

# Forceps Delivery

## Shall we reinvent the wheel?

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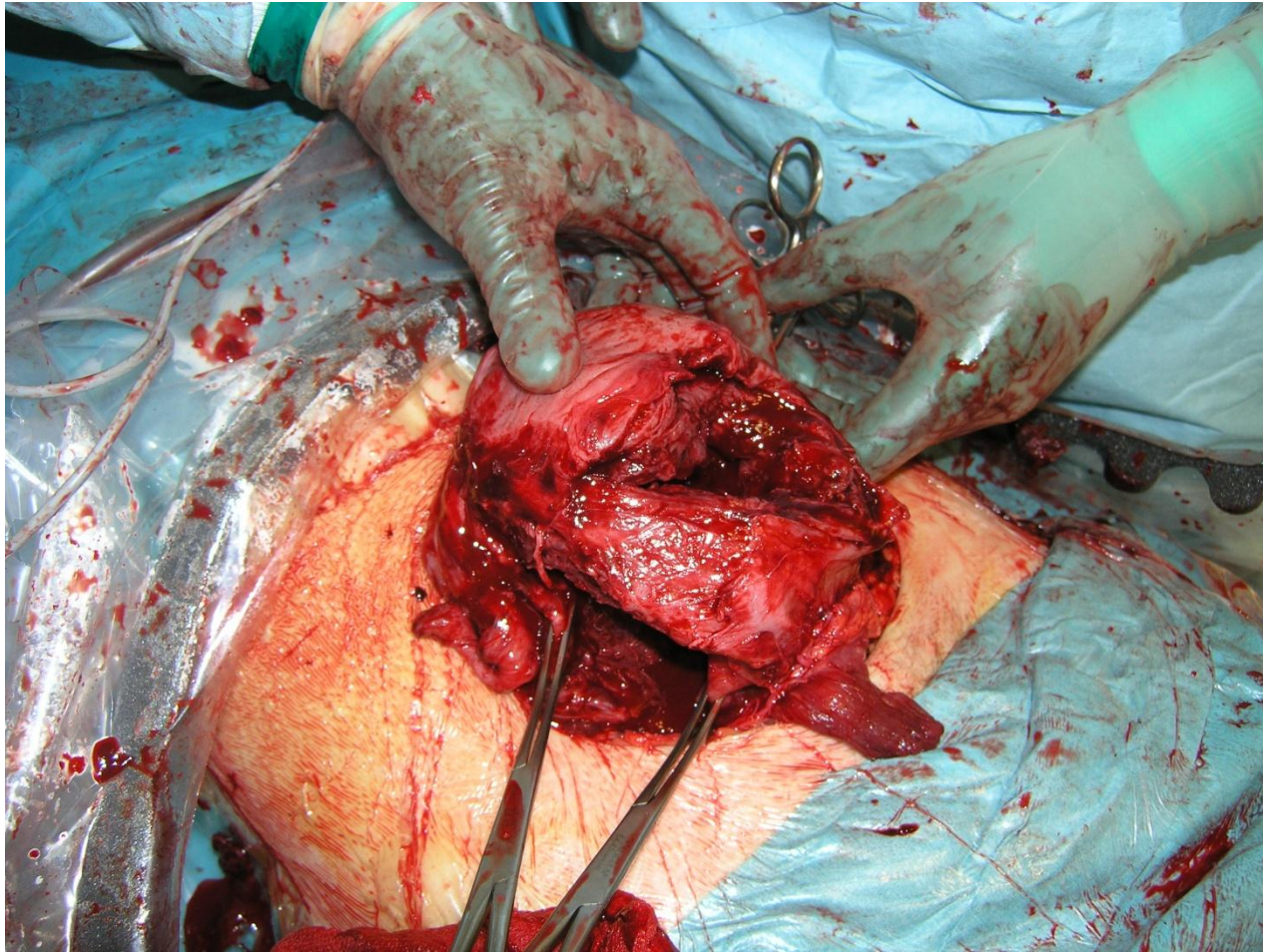
Department of Clinical Sciences, Intervention and Technology (CLINTEC)

