Role of intrapartum ultrasound (ITU)

WL Lau
KWH O&G
22-5-2016

OGASM 2016
Introduction

• First talk on this topic 28-5-2008 in QEH lunch time meeting!
• Frequently asked question in the past years:
  What is the role of ITU (TAS+TPS)?
• Disclaimer: NIL
Content

• Introduction of ITU/TPS
• Admission test; before IOL
• 1\textsuperscript{st} stage
• 2\textsuperscript{nd} stage
• Conclusion
• Future
Intrapartum Basic scanning

- Number (eg. undiagnosed multiple preg)
- Viability (eg. confirm/refute IUD)
- Lie/presentation/position (eg. undiagnosed breech)
- Amniotic fluid (eg. suspected leaking/reduced fetal movement)
- Simple placental location
Extended scanning

- Placenta praevia/a abruptio placentae

- Cervix in threatened preterm labour (TAS/TPS/TVS*; +/-fibronectin)

- Growth +/-anatomy
Extended scanning

- Assistance in procedure:
  - ECV
  - Intrapartum twin delivery

- Diagnosed of placenta accreta (esp. in NEP)

- Biophysical profile/Doppler study
  (eg. Reduced fetal movement, suboptimal CTG esp in case of prematurity)
Advanced intrapartum scan

**Transabdominal**
- Lie
- Heart rate
- Presentation
- Position-head, spine
- Attitude
- Any asynclitism?

**Transperineal**
- Head direction
- Engagement/descent: angle of progression, head perineum distance
- Midline rotation
- Caput, moulding
- Cervical dilatation?
Fetal head position

- USG could improve the diagnosis of fetal head position.
- Digital vaginal examinations for fetal head position are less accurate than is transabdominal ultrasound.


OA position
(transverse suprapubic plane)

Figure 1: Transverse (axial) suprapubic magnetic resonance imaging (MRI) of fetal head in occiput anterior (OA) position. Key features include:
- Cerebral peduncles (cp)
- Cerebellum (fc)

Figure 2: Transverse (axial) suprapubic transvaginal ultrasound image of fetal head in left occiput anterior (LOA) position. Key features include:
- Cranial fossae (th)
- Cerebral peduncles (cp)
- Cerebellum (fc)

Sagittal plane
OP position

(transverse suprapubic plane)
Advanced intrapartum scan

Transabdominal
- Lie
- Heart rate
- **Presentation**
- Position-head, spine
- Attitude
- Any asynclitism?

Transperineal
- Head direction
- Engagement/descent: angle of progression, head perineum distance
- Midline rotation
- Caput, moulding
- *Cervical dilatation?*
Fetal head engagement $\rightarrow$ Clinical?

- Abdominal palpation and pelvic examination
- Digital vaginal examination for assessment of fetal head position and station is subjective and depends on the examiner’s obstetric experience.
With the use of Birth stimulator

Dupuis et al AJOG 2005

- The error in the diagnosis of station was assessed by calculating the difference between the true station (established by a sensor in the birth simulator) and that determined by the operator using digital examination.

- Numerical errors occurred in 50–88% of cases in the resident group, and in 36–80% of cases in the attending physician group.

- The mean ‘group’ error for residents was 30% (95% CI, 25–35%), and for attending physicians was 34% (95% CI, 27–41%).

- The mean error rate in the diagnosis of engagement was 12%. 
Transperineal scan
Anatomic relationship between the pubic symphysis and ischial spines and its clinical significance in the assessment of fetal head engagement and station during labor

A. F. BARBERA, F. IMANI, T. BECKER, D. C. LEZOTTE and J. C. HOBINS

Figure 2. Transperineal ultrasound image (sagittal view) showing long axis of the pubic symphysis, fetal head contour and line extending from the most inferior point of the symphysis tangentially to the fetal skull contour.

