

## Uterine Relaxation: Techniques

Often in obstetric anesthesia we are focused on increasing uterine tone, especially in situations of atony and hemorrhage. However, there are occasionally times where a reduction in uterine tone is required including: reduction of uterine inversion, transient reduction in tone during delivery of the fetus during cesarean, fetal surgery, and the Ex-utero intrapartum treatment (EXIT) procedure.

I suspect you are all familiar with the ability of **volatile anesthetics** to cause uterine relaxation. Hence our willingness to use them prior to delivery during cesarean but minimization of their use after delivery to avoid uterine atony and hemorrhage. This is why you will see many reports on fetal surgery and EXIT procedures with very high levels of volatile anesthetic (i.e. ~2-3 MAC) despite the mother then often requiring a vasopressor infusion.

For an even shorter-term relaxant, a bolus of **nitroglycerin** can be used. A common scenario for its use may be to assist with delivery of the fetal head during cesarean if the incision is not large enough to accommodate the head without assistance. Infusions of nitroglycerin are also seen in cases where there is the need for prolonged uterine relaxation.

In an effort to reduce the volatile requirements, some have reported adding **remifentanyl** as an adjunct to neuraxial or general anesthesia. This has allowed for adequate uterine relaxation with less need for vasopressor and volatile.

Lastly any of the usual tocolytics can be used to augment the above. However, due to unfavorable pharmacokinetics or pharmacologic, these are less ideal for the uses described above. These medications include:

### **-Magnesium**

- $\beta_2$  agonists such as **terbutaline** or **ritodrine** (no longer available in the US)
- Prostaglandin synthesis inhibitors such as **indomethacin**
- Calcium channel blockers such as **nifedipine** or **nicardipine**
- A direct oxytocin antagonist: **atosiban** (I don't think this is available in the US)

Further discussion of these is beyond the scope of this one-page write-up.

Further reading:

Constantine MM, Saad A, Saade G: Obstetric Management of Prematurity, Fanaroff and Martin's Neonatal-Perinatal Medicine, 11th edition. Edited by Martin RJ, Fanaroff AA, Walsh MC. Philadelphia, Elsevier, 2020, pp 327-334

Lin EE, Moldenhauer JS, Tran KM, Cohen DE, Adzick NS. Anesthetic Management of 65 Cases of Ex Utero Intrapartum Therapy: A 13-Year Single-Center Experience. *Anesth Analg*. 2016 Aug;123(2):411-7. doi: 10.1213/ANE.0000000000001385. PMID: 27258076.