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Predittività e diagnosi precoce delle distocie intra-partum



tullio.ghi@unipr.it

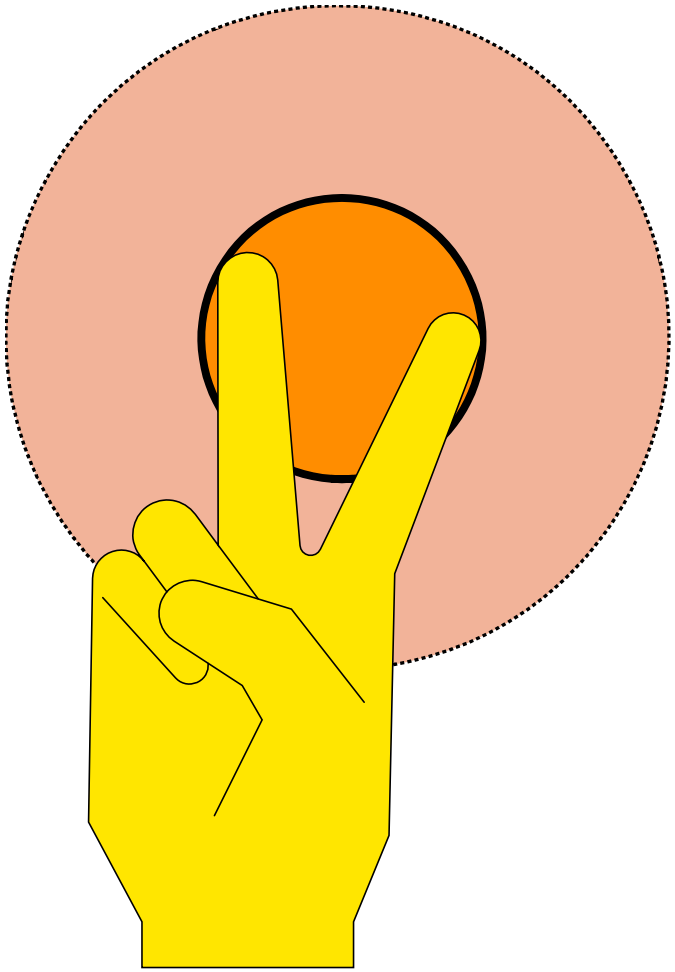
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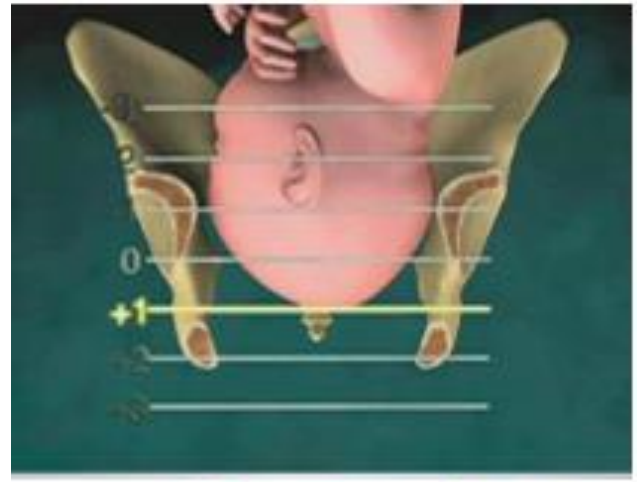
Introduzione

- Evoluzione fisiologica del travaglio di parto è caratterizzata dalla progressione della dilatazione cervicale e della discesa della parte presentata
- In travaglio attivo una mancata modificazione nel tempo di questi reperti è espressione di distocia
- In questi casi è indicato un intervento ostetrico
- Causa di distocia ex post spesso indeterminata

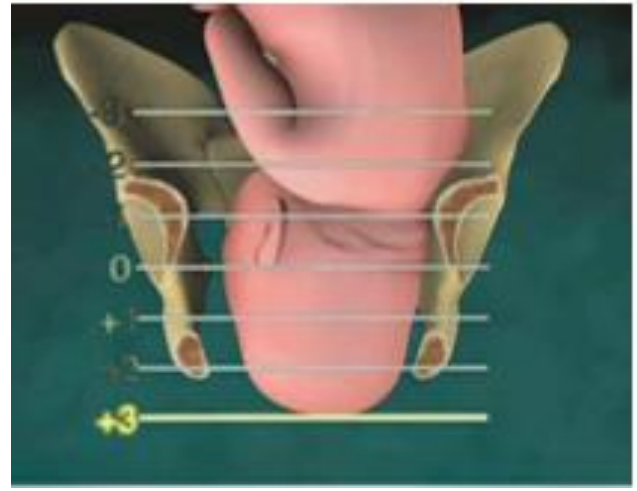
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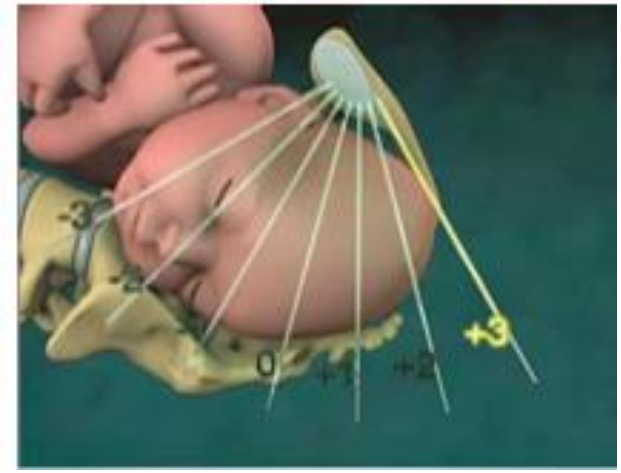
Partogramma

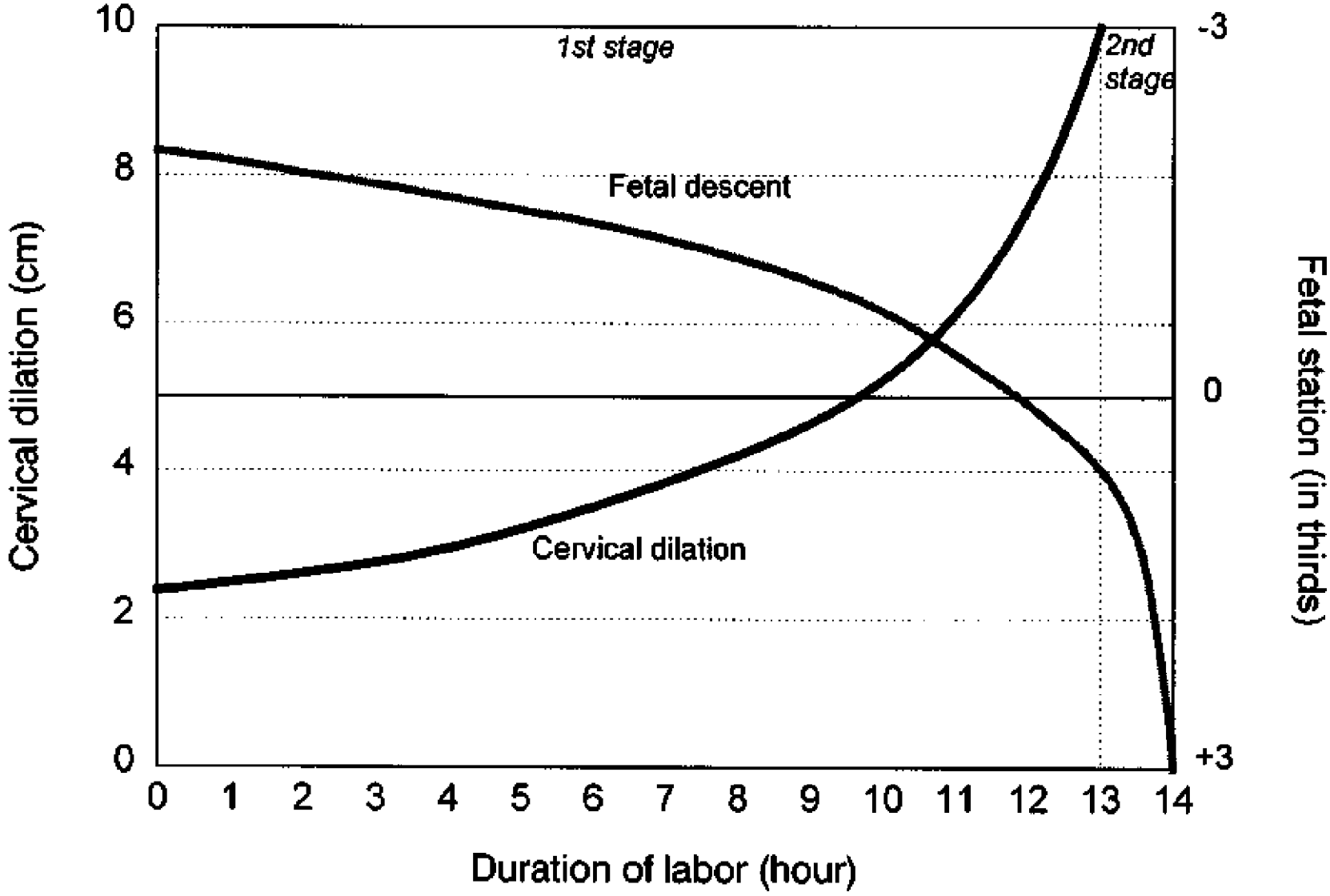






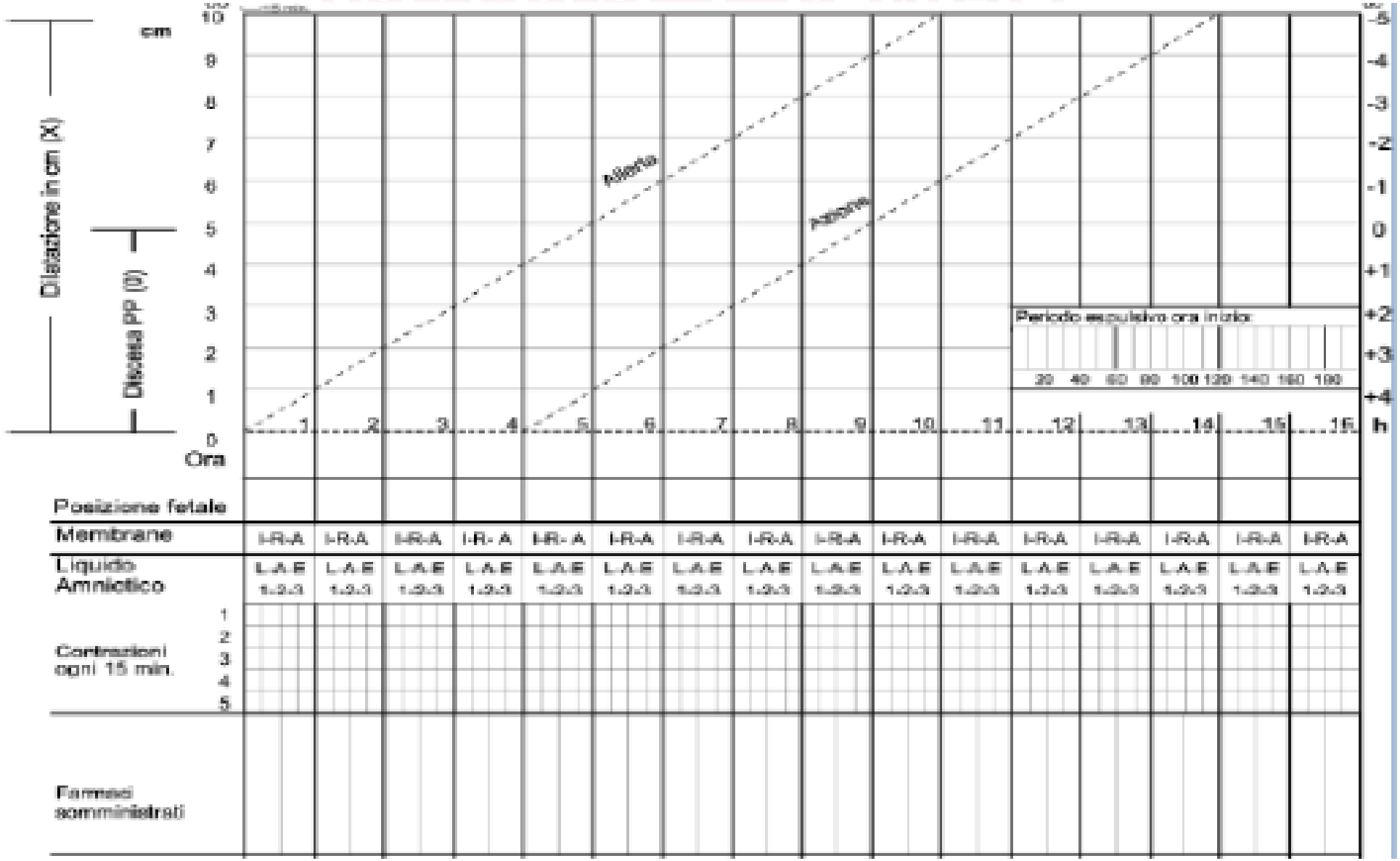





10
8
6
4
2
0
Cervical dilation (cm)
1st stage
2nd stage
Fetal descent
Cervical dilation
-3
0
+3
Fetal station (in thirds)
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14
Duration of labor (hour)

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Partogramma WHO



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Distocia

Definizione:

Ostacolo all'evoluzione spontanea del travaglio che richiede manovre manuali o strumentali o chirurgiche per l'espletamento del parto

- Arresto primo stadio (periodo dilatante)
- Arresto secondo stadio (periodo espulsivo)

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Distocia

Cause:

Sproporzione feto-pelvica

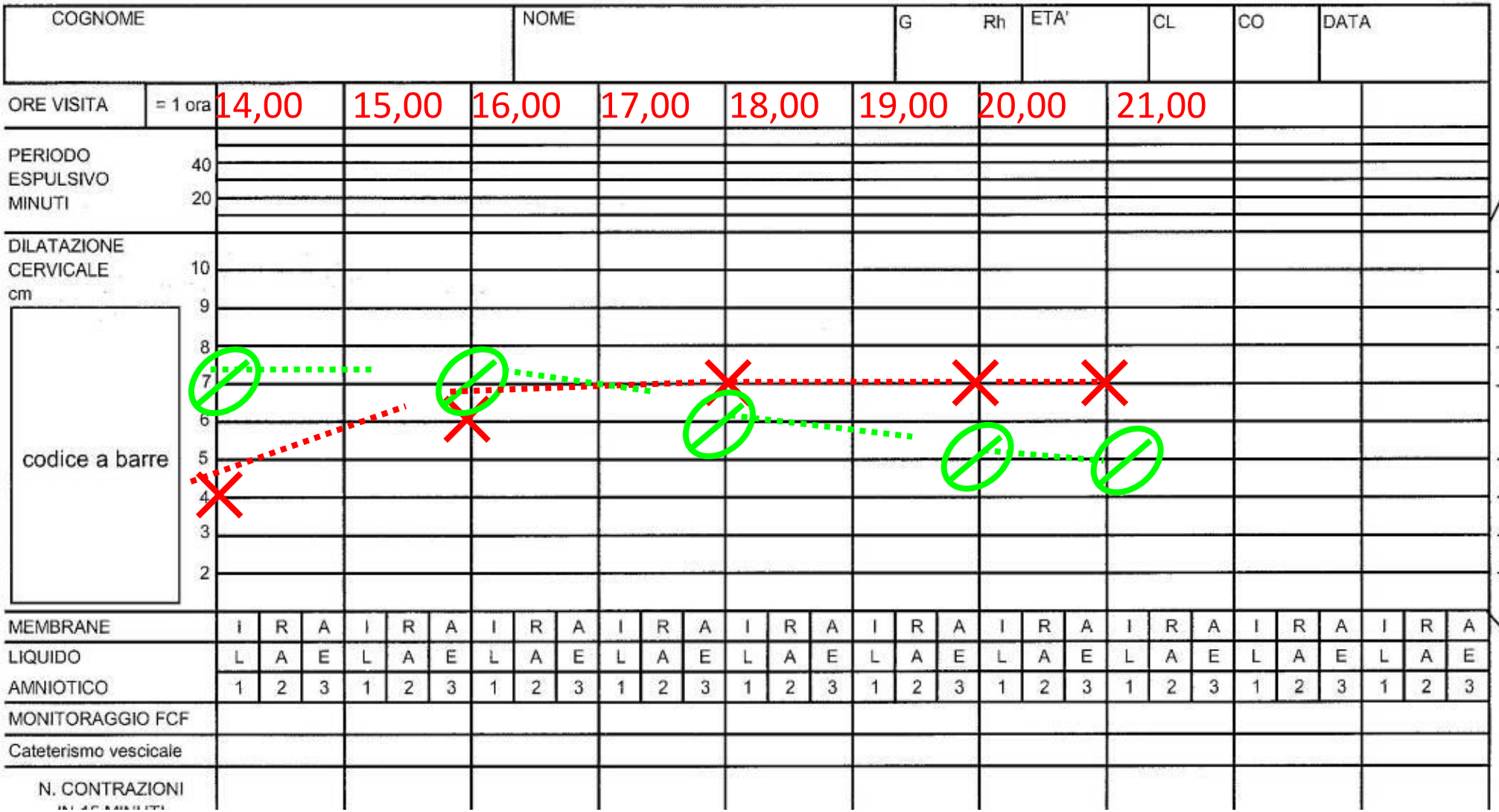
- Canale parto
  - ✓ Bacino piccolo, viziato (es fratture, lussazioni anca)
- Feto
  - ✓ Macrosomia (es peso ≥4500 gr)
  - ✓ Malposizioni/Malpresentazioni (es deflesse)

Attivita' contrattile insufficiente/inefficace

- Anomalie congenite o acquisite utero (es miomi)
- Inerzia uterina primaria (es. obesità)
- Mancanza di spinte volontarie madre

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Distocia



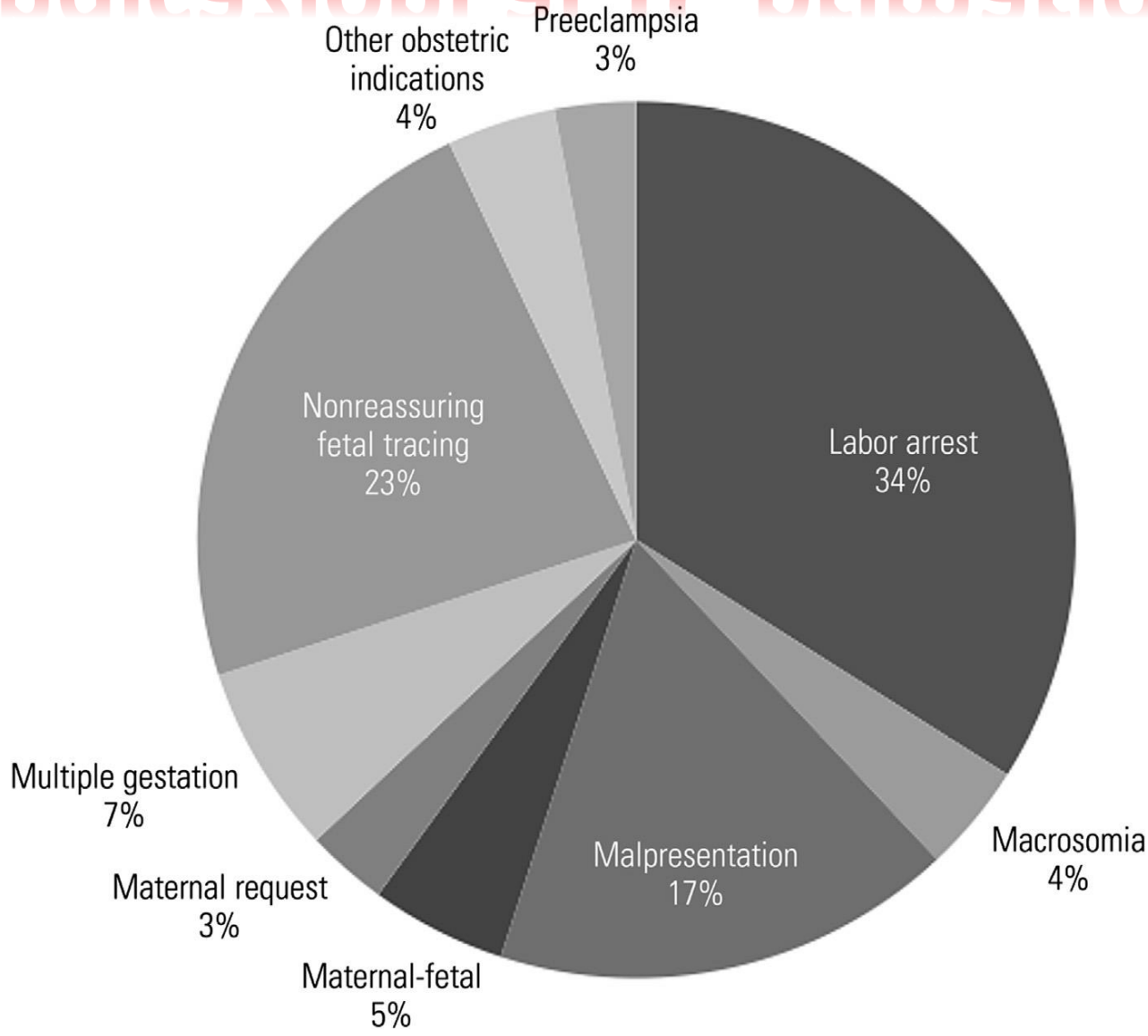
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Distocia