Geometric model of the pelvis and human labor

U: Upper border of symphysis pubis
L: Lower border of symphysis pubis
M: Midpoint between right and left ischial spines (station 0)
S: Any station proximal to station 0
S′: Any station distal to station 0
θ: X-angle for station 0
θ: X-angle for stations proximal to station 0
θ′: X-angle for stations distal to station 0
Table 1 Mean and SD of the calculated pelvic angle for each theoretical clinical station

<table>
<thead>
<tr>
<th>Station</th>
<th>Angle (°) (mean (SD))</th>
</tr>
</thead>
<tbody>
<tr>
<td>-5</td>
<td>65 (5)</td>
</tr>
<tr>
<td>-4</td>
<td>71 (6)</td>
</tr>
<tr>
<td>-3</td>
<td>78 (6)</td>
</tr>
<tr>
<td>-2</td>
<td>85 (6)</td>
</tr>
<tr>
<td>-1</td>
<td>92 (6)</td>
</tr>
<tr>
<td>0</td>
<td>99 (6)</td>
</tr>
<tr>
<td>1</td>
<td>106 (7)</td>
</tr>
<tr>
<td>2</td>
<td>113 (7)</td>
</tr>
<tr>
<td>3</td>
<td>120 (7)</td>
</tr>
<tr>
<td>4</td>
<td>127 (7)</td>
</tr>
<tr>
<td>5</td>
<td>135 (8)</td>
</tr>
</tbody>
</table>
Figure 3: Schematic drawing of fetal head descent in a curved birth canal showing association with remaining fetal head-perineum distance.

Figure 4: Schematic representation of the curved path that the fetal head describes (curved arrow) during a normal second stage of labor.
Diagnosis of station and rotation of the fetal head in the second stage of labor with intrapartum translabial ultrasound

T. GHI, A. FARINA, A. PEDRAZZI, N. RIZZO, G. PELUSI and G. PILU

Department of Obstetrics and Gynecology, University of Bologna, Bologna, Italy

Figure 2. Computation of fetal head direction (indicated by white arrow) in longitudinal translabial sonograms compared with schematic representations: (a) downward direction; (b) horizontal direction; (c) upward direction.

Figure 3. Translabial ultrasound in the axial plane of the maternal pelvis. The transducer is rotated by 90° (curved arrow) (a), to visualize the midline of the fetal head (b). (c) Rotation was subdivided into two categories: ≥ 45° (1) and < 45° (2).
We evaluated prospectively 100 primiparous and multiparous women ≥37 weeks of gestation in active labor.

Conclusion:

Both HPD and AOP were moderately correlated with clinical fetal head station.

They are correlated with the time of delivery.
Key points

- ITU is much better tolerated than digital examination.
  ~75% -- Pain score=0  (V Chan et al., J Matern Fetal Neonatal Med 2016)

- Different ITU parameters are highly correlated (2D/3D) and reproducible.

- They are better correlated to the fetal head station than digital examination.

- The correlation of these parameters and pelvic landmarks have been verified by CT scan/MRI.

Table 2. Conversion table for ultrasound methods to assess fetal head descent, using head–perineum distance (HPD) and head–symphysis distance (HSD) data from this study and published data for angle of progression.

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<tr>
<th>ITU head station (cm)</th>
<th>Angle of progression (°)</th>
<th>HPD (mm)</th>
<th>HSD (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>−3</td>
<td>84</td>
<td>54</td>
<td>*</td>
</tr>
<tr>
<td>−2</td>
<td>95</td>
<td>48</td>
<td>48</td>
</tr>
<tr>
<td>−1</td>
<td>106</td>
<td>42</td>
<td>41</td>
</tr>
<tr>
<td>0</td>
<td>116</td>
<td>36</td>
<td>34</td>
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<tr>
<td>1</td>
<td>127</td>
<td>31</td>
<td>27</td>
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<td>2</td>
<td>138</td>
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<td>3</td>
<td>148</td>
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<tr>
<td>4</td>
<td>159</td>
<td>*</td>
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<tr>
<td>5</td>
<td>170</td>
<td>&lt;</td>
<td>&lt;</td>
</tr>
</tbody>
</table>

*Conversion to HPD and HSD was only calculated for values supported by data from this study. ITU, intrapartum transperineal ultrasound.
Admission test?

- Number of fetus: yes
- Lie and presentation: Yes

PROM after 36wk, ~10% breech, ~13% missed by clinical exam (TK Lo et al 2009)

- Fetal head position: likely not useful in predicting outcome
- Fetal head engagement/cervical length: maybe useful before IOL
- Fetal Head circumference:?
First stage?