Karolinska Institute

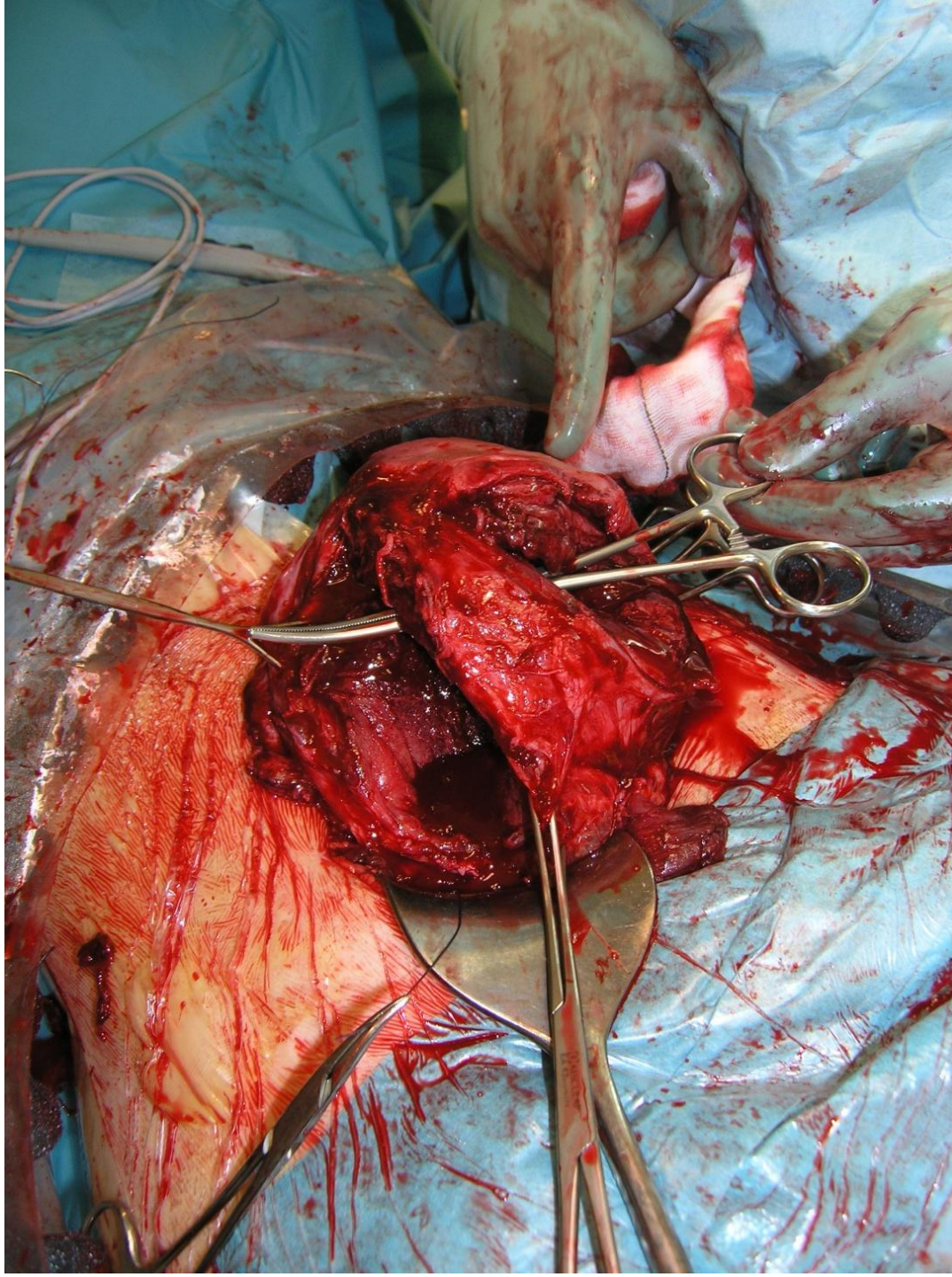
Stockholm, Sweden



# A Case of Uterine Rupture

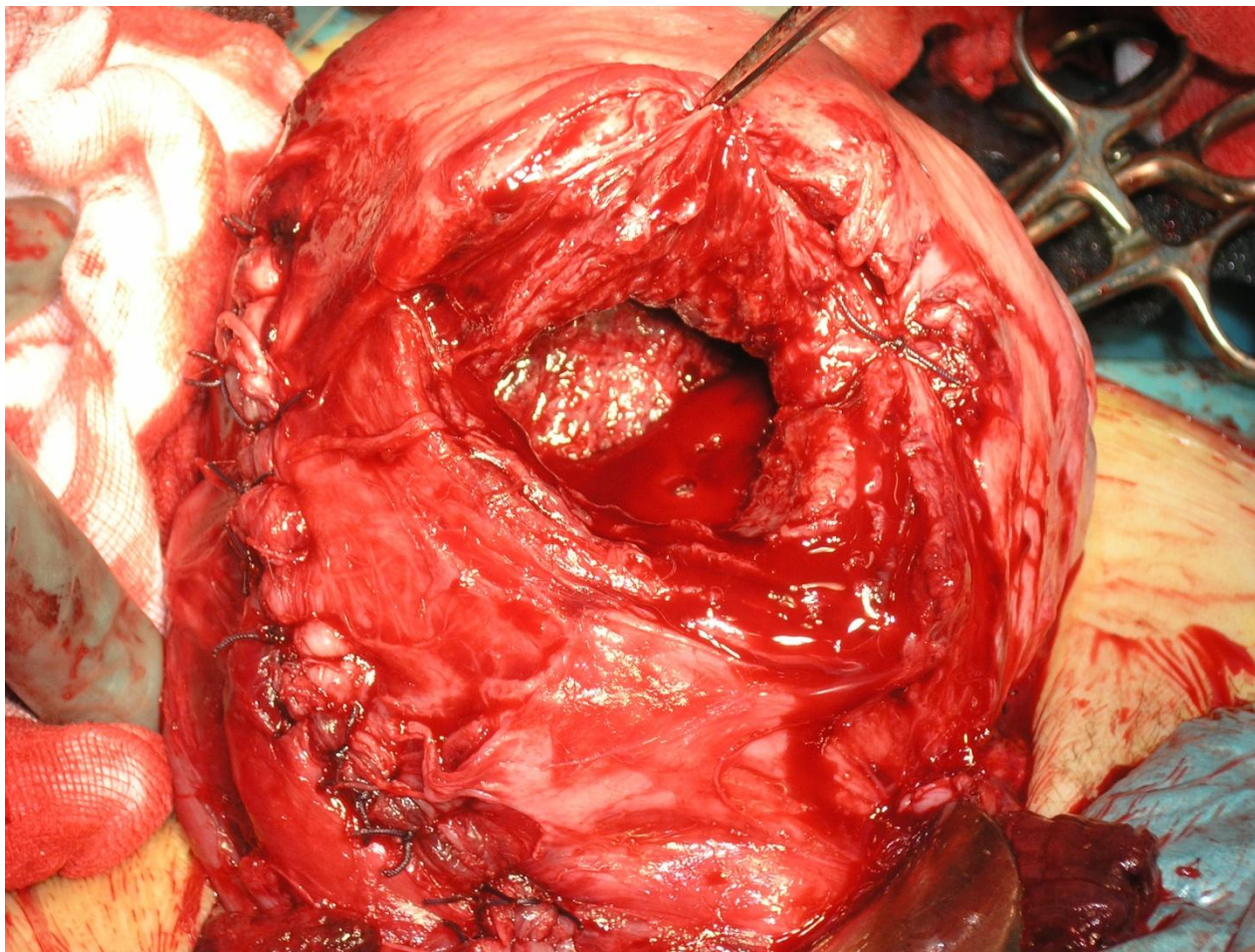




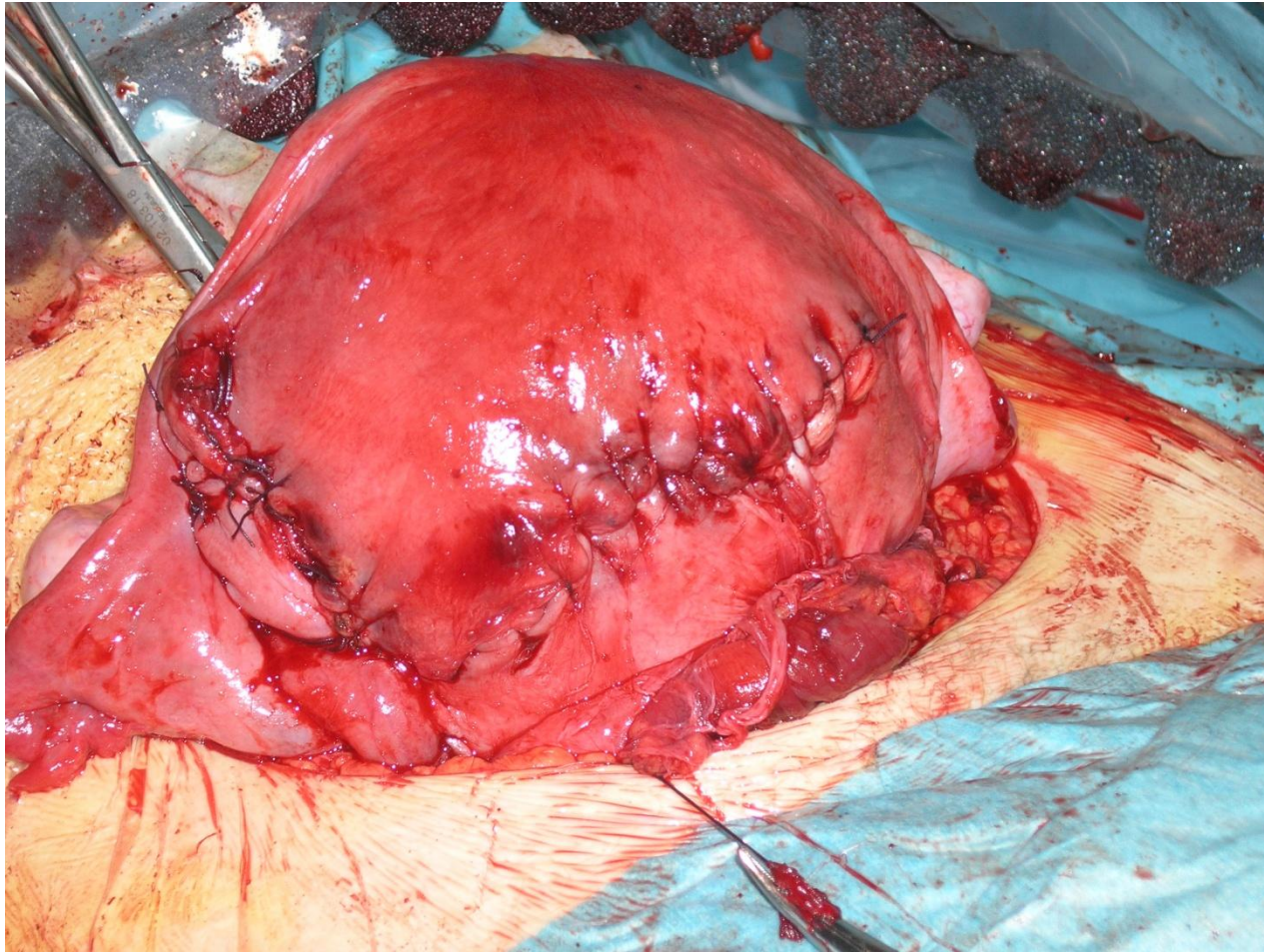




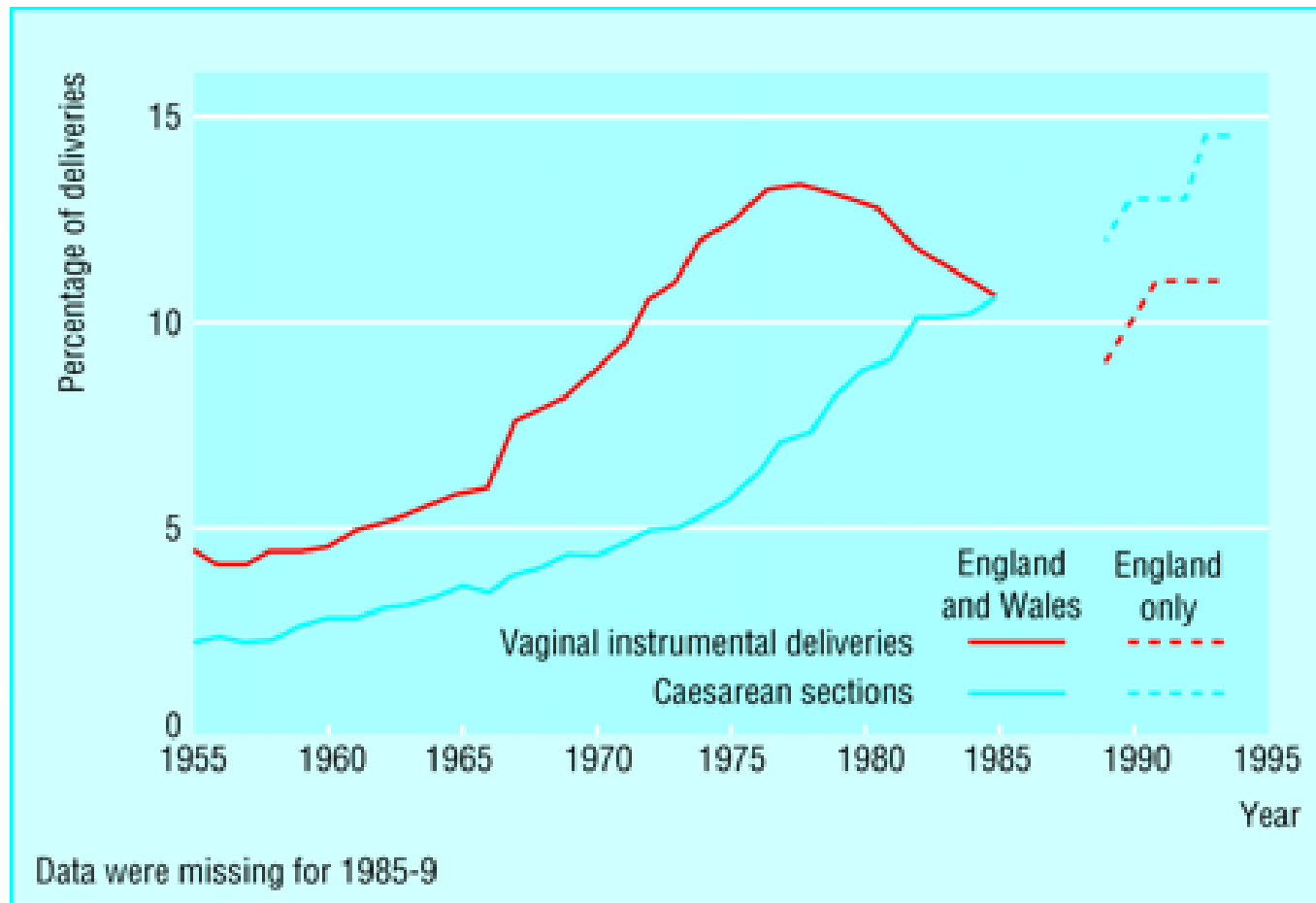
# Repair or remove?



# After a repair



# Operative delivery rates in England and Wales, 1955-95



# How to reduce the CS rate?

- Deliver breeches vaginally
- Avoid failed inductions
- Stop doing CS on demand
- Appropriate use of electronic fetal monitoring
- Allow vaginal delivery after two CS
- Reduce severe perineal trauma by good care
- Training in instrumental vaginal delivery

**The best way of reducing CS rate is to avoid first CS**



# Why to reinvent the wheel?

- The rates of CS during the second stage of labour are increasing and risks are high.
- ACOG recommends training in instrumental births to control and reduce the rates of CS.
- Nonprogress due to malposition of the fetal head is the main indication for CS in the second stage of labour.
- There is no evidence from randomized trials to inform best practice for delivery when malposition complicates the second stage.



# Caesarean vs. Forceps

## Caesarean section

- Risk of bleeding, sepsis, and thrombosis is high with CS at full dilatation.
- The risk of neonatal cerebral haemorrhage and convulsions are similar with CS at full dilatation and instrumental vaginal births.