Interventi ostetrici

- Ossitocina ev
- Amniorexi
- Analgesia epidurale
- Cambiamento posizioni materne
- Rotazione manuale occipite
- Parto strumentale vaginale o Taglio Cesareo

Indicazioni al TC primario



Barber et al Obstet Gynecol 2011

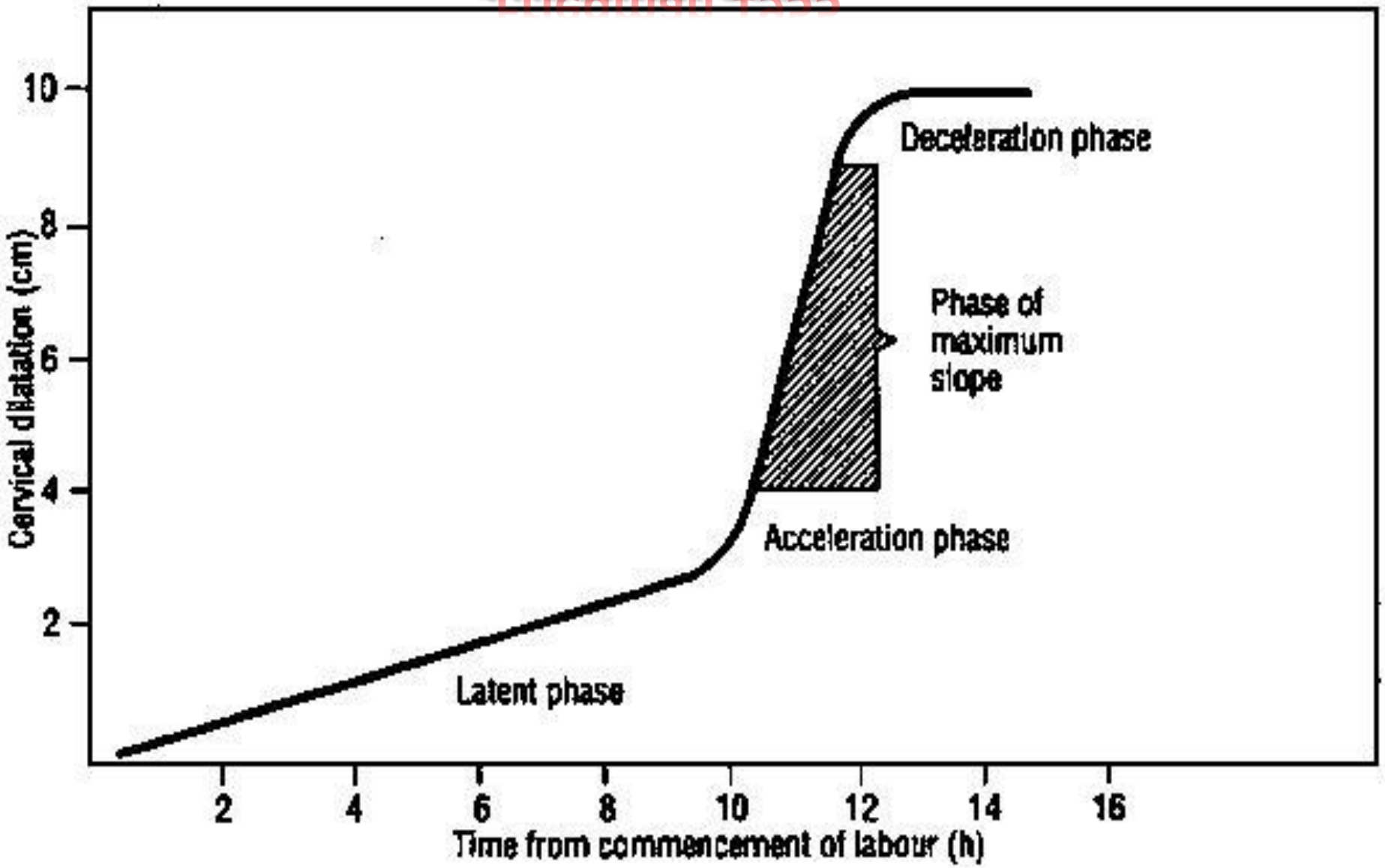
Anomalie del primo stadio del travaglio
(Friedman 1955)

- Rallentamento
  - P0: <1.2 cm/h
  - P1 o +: < 1.5 cm/h
- Arresto
  - Cervice ≥ 4cm
  - Non > dilatazione dopo ≥2h in presenza di contrazioni uterine regolari

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Dilatazione cervicale

Friedman 1955



Diagnosi di travaglio attivo

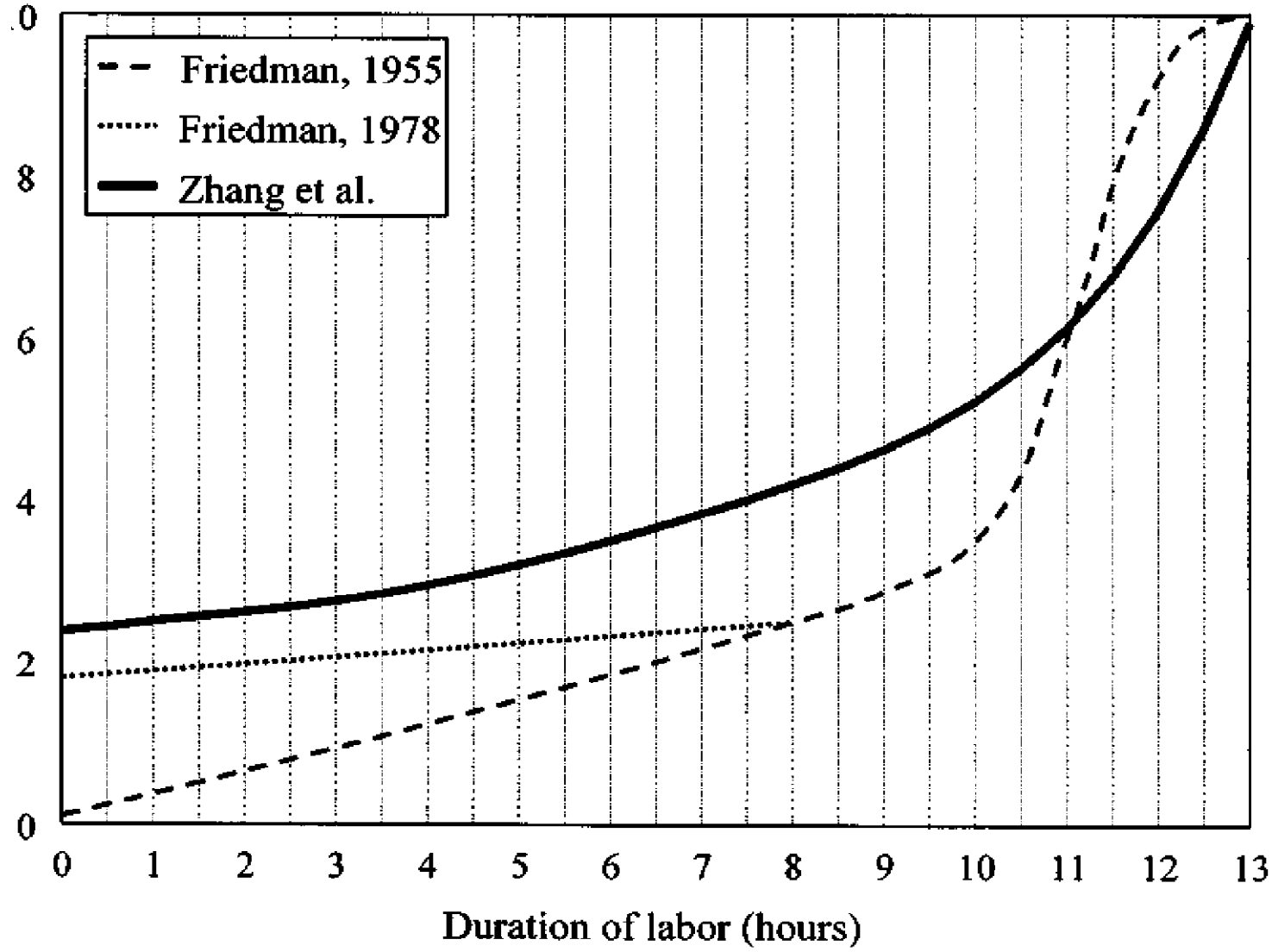
Friedman 1955

- Dilatazione cervicale >3-4 cm
- Contrazioni uterine regolari
  - ≥3 ogni 10 minuti
  - percepite come *dolorose*
  - durata media 1 minuto
  - Intensità adeguata (>25 mmHg…)
- Appianamento del collo
- Marcatura
- Fase latente fino a 20 h nullipare vs 14 h pluripare

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Reassessing the labor curve in nulliparous

Zhang et al, Am J Ob Gyn 2002

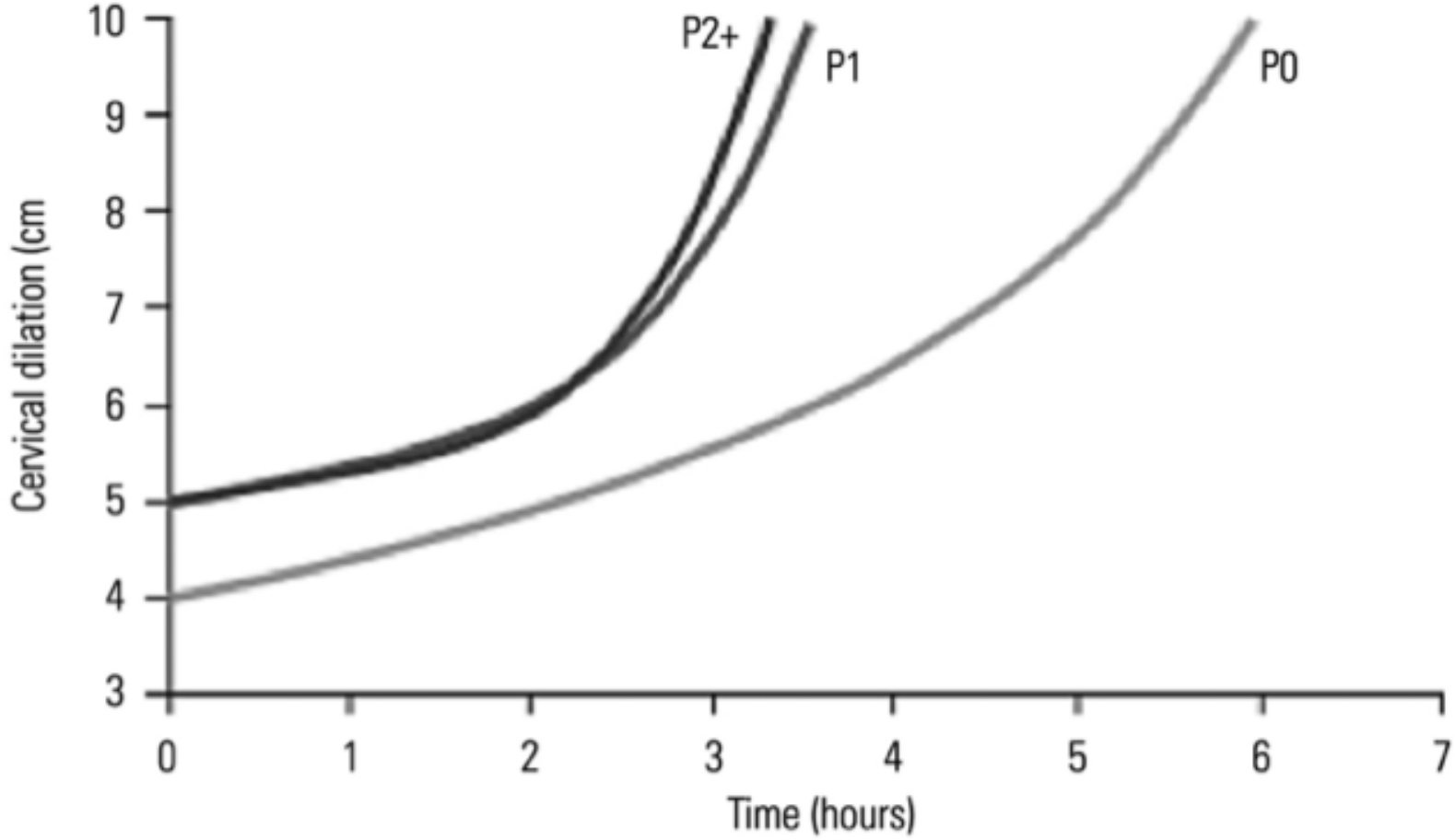


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Reassessing the labor curve

Zhang et al, Am J Ob Gyn 2010

Average labor curves by parity in singleton term pregnancies with spontaneous onset of labor, vaginal delivery, and normal neonatal outcomes



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Reassessing the labor curve

Zhang et al, Am J Ob Gyn 2010

Spontaneous labor progress stratified by cervical dilation and parity

Cervical dilation, cm	Median elapsed time, h		
	Parity 0 (95th percentile)	Parity 1 (95th percentile)	Parity ≥2 (95th percentile)
3-4	1.8 (8.1)	—	—
4-5	1.3 (6.4)	1.4 (7.3)	1.4 (7.0)
5-6	0.8 (3.2)	0.8 (3.4)	0.8 (3.4)
6-7	0.6 (2.2)	0.5 (1.9)	0.5 (1.8)
7-8	0.5 (1.6)	0.4 (1.3)	0.4 (1.2)
8-9	0.5 (1.4)	0.3 (1.0)	0.3 (0.9)
9-10	0.5 (1.8)	0.3 (0.9)	0.3 (0.8)

Anomalie del primo stadio del travaglio
(Zhang 2010)

- Rallentamento
  - P0: <0.5-0.7 cm/h
  - P1 o + : <0.5-1.3 cm/h
- Arresto
  - Cervice ≥6 cm
  - Non > dilatazione dopo ≥4 h in presenza di contrazioni uterine regolari

Diagnosi di travaglio attivo

Zhang 2010

- Contrazioni senza modificazioni cervicali non implicano travaglio
- Una dilatazione della cervice fino a 6 cm senza dinamica regolare può essere compatibile con le modificazioni passive e non indicativa di travaglio attivo
- La durata della fase latente non influisce sulla probabilità di una regolare evoluzione della fase attiva e anche se prolungata richiede attesa

The frequency of intrapartum caesarean section use with the WHO partograph versus Zhang's guideline in the Labour Progression Study (LaPS): a multicentre, cluster-randomised controlled trial

Stine Bernitz, Rebecka Dalbye*, Jun Zhang, Torbjørn M Eggebø, Kathrine F Frøslie, Inge Christoffer Olsen, Ellen Blix†, Pål Øian†*

www.thelancet.com **Published online December 20, 2018 http://dx.doi.org/10.1016/S0140-6736(18)31991-3**

	WHO partograph (control) group		Zhang's guideline (intervention) group	
	n (%)	Number assessed	n (%)	Number assessed
Primary endpoint				
Intrapartum caesarean sections*	196 (5·9%)	3305	271 (6·8%)	3972
Descriptive endpoints				
Intrapartum caesarean sections for labour dystocia	132 (67·3%)	196	178 (65·7%)	271
Intrapartum caesarean sections for labour dystocia at a cervical dilatation of less than 6 cm	28 (21·2%)	132	25 (14·0%)	178
Labour dystocia, according to the allocated guideline	1512 (45·7%)	3305	1882 (47·4%)	3972
Labour dystocia, according to the allocated guideline, diagnosed at a cervical dilatation of less than 6 cm	214 (14·2%)	1512	222 (11·8%)	1882
Initiation of synthetic oxytocin during labour at a cervical dilatation of less than 6 cm	289 (18·5%)	1561	244 (14·7%)	1658
Duration of active phase of labour, hours†	6·05 (3·38–9·50)	NA	6·59 (3·55–10·53)	NA

NA=not applicable. *Adjusted relative risk is 1·17 (95% CI 0·98–1·40; p=0·08), giving an adjusted risk difference of 1·0% (95% CI −0·1 to 2·1), and an intraclass correlation coefficient (estimated within centres) of $3{\cdot}4 \times 10^{-34}$; the number needed to treat with the WHO guideline to avoid one intrapartum caesarean section was therefore 100. †Data are median (IQR).

Table 2: **Intrapartum caesarean sections and labour dystocia**

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ACOG/SMFM CONSENSUS www.AJOG.org

ACOG/SMFM OBSTETRIC CARE CONSENSUS

Safe prevention of the primary cesarean delivery

This document was developed jointly by the American College of Obstetricians and Gynecologists (the College) and the Society for Maternal–Fetal Medicine with the assistance of Aaron B. Caughey, MD, PhD; Alison G. Cahill, MD, MSCI; Jeanne-Marie Guise, MD, MPH; and Dwight J. Rouse, MD, MSPH

Am J Obstet Gynecol 2014

Recommendations for safe prevention of primary cesarean delivery

Recommendations	Grade of recommendations
First stage of labor	
A prolonged latent phase (eg, >20 h in nulliparous women and >14 h in multiparous women) should not be indication for cesarean delivery.	1B Strong recommendation, moderate-quality evidence
Slow but progressive labor in first stage of labor should not be indication for cesarean delivery.	1B Strong recommendation, moderate-quality evidence
Cervical dilation of 6 cm should be considered threshold for active phase of most women in labor. Thus, before 6 cm of dilation is achieved, standards of active-phase progress should not be applied.	1B Strong recommendation, moderate-quality evidence
Cesarean delivery for active-phase arrest in first stage of labor should be reserved for women ≥6 cm of dilation with ruptured membranes who fail to progress despite 4 h of adequate uterine activity, or at least 6 h of oxytocin administration with inadequate uterine activity and no cervical change.	1B Strong recommendation, moderate-quality evidence

Assessing the 1st stage labor progression and its relationship to complications

Hamilton et al, Am J Ob Gyn 2016

- L'impiego della sola dilatazione cervicale e solo dopo i 6 cm come parametro di progressione del primo stadio fortemente criticato
- La progressione del primo stadio deve essere valutata in base alla dilatazione cervicale e alla discesa della parte presentata
- Curve di normalità del primo stadio costruite su migliaia di parti dalla fase iniziale (3 cm)

Assessing the 1st stage labor progression and its relationship to complications

Hamilton et al, Am J Ob Gyn 2016

TABLE 2

Area under the curve for the duration of first-stage arrest at ≥6 cm dilation for dilation percentile and for station percentile in each of the outcome groups

Variable	Intervention outcome		Clinical outcome	
	First-stage cesarean delivery for labor-progress disorder	Cesarean delivery for fetal heart rate concern	Obstetric hemorrhage	Neonatal depression
Duration of arrest at ≥ 6 cm dilation	0.65[a]	0.55[a]	0.52	0.52
Dilation percentile	0.93[a,b]	0.81[a,b]	0.60[a]	0.61[a,b]
Station percentile	0.82[a,b]	0.78[a,b]	0.61[a,b]	0.58[a,b]

[a] $P < .01$; [b] $P < .01$ for comparison with duration of arrest.