- At prolonged 1\textsuperscript{st} stage: may be useful

Non–OP or shorter HPD $\rightarrow$ higher chance of vaginal delivery

\textit{(Eggebo UOG 2014, Eggebo AJOG 2016)}
Figure 1: A sample sonopartogram showing fetal head descent, cervical dilatation and head rotation with explanatory ultrasound images and depiction of the cervical dilatation score.
Poilot study on 2D scan for cervical dilatation
Hassan et al UOG 2013

Figure 1 Two-dimensional (2D) ultrasound technique to measure cervical dilatation in labor. Transperineal sagittal application of the 2D transducer (a) gives views of the maternal symphysis pubis and the upper part of the cervix lying just above the upper part of the fetal skull (b). Rotation of the 2D transducer by 90° (c) provides a view of the cervix (d).
Figure 3 Images obtained by ultrasound examination from three nulliparous women in labor, representing ultrasound cervical visualization scores of: (a) 3 (more than 75% of the cervical circumference visible), (b) 2 (50–75% of the cervical circumference visible) and (c) 1 (25–50% of the cervical circumference visible).
Example 1:
P0, 39wk, PROM, latent phase 2cm dilated

TAS

TPS

------------------------→ NSD~ 4 hours after SD augmentation
Example 2:
P1, 39wk, active labour under EA

1/2 hr before PV-5cm ROP, ARM done;
2 hrs later Fully dilated, ROA, --->
NSD ~1/2 hr later, BW: 2.9 Kg, OA position
2\textsuperscript{nd} stage!

In general
Fetal position before VE

• Transabdominal ultrasound for fetal head position immediately before instrumental delivery showed its diagnostic superiority over digital vaginal exam.

Instrumental delivery and ultrasound: a multicentre randomised controlled trial of ultrasound assessment of the fetal head position versus standard care as an approach to prevent morbidity at instrumental delivery

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b Mid-Western Regional Maternity Hospital, Limerick, Ireland c Department of Obstetrics and Gynaecology, Graduate Entry Medical School, University of Limerick, Mid-Western Regional Maternity Hospital, Limerick, Ireland d University College Dublin, Coombe Women & Infant’s University Hospital, Dublin, Ireland e Bristol Randomised Trials Collaboration School of Social and Community Medicine, University of Bristol, Bristol, UK

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Accepted 26 February 2014. Published Online 11 April 2014.
Objective To determine whether the use of ultrasound can reduce the incidence of incorrect diagnosis of the fetal head position at instrumental delivery and subsequent morbidity.

Design Two-arm, parallel, randomised trial, conducted from June 2011 to December 2012.

Setting Two maternity hospitals in the Republic of Ireland.

Sample A cohort of 514 nulliparous women at term (≥37 weeks of gestation) with singleton cephalic pregnancies, aiming to deliver vaginally, were recruited prior to an induction of labour or in early labour.

Methods If instrumental delivery was required, women who had provided written consent were randomised to receive clinical assessment (standard care) or ultrasound scan and clinical assessment (ultrasound). [Correction added on 17 April 2014, after first online publication: Sentence was amended.]

Main outcome measure Incorrect diagnosis of the fetal head position.

Results The incidence of incorrect diagnosis was significantly lower in the ultrasound group than the standard care group (4/257, 1.6%, versus 52/257, 20.2%; odds ratio 0.06; 95% confidence interval 0.02–0.19; P < 0.001). The decision to delivery interval was similar in both groups (ultrasound mean 13.8 minutes, SD 8.7 minutes, versus standard care mean 14.6 minutes, SD 10.1 minutes, P = 0.35). The incidence of maternal and neonatal complications, failed instrumental delivery, and caesarean section was not significantly different between the two groups.

Conclusions An ultrasound assessment prior to instrumental delivery reduced the incidence of incorrect diagnosis of the fetal head position without delaying delivery, but did not prevent morbidity. A more integrated clinical skills-based approach is likely to be required to prevent adverse outcomes at instrumental delivery.

