PROGENY

VOL XXIII, NO 2 August 2007

Oxytocin: A Physiologic Approach

Oxytocin is the most commonly used induction agent in the United States and worldwide (Kelly & Tan, 2001). There is considerable controversy and no concensus in the literature on the ideal dosage and rate increase intervals, although available data support a lower dosage rate of infusion (Arias, 2000; Brindley & Sokol, 1998; Crane & Young, 1998; Shyken& Petrie, 1995a; SOGC, 2001). Multiple clinical studies and current data based on physiologic and pharmacologic principles have shown that 90% of pregnant women at term will have labor successfully induced with 6mu/min or less of oxytocin (Simpson, 2002). A meta-analysis of low-dose versus high-dose oxytocin protocols for labor induction by Crane & Young (1998) found low-dose protocols resulted in fewer episodes of excessive uterine activity, fewer operative vaginal births, a higher rate of spontaneous vaginal births, and a lower rate of cesarean births.

Based on the current evidence, the Statewide Perinatal Care Team's recommendation for oxytocin administration is: initiate at 1-2 mU/min and increase 1-2 mU/min every 30-40 minutes as needed based on maternal and fetal response.

A Review of the Basics

Oxytocin is a peptide synthesized by the hypothalamus and released by the pituitary gland into the maternal circulation. The maternal concentration during labor is approximately 2-4 mU/min. The fetus is also thought to excrete oxytocin during labor at a level similar to an infusion of oxytocin of approximately 3 mU/min. The maternal and fetal oxytocin is known as endogenous and the combined concentration is equivalent to a dose of 5-7 mU/min. Exogenous oxytocin is the synthetic hormone used to artificially stimulate labor. Endogenous and exogenous oxytocin both work at the receptor sites located in the uterine myometrium (smooth muscle) and decidua (the endometrium of the pregnant uterus). The half life of oxytocin is 10 to 12 minutes and 3 to 4 half lives are needed to reach a steady-state plasma concentration.

During the initial phase of exposure to exogenous oxytocin during induction or augmentation of labor uterine contractions will increase progressively in frequency and intensity. However, after several hours exposure to increasing doses no longer causes normal increases in uterine forces and may produce adverse side effects such as hyperstimulation (greater than 5 contractions in 10 minutes, contractions lasting longer than 90 seconds, or an increase in baseline uterine tone). There is no current data demonstrating that more oxytocin will improve dysfunctional labor. Long durations and high doses may have the reverse effect on the course of labor by desensitizing the uterine receptors to exogenous and endogenous oxytocin. During oxytocin infusion, nurses often focus on the rate increase section of the protocol while ignoring the clinical criteria for increases. For example, if cervical effacement is occurring or if the woman is progressing in labor at approximately one centimeter per hour, there is no need to increase the oxytocin rate, even if contractions appear to be mild and infrequent. Labor progress and maternal-fetal response to the drug should be the primary considerations (Simpson, 2003).

Hyperstimulation

- Hyperstimulation with a reassuring FHR pattern: decrease the infusion and reassess uterine activity.
- Hyperstimulation with a nonreassuring FHR pattern: discontinue infusion and implement intrauterine resuscitation techniques: maternal position changes, oxygen per face mask at 10 liters, IV LR bolus, and notify care provider.

Things to Keep in Mind

- Nursing responsibility during oxytocin infusion involves careful titration of the drug to the maternal-fetal response (Kendrick & Simpson, 2001).
- It is important to consider that the misuse of oxytocin is the most preventable cause of perinatal liability (Knox et al, 1999).
- Failure to recognize and promptly treat hyperstimulation and resultant nonreassuring FHR patterns is a significant source of successful claims against physicians, nurses, and health care institutions (Knox et al., 1999; Simpson & Knox, 2003a, 2003b).
- "The goal of oxytocin administration is to effect uterine activity that is sufficient to produce cervical change and fetal descent while avoiding uterine hyperstimulation and fetal compromise" (ACOG, 1995).
- Develop an evidence based protocol for your unit that includes the rate, dosage increases, interval between increases in dosage, and IV mixture. Once the interdisciplinary team agrees on the policy or protocol, all providers are expected to practice within the established unit parameters (Knox et al., 1999; Simpson & Knox, 2003a).

~ Amy N. Sanborn, RNC,

QUESTIONS OR COMMENTS: Contact Amy Sanborn, RNC or Penny Smith, RNC; Statewide Perinatal Care Program, Department of Pediatrics, 200 Hawkins Drive, Iowa City, Iowa 52242-1083. Call (319) 356-2637 or FAX 319-353-8861.