



# Medikamentöse und mechanische Strategien zur Geburtseinleitung

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Obstet Gynecol. 2002 Jul;100(1):164-7. Links  
**Rising rates of labor induction: present concerns and  
future strategies.**

[Rayburn WF, Zhang J.](#)

- The rate of labor induction nationwide increased gradually from 9.5% to 19.4% between 1990 and 1998. Reasons for this doubling of inductions relate to widespread availability of cervical ripening agents, pressure from patients, conveniences to physicians, and litigious constraints. The increase in medically indicated inductions was slower than the overall increase, suggesting that induction for marginal or elective reasons has risen more rapidly. Data to support or refute the benefits of marginal or elective inductions are limited. Many trials of inductions for marginal indications are either nonexistent or retrospective with small sample sizes, thereby limiting definitive conclusions.

Clin Obstet Gynecol. 2006 Sep;49(3):698-704. Links  
**Elective induction of labor.**

**Moore LE, Rayburn WF.**

- Induction of labor rates have **more than doubled nationwide in the past 15 years**. The increase in medically induced inductions was slower than the overall increase, suggesting that inductions for marginal or elective reasons rose more rapidly. Elective inductions seem to account for at least half of all inductions and 10% of all deliveries. Whether the experience of an elective induction is satisfactory to the patient, obstetrician, and intrapartum crew warrants more widespread attention. **Cesarean rates are high for nulliparas undergoing an induction with an unfavorable cervix.** Prospective studies are limited or nonexistent to recommend induction of labor for elective or marginal indications. Until more prospective work is performed, it will be difficult to evaluate the true impact of the elective induction of labor on population-wide cesarean delivery rates. Strategies for increased obstetrician awareness are proposed through practice guidelines and through clinical research trials.

# Indikationen zur Geburtseinleitung

## Maternal:

- Terminüberschreitung
- Vorzeitiger Blasensprung
- Präeklampsie
- Diabetes mellitus
- Hypertonie
- Primäre Wehenschwäche



# Indikationen zur Geburtseinleitung

## Fetal:

- Fetal growth restriction
- Fetal distress
- Other states of potential fetal compromise
- Fetal anomalies
- Stillbirth



# Background

- Mechanical methods were the first methods developed to ripen the cervix or to induce labour. Devices which were used include various type of catheters and of laminaria tents, introduced into the cervical canal or into the extra-amniotic space. Mechanical methods were never completely abandoned, but were substituted by pharmacological methods during recent decades.

# Substanzen

- Mifepriston (Mifegyne)
- Misoprostol (Cyprostol, PGE1)
- Dinoproston (Prostin, PGE2)
- Oxytocin (Syntocinon)

# Substanzen

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# Mifepriston

## Anwendungsgebiete

- Medikamentöser Abbruch einer frühen intrauterinen Schwangerschaft.
- Erweichung und Erweiterung der Cervix uteri vor dem chirurgischen Abbruch der Schwangerschaft während des ersten Trimesters.
- Vorbereitung für die Wirkung von Prostaglandinanalogen beim Abbruch der Schwangerschaft aus medizinischen Gründen (nach dem ersten Trimester).
- Einleitung von Wehen beim Tod des Feten in utero.

# Mifepriston

## Gegenanzeigen

- Chronisches Nierenversagen
- Überempfindlichkeit
- Schweres Asthma
- Angeborene Porphyrie

# Mifepriston

## Nebenwirkungen

- Blutungen (5%)
- Uteruskontraktionen, Krämpfe (10-45%)
- Uterusruptur
- Infektionen
- Toxischer Schock durch *Clostridium sordellii*

Expert Opin Pharmacother. 2008 Oct;9(14):2459-72. Links  
**Selective progesterone receptor modulators 1: use during pregnancy.**

**[Benagiano G](#), [Bastianelli C](#), [Farris M](#).**

- Besides early and late voluntary interruption of gestation, selective progesterone receptor modulators have been tested in a variety of obstetrical situations: to obtain a ripening of the cervix, for the medical management of early embryonic loss and foetal death, for the induction of labour at term and for the medical treatment of extra-uterine pregnancies. **The only applications that seem worthy of large-scale utilisation during pregnancy are voluntary interruption of early and late gestation, medical management of early delayed miscarriage and late foetal demise.**

# Mifepriston

- BJOG. 2008 Nov;115(12):1575-7. Links
- **Rupture of uterus in the first trimester during medical termination of pregnancy for exomphalos using mifepristone/misoprostol.**
- [Willmott FJ](#), [Scherf C](#), [Ford SM](#), [Lim K](#).
- Eur J Obstet Gynecol Reprod Biol. 1996 Apr;65(2):175-6. Links
- **Uterine rupture during second trimester termination of pregnancy using mifepristone and a prostaglandin.**
- [Phillips K](#), [Berry C](#), [Mathers AM](#).
- Int J Gynaecol Obstet. 2004 Oct;87(1):42-3. Links
- **Rupture in an unscarred uterus during second trimester pregnancy termination with mifepristone and misoprostol.**
- [Bagga R](#), [Chaudhary N](#), [Kalra J](#).