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Descent of the fetal head (station) during the first stage of labor

Hamilton et al, Am J Ob Gyn 2015

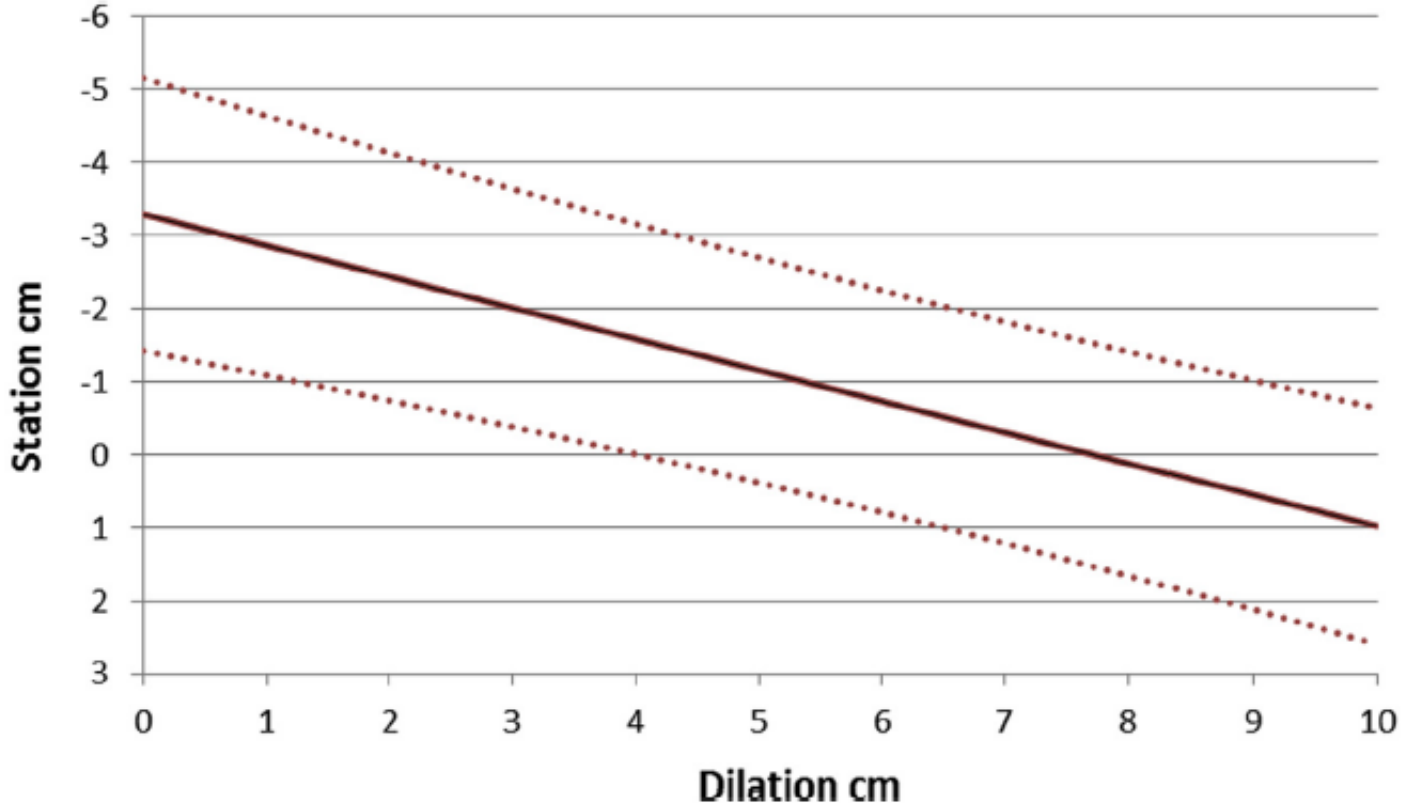
- Osservazione di 5 mila parti vaginali a termine non operativi
- Elaborazione di un modello matematico per descrivere la discesa della testa fetale attesa in base alla dilatazione cervicale (e non in base al tempo come nelle curve di Friedman o Zhang)

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Descent of the fetal head (station) during the first stage of labor

Hamilton et al, Am J Ob Gyn 2015

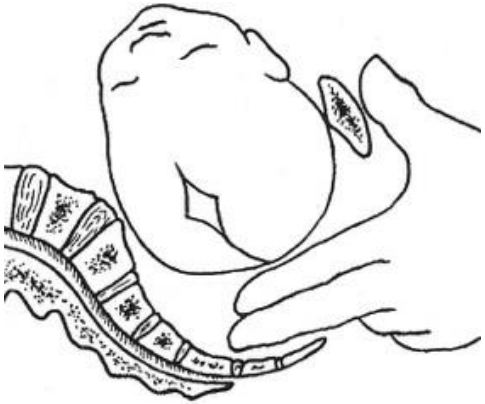
FIGURE 2
The relationship between station and dilation in nulliparous women

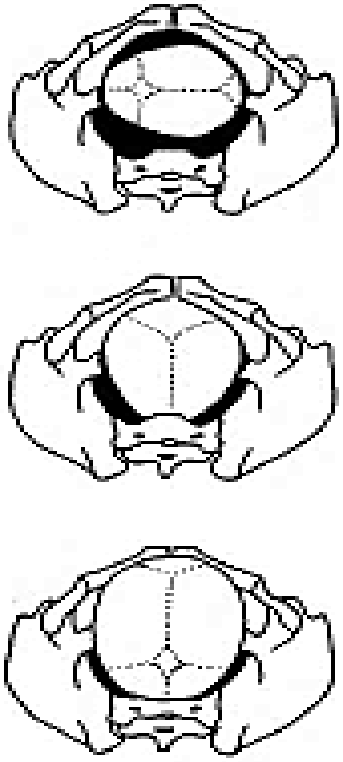


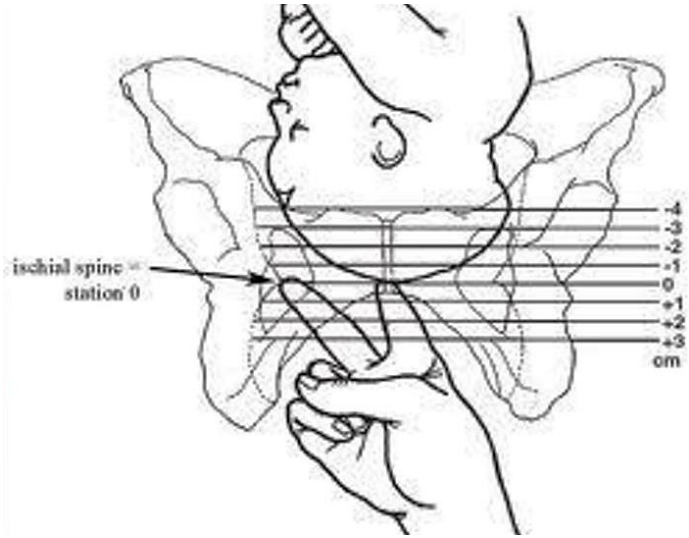
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SIEOG