Keywords Fetal head position, intrapartum ultrasound, randomised controlled trial, second stage of labour.
Primary outcome

- incidence of incorrect diagnosis of the fetal head position **was significantly lower in the ultrasound group** compared with the standard care group (still true if adjusted to study centre, pathological CTG and senior obstetrician)

**Table 2. Primary outcome: intention to treat and sensitivity analyses**

<table>
<thead>
<tr>
<th></th>
<th>Ultrasound n (%)</th>
<th>Standard care n (%)</th>
<th>aOR* (95% CI)</th>
<th>P</th>
<th>aOR** (95% CI)</th>
<th>P</th>
<th>Number needed to treat (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incorrect diagnosis of fetal head position</td>
<td>4/257 (1.6)</td>
<td>52/257 (20.2)</td>
<td>0.06 (0.02–0.19)</td>
<td>&lt;0.001</td>
<td>0.06 (0.02–0.16)</td>
<td>&lt;0.001</td>
<td>5 (5–6)</td>
</tr>
</tbody>
</table>

*Adjusted for study centre as a stratification variable.
**Adjusted for pathological CTG and senior obstetrician, in addition to study centre.
Secondary outcomes

- The incidence of maternal and neonatal complications was not significantly different between the two groups — insufficient sample size!!

**Table 3. Maternal and neonatal secondary outcomes**

<table>
<thead>
<tr>
<th></th>
<th>Ultrasound (n = 257)</th>
<th>Standard care (n = 257)</th>
<th>OR (95% CI)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Maternal</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Postpartum haemorrhage (blood loss &gt;500 ml)</td>
<td>49 (19.1)</td>
<td>43 (16.7)</td>
<td>1.16 (0.73–1.83)</td>
<td>0.53</td>
</tr>
<tr>
<td>Third- or fourth-degree perineal tear</td>
<td>10 (3.9)</td>
<td>7 (2.7)</td>
<td>1.42 (0.53–3.80)</td>
<td>0.49</td>
</tr>
<tr>
<td>Shoulder dystocia</td>
<td>9 (3.5)</td>
<td>13 (5.1)</td>
<td>0.67 (0.28–1.60)</td>
<td>0.37</td>
</tr>
<tr>
<td>Prolonged length of stay (&gt;3 days)</td>
<td>52 (20.2)</td>
<td>42 (16.3)</td>
<td>1.29 (0.82–2.02)</td>
<td>0.27</td>
</tr>
<tr>
<td><strong>Neonatal</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neonatal trauma*</td>
<td>20 (7.8)</td>
<td>17 (6.6)</td>
<td>1.13 (0.57–2.22)</td>
<td>0.72</td>
</tr>
<tr>
<td>Apgar score &lt;7 at 5 minute</td>
<td>0 (0.0)</td>
<td>2 (0.8)</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Arterial pH &lt;7.10/n</td>
<td>8/203 (3.9)</td>
<td>9/191 (4.7)</td>
<td>0.81 (0.31–2.16)</td>
<td>0.68</td>
</tr>
<tr>
<td>Admission to neonatal intensive care unit</td>
<td>31 (12.1)</td>
<td>30 (11.7)</td>
<td>1.05 (0.61–1.79)</td>
<td>0.87</td>
</tr>
</tbody>
</table>

Figures are represented as number (%).
*Excluding bruising and skin abrasions, and including facial nerve palsy, Erb’s palsy, fractures, retinal haemorrhage, encephalopathy, and cephalohaematoma.

TPS not done!!!
Intrapartum translabial ultrasound (ITU): sonographic landmarks and correlation with successful vacuum extraction

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Departments of *Obstetrics and †Radiology, Charité Virchow Clinic, Berlin and ‡Heinrich-Heine-University, Düsseldorf, Germany
Figure 1. Anatomical structures in the infrapubic plane used in this study: original (a) and annotated (b) ultrasound images. The transducer is applied to show the pubic symphysis in a horizontal plane. The 'infrapubic line' (solid line) runs perpendicular to the symphysis and originates from its caudal end. The dashed line indicates the greatest diameter of the fetal head. The 'head direction' (arrow) indicates the orientation of the widest part of the fetal head with respect to the infrapubic line (in this example, towards the symphysis, i.e., 'head up'). Note the caput succedaneum (indicated by the dotted line) appearing at a lower station than the actual skull.
Smooth VE