# Substanzen

- Mifepriston (Mifegyne)
- **Misoprostol (Cyprostol, PGE1)**
- Dinoproston (Prostin, PGE2)
- Oxytocin (Syntocinon)

# Misoprostol

## Anwendungsgebiete

- Prophylaxe von Magen- und Duodenalschleimhautläsionen, die durch Therapie mit nichtsteroidalen Antirheumatika bedingt sind

# Misoprostol

## Gegenanzeigen

- Überempfindlichkeit
- Entzündliche Darmkrankheiten
- Nicht eingestellte Epilepsie
- Schwangere Frauen

# Misoprostol

## Nebenwirkungen

- Gastrointestinaltrakt (Diarrhoe, Übelkeit)
- Uteruskrämpfe, Menorrhagie, Dysmenorrhoe
- Bei schwangeren Frauen: Uteruskrämpfe, -hämorrhagien, -risse/-perforationen, Plazentaretention, Fruchtwasserembolie, unvollständiger Abort, Frühgeburt, Totgeburt und Entbindungsschäden

Cochrane Database Syst Rev. 2003;(1):CD000941. Links  
Update of: [Cochrane Database Syst Rev.  
2001;\(3\):CD000941](#). **Vaginal misoprostol for cervical  
ripening and induction of labour.**  
**[Hofmeyr GJ](#), [Gülmezoglu AM](#).**

Vaginal misoprostol appears to be more effective than conventional methods of cervical ripening and labour induction. The apparent increase in uterine hyperstimulation is of concern. Doses not exceeding 25 mcg four-hourly of concern. Doses not exceeding 25 mcg four-hourly appeared to have similar effectiveness and risk of uterine hyperstimulation to conventional labour inducing methods. The studies reviewed were not large enough to exclude the possibility of rare but serious adverse events, particularly uterine rupture, which has been reported anecdotally following misoprostol use in women with and without previous caesarean section.

BJOG. 2008 Oct;115(11):1340-9. Links

**Comparison of sublingual versus vaginal misoprostol for the induction of labour: a systematic review.**

**[Souza AS](#), [Amorim MM](#), [Feitosa FE](#).**

The sublingual route of administration is as effective as the vaginal route in inducing labour in full-term pregnancies with live fetuses. However, the safety, adverse effects, optimal dose and perinatal outcome related to this route of administration remain to be established, and it cannot be recommended for routine use in obstetric practice.

Cochrane Database Syst Rev. 2004 Oct 18;(4):CD004221.

Links

**Buccal or sublingual misoprostol for cervical ripening and induction of labour.**

**[Muzonzini G](#), [Hofmeyr GJ](#).**

- Based on only three small trials, sublingual misoprostol appears to be at least as effective as when the same dose is administered orally. There are inadequate data to comment on the relative complications and side-effects. **Sublingual or buccal misoprostol should not enter clinical use until its safety and optimal dosage have been established by larger trials.**

BJOG. 2006 Dec;113(12):1366-76. Links

**Misoprostol compared with prostaglandin E2 for labour induction in women at term with intact membranes and unfavourable cervix: a systematic review.**

**[Crane JM](#), [Butler B](#), [Young DC](#), [Hannah ME](#).**

- Although misoprostol in women at term with an unfavourable cervix and intact membranes was more effective than PgE2 in achieving vaginal delivery within 24 hours, misoprostol does not reduce the rate of caesarean delivery either in all women or in the subgroup of nulliparous women, and it increases the rates of tachysystole and hyperstimulation. Further studies of misoprostol using a starting dose of 25 microgram may be warranted.

# Substanzen

- Mifepriston (Mifegyne)
- Misoprostol (Cyprostol, PGE1)
- **Dinoproston (Prostin, PGE2)**
- Oxytocin (Syntocinon)

# Dinoproston

## Anwendungsgebiete

- Geburtseinleitung am Termin oder in Terminnähe bei medizinischer bzw. geburtshilflicher Indikation

# Dinoproston

## Gegenanzeigen

- Bei mehrfach vorangegangenen Schwangerschaften
- Bei Multipara mit sechs oder mehr vorangegangenen termingerechten Entbindungen
- Bei vorangegangenen komplizierten Geburten
- Vor Eintritt des kindlichen Kopfes in das kleine Becken
- Bei vorausgegangenen Uterusoperationen
- Bei früheren Operationen oder Rupturen an der Cervix
- Bei Schädel-Becken-Missverhältnis
- Bei fetalem Distress
- Bei vaginalem Ausfluss oder Blutungen ungeklärter Genese
- Bei geburtsungünstiger Kindeslage
- Bei vorliegenden Infektionen
- Bei Placenta praevia
- Bei vorzeitiger Placentalösung

# Dinoproston

## Nebenwirkungen

- Hypertonie
- Asthma
- Übelkeit, Erbrechen
- Uterine Überstimulation
- Uterusruptur
- Plazentalösung
- Fruchtwasserembolie

Cochrane Database Syst Rev. 2001;(2):CD003101. Links  
Update in: [Cochrane Database Syst Rev. 2003;\(4\):CD003101.](#)

## **Vaginal prostaglandin (PGE2 and PGF2a) for induction of labour at term.**

[Kelly AJ](#), [Kavanagh J](#), [Thomas J](#).