- The risk of death is 0.8 per 1000 births for emergency CS
- Less chance of successful vaginal delivery in future

## Forceps delivery

- Risk of bleeding and infection, and thrombosis is less
- Recovery is quick
- Similar neonatal morbidity compared to emergency CS in the second stage
- Risk of death is 0.6 per 1000 births
- More chance of successful vaginal delivery in future

# Vacuum vs. Forceps

## Vacuum delivery

- Contractions and maternal effort required
- More likely to fail
- Less perineal trauma
- More retinal haemorrhage and cephalhaematoma
- Takes longer to deliver
- Can use forceps if it fails

## Forceps delivery

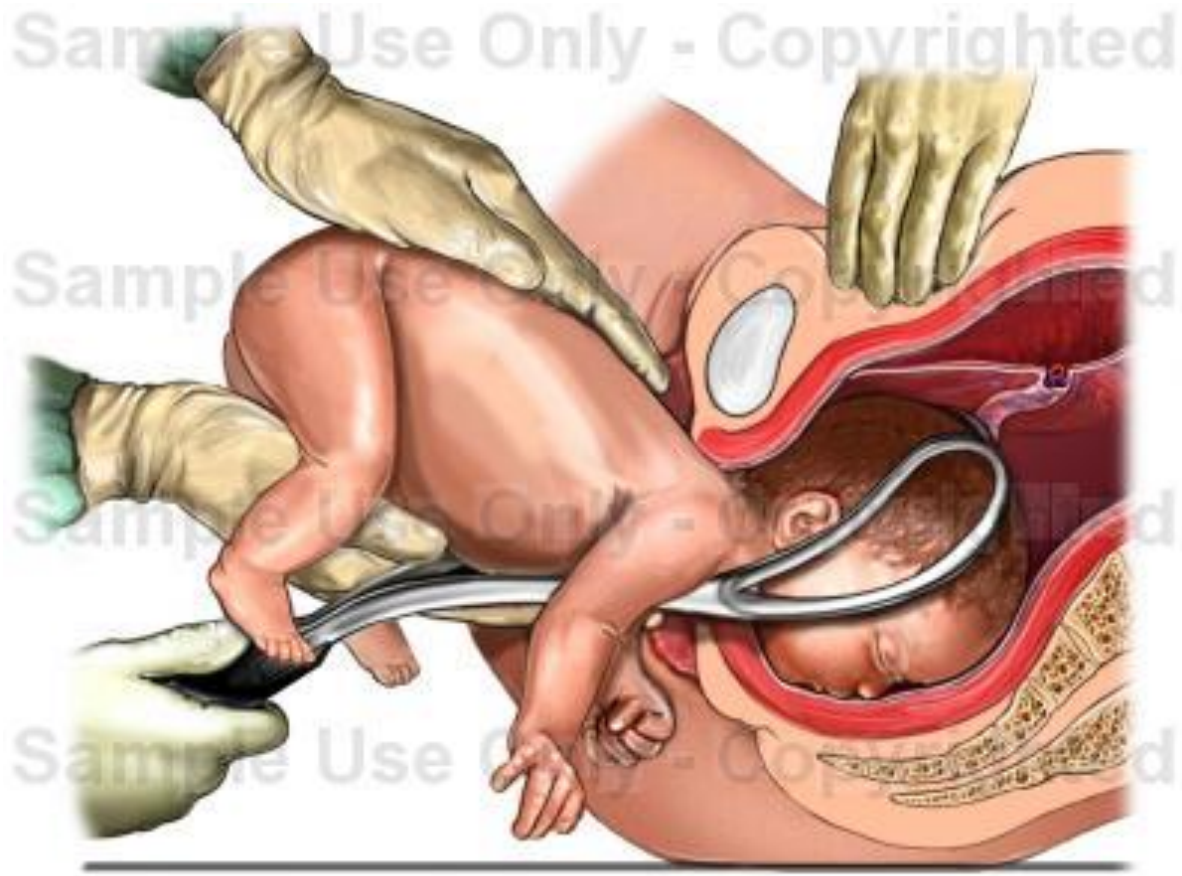
- Contractions and maternal effort may not be required
- Less likely to fail
- More perineal trauma
- Less retinal haemorrhage but more perineal trauma
- Quicker to deliver
- Caesarean section if it fails

# When are Forceps Preferable to Vacuum?

- Delivery of the head at assisted breech delivery (singleton or twin)
- Assisted delivery of preterm infant (< 34 weeks' gestation)
- Controlled delivery of head at caesarean section
- Assisted delivery with a face presentation
- Assisted delivery with suspected coagulopathy or thrombocytopenia in fetus
- Instrumental delivery for maternal medical conditions that preclude pushing
- Instrumental delivery under general anaesthesia
- Cord prolapse in the second stage of labour