Figure 2: Descent of the fetal head as seen on intrapartum intrapartum ultrasound: (a) without contraction, (b) during contraction, (c) with pushing during contraction, and (d) after further contraction and immediately prior to a complication-free vacuum extraction (two tractions, Case 19).
Difficult VE

Figure 4: Intrapartum translabial ultrasound before difficult vacuum extraction (Case 18). Excessive configuration and large caput succedaneum suggested falsely a low head station (+2), while the largest diameter was above the infrapubic line. Head direction (arrow) was classified as horizontal. Solid line, infrapubic line; dashed line, greatest diameter of the fetal head.
Failed VE → LSCS

Figure 5. Intrapartum translabial ultrasound before failed vacuum extraction followed by Cesarean delivery (Case 9). Note the prominent caput succedaneum. Solid line, infrapubic line; dashed line, greatest diameter of the fetal head (here well above infrapubic line); arrow, direction of the fetal head (head down).
Good prognostic signs

• Fetal head descent +ve
• Passage of the head below the “intrapubic” line
• Upward head direction
  • Henrich W et al UOG 2006
  • Lau WL et al UOG 2009
2nd stage
OA/non OP
When the angle of progression was $120^\circ$, the fitted probability of either an easy and successful vacuum extraction or spontaneous vaginal delivery was 90%.
• **Results** There were 26 cases with occipitoanterior fetal position (Cesarean section, n = 5; vacuum extraction, n = 16; spontaneous delivery, n = 5).

• **When the angle of progression was** 120°, the fitted probability of either an easy and successful vacuum extraction or spontaneous vaginal delivery was 90%.

• **Conclusions** This is the first report to document a strong relationship between an objective ultrasound marker prolonged second stage of labor with occipitoanterior fetal position.

• A predictive model using this parameter would allow better decision making regarding operative delivery for obstructed labor.
Table 1 Comparison of labor and delivery characteristics between pregnancies with prolonged second stage of labor and occipitoanterior fetal position, in which delivery was by Cesarean section, vacuum extraction or spontaneous delivery

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Cesarean section (n = 5)</th>
<th>Vacuum extraction (n = 16)</th>
<th>Spontaneous (n = 5)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gestational age (weeks)</td>
<td>38 ± 3</td>
<td>38 ± 1</td>
<td>40 ± 1</td>
<td>NS‡</td>
</tr>
<tr>
<td>Birth weight (g)</td>
<td>3247 ± 507</td>
<td>3459 ± 594</td>
<td>3540 ± 474</td>
<td>NS‡</td>
</tr>
<tr>
<td>Head circumference (cm)</td>
<td>33.9 ± 1.6</td>
<td>34.3 ± 2.6</td>
<td>34.9 ± 0.8</td>
<td>NS‡</td>
</tr>
<tr>
<td>Ischial spine station (cm)</td>
<td>0 (0–1)</td>
<td>2 (0–3)</td>
<td>2 (0–3)</td>
<td>0.0002†</td>
</tr>
<tr>
<td>Angle of progression (°)</td>
<td>104 ± 9</td>
<td>130 ± 18</td>
<td>174 ± 34</td>
<td>0.008*</td>
</tr>
</tbody>
</table>

Data are presented as mean ± SD for normally distributed parameters and median (range) for those not normally distributed. ‡One-way ANOVA. †Kruskal-Wallis test. NS, not significant.
Figure 2 Logistic regression curve showing the fitted probability of the need for Cesarean section depending on the angle of progression in prolonged second stage of labor with occipitoanterior fetal position. The estimated probability of either an easy and successful vacuum extraction or spontaneous vaginal delivery for an angle of progression of 120° is 90% (1.00 – 0.10 = 0.90).