- The primary aim of this review was to examine the efficacy of vaginal prostaglandin E2 and F2a. This is reflected by an **increase in successful vaginal delivery rates in 24 hours, no increase in operative delivery rates and significant improvements in cervical favourability within 24-48 hours.** Further research is needed to quantify the cost-analysis of induction of labour with vaginal prostaglandins, with special attention to different methods of administration.

Cochrane Database Syst Rev. 2000;(4):CD002864.

Links

**Intravenous prostaglandin for induction of labour.**

**[Luckas M](#), [Bricker L](#).**

- Intravenous prostaglandin is no more efficient than intravenous oxytocin for the induction of labour but its use is associated with higher rates of maternal side effects and uterine hyperstimulation than oxytocin. No conclusions can be drawn from the comparisons of combination of prostaglandin F2 alpha and oxytocin compared to oxytocin alone or extra amniotic and intravenous prostaglandin E2.

Cochrane Database Syst Rev. 2008 Jan

23;(1):CD006971. Links

**Intracervical prostaglandins for induction of labour.**

**[Boulvain M](#), [Kelly A](#), [Irion O](#).**

- Intracervical prostaglandins are effective compared to placebo, but appear inferior when compared to intravaginal prostaglandins.

# Substanzen

- Mifepriston (Mifegyne)
- Misoprostol (Cyprostol, PGE1)
- Dinoproston (Prostin, PGE2)
- **Oxytocin (Syntocinon)**

# Oxytocin

## Anwendungsgebiete

- Vorzeitige Einleitung der Geburt bei Erkrankungen von Mutter und Kind
- Geburtseinleitung bei Übertragung, Blasensprung
- Primäre und sekundäre Wehenschwäche
- Prophylaxe und Therapie einer postpartalen Uterusatonie und –hämorrhagie
- Während einer Sectio caesarea nach Entwicklung des Kindes
- In der Nachgeburtsperiode

# Oxytocin

## Gegenanzeigen

- Überempfindlichkeit
- Hypertone Wehentätigkeit
- Fetaler Distress
- Kontraindizierte vaginale Geburt
- Placenta praevia, Vasa praevia, Placentalösung
- Überdehnung des Uterus
- Multiparae (>4 Geburten)
- Uterusnarbe
- Schwere Schwangerschaftstoxikose
- Prädisposition für Fruchtwasserembolie

# Oxytocin

## Nebenwirkungen

- Überstimulation des Uterus, tetanische Kontraktionen, Uterusruptur
- Fetalen Distress, Asphyxie
- Wasserintoxikation, neonatale Hyponatriämie
- Pulmonales Ödem
- DIC
- Tachy-, Bradykardie, Hypertonie
- Kopfschmerzen

Cochrane Database Syst Rev. 2001;(3):CD003246. Links  
**Intravenous oxytocin alone for cervical ripening and  
induction of labour.**

[Kelly AJ, Tan B.](#)

- Overall, comparison of oxytocin alone with either intravaginal or intracervical PGE2 reveals that the prostaglandin agents probably overall have more benefits than oxytocin alone. The amount of information relating to specific clinical subgroups is limited, especially with respect to women with intact membranes. Comparison of oxytocin alone to vaginal PGE2 in women with ruptured membranes reveals that both interventions are probably equally efficacious with each having some advantages and disadvantages over the others.

Obstet Gynecol. 2003 Jun;101(6):1312-8. Links  
**Labor induction versus expectant management for  
postterm pregnancies: a systematic review with  
meta-analysis.**

**[Sanchez-Ramos L](#), [Olivier F](#), [Delke I](#), [Kaunitz AM](#).**

- A policy of labor induction at 41 weeks' gestation for otherwise uncomplicated singleton pregnancies reduces cesarean delivery rates without compromising perinatal outcomes.

# Mechanische Methoden zur Geburtseinleitung



# Mechanische Methoden zur Geburtseinleitung

- Digital stretching of the cervix and sweeping of the membranes
- Hygroscopic cervical dilators
- Artificial rupture of the membranes
- Extra-amniotic balloon catheters
- Nipple stimulation

Cochrane Database Syst Rev. 2000;(4):CD002862.