# Delivery of the aftercoming head



# Face presentation: Mento-anterior

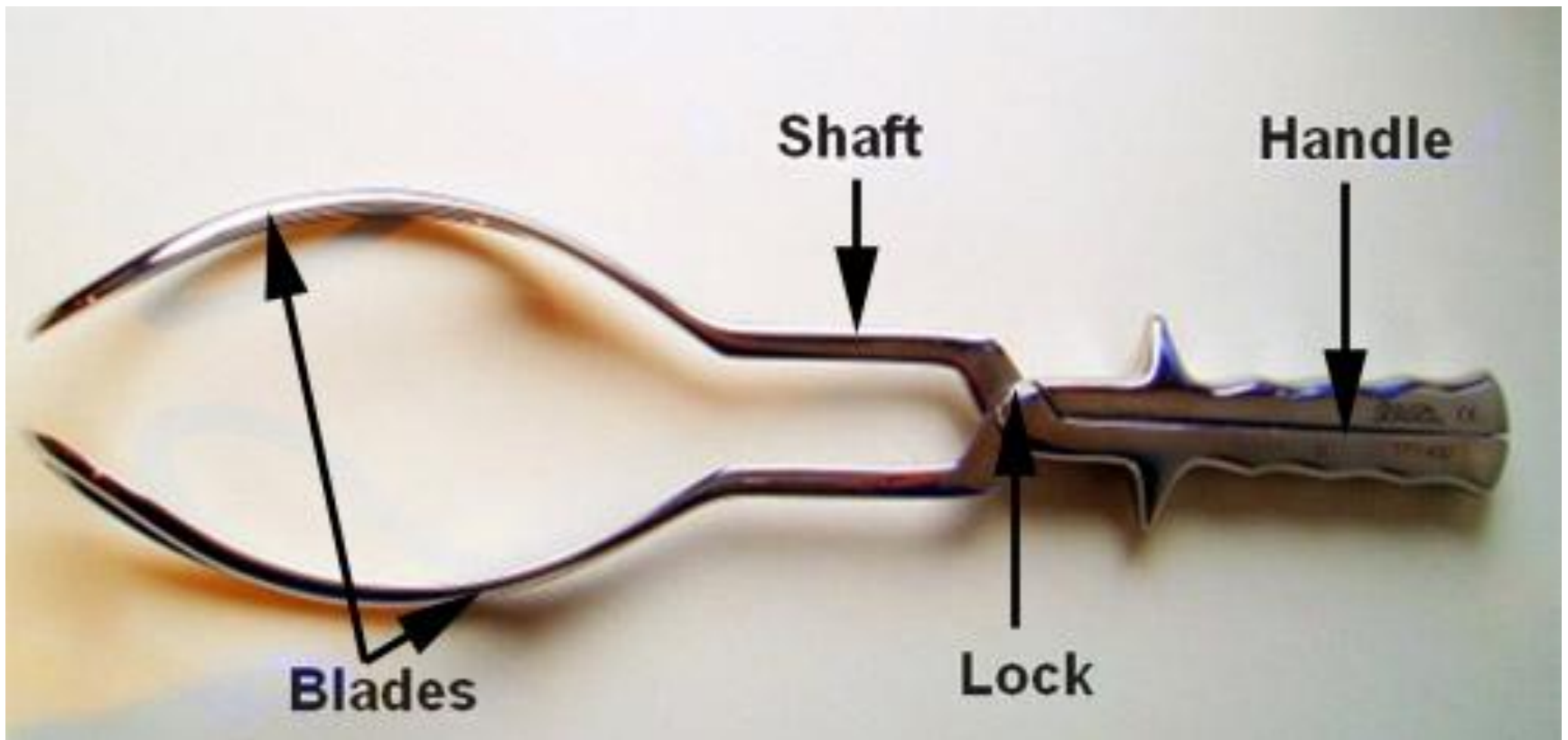


# Myth and Reality

- *Spencer C, Murphy D, Bewley S. Caesarean delivery in the second stage of labour. BMJ, 2006; 333: 613-614.*
- *Chalmers JA, Chalmers I. The obstetric vacuum extractor is the instrument of first choice for operative vaginal delivery. BJOG 1996;9: 41-5.*
- *Johanson RB, Menon V. Vacuum extraction versus forceps for assisted vaginal delivery. Cochrane Database of Systematic Reviews 2000; (2):CD000C24.*
- *Chiswick ML, James DK. Kielland's forceps: association with neonatal morbidity and mortality. BMJ. 1979; 6: 1: 7-9.*



# Components of Forceps



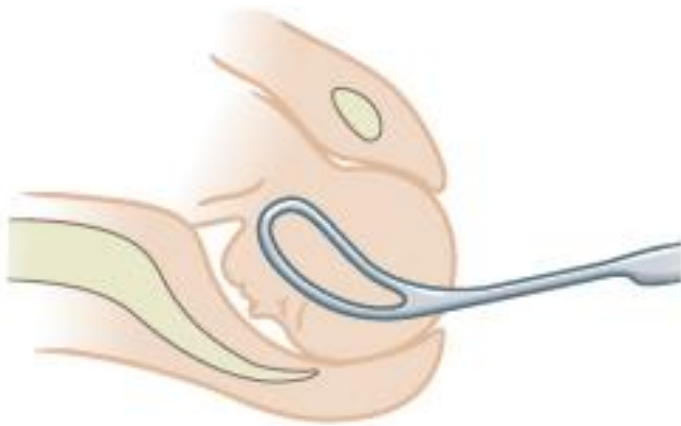
# Types of Forceps



# ACOG Classification of Instrumental Vaginal Delivery; 2000

Low	<p>Fetal scalp is visible without separating the vulva</p> <p>Fetal skull has reached the pelvic floor</p> <p>Sagittal suture is in the AP diameter or in the Lt./Rt. Occiputo-anterior/posterior position</p> <p>Rotation does not exceed 45 degrees</p>
Outlet	<p>The leading point of the skull is 2cm or more below the ischial spine but not on the pelvic floor</p> <p>Sagittal suture is in the AP diameter or in the Lt./Rt. Occiputo anterior/posterior position</p>
Mid	<p>The leading point of the skull is 2cm or less above the spine but head is engaged (1/5 palpable).</p> <p>Rotation of &lt;45 degrees in OA and &gt;45 degrees in OP</p>
High	<p>The fetal head is 2/5th or more palpable abdominally and the presenting part is above the level of the ischial spines</p>

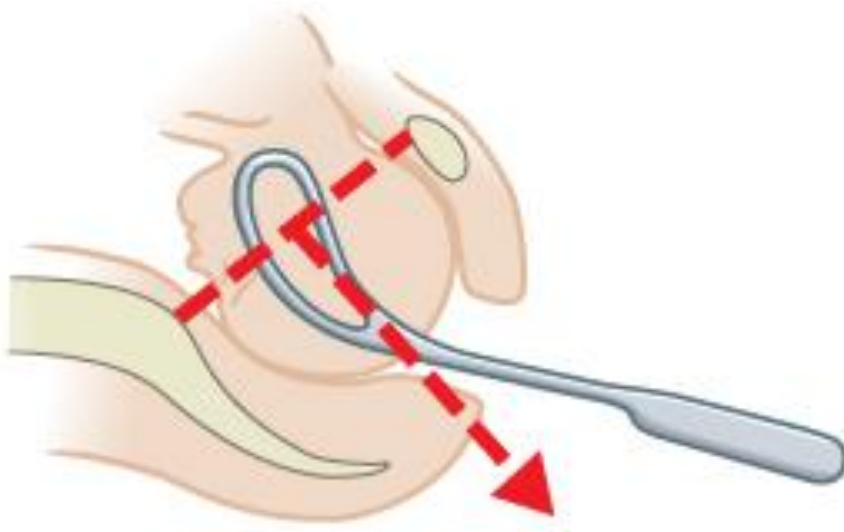




- **Low:**
- Fetal scalp is visible without separating the labia
- Fetal skull has reached the pelvic floor
- Sagittal suture is in the antero-posterior diameter (rotation does not exceed 45 degrees)
- Fetal head is at or on the perineum

### **Outlet:**

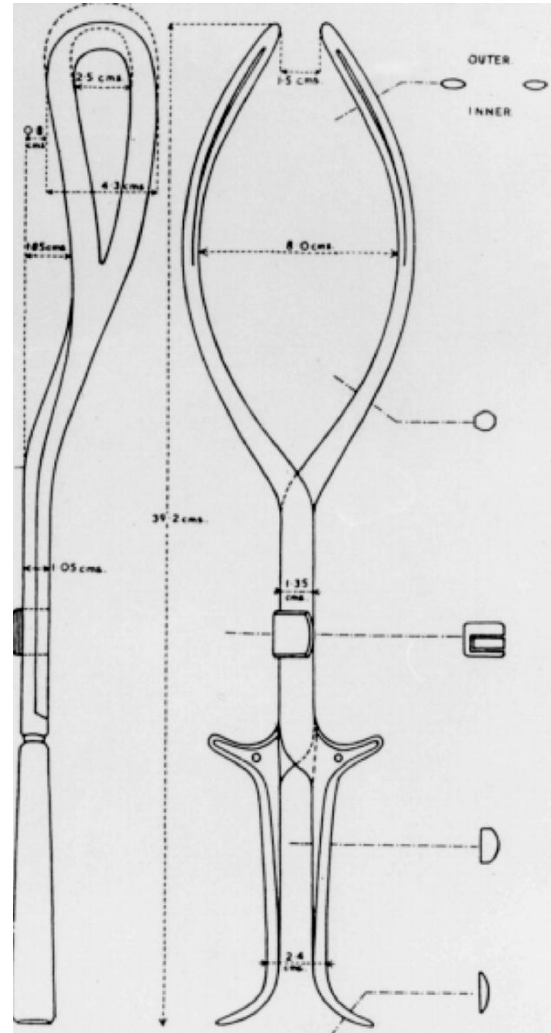
- Leading point of the skull (not caput) is at station +2 cm or more but not on the pelvic floor
- Rotation <45 degrees in OA and more than 45 degrees in OP position