Figure 3 Plot showing the angle of progression in prolonged second stage of labor with occipitoanterior fetal position in pregnancies grouped according to subsequent mode of delivery. Horizontal bars represent the mean for each group.
Intrapartum transperineal ultrasound as a predictor of instrumentation difficulty with vacuum-assisted delivery in primiparous women


- Fifty-two (52) patients were studied (26 patients per study group).
- The vacuum extractions were classified as easy group (EG) (3 vacuum pulls), difficult/impossible-group (DG)(4 pulls). Occiput-posterior presentations were not assessed.
- **Conclusion:** If previous to the placement of the vacuum cup the progression angle is $\leq 120$ at rest, the foetal head direction is horizontal or down, and the midline angle is $\geq 35$, there is an 85% chance that the delivery will require more than 4 vacuum pulls.
Utility of intrapartum transperineal ultrasound to predict cases of failure in vacuum extraction attempt and need of cesarean section to complete delivery

- Vacuum extractions were classified as easy (EG) (three or less vacuum pulls), difficult (DG) (more than three vacuum pulls) or impossible (IG) (delivery completed by cesarean section).
- 52 patients were studied (26-EG, 19-DG and 7-IG).
- **Conclusion:** We have observed that the presence of an AoP with pushing <105, a PD<25 mm, a “head-down” direction and a > 45 degree MLA are very unfavorable ITU parameters which can be used to identify cases of high risk of fetal extraction failure in vacuum-assisted deliveries.
Intrapartum translabial ultrasound with pushing used to predict the difficulty in vacuum-assisted delivery of fetuses in non-occiput posterior position

- 70 nulliparous were studied (44-ED, 26-DD).
- AoP-Pushing >128 predicts an Easy-Vacuum Delivery (<3 Vacuum-Pulls) in >85% of cases (Sen 80%, FPR 9.3%).
Use of intrapartum ultrasound in the prediction of complicated operative forceps delivery of fetuses in non-occiput posterior position  

Cuerva et al, UOG 2014

• In this prospective observational study, a single operator performed ITU on 30 patients with an indication for operative forceps delivery.

• The best cut-off for predicting a difficult forceps delivery was an AOP at rest of 138° (sensitivity=85.7%, specificity=100%).

• The best predictive model included both the AOP at rest and the Head direction during a contraction with active pushing.
In summary (for OA/no OP) at 2\textsuperscript{nd} stage

- **VED** – AOP (rest)\(\geq\)120, 90% VED/NSD
  - --AOP (rest)\(\leq\)120, 85% Difficult VED
  - --AOP (push)<105, high chance of failed VED\(\rightarrow\)LSCS
  - --AOP (push)>128, easy VED, sensitivity 84%, False positive 9.3%

- **Forceps Delivery**
  - AOP (rest)<138, difficult Forceps (sens 85.7%; spec 100%)

- **Unsettled!!!**

### Table 2

Conversion table for ultrasound methods to assess fetal head descent, using head–perineum distance (HPD) and head–symphysis distance (HSD) data from this study and published data for angle of progression.\(^a\)

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<tr>
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<th>Angle of progression (°)</th>
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<td>159</td>
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<td>*</td>
</tr>
<tr>
<td>5</td>
<td>170</td>
<td>*</td>
<td>*</td>
</tr>
</tbody>
</table>

\(^a\)Conversion to HPD and HSD was only calculated for values supported by data from this study. ITU, intrapartum transperineal ultrasound.
Using a cut-off of 150° for the angle of progression during maternal pushing, we could predict 12 of the 15 (80%) successful vacuum extractions and all five Cesarean sections.
Prospective observational study in KWH (from May 2011– March 2016)

• ~110 VED/FD
• ~25 2nd stage CS
• In the progress of data analysis.....................!!!
My speculation:
Analogue with Fetal blood sample for fetal acidosis:

<table>
<thead>
<tr>
<th>FBS Result (pH)</th>
<th>Interpretation</th>
<th>Subsequent Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>≥7.25</td>
<td>Normal</td>
<td>Repeat FBS if FHR abnormality persists</td>
</tr>
<tr>
<td>7.21 – 7.24</td>
<td>Borderline</td>
<td>Repeat FBS within 30 minutes or consider delivery if rapid fall since last sample</td>
</tr>
<tr>
<td>≤7.20</td>
<td>Abnormal</td>
<td>Delivery indicated</td>
</tr>
</tbody>
</table>

Eg. AOP at pushing < ? and > ?
HPD at pushing < ? and > ?
2nd stage
OP/asynclitism
Sonographic pattern of fetal head descent: relationship with duration of active second stage of labor and occiput position at delivery
Ghi et al. UOG 2014