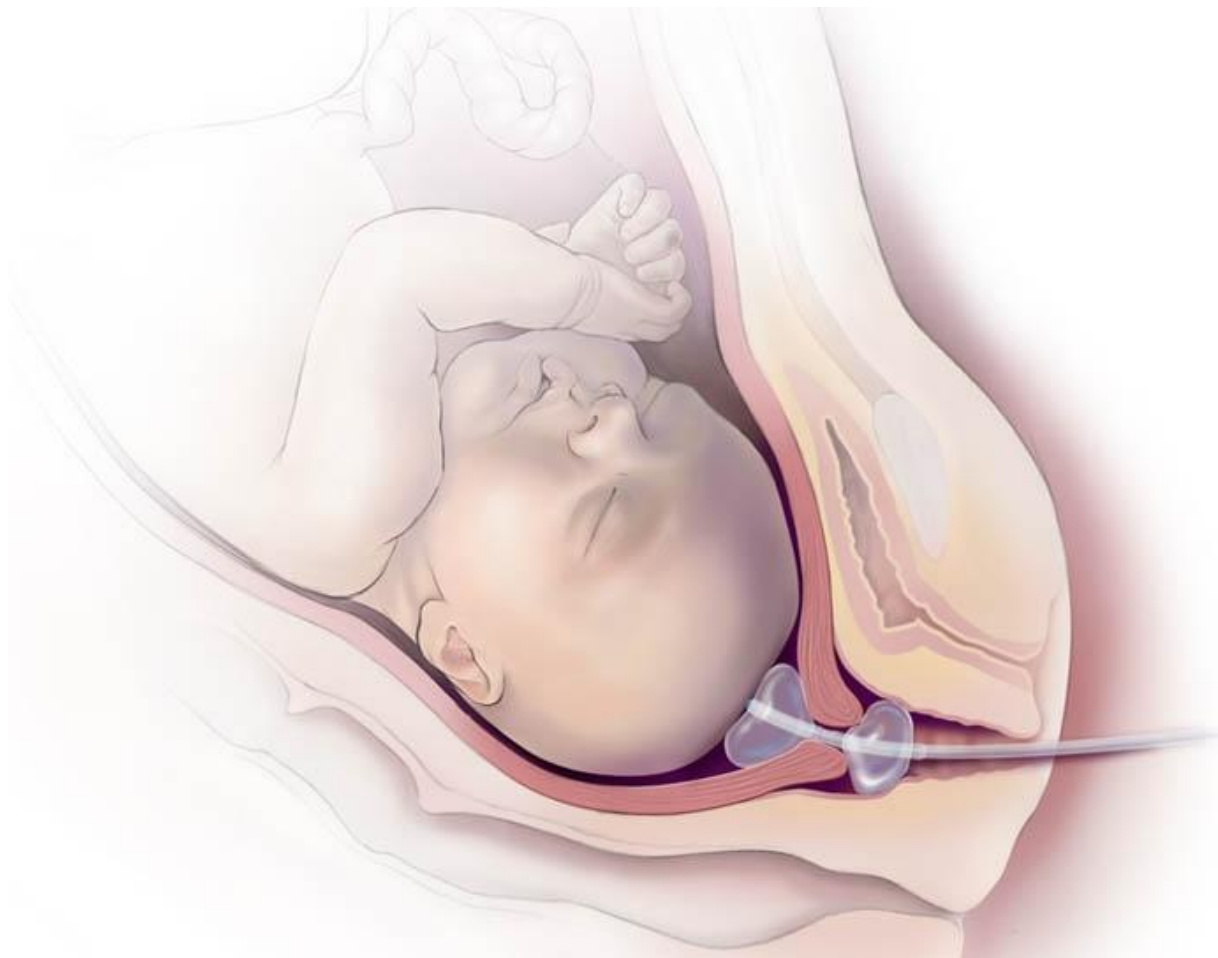
Links

## **Amniotomy alone for induction of labour.**

**[Bricker L](#), [Luckas M](#).**

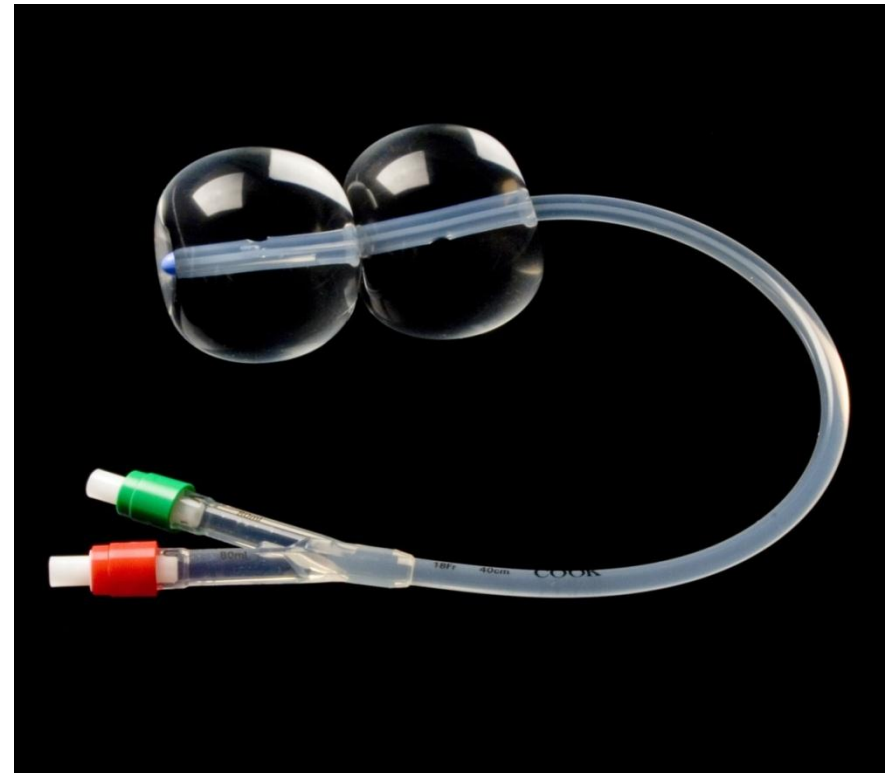
- **Data is lacking** about the value of amniotomy alone for induction of labour. While there are now other modern methods available for induction of labour (pharmacological agents), **there remain clinical scenarios where amniotomy alone may be desirable and appropriate**, and this method is worthy of further research. This research should include evaluation of the appropriate time interval from amniotomy to secondary intervention, women and caregivers' satisfaction and economic analysis.