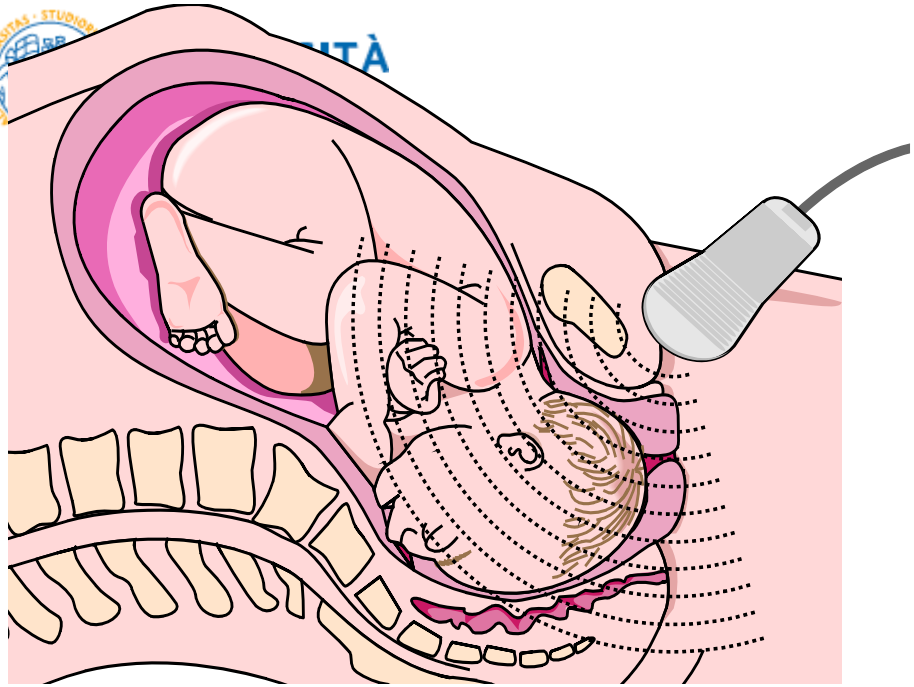
DEFINIZIONE DELLA PROGNOSI DEL PARTO

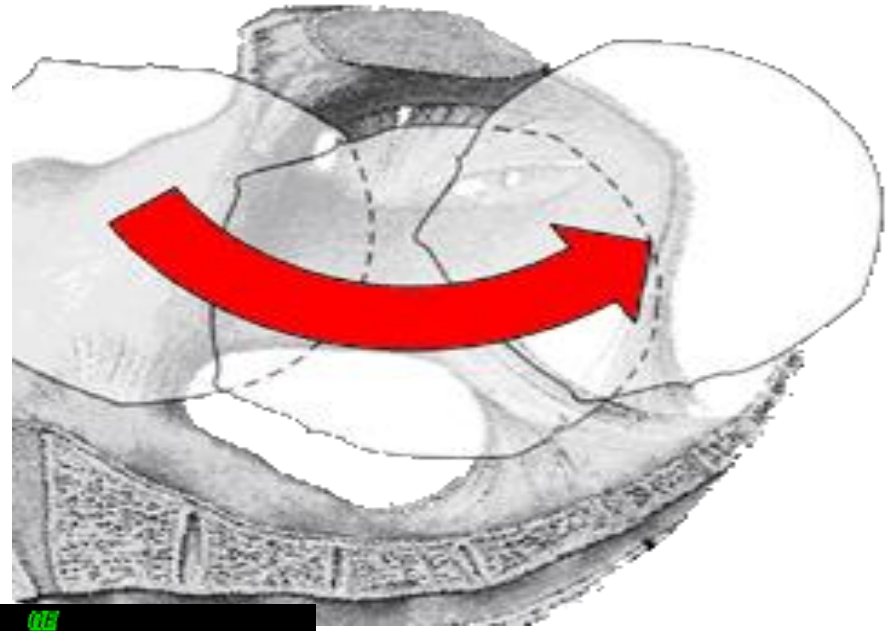


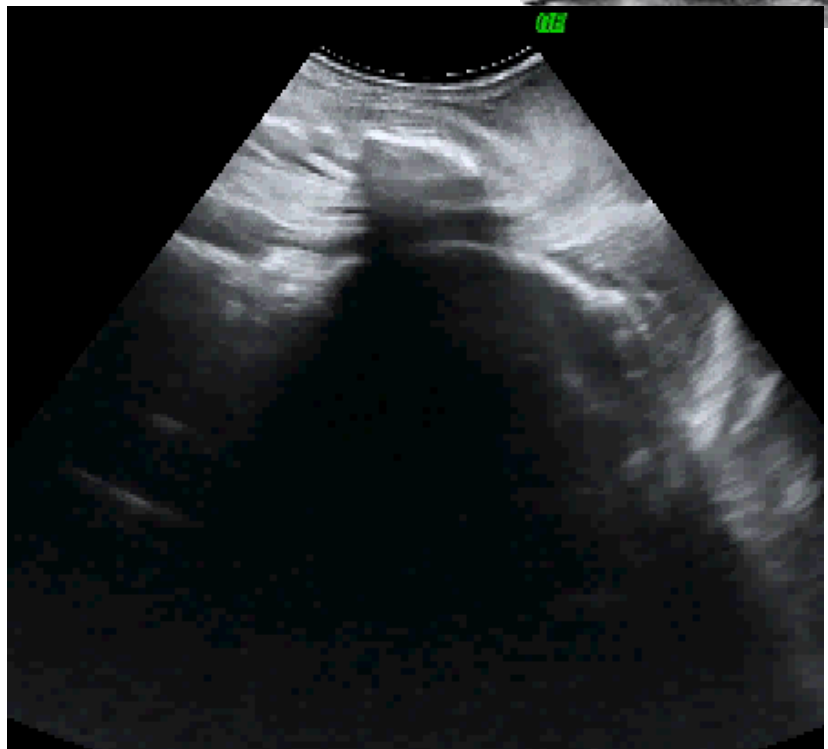


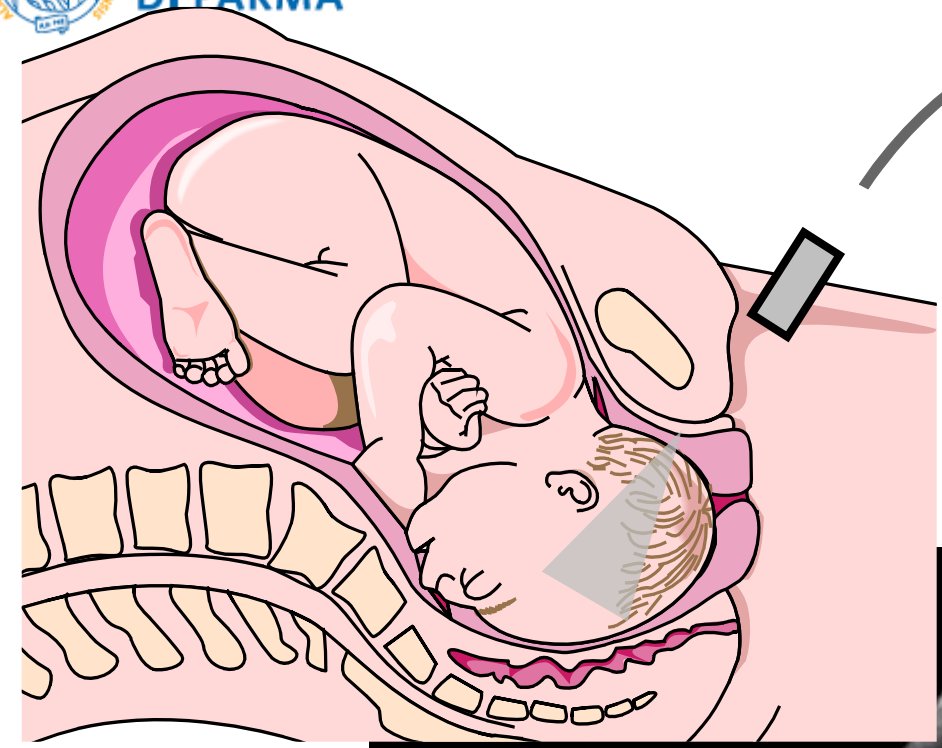


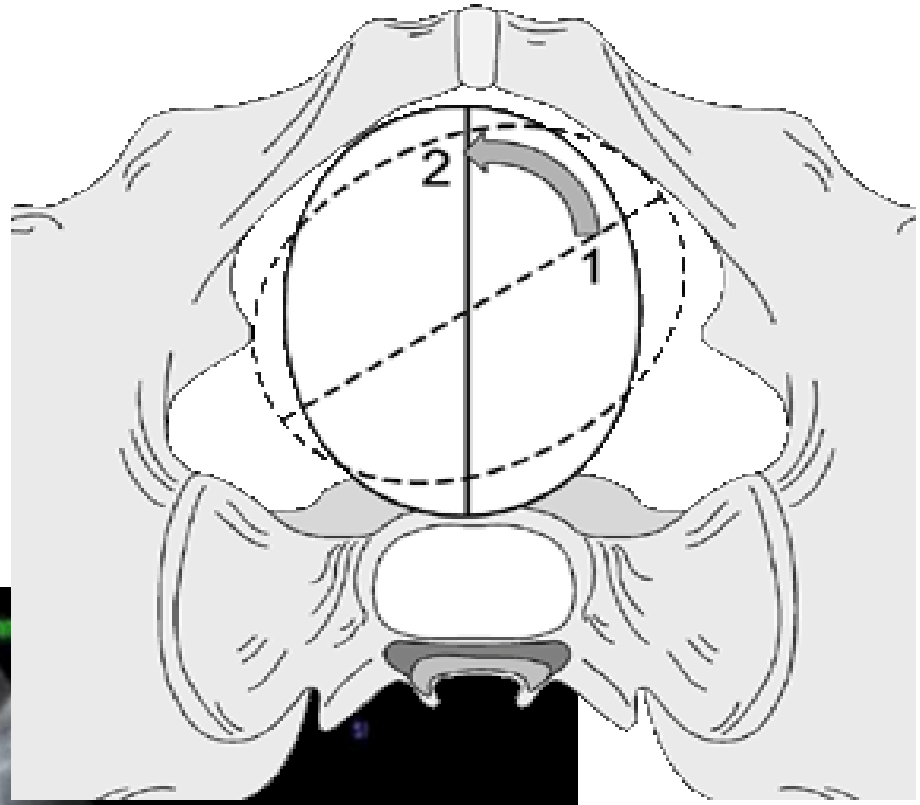
VALUTAZIONE CLINICA

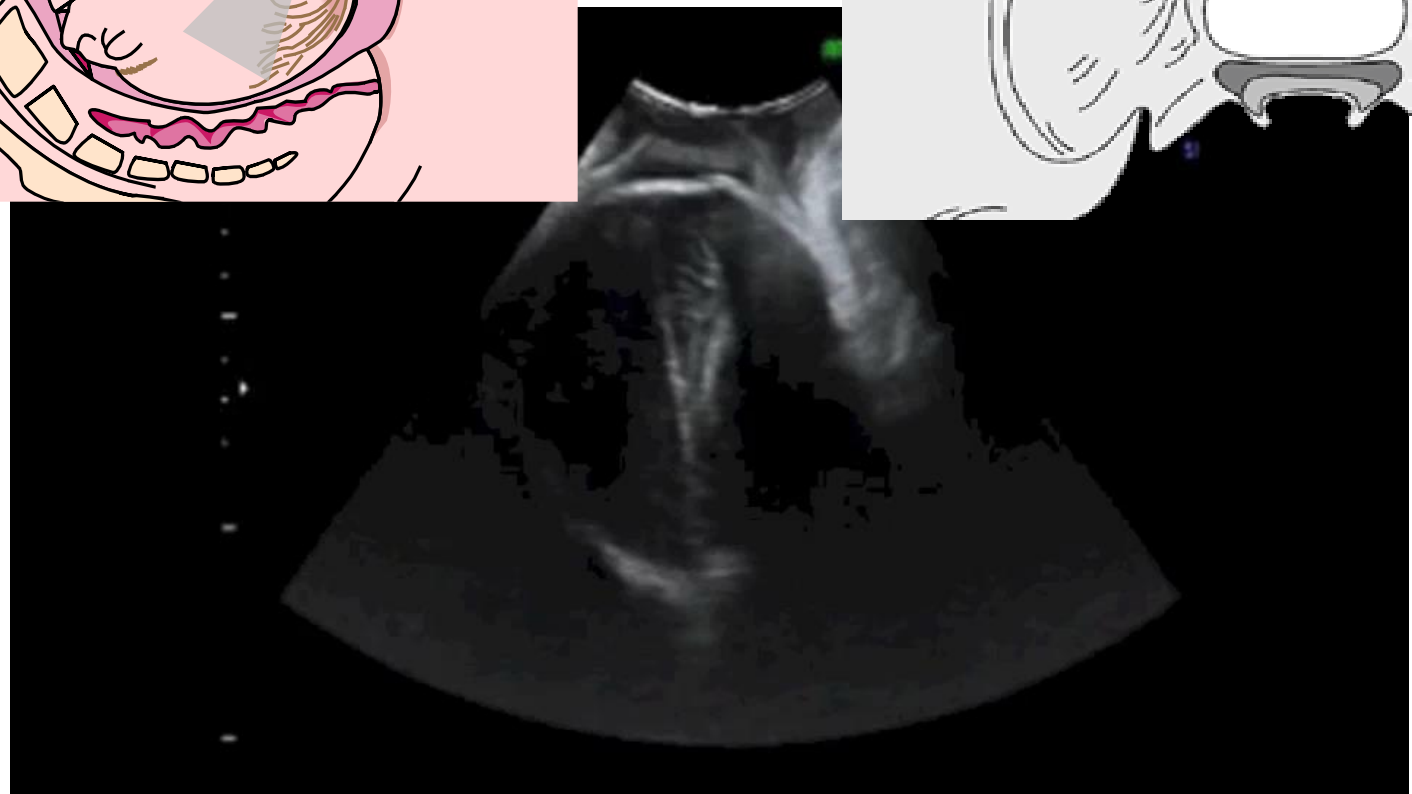




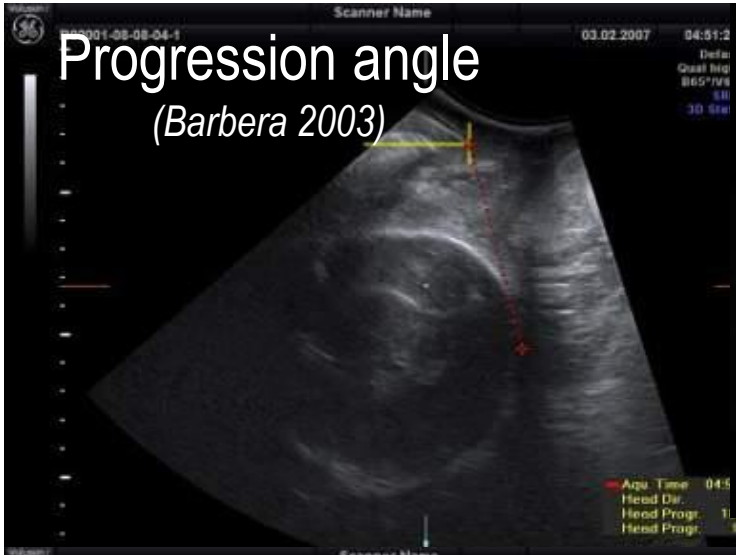





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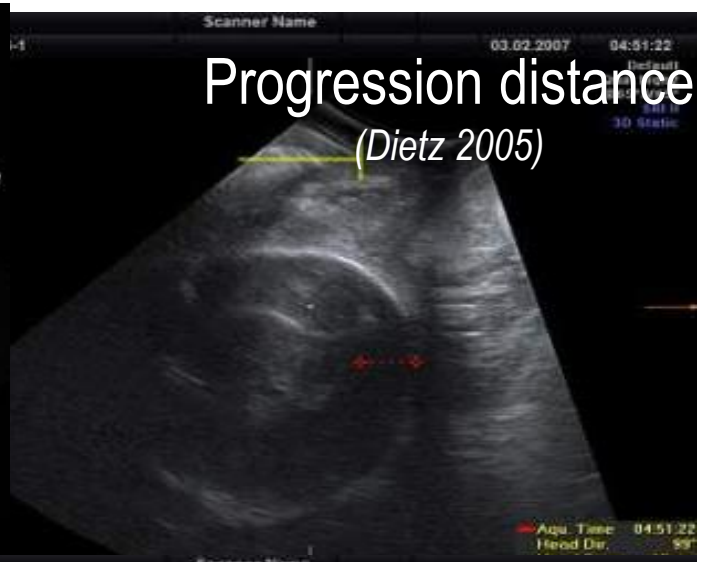
Progression angle

(Barbera 2003)



Head-Perineum distance

(Eggebo 2006)



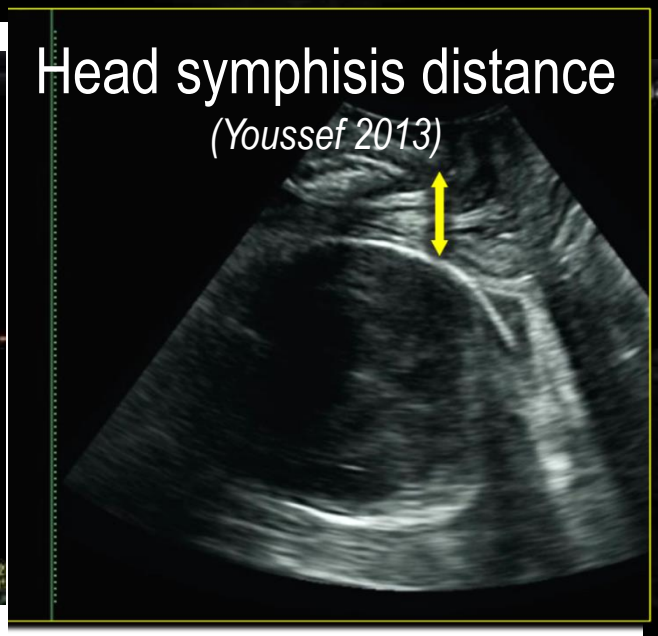
Progression distance

(Dietz 2005)



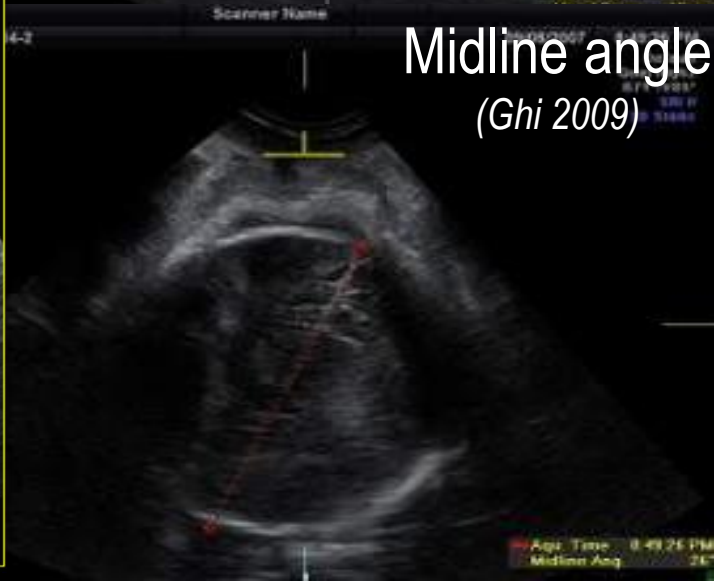
Head direction

(Henrich 2006)



Head symphisis distance

(Youssef 2013)

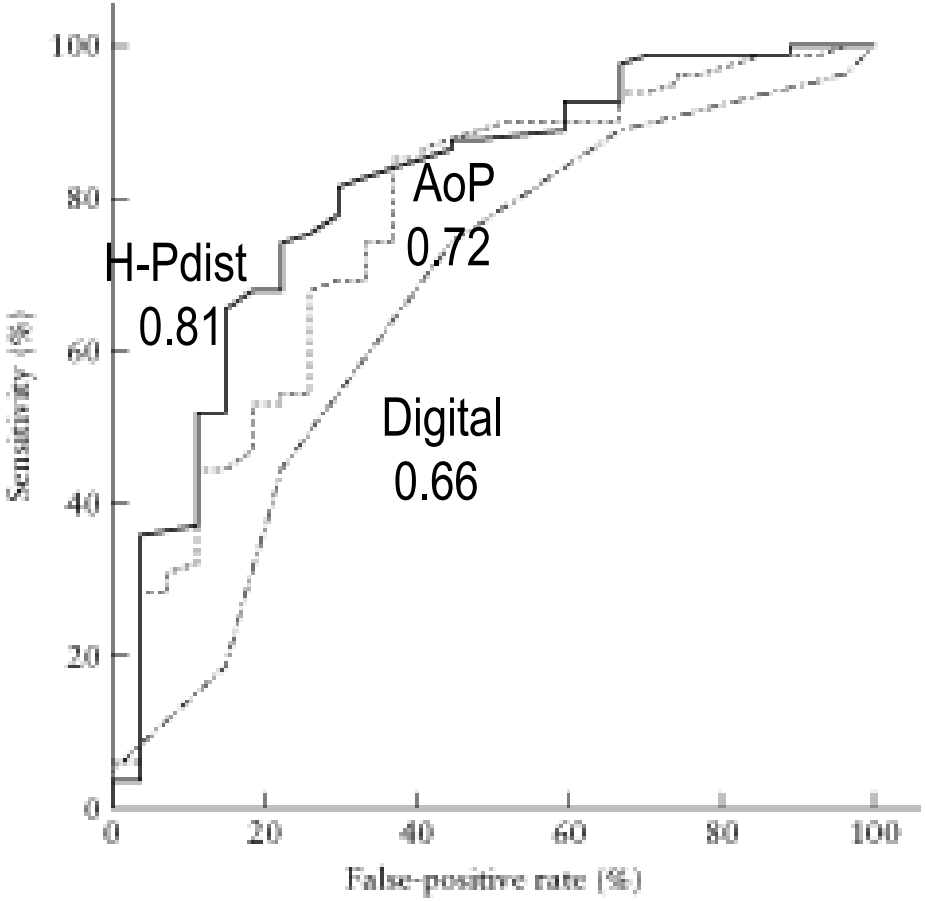


Midline angle

(Ghi 2009)

Sonographic prediction of vaginal delivery mode in prolonged first stage of labor

Eggebo et al, UOG 2014



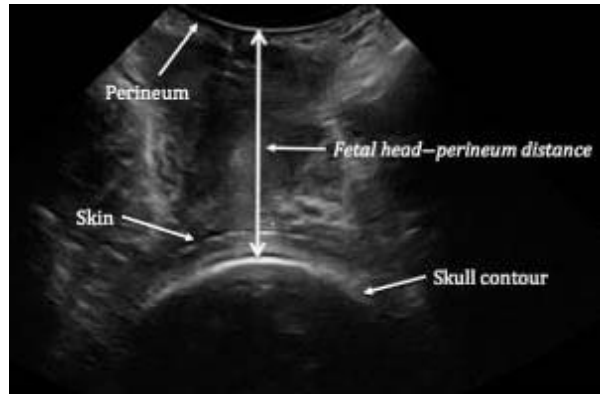
Angle of Progression

- ≥110° : Vag deliv 88%
- <100° : Vag deliv 38%

Head Perineum distance:

- ≤40 mm: Vag deliv 93%
- >50 mm: Vag deliv 18%





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Ultrasound Obstet Gynecol 2014; 43: 189–194
Published online in Wiley Online Library (wileyonlinelibrary.com). DOI: 10.1002/uog.13212

The sonopartogram: a novel method for recording progress of labor by ultrasound

W. A. HASSAN*, T. EGGEBØ†‡, M. FERGUSON§, A. GILLETT¶, J. STUDD**, D. PASUPATHY¶ and C. C. LEES*††

**Fetal Medicine Department, Rosie Hospital, Cambridge University Hospitals NHS Foundation Trust, Cambridge, UK; †Department of Obstetrics and Gynaecology, Stavanger University Hospital, Stavanger, Norway; ‡National Center for Fetal Medicine, Trondheim University Hospital (St Olavs Hospital), Trondheim, Norway; §Delivery Unit, Rosie Hospital, Cambridge University Hospitals NHS Foundation Trust, Cambridge, UK; ¶Women's Health Academic Centre, King's College London, King's Health Partners, St. Thomas' Hospital, London, UK; **46 Wimpole St, London, UK; ††Department of Development and Regeneration, Katholieke Universiteit Leuven, Leuven, Belgium*

SONOPARTOGRAM

HOSP. NO :
SURNAME :
FORENAME :

AGE :
CONSULTANT :

DATE
EDD
PARITY

SPECIAL INSTRUCTIONS:

INITIAL ASSESSMENT: Time:
1. Fetal head descent
2. Fetal head position
3. Cervical dilatation
4. Deepest pool of amniotic fluid
5. Umbilical artery Doppler

Time SROM:
Time ARM:

DURATION OF LABOUR IN HOURS

FETAL HEART RATE

CAPUT

MOULDING

CERVICAL DILATATION SCORE (3,2,1,0)

CERVICAL DILATATION (cm)

HEAD POSITION

AMNIOTIC FLUID (N,I,M)
OXYTOCIN
ml/hr

CONTRACTIONS PER 10 MIN

INITIALS



CAPUT: SAGITTAL VIEW OF THE HEAD
TRANSPERINEAL ULTRASOUND

0 No caput
1 0-1cm Skull-Skin distance
2 1-2cm Skull-Skin distance
3 2-3cm Skull-Skin distance



MOULDING: OVERLAPPING OF SUTURES
TRANSPERINEAL ULTRASOUND

Yes
No



3 2 1 0

>75% 50-75% 25-50% <25%

Cervix Cervix Cervix Cervix



FETAL HEAD DESCENT
TRANSPERINEAL ULTRASOUND

Fetal head-perineum distance (cm)



FETAL HEAD POSITION
TRANSABDOMINAL ULTRASOUND

> 09:30 - < 02.30 OA
02:30 - 04:30 LOT
08.30 - 09.30 ROT
> 05:30 - < 08.30 OP

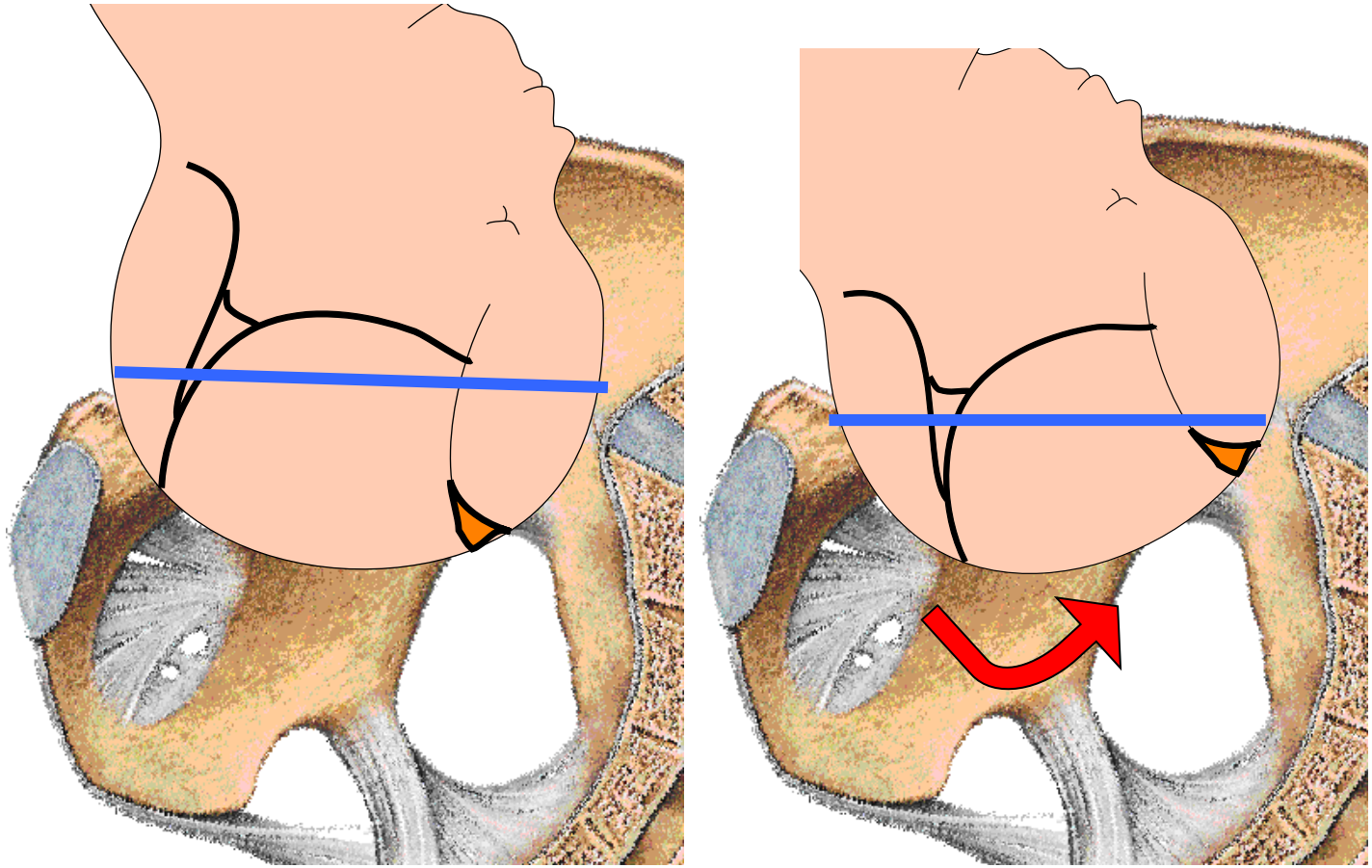
Prediction of delivery mode by ultrasound assessed fetal position in nulliparous women with prolonged first stage of labor

Eggebo et al, UOG 2015

Characteristic	*Non-OP position* (n = 92)	*OP position* (n = 50)	P*
Maternal			
Age (years)	29 (18–41)	30 (18–44)	0.85
Body mass index (kg/m^2)	24 (17–37)	23 (17–42)	0.58
GA at assessment (weeks)	40 (37–42)	40 (37–42)	0.89
White European ethinicity	80 (87)	42 (84)	0.63
Labor			
Induction of labor	28 (30)	15 (30)	0.92
Augmentation of labor	81 (88)	41 (82)	0.47
Epidural analgesia	86 (93)	45 (90)	0.46
Cesarean section delivery	16 (17)	19 (38)	0.01
Operative vaginal delivery	35 (38)	13 (26)	0.15
Postpartum bleeding (mL)	400 (150–2000)	450 (100–2500)	0.31
Neonatal			
Birth weight (g)	3625 (2430–5020)	3548 (2560–4770)	0.61
Apgar score at 1 min	9 (2–10)	9 (4–10)	0.45
Apgar score at 5 min	10 (4–10)	10 (6–10)	0.22
UA pH (n = 109)	7.23 (7.02–7.33)	7.23 (7.00–7.36)	0.87
UA base deficit (n = 107)	3 (–1 to 13)	3 (–2 to 12)	0.68

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Fetal attitude and head descent



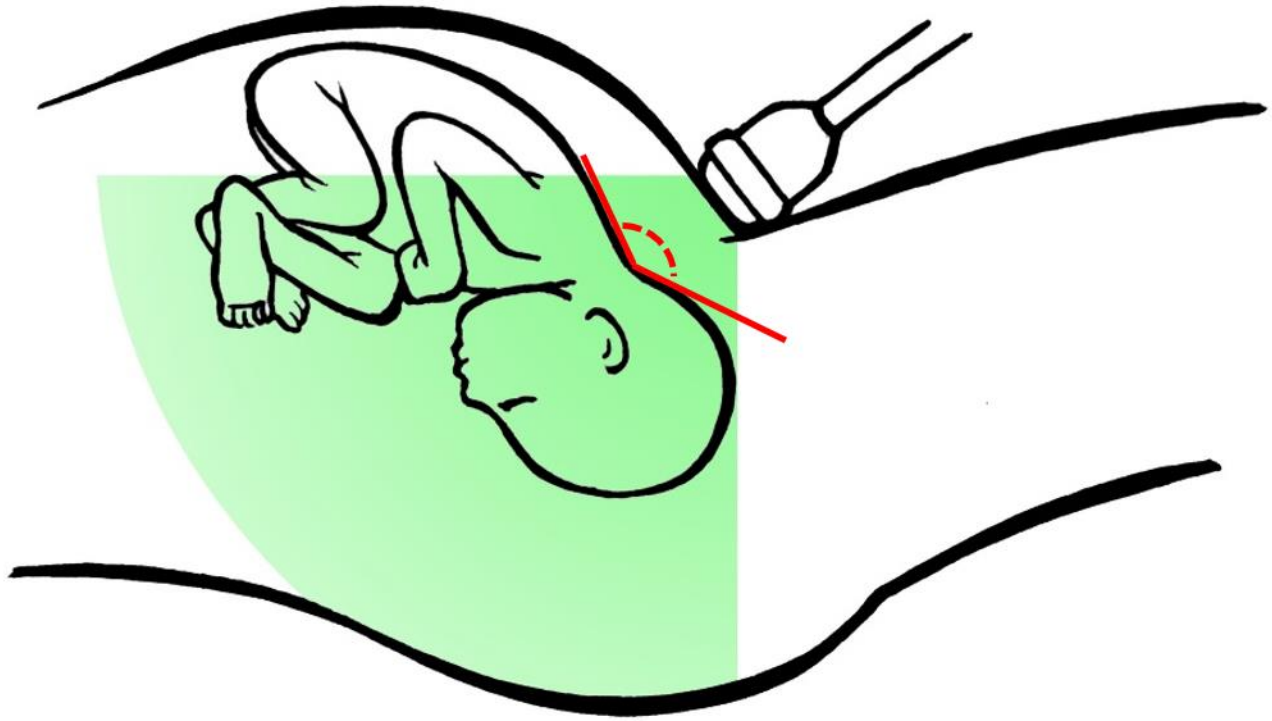
Head flexion

(fronto-occiput 11.5 cm→ subocciput-sinciput 9.5 cm

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The Occiput-Spine angle: a new sonographic index of fetal head deflexion in stage 1 of labor

Ghi et al Am J Ob Gyn 2016



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The Occiput-Spine angle: a new sonographic index of fetal head deflexion in stage 1 of labor

Ghi et al Am J Ob Gyn 2016

- To quantify the degree of fetal head deflection using sonography during the first stage of labor;
- To determine if a parameter derived from ultrasound examination (the occiput-spinal angle) has a relationship with the course and outcome of labor.