### **Mid cavity:**

- Fetal head is one-fifth palpable per abdomen
- Leading point of the skull is above station plus 2 cm but not above the ischial spines
- rotation of  $<45$  degrees in OA and  $>45$  degrees in OP

# ROTATIONAL FORCEPS



Dunn P M Arch Dis Child Fetal Neonatal Ed 2004;89:F465-F467

# Kielland vs. Rotational Ventouse

- The most commonly used method for birth when malposition delays delivery is rotational ventouse (RV). However, the use of RV is four times more likely to fail to deliver the baby when compared with non-rotational ventouse birth.
- Ventouse use is associated with a 60 times higher risk of sub-aponeurotic haemorrhages than with other modes of childbirth.
- The negative publicity received by Kiellands forceps has resulted in a dramatic reduction in their use.
- Kielland forceps, in experienced hands is associated with a higher chance of achieving a vaginal birth without a significant increase in neonatal morbidity or mortality.



**A re-evaluation of the role of rotational forceps: retrospective comparison of maternal and perinatal outcomes following different methods of birth for malposition in the 2nd stage of labour.**

**Tempest N et al, 2013**

- 1291 consecutive full term, singleton cephalic births between 2006 and 2010 with malposition of the fetal head during the 2nd stage of labour leading to an attempt to deliver by Kielland forceps, rotational vacuum or emergency CS
- Women were more likely to need caesarean section if rotational vacuum (22.4%) was selected to assist the birth rather than Kielland Forceps (3.7%) (Adjusted OR 8.20 (95% CI 4.54 to 14.79).
- Kielland forceps births had a rate of adverse maternal and neonatal outcomes comparable to rotational vacuum, and emergency CS in the 2nd stage for malposition.

# INDICATIONS FOR FORCEPS DELIVERY

## Maternal factors

- Lack of maternal pushing effort (maternal distress)
- Prolonged second stage of labour
- Prophylactic shortening of 2nd stage in case of maternal illness, which makes pushing difficult or dangerous (e.g. heart failure, severe hypertension, glaucoma, cerebrovascular aneurysm)
- Intrapartum haemorrhage with fully dilated cervix

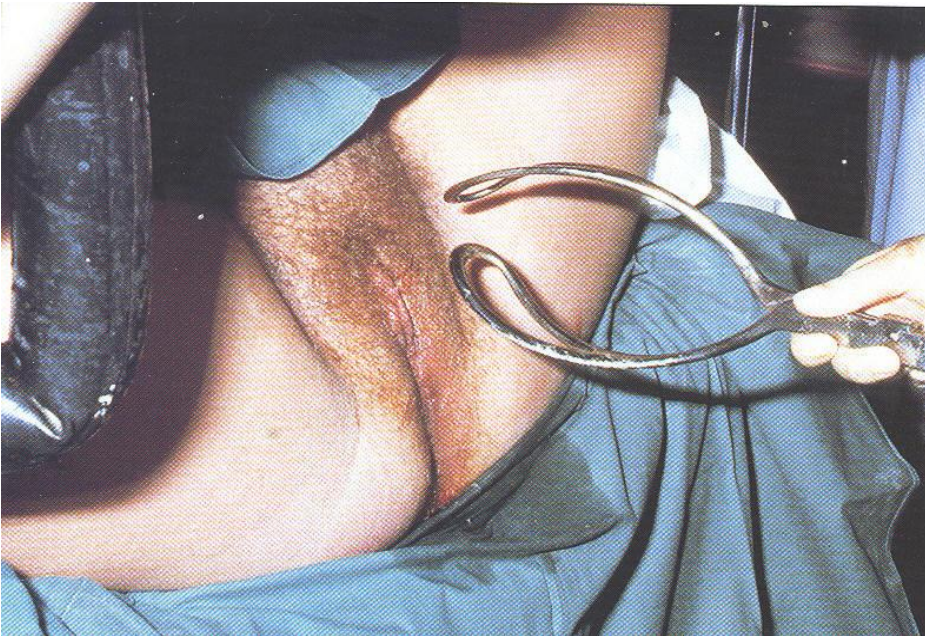
## Fetal Factors

- Non-reassuring fetal heart rate tracing (fetal distress)
- After-coming head in breech delivery
- Cord prolapse with fully dilated cervix

# Prerequisites

- Appropriate indication and consent
- Head is engaged and cervix is fully dilated
- Membranes ruptured
- Suitable presentation (Cephalic, Face-mento-anterior, Breech)
- Position of the head confirmed (by US if required)
- Empty urinary bladder
- Adequate Pain relief
- Trained operator and back up for CS

# Technique



**Assembly, application, locking, safety check, and rotation if needed**



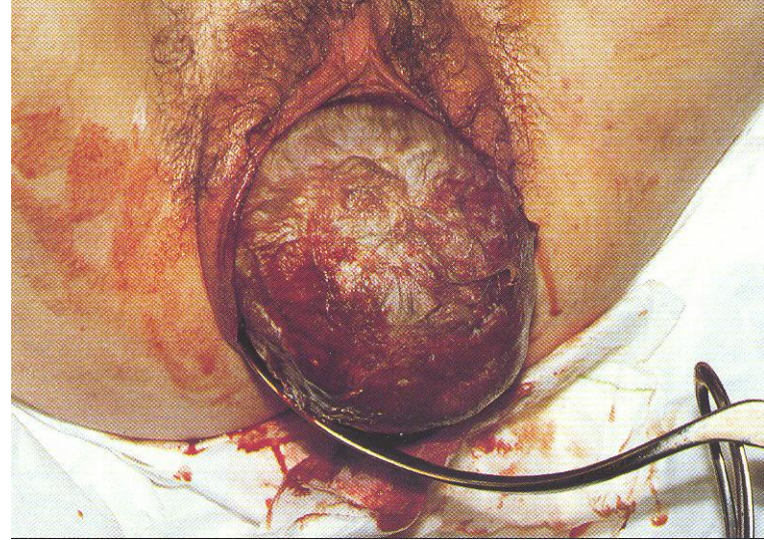
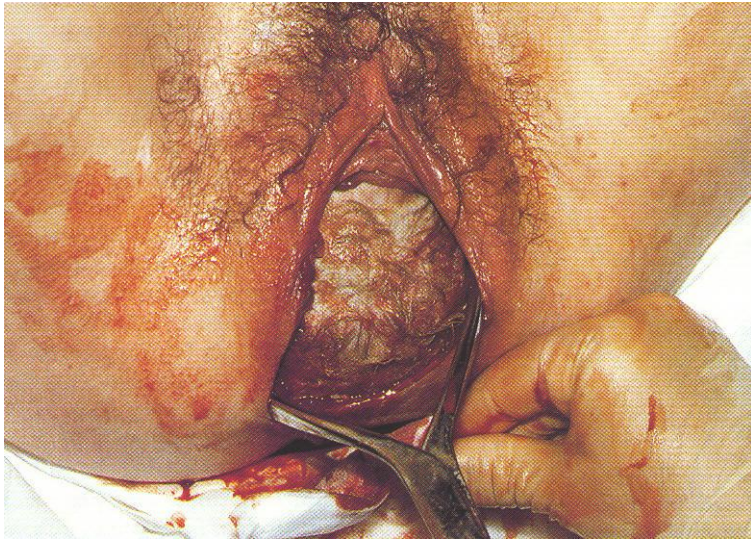
# Safety Checks

- The forceps should not be forced into position
- The forceps should lock with ease
- The sagittal suture should lie vertically in the midline
- The blades should be equidistant from the sagittal and occipital sutures
- You should be able to insert a fingertip between the end of the fenestration and the fetal head