# Cook Cervical Ripening Balloon



# Cook Cervical Ripening Balloon

- Indicated for mechanical dilation of the cervical canal prior to labor induction at term when the cervix is unfavorable for induction.



# Cook Cervical Ripening Balloon

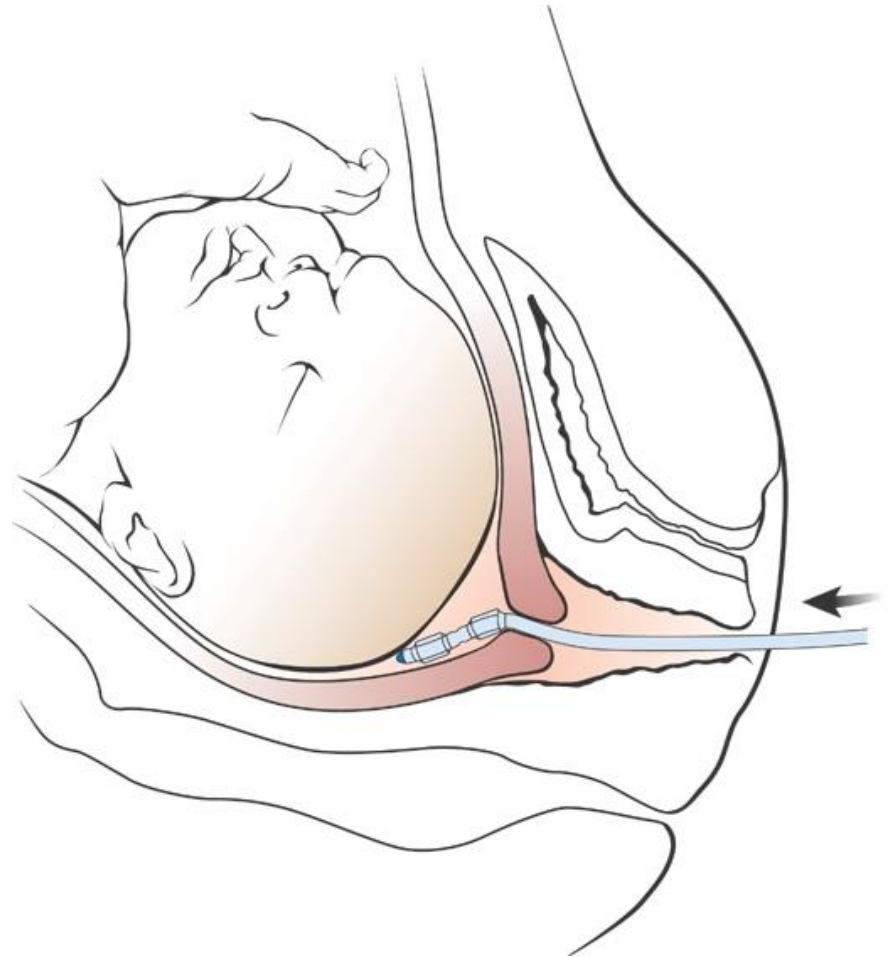
- Safely ripens and dilates the cervix without pharmaceuticals.
- Eliminates the potential side effects of repeat medications.
- Silicone balloons adapt to the contour of the cervical canal.
- Cervix gradually and naturally dilates over time.
- Gentle and constant pressure at the level of the cervix.
  - Both internal and external ostia.

# Patient Preparation

- Perform an abdominal ultrasound to confirm singleton, vertex presentation and to rule out partial or complete placenta previa, and/or placental percreta.
- Place the patient in the lithotomy position
- Insert a large vaginal speculum to gain cervical access.
- Clean the cervix with an appropriate cleaning solution to prepare for device insertion.

