Topics: Maternal Morbidity and Mortality, Labor Analgesia

Assessing adverse childhood experience (ACE) is a way of measuring a wide range of traumatic events that might take place before an individual is 18 years of age.
These traumas may include emotional, physical, and sexual abuse as well as various household dysfunctions. Adverse childhood experiences are currently believed to lead to impaired social, emotional, and cognitive development. They might also increase the risk for various diseases and premature death. A recent study reported that such traumas were shown to influence obstetric and neonatal complications, including preterm birth, depression, and suicidal thoughts. However, it is currently unknown whether such experiences have an effect on pain development during pregnancy. Therefore, this study set out to investigate whether there was any association between adverse childhood experiences and onset of pain during pregnancy.

The authors conducted a cross-sectional study at 18 antenatal clinics in southern Mid Sweden between October 2011 and April 2012. A total of 232 patients agreed to participate in the study early in their pregnancies and 142 were assessed again in late pregnancy. In each instance questionnaires were used that asked patients to provide information regarding their sociodemographics and ACEs (ACEscore), as well as pain location and intensity. ACE questionnaires consisted of 19 items within 8 categories including physical, sexual, or emotional abuse, mother being treated violently, household mental illness, living with a drug user/alcoholic/risk consumer of alcohol, parental separation, and incarceration of a household member. ACEscores were then calculated as the sum of each category experienced in the first 18 years of life, with scores ranging from 0 to 8 (with 0 indicating no negative events). Investigators also coded the distribution of pain into 41 predetermined areas. Totally, 62% of the participants reported having adverse childhood experiences, with ACEscores from 1 to 5. Totally, 72% of participants indicated any pain onset during their pregnancy, with a median of 5 pain locations. In late pregnancy, the median worst pain intensity was higher among the women with adverse childhood experiences than the women without any (48 vs. 23 mm, P = 0.01). There was also a positive association between adverse childhood experiences and the number of reported pain locations in late pregnancy [Spearman’s correlation coefficient (rs) = 0.19, P = 0.02], which was still significant even after background factors were taken into account using multiple regression analysis (P = 0.01). There was no difference between the 2 groups with regards to overall prevalence of pain, but the subgroup of women who reported childhood physical abuse did suffer a higher incidence of sacral (P = 0.0003) and pelvic pain (P = 0.02).

Participants of this study frequently reported adverse childhood experiences, which had a positive association with the development of pain during pregnancy. Patient information relating to adverse childhood experiences could therefore be beneficial in helping health care providers identify pregnant women who have an increased risk of developing high intensity and widely distributed pain, which can also lead to chronic pain problems following childbirth.

Carbetocin at Cesarean Delivery for Labour Arrest: A Sequential Allocation Trial to Determine the Effective Dose

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Topics: Obstetric Complications, Systems-based Practice

Currently, oxytocin is the primary drug used to reduce the incidence of postpartum hemorrhage. However, oxytocin does have limitations, including a half-life of only 4 to 10 minutes, administration by means of an intravenous infusion, and a high rate of dose-dependent adverse effects. In contrast, carbetocin is administered as a single intravenous dose, but the recommended dosages are not well established. The authors of this study sought to determine an effective dose of carbetocin to provide satisfactory uterine tone following an intrapartum cesarean delivery in parturients whose labors were augmented.

This double-blind dose-finding study of carbetocin included 40 healthy women at term whose labors were augmented with a minimum of 3 hours of an oxytocin infusion. Carbetocin was administered intravenously immediately following the delivery of the anterior shoulder of the fetus. The study design involved using the truncated Dixon and Mood method (up-and-down allocation protocol) with the first parturient receiving a dose of 20 µg. Each subsequent parturient received a dose of carbetocin 20 µg higher than the previous dose until the predetermined outcome was observed. Once the predetermined outcome was achieved the next parturient received a dose of carbetocin 20 µg less than the previous parturient. The primary predetermined outcome was satisfactory uterine tone as determined by a blinded obstetrician without the need for any additional uterotonic medications. The maximum dose of carbetocin was also predetermined at 140 µg. Secondary outcomes included the need for other uterotonic drugs for the first 24 hours following cesarean delivery, estimated blood loss, adverse hemodynamic effects, and nausea and vomiting.

The Dixon and Mood method suggested an ED90 of 121 µg (95% confidence interval, 111-130; 99% confidence interval, 108-133). Further analysis using isotonic regression suggested an ED90 of 140 µg. Importantly, however, the observed effective response rate was <90% for all doses, including the maximum dose of 140 µg, it is clear, therefore, that the Dixon and Mood method underestimated the ED90 of carbetocin. At the maximum study dose of 140 µg, intraoperative tachycardia was observed in 76.2% of parturients. Additional observed adverse effects among all patients at all doses included hypotension (45%),