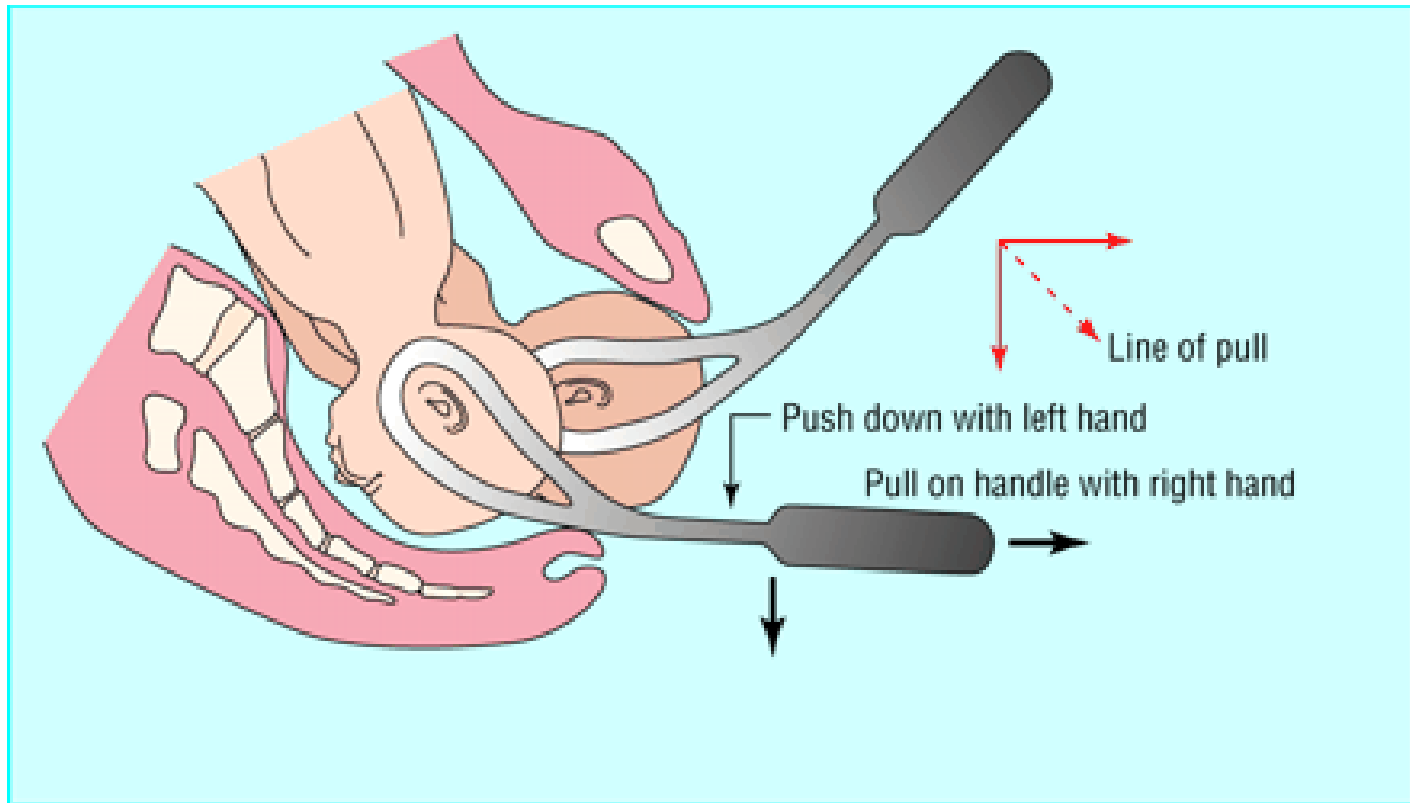
# Traction



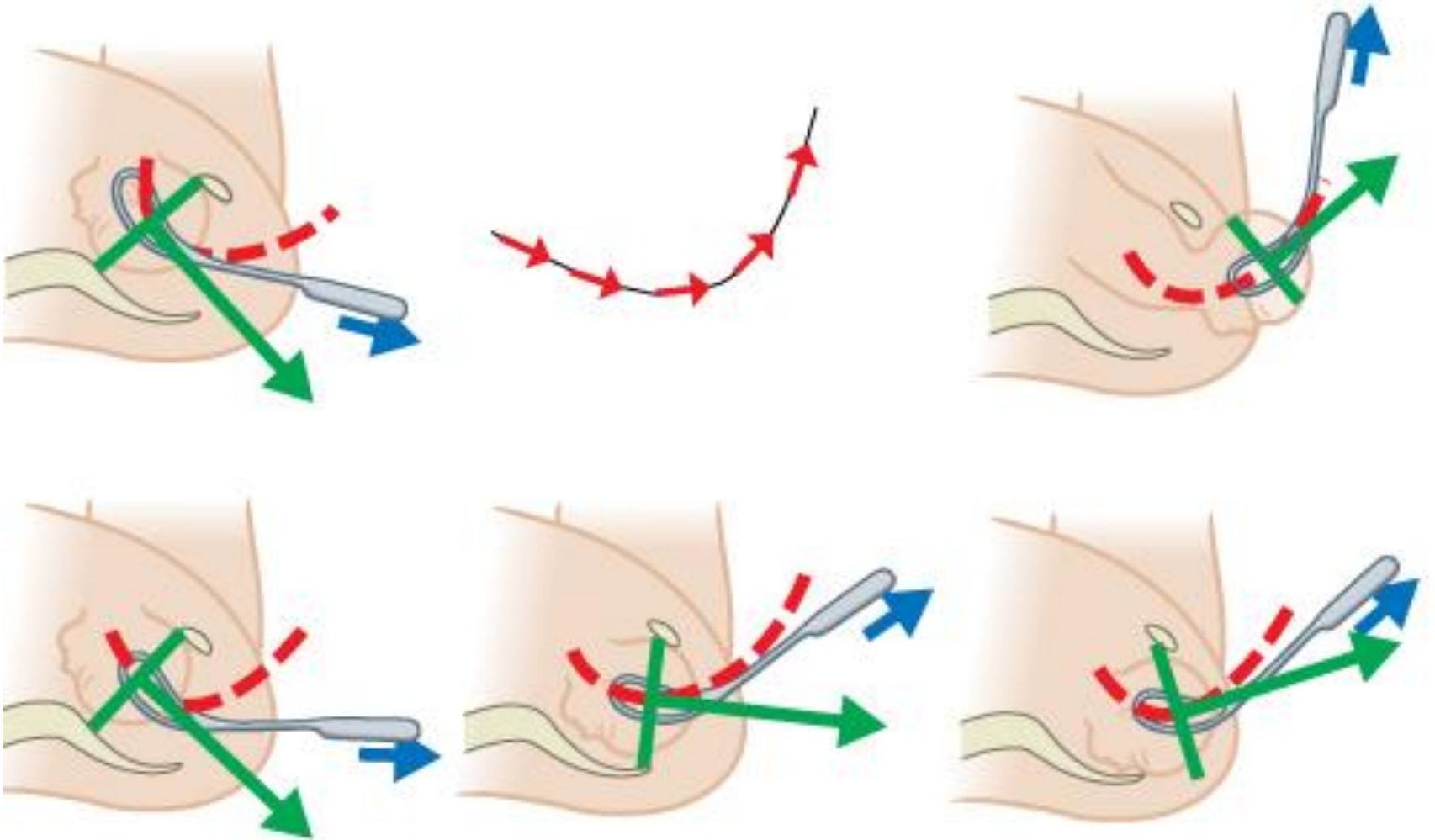
# Episiotomy, further traction & delivery