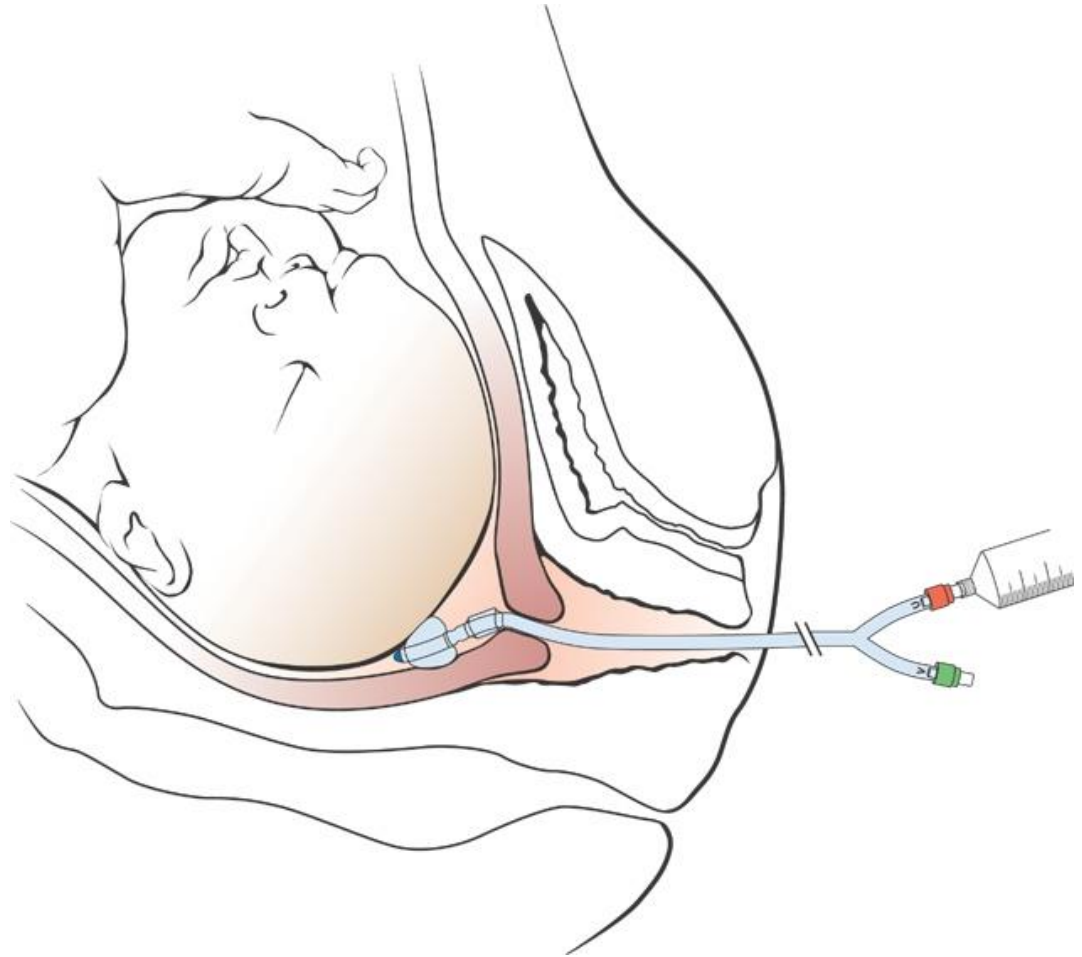
# Insertion & Inflation Technique

Insert the device into the cervix and advance until both balloons have entered the cervical canal.



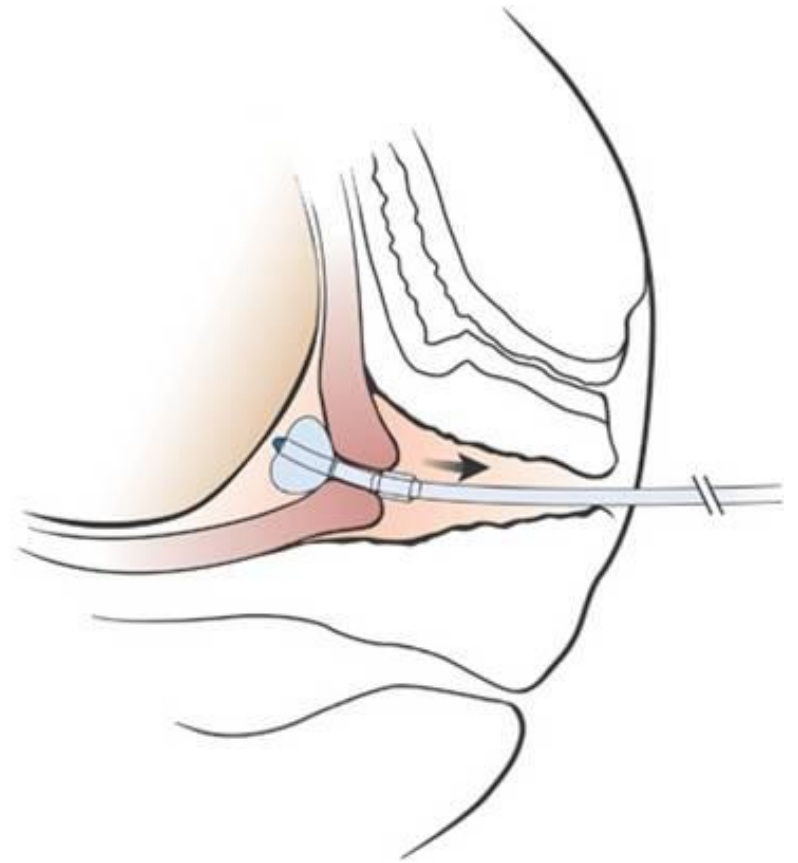
# Insertion & Inflation Technique

Inflate the uterine balloon with 40 mL of normal saline using a standard 20 mL Luer-lock syringe through the red Check-Flo valve marked “U”.



