OXYTOCIN

Use

Oxytocin is used (and misused) to induce or augment labour, and to reduce postpartum haemorrhage.

Pharmacology

Oxytocin is a synthetic octapeptide identical to the naturally occurring hypothalamic hormone. Crude pituitary extracts were first used clinically in 1909, and became commercially available in 1928. Its structure was confirmed by synthesis in 1953. It was long used to initiate and augment labour (given continuously IV because uptake is erratic from mucous membranes and the natural half-life is only 3–4 minutes), but prostaglandin induction (q.v.) is now the preferred option unless the membranes have already ruptured spontaneously. A sudden bolus can cause vasodilatation and tachycardia, and secondary hypotension can be dangerous in patients with underlying heart disease. Uterine hyperstimulation can also cause fetal hypoxia, but this can be reversed by stopping the infusion and/or giving a betamimetic drug. There is some risk of uterine rupture, especially in patients with a uterine scar, even in the absence of cephalopelvic disproportion. Doses of more than 15 mU/min have an antidiuretic effect, and the risk of symptomatic fetal and maternal hyponatraemia is compounded if the mother is also given an excess of 5% dextrose in labour, but this is easily avoided if IV oxytocin is always given through a separate line using a motor driven syringe pump. Recent studies have not supported earlier claims that oxytocin nasal spray can augment lactation.

While use in mothers delivering under epidural anaesthesia can speed up the second stage of labour, there is no controlled trial evidence that use (with or without early amniotomy) to 'augment' spontaneous labour is of any significant clinical benefit. On the other hand such augmentation can certainly cause increased pain and there is a significant risk of uterine hyperstimulation. Oxytocin (10 units IV or IM) can also reduce the risk of postpartum haemorrhage, and a continuous infusion can be used if bleeding continues after the placenta is delivered. A combined IM injection of oxytocin and ergometrine maleate (Syntometrine®), is marginally more effective in reducing blood loss, but can sometimes cause nausea, vomiting, and other unpleasant symptoms together with a transient rise in blood pressure. A 100 microgram IV dose of carbetocin (a longer acting synthetic analogue of oxytocin) may be equally effective and cause less nausea. Misoprostol (q.v.) is an extremely effective way of containing excessive post-delivery blood when it does occur, especially in a setting where it is difficult to keep supplies of oxytocin refrigerated. The inadvertent administration of Syntometrine to a baby (in mistake for an injection of vitamin K) can cause respiratory depression, seizures, and severe hyponatraemia. Survivors, luckily, seem to make a complete recovery.

Units used when prescribing oxytocin

Oxytocin is such a potent drug that only a few nanograms are needed. Many staff feel insecure trying to use nanogram units and, for this reason, oxytocin remains (like insulin) one of the few drugs still widely prescribed using the old pharmaceutical unit of potency – the 'unit' and, because of its short half life, prescribed in milliunits per minute (often written as mU/min) to avoid writing "start by giving 0·001 units/min".

Treatment

Inducing and augmenting labour: Start with 1 or 2 mU/min and increase this by 1 mU/min every 30 minutes as necessary using a motor-driven syringe. If more than 4 mU/min proves necessary increase the dose by 2 mU/min increments once every 30 minutes to a maximum of 20 mU/min.

Postpartum use: Give 10 units of oxytocin (or 1 ml of Syntometrine) IM once the anterior shoulder of the baby is safely delivered. Continuous IV oxytocin will usually limit residual postpartum bleeding.

Supply and administration

Oxytocin comes in 5 or 10 unit 1 ml ampoules. For accurate, continuous, dose-adjusted IV administration, dilute 3 units of oxytocin to 50 ml with 0·9% sodium chloride (or Hartmann's solution). This gives a solution containing 60 mU/ml which, when infused at a rate of 1 ml/hr, gives the patient 1 mU/min of oxytocin. (1 unit = 2·2 micrograms of oxytocin). I ml ampoules of Syntometrine contain 5 units of oxytocin and 500 micrograms of ergometrine. UK midwives can use these products on their own authority. They cost about £1 per ampoule. 100 microgram ampoules of carbetocin cost £12. Keep all three products in the dark at 4ºC.

References

See also the relevant Cochrane reviews ©

Daraville PA, Campbell NT. Overdose of ergometrine in the newborn infant: acute symptomatology and long-term outcome. *J Paediatr Child Health* 1998;**34**:83–9.

Soriano D, Dulitzki M, Schiff E, *et al.* A prospective cohort study of oxytocin plus ergometrine compared with oxytocin alone for prevention of postpartum haemorrhage. *Br J Obstet Gynaecol* 1996;**103**:1068–73. (See also **104**:643–4.)

Royal College of Obstetricians and Gynaecologists. *Induction of labour.* National Evidence-based Clinical Guideline Number 9. London: RCOG Press, 2001. [SR] (See www.rcog.org.uk)

Harrison K, Read MD, Woodman NM. Current practice for induction of labour in the United Kingdom: time for a review ? *J Obstet Gynaecol* 2003;**23**:138–42. (Reprinted in *MIDIRS Midwifery Digest* 2003;**13**:350–3.)

Fewtrell MS, Loh KL, Blake A, *et al.* Randomised, double blind trial of oxytocin nasal spray in mothers expressing breast milk for preterm infants. *Arch Disd Child* 2006;**91**:F169–74. [RCT]

Leung SW, Ng PS, Wong WY, *et al.* A randomised trial of carbetocin versus syntometrine in the management of the third stage of labour. *BJOG* 2006;**113**:1459–64. [RCT]

Chelmow D, O'Brien B. Postpartum haemorrhage: prevention. *Clin Evid* 2006;**15**:1932–50 (and updates). [SR]

June 2007 (CE ww)