# Axis of Traction



# Traction





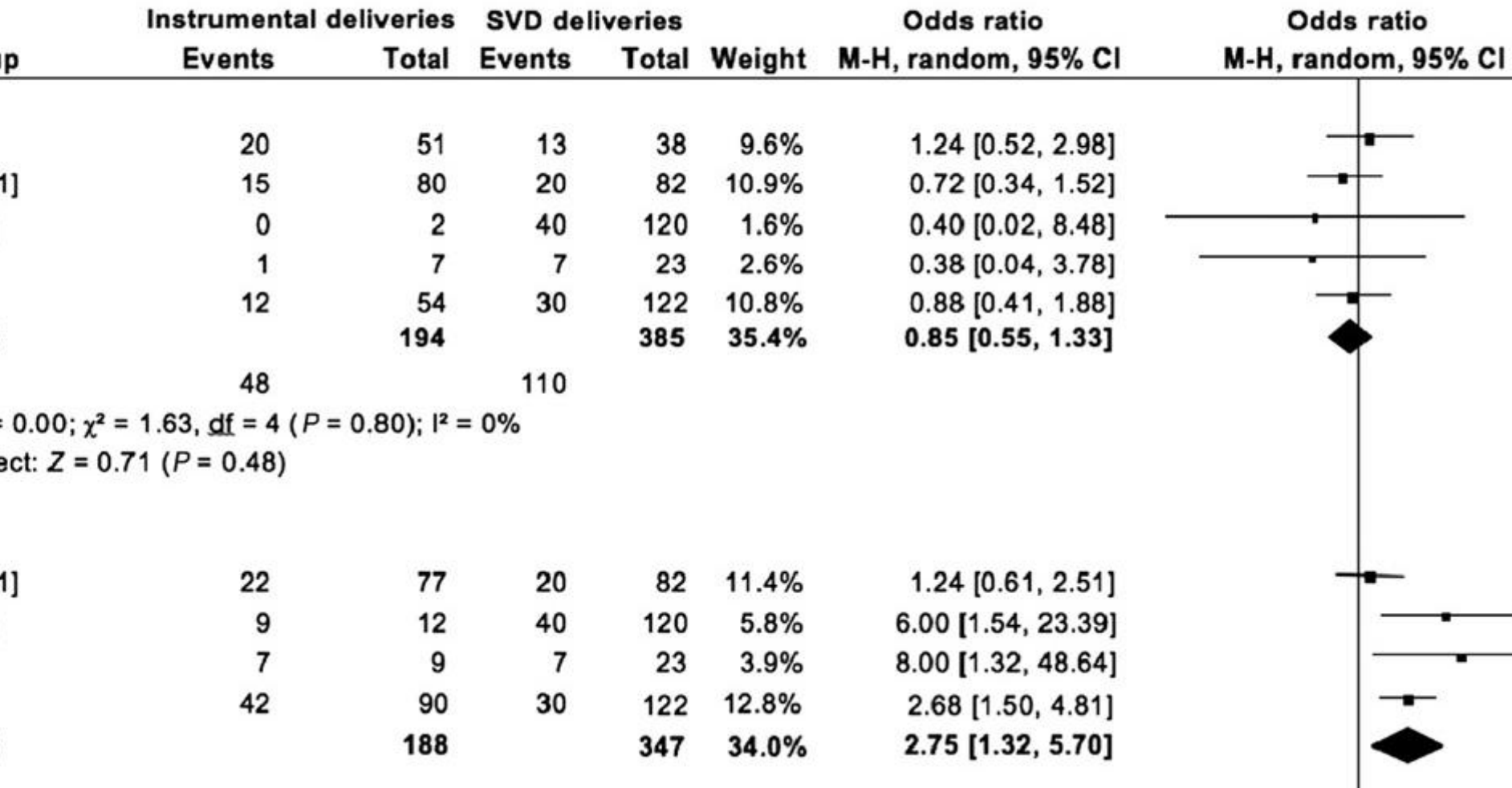
# Fetal and Neonatal Complications

- **Minor cuts and bruises**
- **Facial nerve injury (usually temporary)**
- **Intracranial hemorrhage (may lead to death: 4/10,000)**
- **Slightly increased incidence of trauma to the baby**
- **No difference in long term neurodevelopment of the babies born by operative vaginal delivery compared to caesarean section in second stage.**



- *O'Mahony F, Settatee R, Platt C, et al. Review of singleton fetal and neonatal deaths associated with cranial trauma and cephalic delivery during a national intrapartum-related confidential enquiry. BJOG 2005;112:619–26*
- *Murphy DJ, Liebling RE, Verity L, Swingler R, Patel R. Early maternal and neonatal morbidity associated with operative delivery in second stage of labour: A cohort study. Lancet 2001; 358:1203-1207.*
- *Bahl R, Patel RR, Swingler R, Ellis M, Murphy DJ. Neurodevelopmental outcome at 5 years after operative delivery in the second stage of labor: a cohort study. Am J Obstet Gynecol. 2007;197(2):147.e1-6.*

# RETINAL HAEMORRHAGE



# Neonatal outcome:Kielland vs Rotational Ventouse

- Kielland forceps births were associated with a non-significant increase in the rate of shoulder dystocia (64/1038, 6.2%) compared with rotational ventouse (4/107, 3.7%).
- The rates of cord pH <7.1 were similar
- Transient Erb's palsy complicated 1% of Kielland forceps births (10/1038) and none of the RV births.

*Tempest N et al, BJOG 2013*

# Maternal Complications

- Perineal trauma (third degree tear)
- Haematomas
- Postpartum haemorrhage

# RISK OF ANAL SPHINCTER INJURY AND NEONATAL MORBIDITY

- 3.3% for nulliparous and 1.4% for multiparous women following ventouse delivery in Finland

*(Raisanen S, Vehvilainen-Julkunen K, Cartwright R, Gissler M, Heinonen S (2012) Vacuum-assisted deliveries and the risk of obstetric anal sphincter injuries – a retrospective register-based study in Finland. BJOG 119:1370-1378 )*

## In a study from Liverpool (Tempest et al, 2013 BJOG)

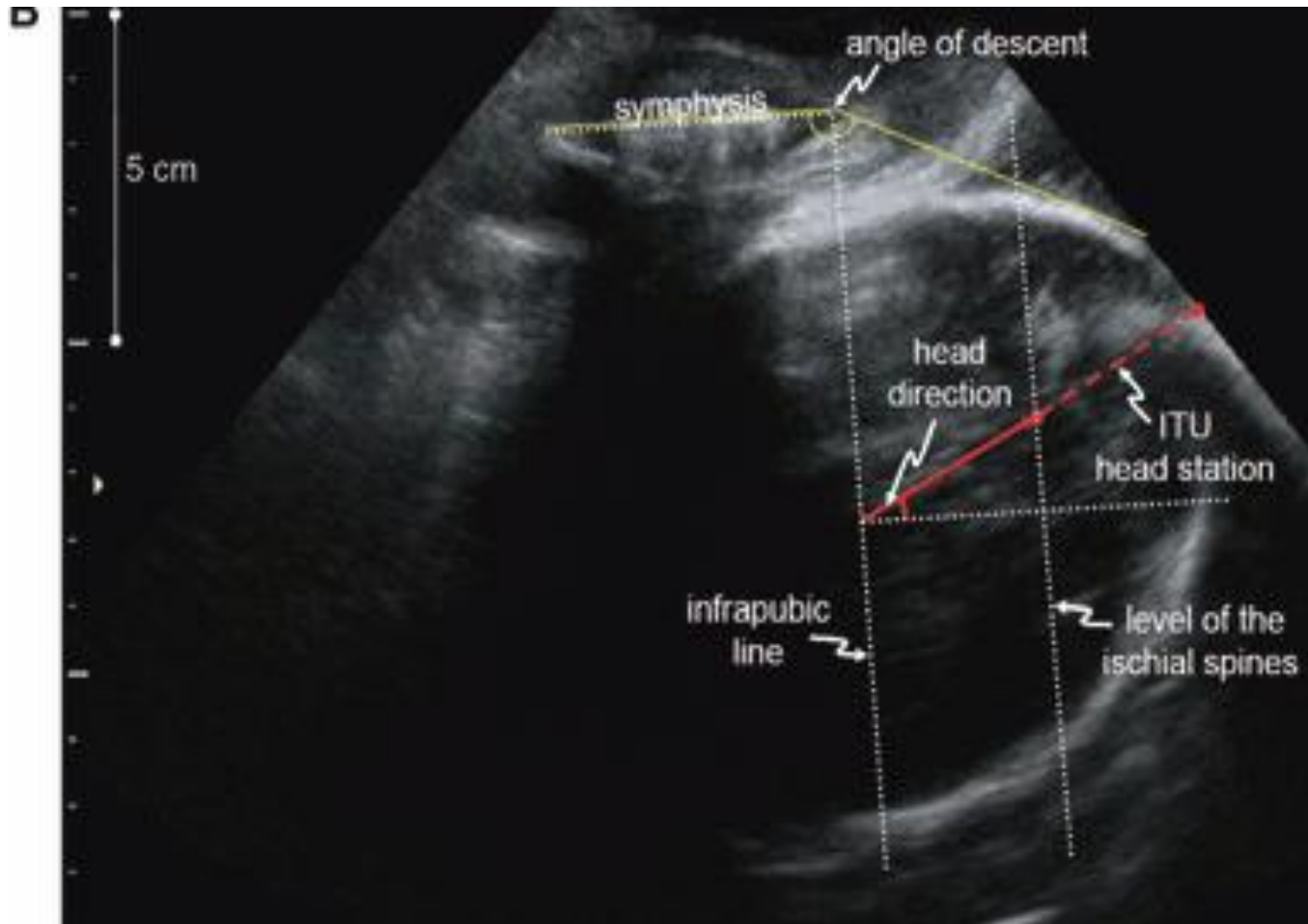
- sphincter injury rate 25/1037 (2.4%) for Kielland and 0/107 (0%) for rotational ventouse
- The rates of cord pH <7.1 were similar
- Transient Erb's palsy complicated 1% of Kielland forceps births (10/1038) and none of the RV births.