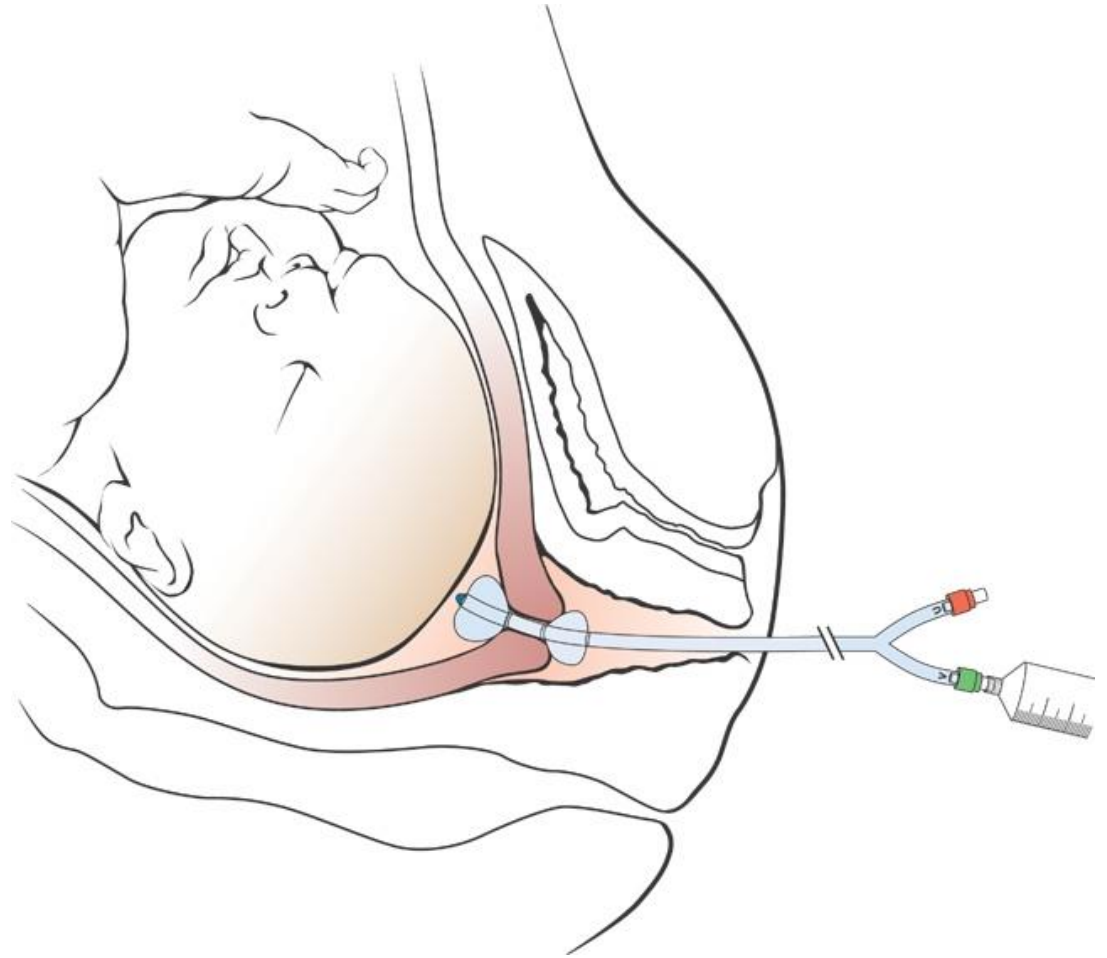
# Insertion & Inflation Technique

Once the uterine balloon is inflated, the device is pulled back until the uterine balloon is against the internal cervical os. The vaginal balloon is now visible outside the external cervical os.