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The Occiput Spine Angle (OSA) measurement

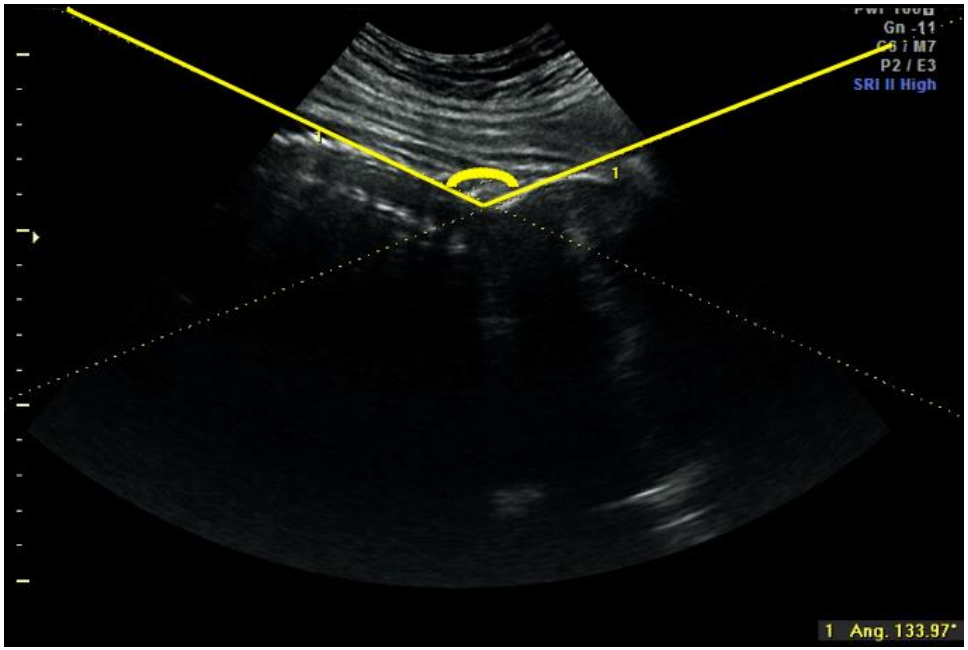


Figure 1. Normal OSA: 133,97°

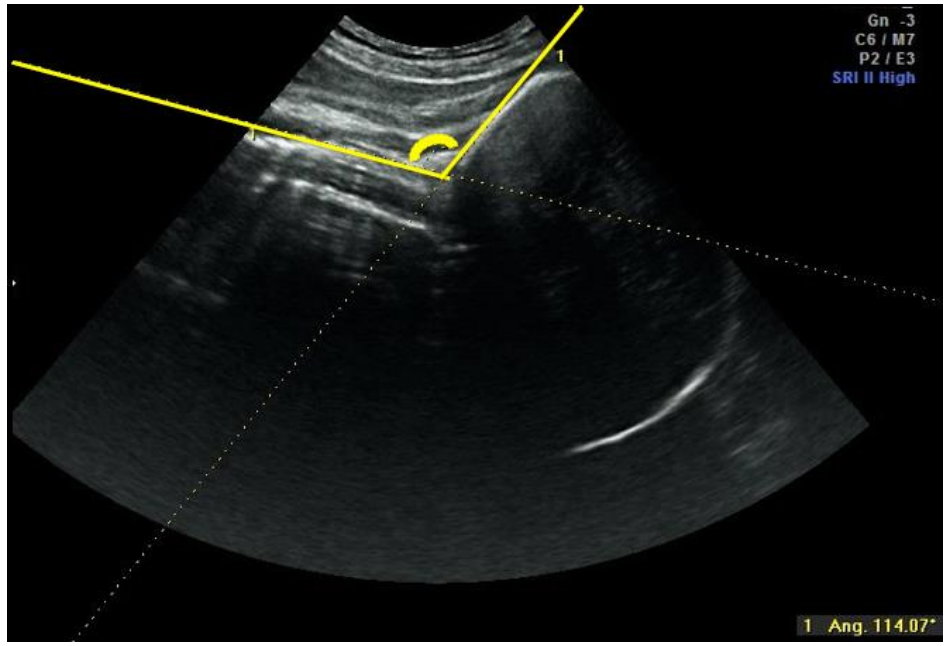
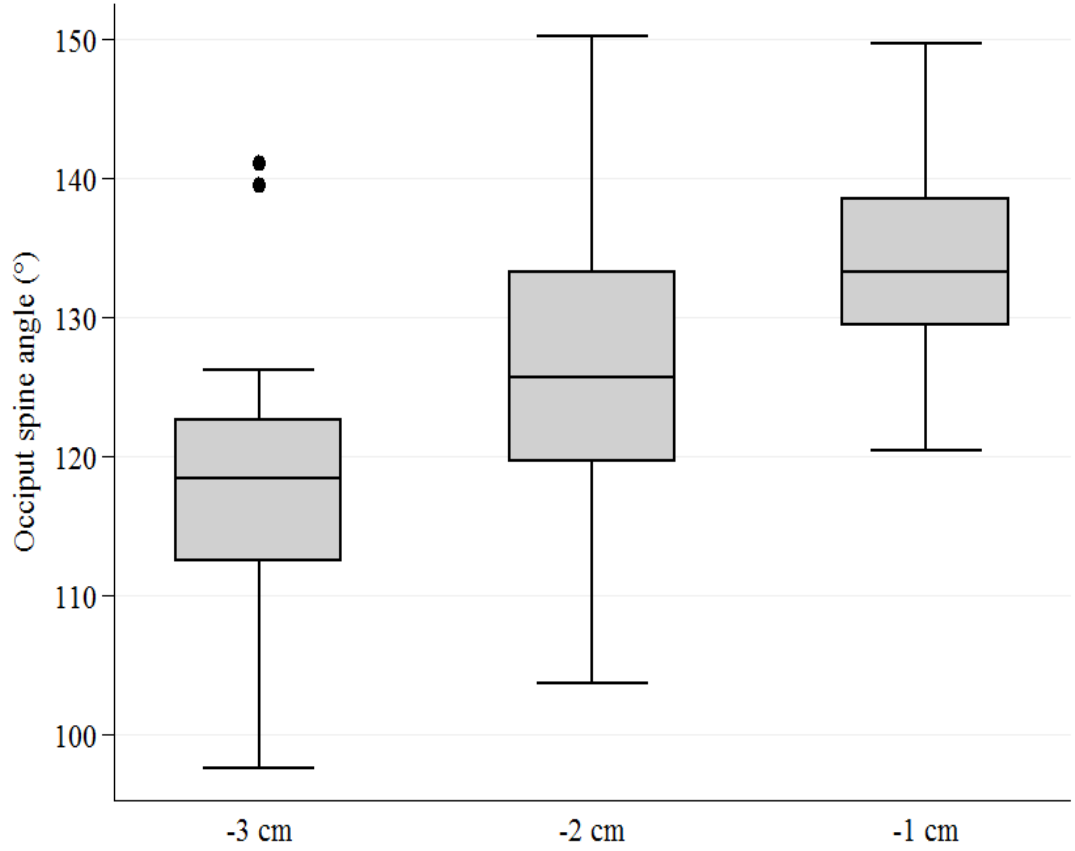


Figure 2. Narrow OSA: 114,07°

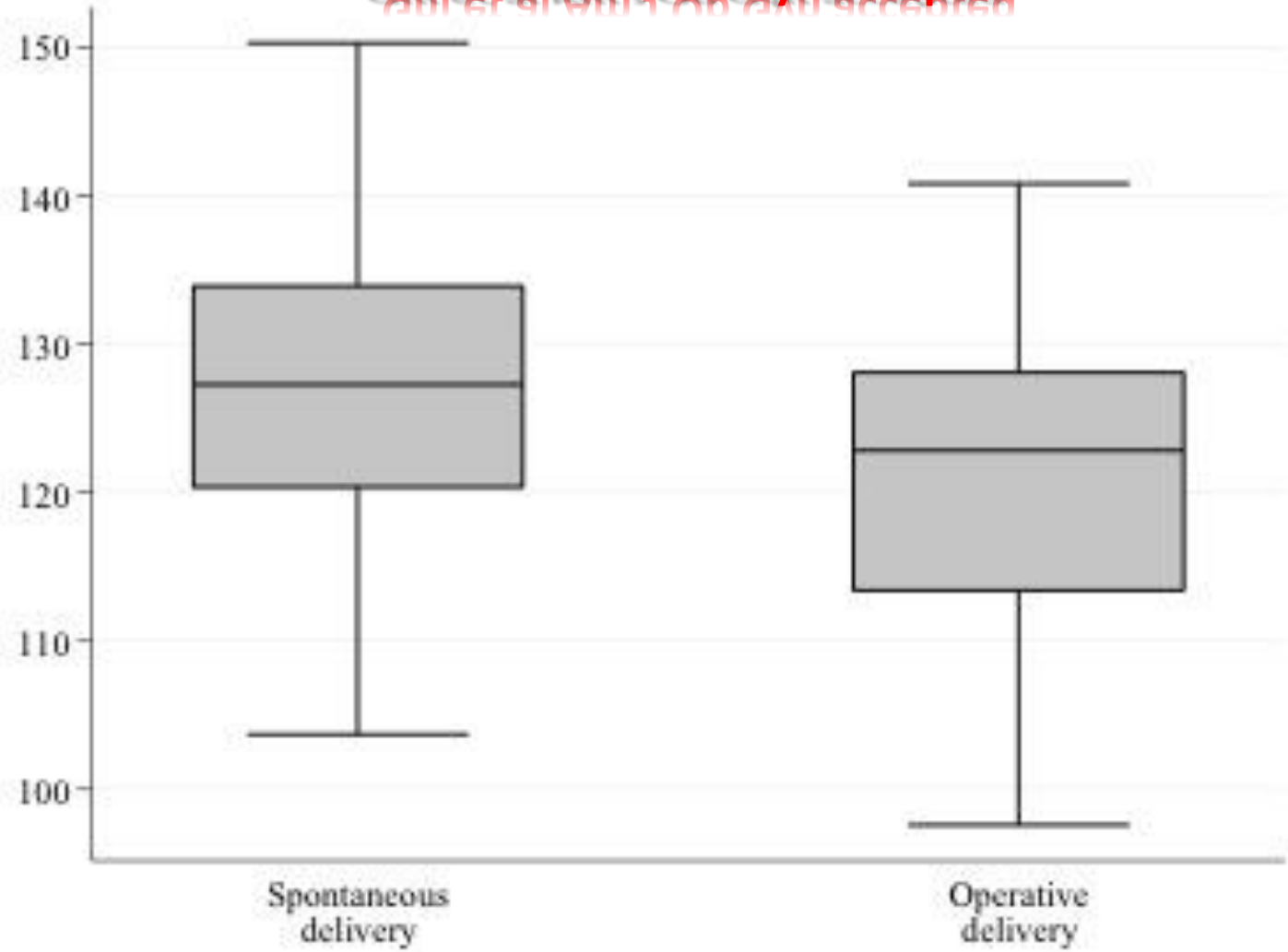
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The distribution of OSA values according to the fetal head station



The Occiput-Spine angle: a new sonographic index of fetal head deflexion in stage 1 of labor

Ghi et al Am J Ob Gyn accepted



OSA < in TC/vacuum vs parto spont (121.2 vs 127.2 p<.005)

The multivariable logistic regression in the prediction of operative delivery due to labor arrest

Maternal and obstetric characteristic	Odd Ratio (OR)	*P* value	95% CI
Narrower Occiput-Spine Angle	1.08	0.01	1.02-1.14
Nulliparity	16.11	<0.01	2.00-130.14

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Relationship between occiput spine angle and parity and labor duration (Cox model)

Variables	Hazard Ratio (HR)	*P* value	95% CI
Occiput-Spine Angle	1.72	<0.01	1.16-2.55
Multiparity	3.02	<0.001	1.97-4.62

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Original Paper

Fetal Diagnosis and Therapy

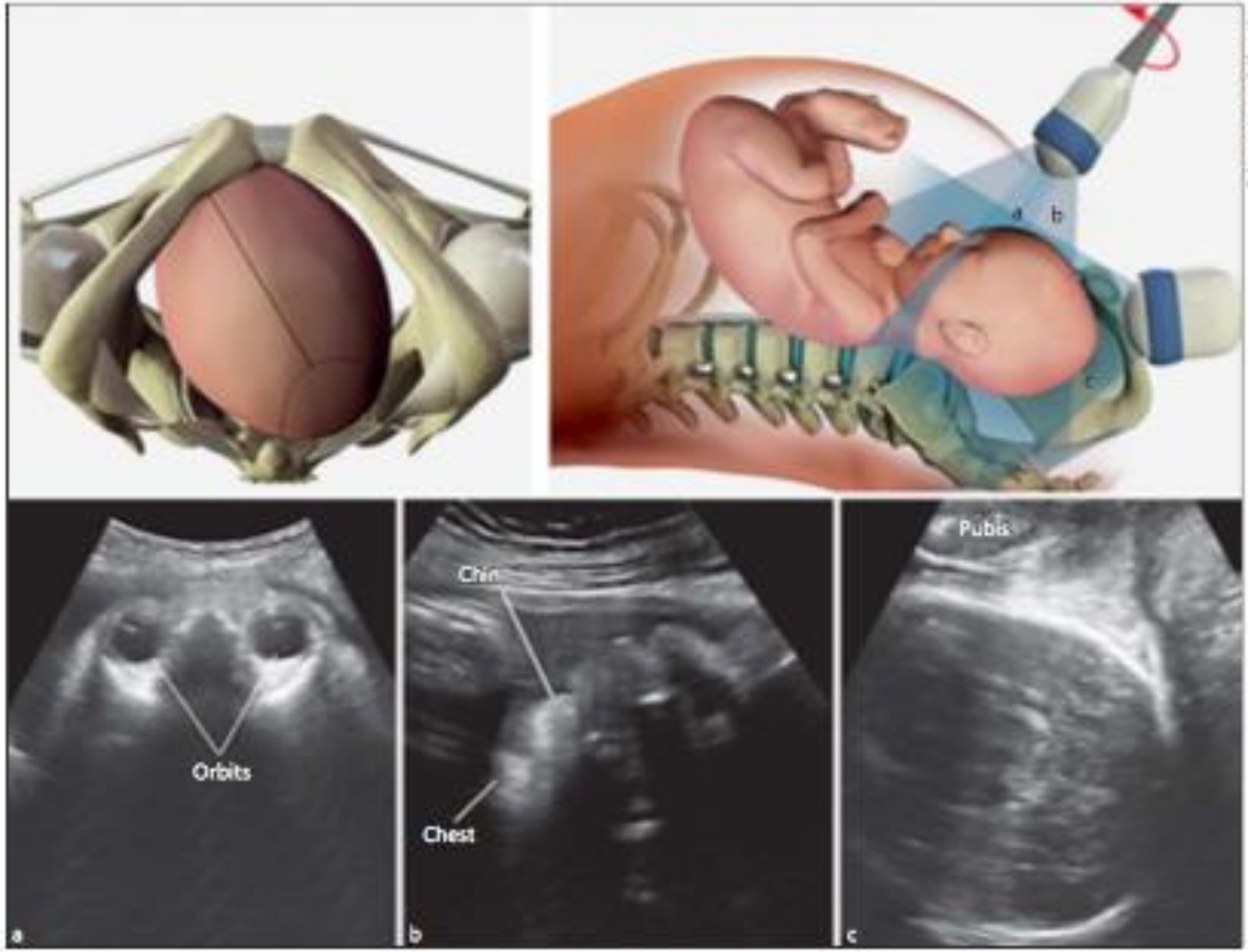
Fetal Diagn Ther
DOI: 10.1159/000457124

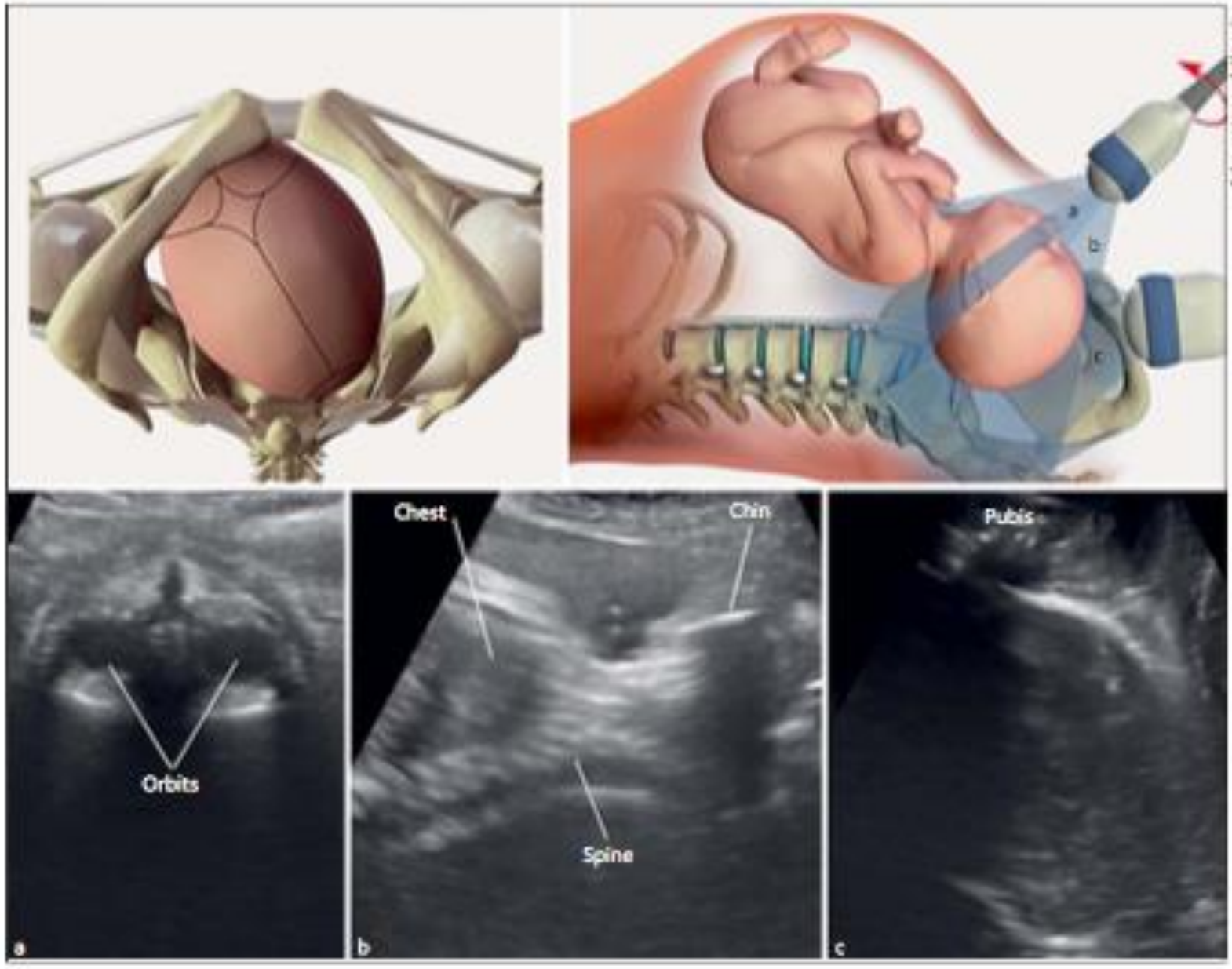
Received: October 27, 2016
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Intrapartum Ultrasound to Differentiate Flexion and Deflexion in Occipitoposterior Rotation