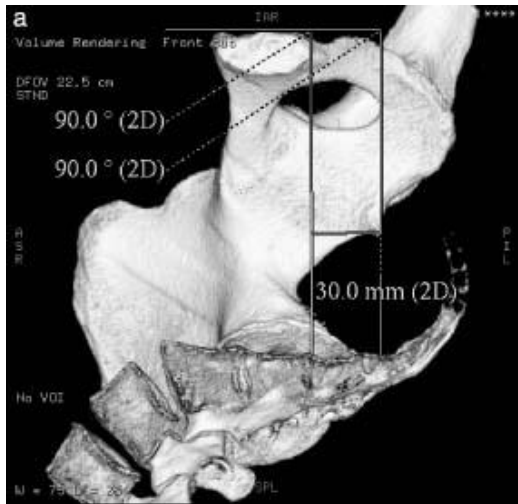
# **Importance of accurate assessment of fetal head position during 2nd stage of labour**

- Sphincter damage on delivering the baby in OP position is higher
- Rotation and delivery in OA reduces the risk of sphincter damage.

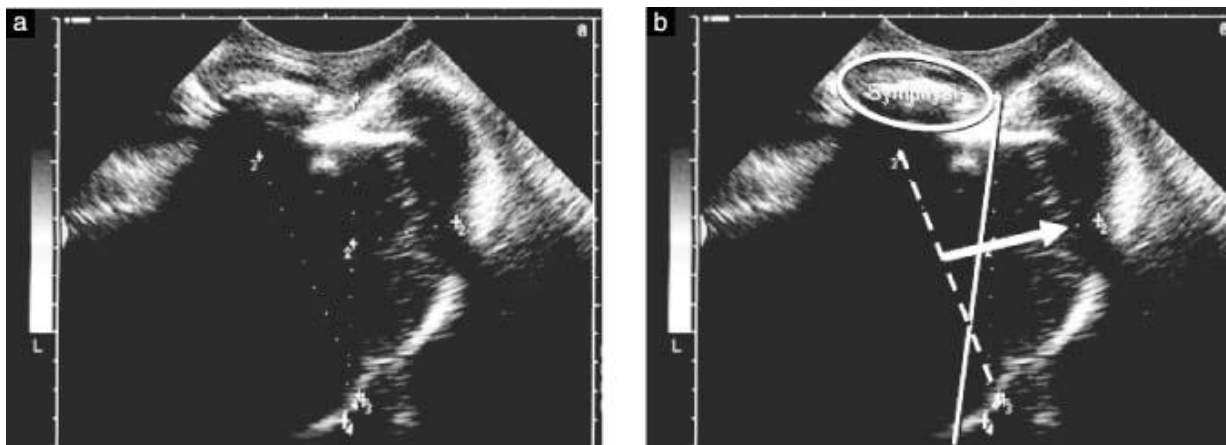
# Intrapartum ultrasound



# Intrapartum translabial ultrasound (ITU): sonographic landmarks and correlation with successful vacuum extraction



## Intrapartum translabial ultrasound (ITU): sonographic landmarks and correlation with successful vacuum extraction



Maternal and neonatal morbidity in relation to the instrument used for mid- cavity rotational operative vaginal delivery: A prospective cohort study (n= 380) Bahl R et al  
BJOG 2013

- 163 women (42.8%) underwent manual rotation followed by non-rotational forceps delivery, 73 (19.1%) had a rotational vacuum delivery and 145 (38.1%) delivered with the assistance of rotational forceps.
- On comparing key outcomes such as postpartum bleeding, sphinter injury, low cord pH, neonatal trauma and admission to NICU, rates of morbidity were low and there were no significant differences between the three groups.
- Sequential use of instruments was less likely with manual rotation and forceps than rotational vacuum delivery (0.6% versus 36.9%, OR 0.01; 95% CI 0.002- 0.09).



# Conclusions

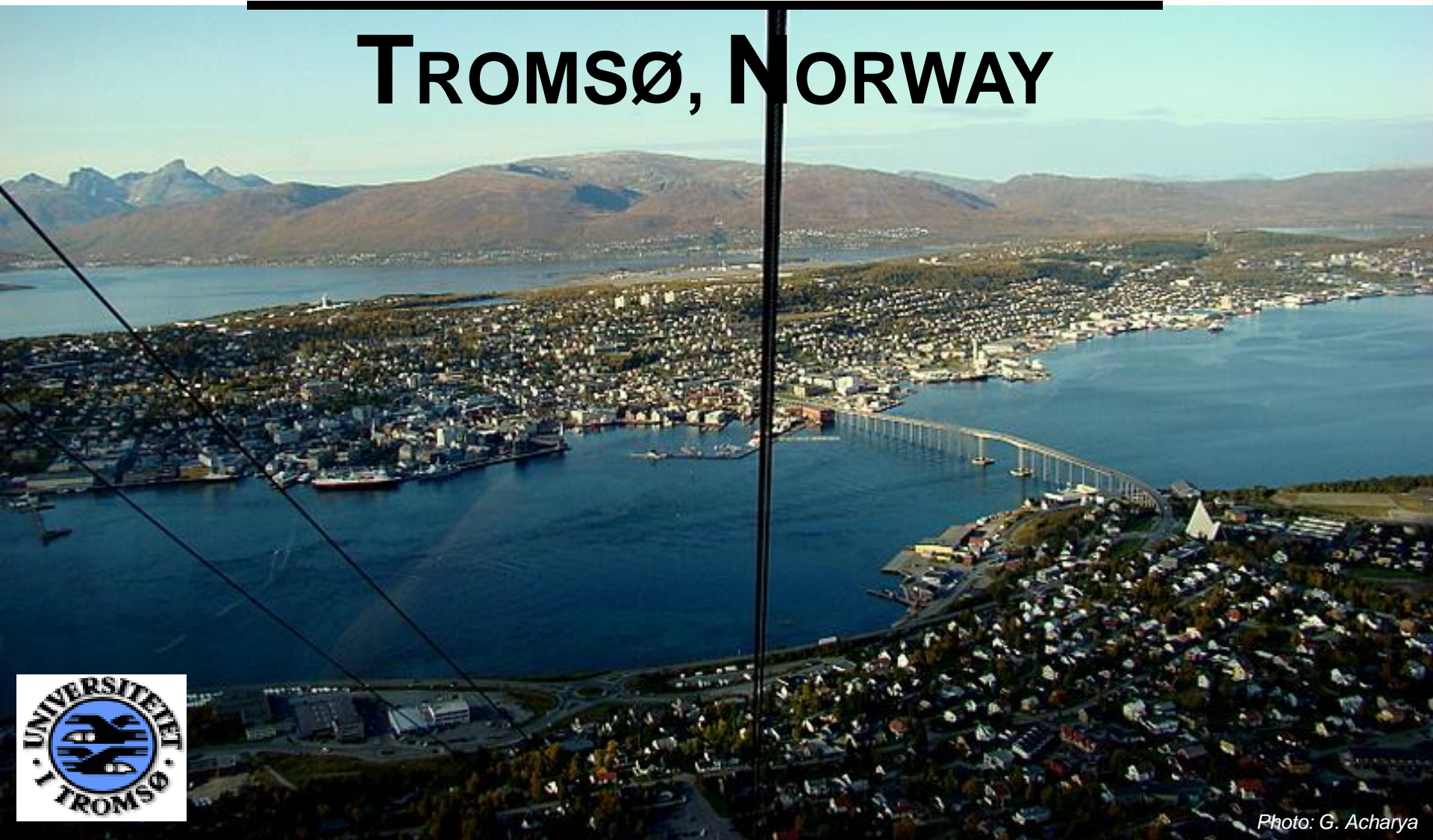
- The obstetric forceps are a useful instrument to expedite the delivery of a baby.
- Forceps are safe in experienced hands.
- As with any instrumental delivery, it is crucial that to identify the position and station of the fetal head prior to applying the forceps.



# ISSHP EUROPEAN CONGRESS

***12<sup>th</sup> to 14<sup>th</sup> of June 2013***

**TROMSØ, NORWAY**







**Thank you for your  
attention**

