

2. Possible Indications for Tocolysis with IV or Spray GTN

GTN in Fetal Entrapment in Uterine Muscle or Cervix

The optimal GTN dosage for fetal entrapment in uterine muscle or cervix is not known but reasonable doses include:

- Intravenous: 100 - 200 microgram
- Sublingual / Lingual Spray: 800 microgram (2 puffs)
- It is reasonable to consider lower doses in small women; conversely, a repeat dose may sometimes be needed. Close dialogue between obstetrician & anaesthetist is important.

GTN MAY PREVENT OR ASSIST MANAGEMENT OF FETAL ENTRAPMENT AT CAESAREAN BIRTH

- Preterm breech, especially < 32 weeks
- Transverse lie, especially with ruptured membranes; also second twin malpresentation
- Deeply engaged head including after failed trial of forceps/vacuum – GTN can be used with any of the techniques available for this situation including reverse-breech, shoulders-first (Patwardhan), push-up-from-vagina and device-assisted techniques
- Cephalic presentation with extremely hyperextended head.
- NOTE:
 - **The obstetrician must prepare in advance for such situations and ensure GTN is available and ready for administration.**
 - However, when giving GTN at caesarean in **anticipation of** entrapment, **do not administer it too early.**
 - GTN IV - administer when opening the uterus as the relaxation effect occurs within a minute but only lasts 1 – 2 minutes.
 - GTN SPRAY - administer a minute or so before opening the uterus (onset a little slower, duration a few minutes longer (see later)).

POTENTIAL BENEFIT of GTN in the caesarean situation - may help to prevent:

- **Woman:**
 - **T or J extension** to uterus which will increase blood loss and infection risk, and will preclude VBAC in the future.
 - **Deep tear down cervix** which risks injury to bladder and ureter.
- **Fetus:**
 - Death from **asphyxia** related to delayed delivery.
 - Cervical spine or skull injury to fetus (**quadriplegia** has resulted from manoeuvres to release the entrapped heads of premature breech babies).
 - Limb **injury** to fetus.

GTN MAY PREVENT OR ASSIST MANAGEMENT OF FETAL ENTRAPMENT AT VAGINAL BIRTH

- Head entrapment above or within the cervix with **preterm breech** – this is most common with fetuses below 32 weeks' gestation but can also occur at later gestations.
 - Obstetricians **can consider the alternative of *IV terbutaline in this situation**; the drugs have not been directly compared; terbutaline has a prolonged, rather than transient, uterine relaxation effect, which may have benefits and risks (see below).
 - Note: entrapment of the term breech head in the **bony** pelvis during vaginal birth is **not** assisted by either of these medications which only work on muscle

POTENTIAL BENEFIT of GTN in the vaginal birth head entrapment situation

- **Woman:**
 - May help to avoid the need to incise the cervix (Dührssen incisions, typically at 6 o'clock, then 2 and 10 o'clock).
 - Such incisions can potentially extend into the lower uterine segment and broad ligament causing injury to uterine vessels, ureter and bladder, together with severe haemorrhage.
 - Local experience suggests such incisions might also result in future **recurrent** mid-trimester pregnancy **loss**.
 - **Fetus:** as above for entrapment at caesarean.
- **Cord prolapse** with high or malpresenting **second twin**, not deliverable with vacuum/forceps.

POTENTIAL BENEFIT OF GTN in entrapped second twin situation:

- While immediate internal podalic version (IPV) and breech extraction will generally allow successful vaginal birth of the second twin without need for GTN, occasionally, the uterus may clamp down quickly and preclude this. The use of GTN to relax the uterus may assist successful vaginal birth and avoid the need to proceed to caesarean.

(UpToDate Hofmeyr 2019, RANZCOG 2017, Dalton 1998).

***IV TERBUTALINE - a possible alternative to GTN in Fetal Entrapment**

Terbutaline IV may be an alternative to GTN in the fetal entrapment within uterus or cervix - no studies exist to compare them, unlike in the fetal distress situation.

- Terbutaline has a rapid onset (a few minutes) like GTN, but a much longer duration of action (up to 4 - 5 hours) compared to GTN's transient duration (3 minutes). Terbutaline also generates less hypotension than GTN (Pullen 2007).
 - Terbutaline's prolonged duration can lead to prolonged uterine **atony** after birth and increase **blood loss** (Eisler 1999). However, this mostly does not occur (Pullen 2007).

- The longer duration may have **benefit in situations of fetal entrapment**.
 - NOTE: **do not use terbutaline** for non-fetal-entrapment situations like uterine inversion and manual removal of placenta with a constriction ring because prolonged atony may have serious negative consequences in these situations.
- As with GTN, terbutaline **must be prepared** shortly **before** the birth to be ready immediately if needed for entrapment in uterus or cervix.
- For **terbutaline dilution, administration contraindications and adverse effects** [see Education Notes](#).

GTN in Retained Placenta with Constriction Ring Cervix / Lower Uterus

- Tocolysis is **mostly not required** for routine manual removal of placenta (MROP).
 - Limited available evidence (3 studies, 175 women) does not suggest that IV GTN is associated with any reduction in need for MROP in cases of retained placenta.
- POTENTIAL BENEFIT of GTN in this situation:
 - In circumstances where the accoucheur finds it difficult to pass a hand through the **contracted cervix or lower uterus**, IV or SPRAY GTN may assist by providing relaxation and access.

Reasonable doses include:

- **100 - 200 microgram IV GTN** (favour 100 microgram initially if there is significant bleeding associated with the retained placenta).
- **2 puffs / 800 microgram SPRAY GTN** (favour 1 puff / 400 microgram initially if there is significant bleeding).

(UpToDate Weeks 2019, MOET 2016, Cochrane Abdel-Aleem 2015)

GTN in Uterine Inversion

Uterine inversion occurs in about 3 per 10,000 births. Unless recognised and managed **immediately** by pushing the fundus along the long axis of the vagina towards the umbilicus, the lower uterine segment and cervix will **contract and create a constriction ring**, making manual replacement of the fundus progressively more difficult. Shock and haemorrhage often result.

While the optimal GTN dose for acute uterine inversion is unknown, initial doses are lower than for entrapment because of the increased risk of hypotension and haemorrhage;

- **Intravenous: 100 microgram** initially - however doses up to 200 microgram might be necessary.
- **Sublingual / Lingual Spray: 400 microgram (1 puff)** as an initial dose – however, 800 microgram (2 puffs) may be necessary.

In the situation of uterine inversion, the following should occur in sequence:

- The placenta should be left in situ until the uterus is replaced.
- Oxytocin should be ceased.
- A uterine relaxant such as GTN should be immediately administered.
 - **Note, GTN is preferable to terbutaline in the uterine inversion situation** due to its short duration of action; the prolonged relaxation of the uterus associated with terbutaline may increase blood loss which is already likely to be significant.
- The fundus should be pushed along the long axis of the vagina towards the umbilicus.
- Oxytocin should then be recommenced, and the placenta subsequently removed.

POTENTIAL BENEFIT of GTN in uterine inversion – GTN may help to prevent / correct:

- Severe hypotension secondary to the uterine inversion itself.
- Massive blood loss causing further hypotension.
- Need for laparotomy in some cases due to persistent constriction ring.

(UpToDate Macones 2019, Coad 2017, MOET 2016, Smith 1998, Riley 1996)