Federica Bellussi[a] Tullio Ghi[b] Aly Youssef[a] Ilaria Cataneo[a] Ginevra Salsi[a]
Giuliana Simonazzi[a] Gianluigi Pilu[a]

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a
b
Orbits
Chin
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a
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Orbits
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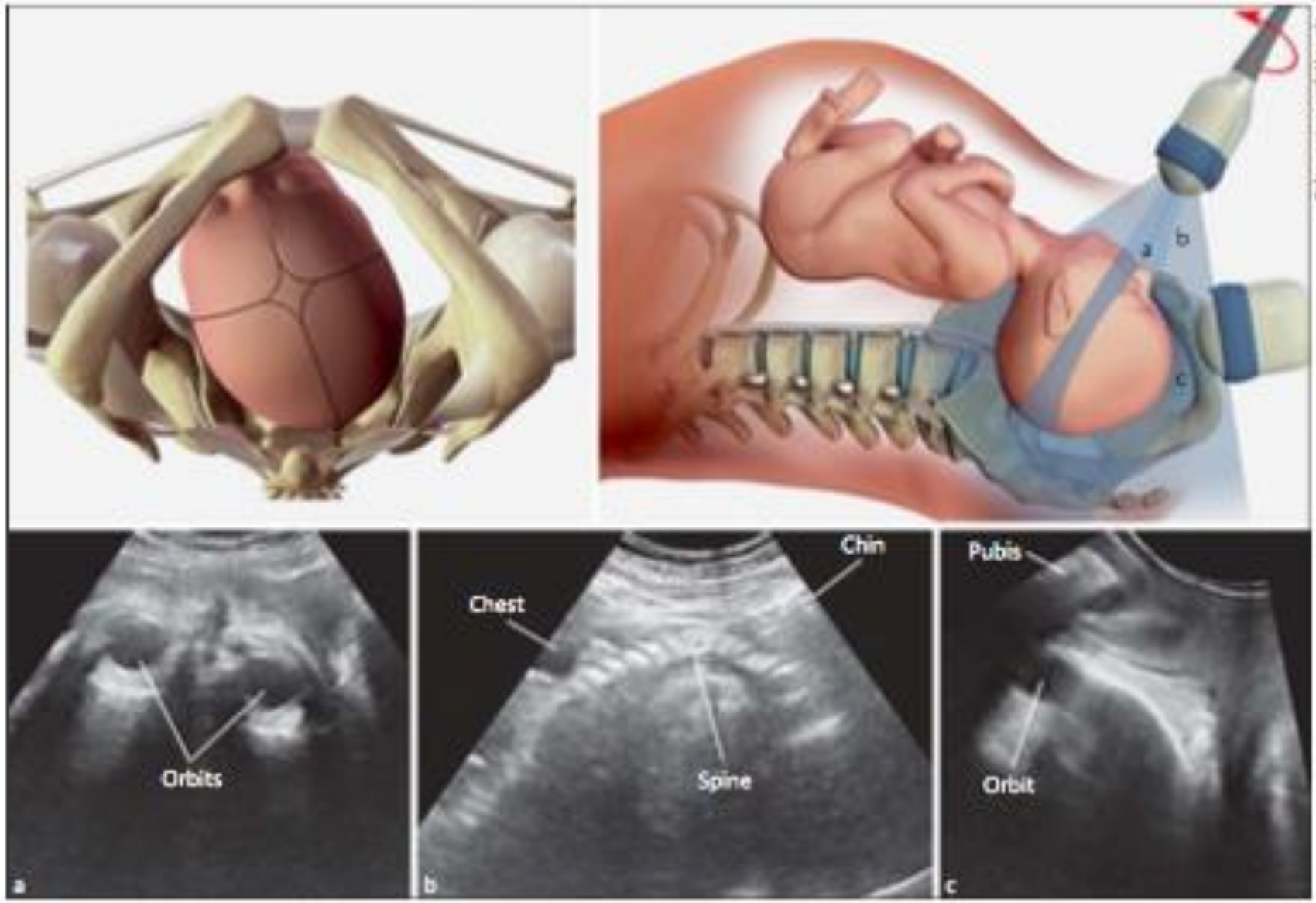

a
b
c
Orbits
Chest
Chin
Spine
Pubis
Orbit
a
b
c

Table 1. Maternal, obstetric, and newborn characteristics stratified by type of presentation

	All cases	Normal flexion	Deflexion	*p*
Cases	42	36	6	–
Parity ≥1	10 (24%)	10 (28%)	0	0.3076[c]
Gestational age, weeks	40 (2.3)[a]	40.3 (2.2)[a]	40 (2.9)[a]	0.3441[d]
Birth weight, g	3,490 (520)[a]	3,590 (497)[a]	3,130 (322)[a]	0.0016[d]
Induction of labor	22 (52%)	20 (55%)	2 (33%)	0.4004[c]
Epidural analgesia	24 (57%)	21 (58%)	3 (50%)	1.000[c]
Ultrasound scan performed because of prolonged labor	27 (64%)	23 (63%)	3 (50%)	0.6580[c]
Ultrasound scan performed because of abnormal cardiotocography	15 (36%)	13 (37%)	3 (50%)	0.6580[c]
Cervical dilatation at the time of ultrasound scan, cm	10 (8–10)[b]	10 (8–10)[b]	10 (8–10)[b]	0.5148[d]
Second stage at the time of ultrasound scan	18/46 (39%)	16/36 (44%)	2/6 (33%)	0.6852[c]
Station at the time of ultrasound scan, cm	0 (–2 to +1)[b]	0 (–2 to +1)[b]	–1 (–2 to 0)[b]	0.0738[d]
Spontaneous vaginal delivery	12 (29%)	12 (33%)	0	0.1589[c]
Vacuum	11 (26%)	11 (31%)	0	0.1724[c]
Cesarean delivery	19 (45%)	13 (36%)	6 (100%)	0.0052[c]
Umbilical artery pH <7.20	9 (21%)	9 (25%)	0	0.3120[c]

[a] Median (interquartile range); [b] median (range); [c] Fisher exact test, two-tailed *p*; [d] Mann-Whitney test.

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Commenti

- Arresto secondario del I stadio tra le cause piu' comuni di TC
- Nella maggiorparte dei casi dovuto a rallentamento della discesa della testa
- Malposizioni e malpresentazioni
- L'ecografia in sala parto sembra promettente nell'identificare visivamente questi quadri e aiutare il medico nella gestione clinica del travaglio di parto

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Criteria for 2nd stage arrest

(ACOG bulletin 2003)

- Estrema variabilità
- Nello stadio 2, criteri variabili in base a parita' e/o epidurale (1-3 ore)

Nullipare con epidurale	3h
Nullipare senza epidurale	2h
Pluripare con epidurale	2h
Pluripare senza epidurale	1h

- 'The only duration does not mandate delivery'

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Evoluzione del travaglio attivo

- La linea di progressione indicata dai partogrammi indica l'evoluzione media di un parto
- Scostamenti anche significativi dalla linea delle medie sono compatibili con parti assolutamente fisiologici
- Non esiste un criterio assoluto per definire patologico uno scostamento; le azioni dipendono dal quadro clinico generale e dalla interazione con la paziente

Randomized controlled trial of prolonged second stage: extending the time limit vs usual guidelines

Alexis C. Gimovsky, MD; Vincenzo Berghella, MD

SMFM

FIGURE 2
Delivery outcomes

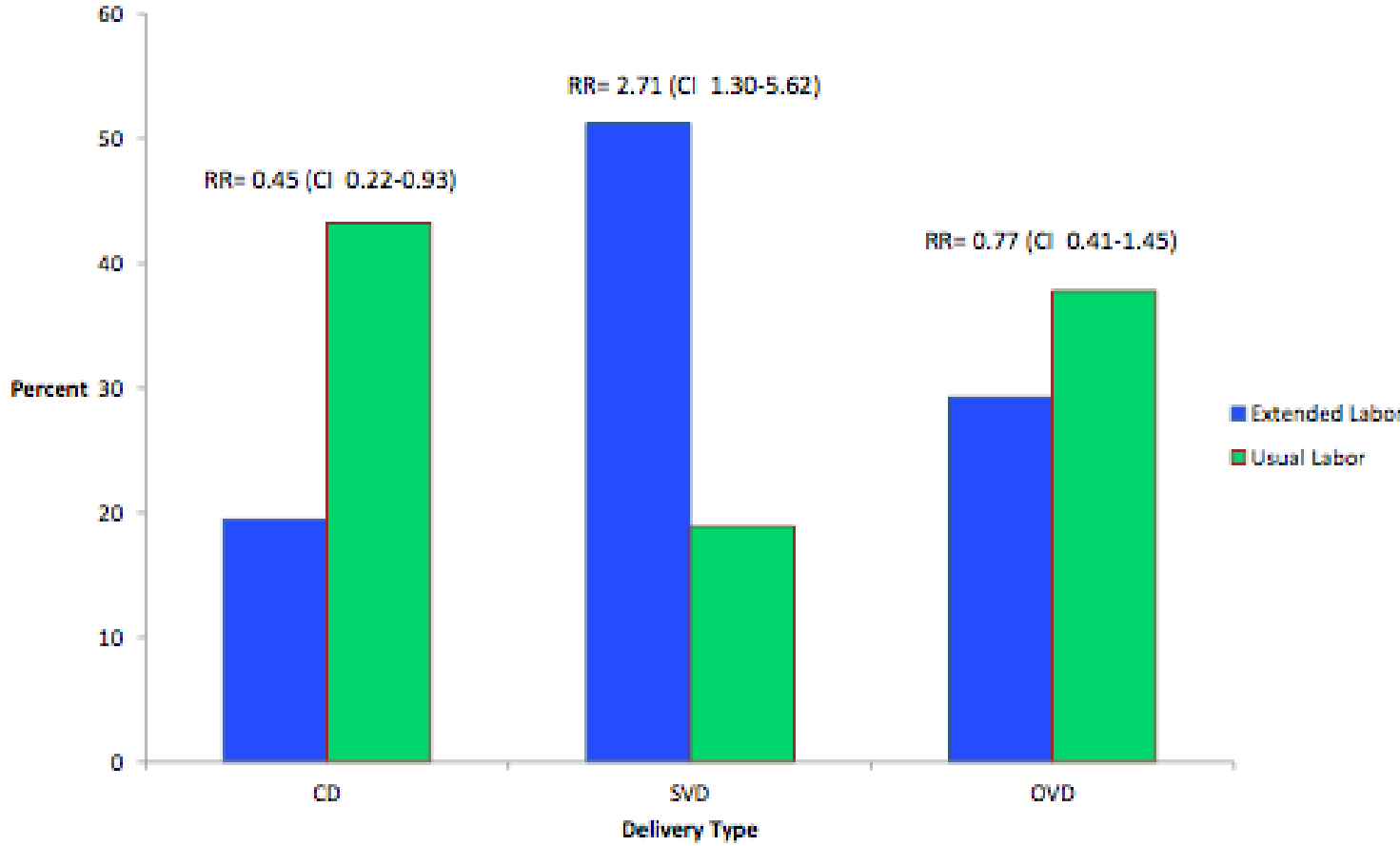


TABLE 2
Maternal outcomes

Outcome	Extended labor (n = 41), n (%)	Usual labor (n = 37), n (%)	Relative risk	95% Confidence interval
Cesarean delivery	8 (19.5)	16 (43.2)	0.45	0.22–0.93[a]
Vaginal delivery	33 (80.5)	21 (56.8)	1.42	1.03–1.95[a]
Spontaneous vaginal delivery	21 (51.2)	7 (18.9)	2.71	1.30–5.62[a]
Operative vaginal delivery	12 (29.3)	14 (37.8)	0.77	0.41–1.45[a]
Chorioamnionitis	11 (26.8)	13 (35.1)	0.76	0.39–1.49[a]
Endometritis	1 (2.4)	1 (2.7)	0.90	0.06–13.92[b]
Postpartum hemorrhage	8 (19.5)	3 (8.1)	2.41	0.67–8.40[b]
Transfusion	1 (2.4)	0	Not estimable	Not estimable
Third-/fourth-degree perineal laceration	6 (14.6)	1 (2.7)	5.41	0.68–42.90[b]
Cervical laceration	0	0	—	—

[a] Chi-square test; [b] Fisher's exact test.

Gimovsky & Berghella. Randomized controlled trial of prolonged second stage. Am J Obstet Gynecol 2016.

TABLE 3
Neonatal outcomes

Outcome	Extended labor (n = 41)	Usual labor (n = 37)	Relative risk	95% Confidence interval	*P* value
Shoulder dystocia, n (%)	1 (2.4)	0 (0)	Not estimable	Not estimable	—
Birthweight, g[a]	3437 ± 527	3506 ± 534	—	—	.6[b]
Neonatal intensive care unit admission, n (%)	13 (31.7)	14 (37.8)	0.8	(0.46–1.54)	
Continuous positive airway pressure or greater, n (%)	1 (2.4)	3 (8.1)	0.3	(0.03–2.77)	
Sepsis, n (%)	0	0	—	—	—
Seizure, n (%)	0	0	—	—	—
Umbilical artery cord pH <7.10, n (%)	0	0	—	—	—
Perinatal death, n (%)	0	0	—	—	—
Neonatal intensive care unit length of stay, d[a]	2.66 ± 1.02	4.03 ± 5.67	—	—	.3[c]

[a] Data are given as mean ± standard deviation; [b] Two sample *t*-test; [c] Wilcox Rank-Sum test.

Gimovsky & Berghella. Randomized controlled trial of prolonged second stage. Am J Obstet Gynecol 2016.

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Durata del secondo stadio e outcome materno e perinatale

Rouse et al, *Eunice Kennedy Shriver NICH* Am J Ob Gyn 2009
Cheng et al, Ob Gyn 2004 2007, Le Ray et al, Am J Ob Gyn 2009

- La > durata del secondo stadio (oltre 3 h) di per se' non comporta dei rischi se il travaglio procede regolarmente
- I rischi di interventi ostetrici e complicazioni materne e perinatali sono comunque bassi e non sembrano dipendere dalla durata ma dalla causa di distocia o dalla gestione ostetrica

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ACOG/SMFM CONSENSUS www.AJOG.org

ACOG/SMFM OBSTETRIC CARE CONSENSUS

Safe prevention of the primary cesarean delivery

This document was developed jointly by the American College of Obstetricians and Gynecologists (the College) and the Society for Maternal–Fetal Medicine with the assistance of Aaron B. Caughey, MD, PhD; Alison G. Cahill, MD, MSCI; Jeanne-Marie Guise, MD, MPH; and Dwight J. Rouse, MD, MSPH

Am J Obstet Gynecol 2014

TABLE 1

Selected verbatim recommendations from executive summary of *Eunice Kennedy Shriver* National Institute of Child Health and Human Development, Society for Maternal-Fetal Medicine, and American Congress of Obstetricians and Gynecologists workshop entitled "Preventing the first cesarean delivery"[2]

Second-stage arrest:
No progress (descent or rotation) for:
≥4 h in nulliparous women with epidural
≥3 h in nulliparous women without epidural
≥3 h in multiparous women with epidural
≥2 h in multiparous women without epidural

Recommendations for safe prevention of primary cesarean delivery

Recommendations	Grade of recommendations
Second stage of labor	
A specific absolute maximum length of time spent in second stage of labor beyond which all women should undergo operative delivery has not been identified.	1C Strong recommendation, low-quality evidence
Before diagnosing arrest of labor in second stage, if maternal and fetal conditions permit, allow for following: • At least 2 h of pushing in multiparous women (1B) • At least 3 h of pushing in nulliparous women (1B) Longer durations may be appropriate on individualized basis (eg, with use of epidural analgesia or with fetal malposition) as long as progress is being documented. (1B)	1B Strong recommendation, moderate-quality evidence
Operative vaginal delivery in second stage of labor by experienced and well-trained physicians should be considered safe, acceptable alternative to cesarean delivery. Training in, and ongoing maintenance of, practical skills related to operative vaginal delivery should be encouraged.	1B Strong recommendation, moderate-quality evidence
Manual rotation of fetal occiput in setting of fetal malposition in second stage of labor is reasonable intervention to consider before moving to operative vaginal delivery or cesarean delivery. To safely prevent cesarean deliveries in setting of malposition, it is important to assess fetal position in second stage of labor, particularly in setting of abnormal fetal descent.	1B Strong recommendation, moderate-quality evidence

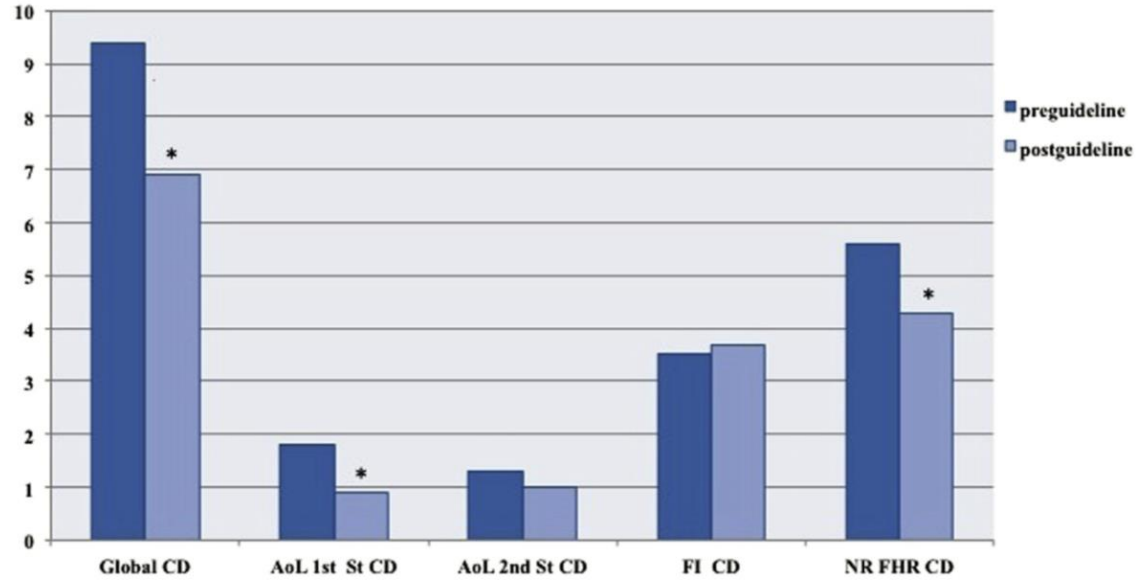
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OBSTETRICS

Impact of recommended changes in labor management for prevention of the primary cesarean delivery

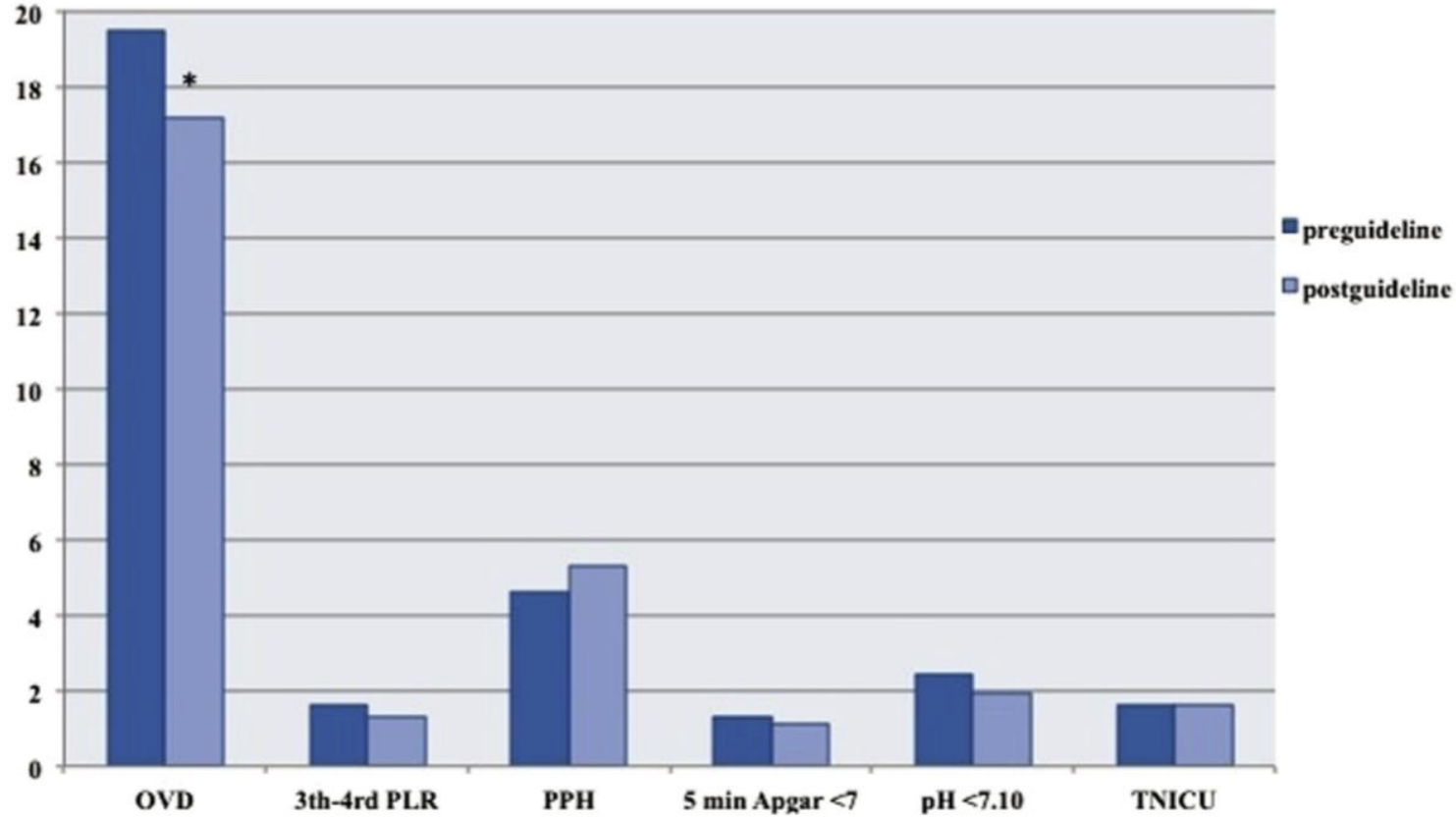
Claire Thuillier, MD; Sophie Roy, MD; Violaine Peyronnet, MD; Thibaud Quibel, MD; Aurélie Nlandu; Patrick Rozenberg, MD

FIGURE 2
Rate of cesarean delivery during the 2 periods



Asterisk indicates a value of $P < .001$.

