Role of oxytocin in third stage

The third stage and the need for uterine contraction

The third stage starts immediately after the baby’s birth. The placenta separates from the uterine wall and is then expelled, together with the membranes. Once separation occurs, the uterine muscle should contract and retract. This contraction is more than a mechanical event: it compresses the open spiral arteries that previously supplied the placenta, providing an important physiological mechanism for limiting blood loss.

When the uterus remains soft and enlarged after placental delivery, a condition often described as uterine atony, those vessels may continue to bleed. Uterine atony is a major contributor to postpartum hemorrhage. Other causes include retained placental tissue, genital tract trauma, coagulation abnormalities, and abnormal placentation. Oxytocin primarily addresses inadequate uterine tone; it does not treat every cause of postpartum bleeding.

The period immediately after birth therefore combines observation with active clinical assessment. Maternity professionals evaluate uterine tone, vaginal blood loss, vital signs, placental completeness, and the mother’s overall condition. Families may notice abdominal palpation, administration of medication, inspection of the placenta, or assistance with delivery of the

placenta. These actions are intended to identify complications early and support safe recovery.

How oxytocin works after birth

Oxytocin is a naturally occurring peptide hormone synthesized in the hypothalamus and released from the posterior pituitary. During labor and after birth, it binds to oxytocin receptors in the myometrium, the muscular layer of the uterus. Receptor expression increases toward the end of pregnancy, making the uterus particularly responsive around labor and the immediate postpartum period.

Binding of oxytocin activates intracellular signaling that increases calcium availability within smooth-muscle cells. The result is coordinated myometrial contraction. After placental delivery, these contractions promote uterine retraction and reduce perfusion at the placental site. Endogenous oxytocin is also involved in breastfeeding-related uterine contractions, sometimes perceived as afterpains, especially during early feeds.

Administered oxytocin is chemically identical or functionally equivalent to the endogenous hormone, depending on the formulation used. In the third stage, it is used as a uterotonic: a medicine intended to increase uterine tone and reduce blood loss. Its action is not meant to hasten recovery by itself, and it does not replace careful examination, observation, or treatment of identified causes of hemorrhage.

The response can vary. A uterus may contract adequately after one dose, while persistent atony may require further uterotonics, uterine massage, intravenous fluids, examination for trauma or retained tissue, blood products, or procedural and surgical management. These interventions are selected by trained clinicians according to the severity and cause of bleeding.

Evidence for prophylactic oxytocin

Prophylactic oxytocin means giving a uterotonic routinely or when indicated to prevent excessive bleeding, rather than waiting for postpartum hemorrhage to develop. Evidence synthesized by the Cochrane review indicates that prophylactic oxytocin reduces blood loss and decreases the likelihood of

requiring additional uterotonics compared with placebo or no uterotonic. The benefit is clinically relevant because postpartum hemorrhage can develop rapidly and may initially be underestimated by visual assessment alone.

Major guidance identifies oxytocin as the preferred uterotonic for prevention of postpartum hemorrhage when it is available and appropriate. The World Health Organization recommendations describe oxytocin use within active management of the third stage. Specific dosing, concentration, route, and timing should follow current local or national protocols, because practice may differ according to whether birth occurred vaginally or by cesarean birth, the availability of controlled storage, and the mother’s risk profile.

Preventive treatment should be understood in the context of absolute risk. Oxytocin lowers the probability and severity of bleeding for many patients, but it cannot eliminate risk. A person with a low-risk pregnancy can still experience hemorrhage, while a person with risk factors may need additional preparation, closer observation, or a broader preventive plan. The care team may discuss anemia, previous postpartum hemorrhage, multiple pregnancy, prolonged labor, uterine overdistension, induction or augmentation, placental abnormalities, and coagulation disorders when planning care.

The evidence supports oxytocin as part of a broader safety strategy, not as a substitute for skilled attendance. Early recognition and coordinated response remain essential even when prophylactic medication has been given.