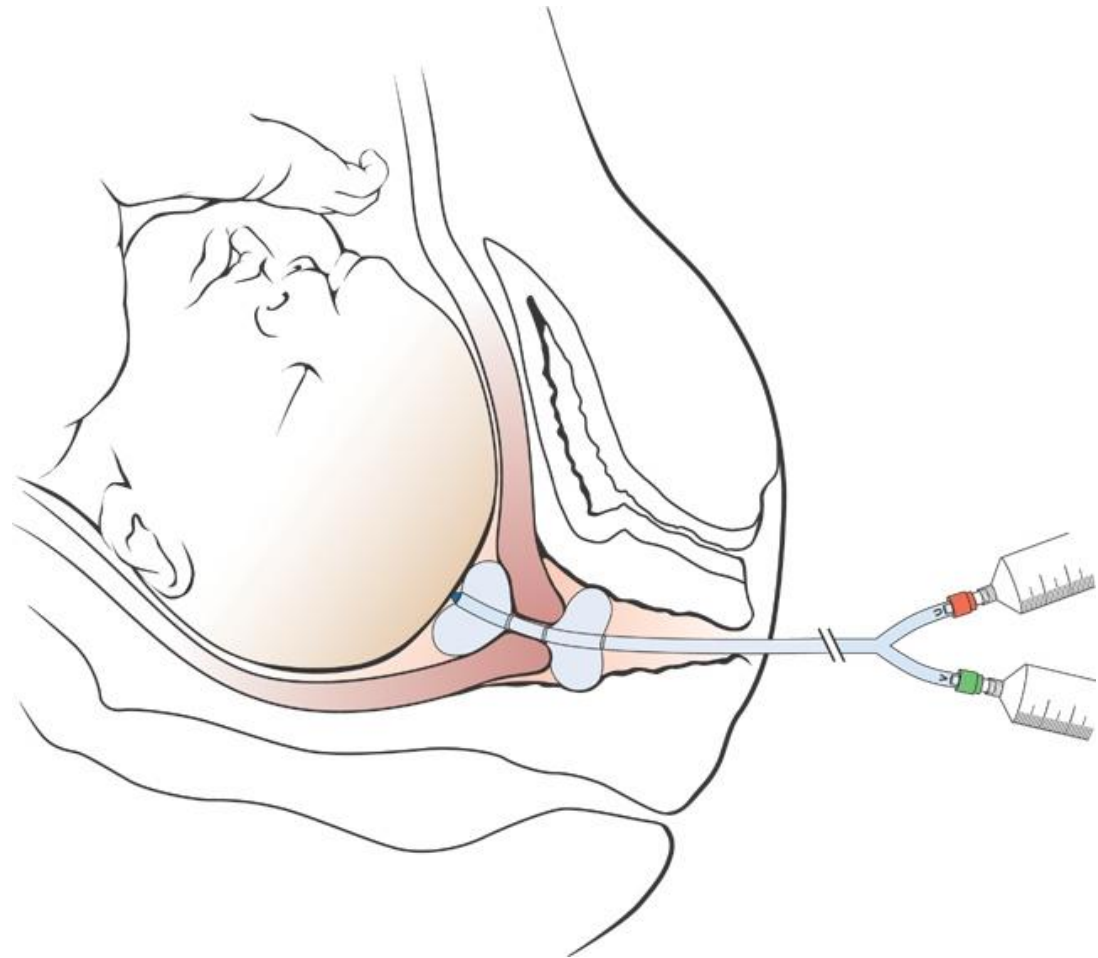
# Insertion & Inflation Technique

Inflate the vaginal balloon with 20 mL of normal saline using a standard 20 mL Luer-lock syringe through the green Check-Flo valve marked "V".



# Insertion & Inflation Technique

Add more fluid to each balloon in turn, in 20 mL increments until each balloon contains 80 mL (maximum) of fluid.



# Insertion & Inflation Technique

Final catheter position



Note: The device is not intended to be left in place for longer than 12 hours. Time the placement of the device 12 hours prior to the planned induction.

# Risks

The risks associated with the Cook Cervical Ripening Balloon and labor induction may include, but are not limited to:

- Placental abruption

- Uterine rupture

- Device expulsion

- Failed dilation or need for caesarean delivery

# Contraindications

- Patient receiving or planning to undergo exogenous prostaglandin administration
- Placenta previa, vasa previa or placenta percreta
- Transverse fetal orientation
- Prolapsed umbilical cord
- Prior hysterectomy, classic uterine incision, myomectomy or any other full-thickness uterine incision
- Pelvic structural abnormality
- Active genital herpes infection
- Invasive cervical cancer

# Contraindications

- Abnormal fetal heart rate patterns
- Breech presentation
- Maternal heart disease
- Multiple gestational pregnancy
- Polyhydramnios
- Presenting part above the pelvic inlet
- Severe maternal hypertension
- Any contraindication for labor induction
- Ruptured membranes

Atad J, et al. Ripening and dilation of the unfavorable cervix for induction of labour by a double balloon device: experience with 250 cases. *Br J Obstet Gynaecol.* 1997;104 (pt1) 29.

- 92% of patients achieve cervical ripening
- Cesarean section rate of only 16%
- Safe & Effective
- Well-tolerated by patients
- Especially advantageous in patients with high risk conditions such as intrauterine growth restrictions (IUGR).

Atad J, et al. A randomized comparison of prostaglandin E<sub>2</sub>, oxytocin and the double-balloon device in inducing labor. *Obstet Gynecol.* 1996; 87(2):223-7.

### **Bishop Score:**

Balloon and PGE<sub>2</sub> are comparable

Balloon is superior to Oxytocin

### **Cervical Ripening:**

Balloon is superior to both PGE<sub>2</sub> & Oxytocin

Cochrane Database Syst Rev. 2001;(4):CD001233. Links

## **Mechanical methods for induction of labour.**

**[Boulvain M](#), [Kelly A](#), [Lohse C](#), [Stan C](#), [Irion O](#).**

- There is **insufficient evidence to evaluate the effectiveness**, in terms of likelihood of vaginal delivery in 24 hours, of mechanical methods compared with placebo/no treatment or with prostaglandins. **The risk of hyperstimulation was reduced** when compared with prostaglandins (intracervical, intravaginal or misoprostol). **Compared to oxytocin in women with unfavourable cervix, mechanical methods reduce the risk of caesarean section.** There is no evidence to support the use of extra-amniotic infusion.

Am J Obstet Gynecol. 2008 Aug;199(2):177-87; discussion  
187-8. Links

**Do mechanical methods of cervical ripening increase  
infectious morbidity? A systematic review.**

**[Heinemann J](#), [Gillen G](#), [Sanchez-Ramos L](#), [Kaunitz AM](#).**

- Compared with the use of pharmacologic methods alone, patients who underwent cervical ripening with mechanical agents had a significantly higher rate of maternal infection rates. Similar results were noted for patients who underwent ripening with Foley catheter alone in comparison with pharmacologic agents. No difference was noted in maternal infection rates for patients who underwent ripening with extraamniotic saline solution infusion, Laminaria, or hygroscopic dilators. **Compared with the use of pharmacologic agents alone, maternal and neonatal infectious morbidity appears to be increased when mechanical agents are used for cervical ripening.**

# Conclusion

- Potential advantages of mechanical methods, compared with pharmacological methods, may include simplicity of preservation, lower cost and reduction of the side effects. However, special attention should be paid to contraindications (e.g. low-lying placenta), risk of infection and maternal discomfort when inserting these devices.