FIGURE 3
Maternal and neonatal morbidity during the 2 periods

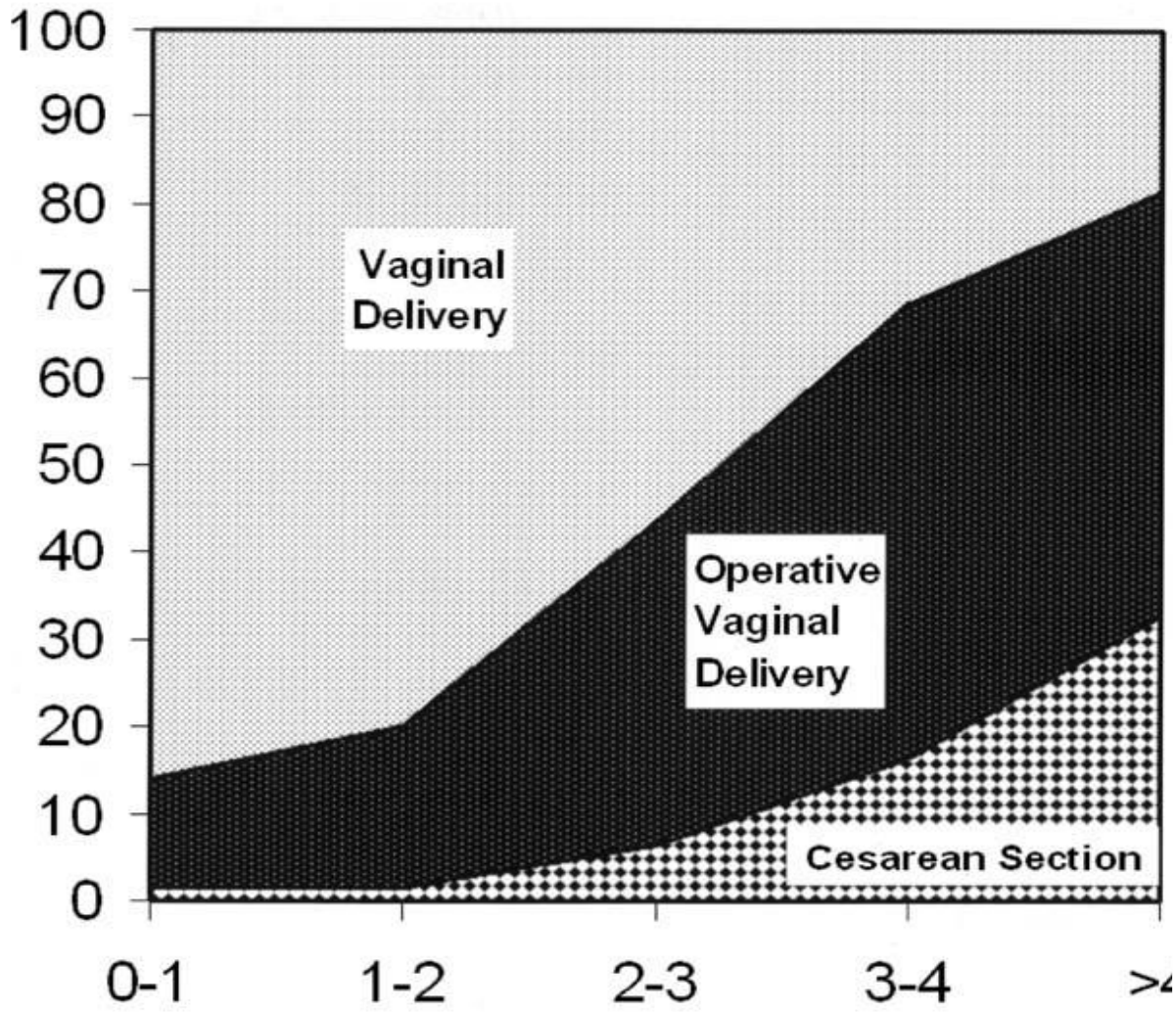


Asterisk indicates a value of $P < .001$.

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How long is too long: the duration of stage 2 and labor outcome

Cheng, Am J Ob Gyn 2004



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2nd Stage Labor: How long is too long?

Kenneth J. Leveno, MD, David B. Nelson, MD, Donald D. McIntire, PhD; AJOG 2016

TABLE 2

Reports from 2004 through 2014 on infant complications for births to nulliparous women with second-stage labor ≤3 hours compared to births >3 hours

Study	No. of women reaching second stage	No. of women with second stage >3 h	Unadjusted infant complications ≤3 h vs >3 h	Adjusted[a] infant complications ≤3 h vs >3 h
Cheng et al,[16] 2004	15,759	2909 (19%)	Not reported	No difference
Le Ray et al,[17] 2009	1862	244 (13%)	Increased Infant trauma and neonatal intensive care	No difference
Rouse et al,[18] 2009	4126	360 (9%)	Increased pH <7.0, stillbirth, and neonatal death	No difference
Allen et al,[19] 2009	55,936	9314 (17%)	Increased HIE, resuscitation at birth, and admission to intensive care	Not done
Laughon et al,[20] 2014	32,124[b]	3533 (10%)	Increased 5-min Apgar <4, asphyxia, and admission to intensive care	Not done

HIE, hypoxic ischemia encephalopathy.

[a] Logistic regression used to adjust for mode of delivery; [b] Limited to women with epidural analgesia.

Leveno. Second-stage labor: how long is too long? Am J Obstet Gynecol 2016.

TABLE 3

Outcomes of second-stage labor in 21,991 nulliparous women reaching second stage of labor at Parkland Hospital, Dallas, TX, from Jan 1, 2003, through Dec 31, 2008[21]

	Second-stage labor, N = 21,991 (100)			
Outcomes	Up to 3 h N = 20,502 (93)	3-4 h N = 1062 (5)	>4 h N = 427 (2)	*P* value
Cesarean delivery				
Total	485 (2.3)	445 (42)	368 (86)	<.001
Nonreassuring fetal heart rate	309 (1.5)	102 (10)	43 (10)	<.001
Dystocia	176 (0.8)	343 (32)	325 (76)	<.001
Infant outcomes				
5-min Apgar <4	14 (0.1)	3 (0.3)	2 (0.5)	<.001
Seizures	23 (0.1)	8 (0.8)	3 (0.7)	<.001
Intubation at delivery	50 (0.2)	7 (0.7)	7 (1.6)	<.001
Neonatal death	3 (0.001)	0	0	NS
Intensive care admission	150 (0.7)	22 (2.1)	8 (1.9)	<.001
Umbilical artery blood				
pH <7.1	566 (3)	42 (4)	15 (4)	.014
pCO2 ≥78.3 mm Hg[a]	414 (2.1)	25 (2.6)	16 (4)	.023
Base excess ≥16 mmol/L[b]	225 (1.1)	22 (2.3)	6 (1.5)	.004

Data presented as N (%). *NS*, not significant.

[a] Umbilical artery blood pCO2 ≥78.3 mm Hg = fetal respiratory acidemia; [b] Umbilical artery base excess ≥16 mmol/L = fetal metabolic acidemia.

Leveno. Second-stage labor: how long is too long? Am J Obstet Gynecol 2016.

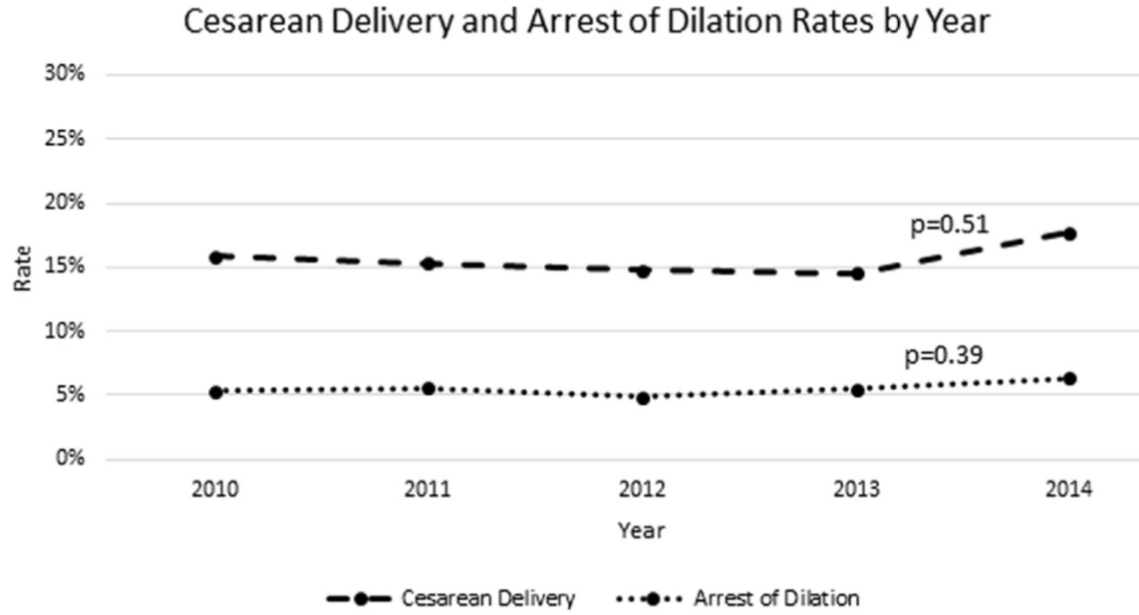
OBSTETRICS

New labor management guidelines and changes in cesarean delivery patterns

Joshua I. Rosenbloom, MD, MPH; Molly J. Stout, MD, MSCI; Methodius G. Tuuli, MD, MPH; Candice L. Woolfolk, PhD, MPH; Julia D. López, MPH, LCSW; George A. Macones, MD, MSCE; Alison G. Cahill, MD, MSCI

DECEMBER 2017 American Journal of Obstetrics & Gynecology

FIGURE
Cesarean delivery and arrest of dilation rates by year



The rates of cesarean delivery and arrest of dilation did not change from 2010 through 2014.

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TABLE 4
Maternal and neonatal outcomes

Outcome	2010	2011	2012	2013	2014	*P* trend
Adverse neonatal outcome	107 (8.0)	165 (8.3)	154 (8.7)	183 (10.8)	153 (13.6)	< .001
Maternal complication	113 (8.5)	203 (10.6)	208 (11.8)	182 (10.7)	153 (13.6)	< .001

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Original Research ajog.org

OBSTETRICS

The impact of extending the second stage of labor to prevent primary cesarean delivery on maternal and neonatal outcomes

Check for updates

Yaniv Zipori, MD; Oren Grunwald, MD; Yuval Ginsberg, MD; Ron Beloosesky, MD; Zeev Weiner, MD

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II STADIO DEL TRAVAGLIO

How long is too long?

SIEOG

- Prolungamento degli sforzi espulsivi >3h

↓ TAGLI CESAREI

↑ COMPLICANZE MATERNO-NEONATALI A BREVE TERMINE

- *Emorragia del post partum, lacerazioni III-IV grado, infezioni materne, accesso in TIN*[1]

↑ PARTI OPERATIVI

TABLE 2
Maternal outcomes

	Period 1 (n = 9300)	Period 2 (n = 10,531)	*P* value[a]	Relative risk (unadjusted) (95% CI)	Relative risk (adjusted) (95% CI)
Cesarean delivery, n (%)					
In nulliparous women[b]	819 (23.3%)	596 (15.7%)	<.0001	0.67 (0.61–0,74)	0.63 (0.58–0,70)
In multiparous women[c]	623 (10.9%)	544 (8.1%)	.0466	0.75 (0.67–0.84)	0.72 (0.67–0.84)
Operative vaginal delivery, n (%)					
In nulliparous women[a]	622 (17.7%)	732 (19.2%)	<.0001	1.08 (0.99–1.2)	1.1 (1.06–1.14)
In multiparous women[b]	169 (2.9%)	221 (3.3%)	.13	1.12 (0.92–1.4)	1.03 (1.015–1.04)
Third- and fourth-degree laceration, n (%)	92 (1%)	137 (1.3%)	.024	1.27 (0.98–1.66)	0.99 (0.77–1.3)
PPH, n (%)	126 (1.4%)	246 (2.3%)	<.001	1.72 (1.39–2.13)	0.99 (0.82–1.23)
Blood transfusion, n (%)	47 (0.5%)	53 (0.5%)	1	—	—
Chorioamnionitis, n (%)	9 (0.1%)	10 (0.09%)	1	—	—

CI, confidence interval; *NS*, not significant; *PPH*, postpartum hemorrhage.

[a] $P < .05$ is considered significant; [b] Of the total births for nulliparous women during period I; [c] Of the total births for multiparous women during period II.

Zipori et al. The impact of extending the second stage of labor. Am J Obstet Gynecol 2019.

1 Zipori AJOG 2019

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II STADIO DEL TRAVAGLIO

How long is too long?

SIEOG

- Prolungamento degli sforzi espulsivi >3h

↓ TAGLI CESAREI

↑ COMPLICANZE MATERNO-NEONATALI A BREVE TERMINE

- *Emorragia del post partum, lacerazioni III-IV grado, infezioni materne, accesso in TIN*[1]

↑ PARTI OPERATIVI

TABLE 3
Neonatal outcomes

	Period 1 (n = 9300)	Period 2 (n = 10,531)	*P* value	Relative risk (95% CI)
Apgar score at 1 min, mean ± SD	8.82 ± 0.4	8.81 ± 0.4	.326	—
Apgar score at 5 min, mean ± SD	9.87 ± 0.1	9.88 ± 0.1	.528	—
Apgar score at 5 min <7, n	18 (0.19%)	21 (0.2%)	.5	—
Shoulder dystocia, n	19 (0.2%)	42 (0.4%)	.016	1.92 (1.08–3.4)
Arterial cord pH ≤ 7.0, %	4 (0.04)	51 (0.48)	<.0001	9.98 (3.6–27.6)
Admission to NICU, %	93 (1)	158 (1.5)	<.001	1.53 (1.18–1.98)
Length of stay in the NICU, days	11.25 ± 5.1	9.94 ± 4.6	.105	—
Sepsis, n (%)	7 (0.075%)	13 (0.12%)	.2	—
Perinatal death, n (%)	4 (0.04%)	3 (0.03%)	.7	—
Abnormal early neurological outcome (number)	9 (0.1%)	11 (0.1%)	1	—

CI, confidence interval; *NICU*, neonatal intensive care unit; *SD*, standard deviation.

Zipori et al. The impact of extending the second stage of labor. Am J Obstet Gynecol 2019.

1 Zipori AJOG 2019

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SIEOG

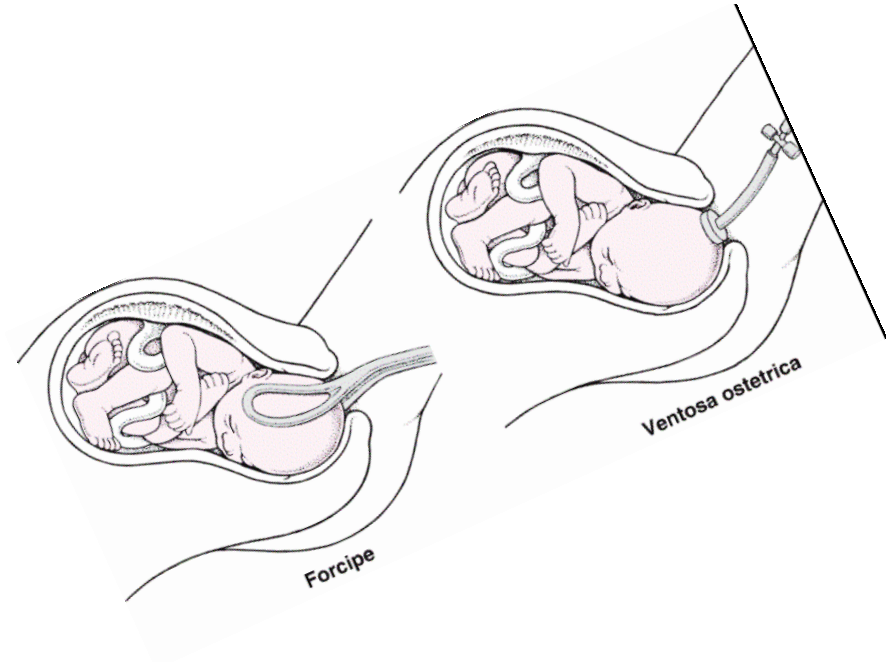
II STADIO DEL TRAVAGLIO

How long is too long?