Oxytocin within active management

Active management of the third stage combines a prophylactic uterotonic with clinical measures intended to support timely placental delivery and detect bleeding. The exact package varies by guideline and setting, but commonly includes administration of oxytocin, assessment for placental separation, controlled cord traction by a trained practitioner when appropriate, and continued observation of uterine tone and blood loss.

Active management is different from physiological management, in which spontaneous uterine contractions and maternal expulsive efforts are allowed to progress without routine prophylactic uterotonic medication or deliberate traction. Neither approach should be treated as a universal rule for every

birth. The relative benefits and burdens depend on the individual’s risk factors, the care environment, clinician expertise, and informed preferences.

Oxytocin does not make controlled cord traction safe in isolation. Traction should only be performed by a clinician who has confirmed appropriate conditions and uses the technique recommended by local guidance. Excessive or premature traction can cause harm, including cord avulsion or uterine inversion, although these complications are uncommon when proper technique is used.

Discussions before birth can clarify whether routine active management is recommended in a particular setting, what alternatives are available, and how preferences may be revisited if bleeding develops. Shared decision-making is especially valuable when a patient is clinically stable and has time to consider options. If urgent hemorrhage occurs, immediate treatment takes priority over a previously stated preference for physiological management.

Administration and monitoring

Oxytocin may be given by intramuscular injection or intravenously, depending on the birth setting, available access, and local protocol. Intravenous administration may be delivered as a carefully controlled dose or infusion. The healthcare professional selects the regimen; patients should not self-administer oxytocin or adjust an infusion.

After administration, the team monitors uterine tone, the amount and pattern of bleeding, pulse, blood pressure, respiratory status, pain, and general appearance. In an intravenous infusion, the rate is controlled because oxytocin can affect fluid balance and cardiovascular physiology. The placenta and membranes are inspected when delivered, and ongoing assessment helps determine whether the uterus is responding as expected.

Commonly recognized adverse effects can include nausea, vomiting, headache, flushing, cramping, and changes in blood pressure or heart rate. Important but less common concerns include water intoxication or hyponatremia with prolonged exposure to large amounts of dilute oxytocin-containing fluid, and significant cardiovascular effects in susceptible patients. Clinicians consider fluid administration, cardiac disease, hypertensive disorders, and other relevant

conditions when selecting and monitoring treatment.

Oxytocin can also cause stronger uterine cramping. This discomfort may be particularly noticeable during breastfeeding because nipple stimulation naturally increases endogenous oxytocin release. Pain relief, reassurance, and postpartum support should be offered according to the patient’s needs and the clinical situation.

When bleeding continues despite oxytocin

Persistent or heavy bleeding after prophylactic oxytocin requires prompt assessment. Clinicians may first confirm whether the uterus is well contracted, quantify blood loss, check the birth canal for lacerations, and determine whether the placenta and membranes are complete. A soft uterus suggests atony, but a firm uterus with ongoing bleeding raises concern for trauma or another cause.

Treatment may include uterine massage, additional uterotonic medicines, intravenous fluids, laboratory testing, repair of genital tract trauma, removal of retained tissue, and blood component therapy. Medication choices are individualized because some uterotonics may be unsuitable in patients with asthma, hypertension, cardiovascular disease, or other contraindications. Severe hemorrhage can require transfer to an operating theatre, balloon tamponade, interventional radiology, or surgery.

Patients and support people should alert the clinical team immediately if bleeding appears to be rapidly increasing, if large clots are passed, or if there is dizziness, faintness, shortness of breath, chest discomfort, confusion, or marked weakness. After discharge, urgent medical review is warranted for sudden heavy bleeding, recurrent large clots, fever, worsening pelvic pain, or symptoms suggestive of anemia or circulatory compromise. The threshold for seeking care should be low because postpartum deterioration can be rapid.

For most people, oxytocin is one component of a carefully monitored birth and postpartum plan. Asking the care team why it is recommended, how it will be administered, and what monitoring will occur can make the process more predictable while preserving the flexibility needed for safe clinical care.