Women with persistent OP position compared with OA showed a significantly different AoP at the beginning of 2nd stage
\((122 \pm 17^\circ \text{ vs } 138 \pm 20^\circ)\)

Schematic representation of fetal head progression through maternal pelvis in occiput anterior (OA) and occiput posterior (OP) fetuses.
In vertex-presenting fetuses, head descent converts from downward at inlet (a) to horizontal at midpelvis (b) to upward at outlet (c). OP fetuses maintain a downward direction with respect to the pubic bone from inlet to midpelvis (a,b) and only after passing the ischial spines do they abruptly twist up towards the outlet (c) only in those cases that are delivered vaginally.
Asynclitism: a literature review of an often forgotten clinical condition

Antonio Malvasi, Antonio Barbera, Giovanni Di Vagno, Alexis Gimovsky, Vincenzo Berghella, Tullio Ghi, Gian Carlo Di Renzo, and Andrea Tinelli

Figure 2. Left occiput posterior position, with anterior asynclitism. Only the anterior orbit is visualized by ultrasound, as the “squint sign” [18] (panel A: graphic representation; panel B: transabdominal ultrasound used up to the beginning of the second stage of labor, with the “squint sign”).
Special scenarios: Extreme prematurity

- Intermittent abdominal ultrasound may be helpful in monitoring fetal viability during labour (to inform the parents and the neonatal team)
- Monitoring the progress in the second stage of labour such as descent of the presenting part.

*Perinatal Management of Pregnant Women at the Threshold of Infant Viability (The Obstetric Perspective)*

RCOG Scientific Impact Paper No. 41, 2014
Case 1
26-5-2014

- NBC
- P0
- 24+1wk
- Referred from private doctor for dilated cervix
- Infrequent UC
- Ceph, EFW 620g, active fetal movement
- 2:30pm: 3.1cm (WL)
- 5:45pm: 3.7cm (WL)
- 8:40pm: 4.4cm (SY/LL)
- 11:50pm: 5.8cm (SY/LL)
- Delivered at 0:53am (27-5-2014): 680g, AS 2/8
- pH 7.43, BE 4.8
Case 2---24wk, failed cerclage

5-2-2015  9am

6-2-2015  8 pm in labour
Intrapartum ultrasound: A useful method for evaluating labor progress and predicting operative vaginal delivery

Ki Hoon Ahn, Min-Jeong Oh
Department of Obstetrics and Gynecology, Korea University College of Medicine, Seoul, Korea

**Table 1.** Intrapartum ultrasonographic techniques according to various situations of women in labor

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<td>1st stage of labor</td>
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<td>To measure fetal station or in case of abnormal labor</td>
<td>Check angle of progression, head-perineum distance, fetal head-symphysis distance, intrapartum translabial ultrasound station, and fetal direction and rotation</td>
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<td>(prolongation disorders, protraction disorders, and arrest disorders)</td>
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<td>For a successful vacuum delivery</td>
<td>Check the followings: an angle of progression &gt;120°; upward fetal head direction; and a rotation &lt;45°</td>
</tr>
<tr>
<td>3rd stage of labor</td>
<td></td>
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<td>In case of abnormal placental separation</td>
<td>Check placental remnants and continuous flow between myometrium and placenta using color Doppler</td>
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Intrapartum ultrasound: A useful method for evaluating labor progress and predicting operative vaginal delivery

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Table 1. Intrapartum ultrasonographic techniques according to various clinical situations in women in labor

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Our way forward:

- Midwifery ITU: may be helpful in choosing different birthing posture
- Demonstration trials of ITU: AT; 1st stage; 2nd stage
- Shoulder scan for high risk cases of shoulder dystocia
- Placental scan for high risk cases of 3rd stage problem
“Ultrasound is the future diagnostic tool in active labor”

TM Eggebo

Acknowledgment:

ITU team members: Viola Chan, Vivian Ng, Cherrie Yung, Grace Tang, Winne Hui, Martin Lau, Samson Lau
COS: WC Leung, DOM: Ms Sing, LW WM: SM Tai
On call team doctors, Midwives, Patients and their partners.....