- **Intervento ostetrico**

  → Parto strumentale o TC

- Tecnicamente complessi
- Rischi potenziali materno-neonatali
  - Cefaloematoma, frattura ossa craniche , ematoma subgaleale, emorragie intracraniche e/o retiniche ,lacerazioni faciali, paralisi del nervo faciale,paralisi del plesso brachiale



2 Walsh Ob Gyn 2014

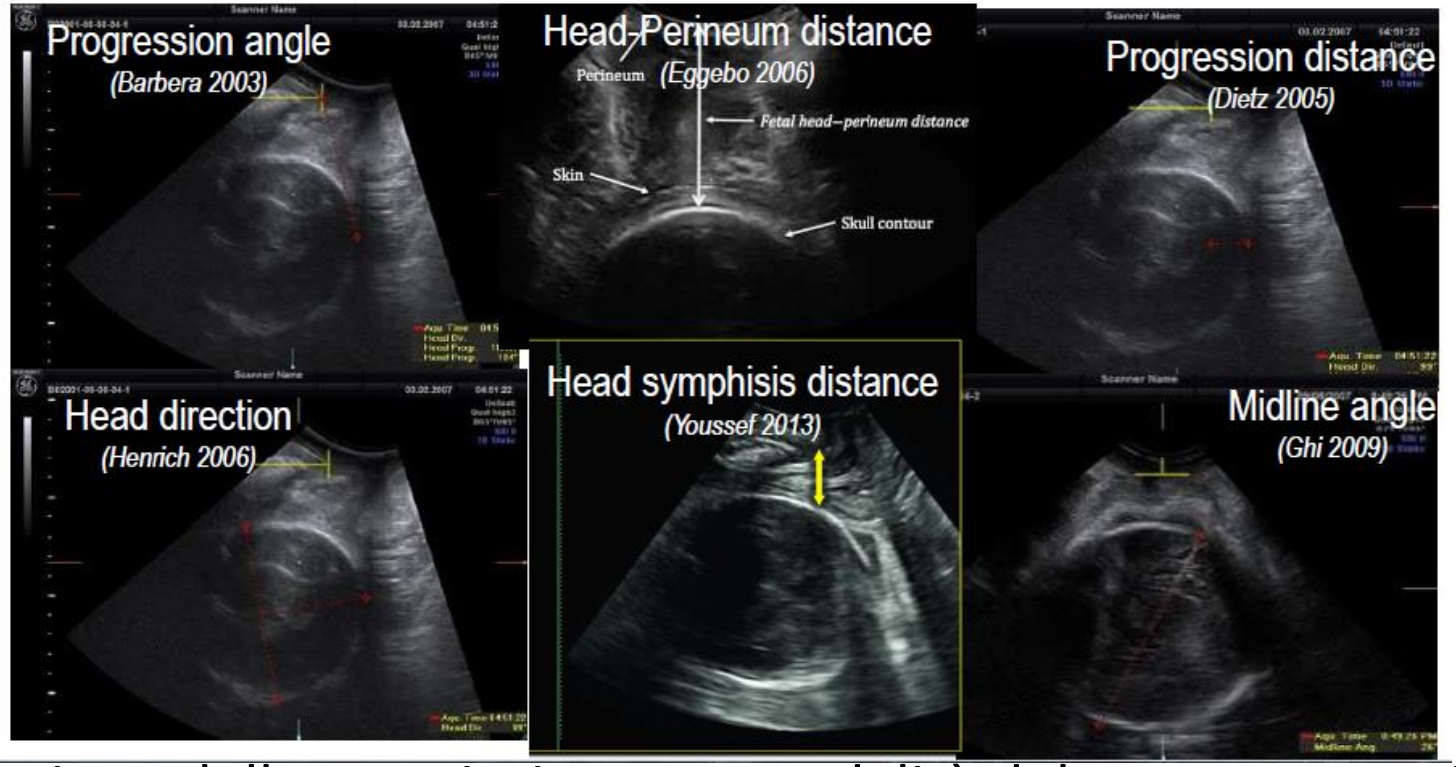
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Ecografia in sala parto e stadio 2 prolungato

- Ultrasound have been suggested as an additional tool for the physician in the management of prolonged 2nd stage of labor
- Sonographic assessment of fetal head station and position in stage 2 has proved to be reproducible and accurate
- The role of ultrasound in predicting vaginal delivery or labor outcome is under investigation

Intrapartum ultrasound for prediction of spontaneous vaginal delivery in nulliparous women with prolonged second stage of labor

Ghi et al submitted AJOG



Valutazione della associazione tra modalità del parto e reperti ecografici ottenuti sia con approccio trans-addominale (TA) che trans-perineale (TP) in nullipare con II stadio del travaglio prolungato

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LO STUDIO

Obiettivo | Materiali e Metodi | Risultati | Discussione

Outcome Primario

Confronto reperti ecografici tra

- PVS Parto Vaginale Spontaneo
- IO Intervento Ostetrico (Parti Operativi + Tagli Cesarei)

Outcome secondario

Esiti materno-neonatali avversi

- Emorragia del Post partum, lacerazioni III IV grado
- Apgar, pH arteria ombelicale, TIN

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LO STUDIO

Obiettivo | **Materiali e Metodi** | Risultati | Discussione

- Studio prospettico osservazionale di coorte
- 2 Maternità di III Livello (Ospedale Universitario di Parma e Ospedale Sant'Anna di Torino)
- Dicembre 2015 Maggio 2018

Criteri di inclusione

- > 37 SA
- Nullipara
- No malformazioni fetali
- Sforzi espulsivi attivi > 120 min

Criteri di esclusione

- Intervento ostetrico per distress materno o fetale
- Ecografia non acquisibile

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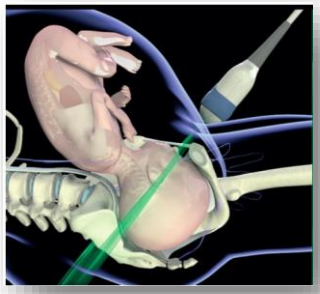
LO STUDIO

Obiettivo | **Materiali e Metodi** | Risultati | Discussione

Dopo la visita vaginale esecuzione di ecografia intrapartum

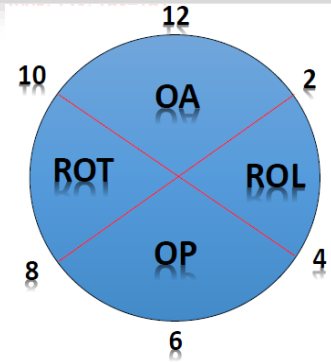
- Donna in posizione litotomica a vescica vuota

- **TA trans addominale** → sonda 3,5 mHz in regione sovrapubica



Posizione della testa fetale





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LO STUDIO

Obiettivo | **Materiali e Metodi** | Risultati | Discussione

Dopo la visita vaginale esecuzione di ecografia intrapartum

- Donna in posizione litotomica a vescica vuota

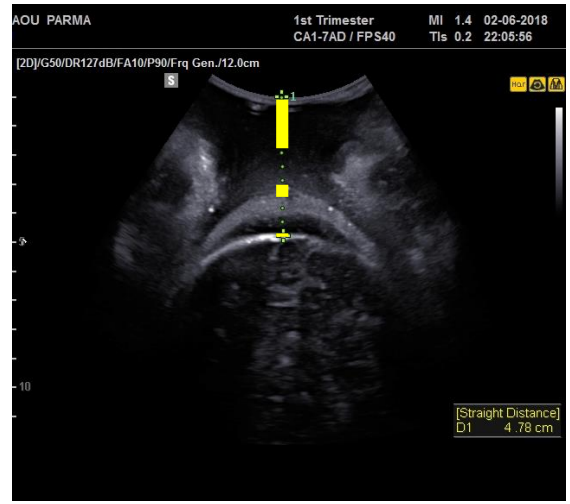
- **TP transperineale assiale**→ sonda 3,5 mHz forchetta vulvare posteriore



MLA Middle Line Angle



HPD Head Perineum Distance



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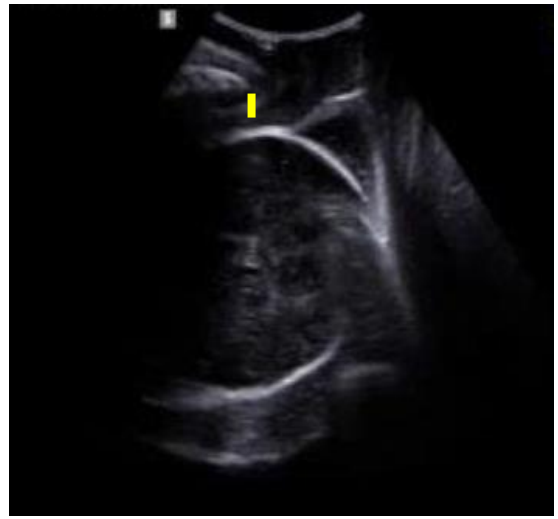
Obiettivo | **Materiali e Metodi** | Risultati | Discussione

Dopo la visita vaginale esecuzione di ecografia intrapartum

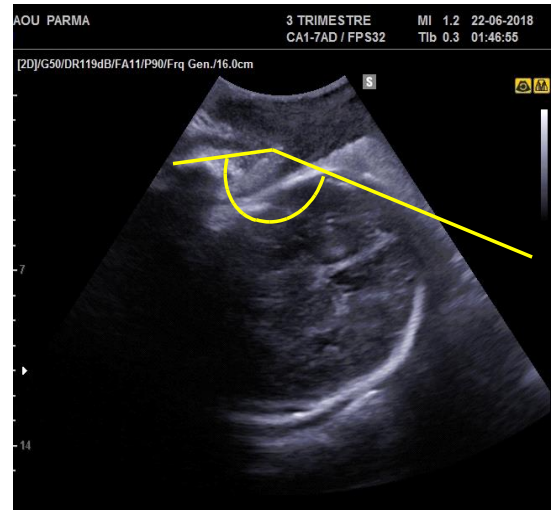
- Donna in posizione litotomica a vescica vuota
- **TP transperineale mediosagittale**→ sonda 3,5 mHz labbra vulvari



HSD Head Symphysis Distance



AoP Angolo of Progression



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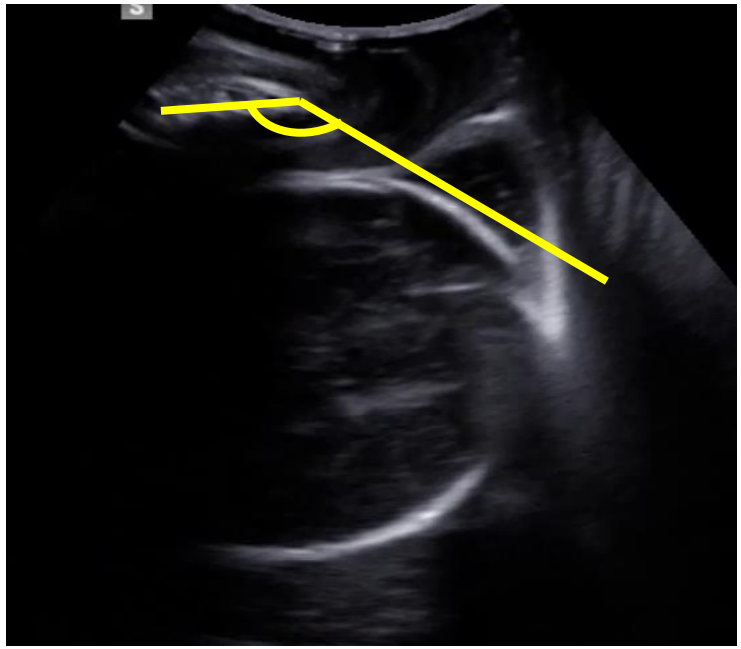
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Obiettivo | **Materiali e Metodi** | Risultati | Conclusioni

Delta AoP

A riposo



Acme della contrazione



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LO STUDIO

Obiettivo | Materiali e Metodi | **Risultati** | Conclusioni

Tab. 1 Popolazione di studio

109 pazienti incluse nello studio

Modalità del Parto	40 PVS (36,7%) 69 IO (63,3 %) [40 PO+ 29 TC]
Posizione della testa fetale	OA 72 (66.1%) Non-OA 37 (33.9%) OT 13 (11.9%) OP 24 (22.0%)
Peridurale	75/109 (68.1%)
Induzione	20/109 (18.3%)
Augmentation	71/109 (65.1%)

PVS parto vaginale spontaneo IO intervento ostetrico
OA occipito anteriore OT occipito travserso OP occipito posteriore

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LO STUDIO

Obiettivo | Materiali e Metodi | **Risultati** | Conclusioni

Tab. 2b Caratteristiche di popolazione

	PVS	IO	p value
I stadio	464 ± 224	463 ± 154	0.96
II stadio	135 ± 11	167 ± 24	<0.001
Durata del travaglio	586 ± 236	624 ± 163	0.72
Intervallo US-parto	15 ± 11	47 ± 24	<0.001

Intrapartum ultrasound for prediction of spontaneous vaginal delivery in nulliparous women with prolonged second stage of labor. Submitted to BJOG

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LO STUDIO

Obiettivo | Materiali e Metodi | **Risultati** | Conclusioni

Tab. 3 Outcome primario

	PVS	IO	p value
Posizione occipite	Non-OA 4 (10.0%)	Non-OA 33 (47.8%)	<0.001
HPD	33.2 ± 7.8	40.1 ± 9.5	0.001
MLA	29.6 ± 15.3	54.2 ± 23.6	<0.001
AoP a riposo	137.2 ± 14.8	130.3 ± 20.0	0.06
AoP sotto spinta	153.3 ± 19.8	141.8 ± 25.7	0.02
Delta AoP	17.3 ± 12.9	12.5 ± 11.0	0.04
HSD	13.1 ± 4.6	19.5 ± 8.4	<0.001

Intrapartum ultrasound for prediction of spontaneous vaginal delivery in nulliparous women with prolonged second stage of labor. Submitted to BJOG

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Obiettivo | Materiali e Metodi | **Risultati** | Conclusioni

Tab. 5 Regressione Logistica

Variable	*Adjusted OR*	*(95%CI)*	*p*
Digital station	0.815	0.348 – 1.913	0.639
HPD	0.991	0.868 – 1.132	0.896
→ *MLA*	1.075	1.014 – 1.139	0.014
AoP pushing	1.058	0.978 – 1.144	0.157
→ *HSD*	1.299	1.036 – 1.630	0.024
Fetal head position	0.200	0.014 – 2.792	0.231
Delta AoP	0.894	0.799 – 1.002	0.054

MLA e HSD come unici valori indipendentement e predittivi

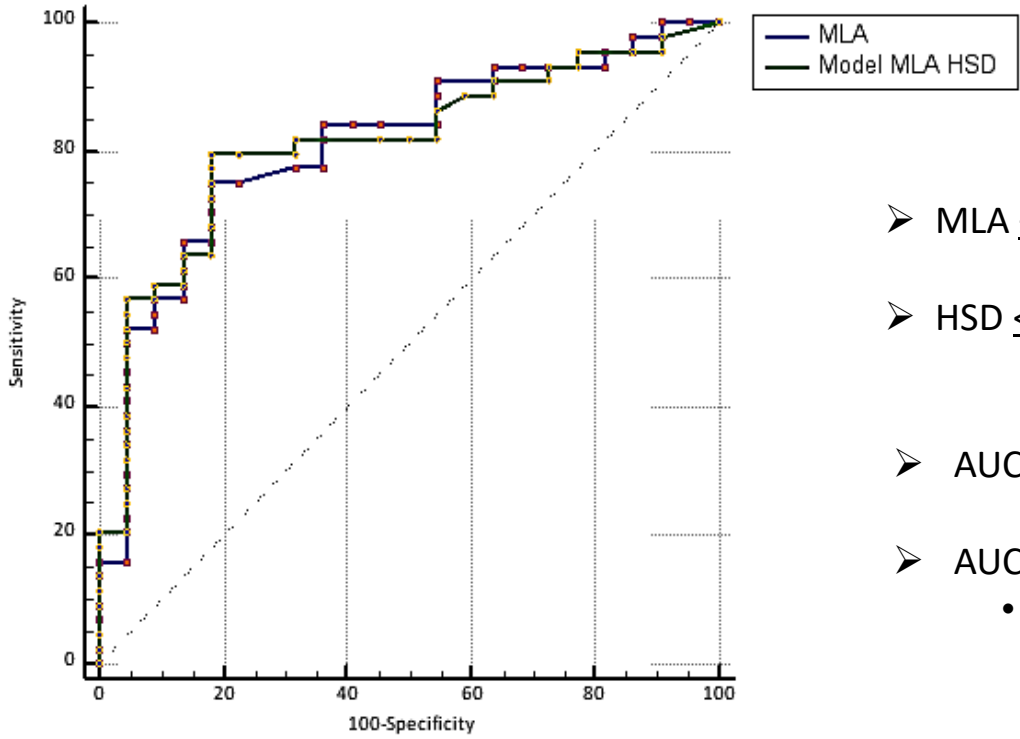
HPD head perineum distance MLA middle line angle AoP angle of progressione HSD head symphisis distance

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LO STUDIO

Obiettivo | Materiali e Metodi | **Risultati** | Conclusioni



- MLA ≤ 34.75° (sens.75%, PPV 89.2%)
- HSD ≤ 15.25 mm (sens.63%, PPV 84.3%)
- AUC MLA: 0.80, 95% CI 0.69 – 0.92
- AUC MLA + HSD 0.81, 95% CI 0.70– 0.92
  - *p value 0,95*

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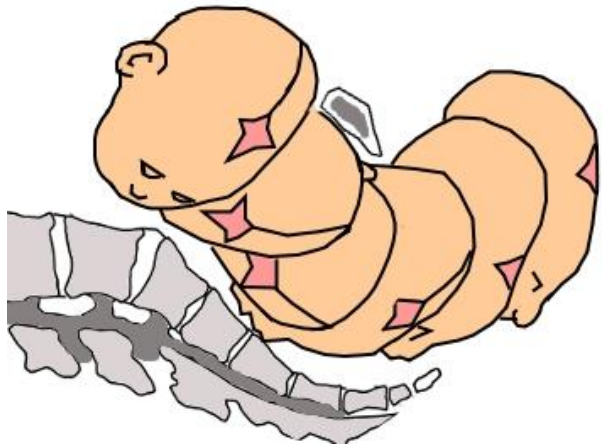
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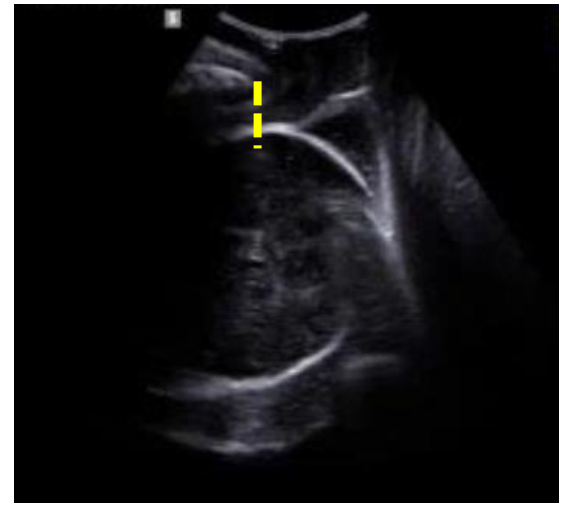
Obiettivo | Materiali e Metodi | Risultati | **Discussione**

Reperti ecografici TP MLA e HSD

unici fattori predittivi indipendenti di modalità del parto





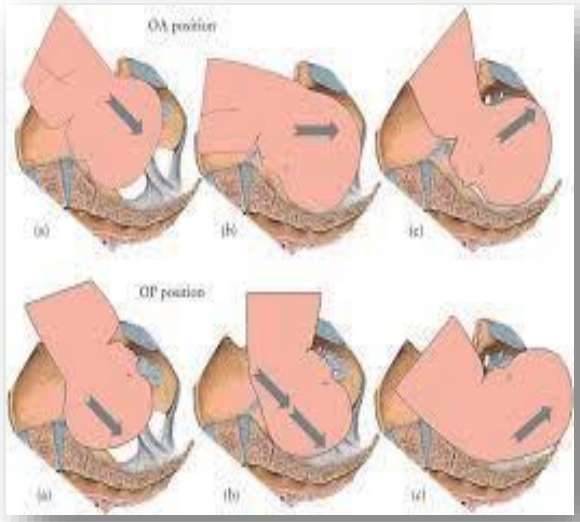


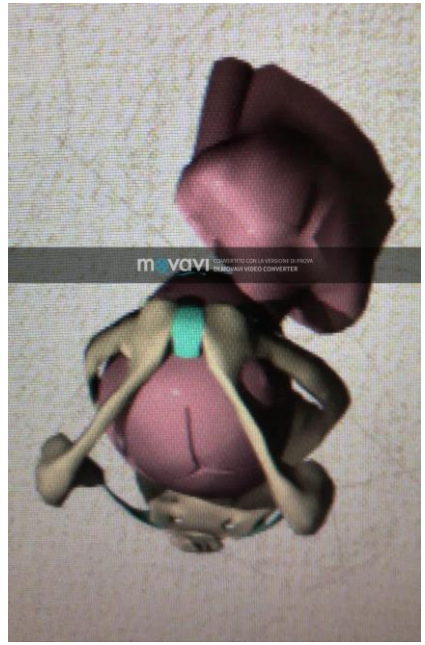
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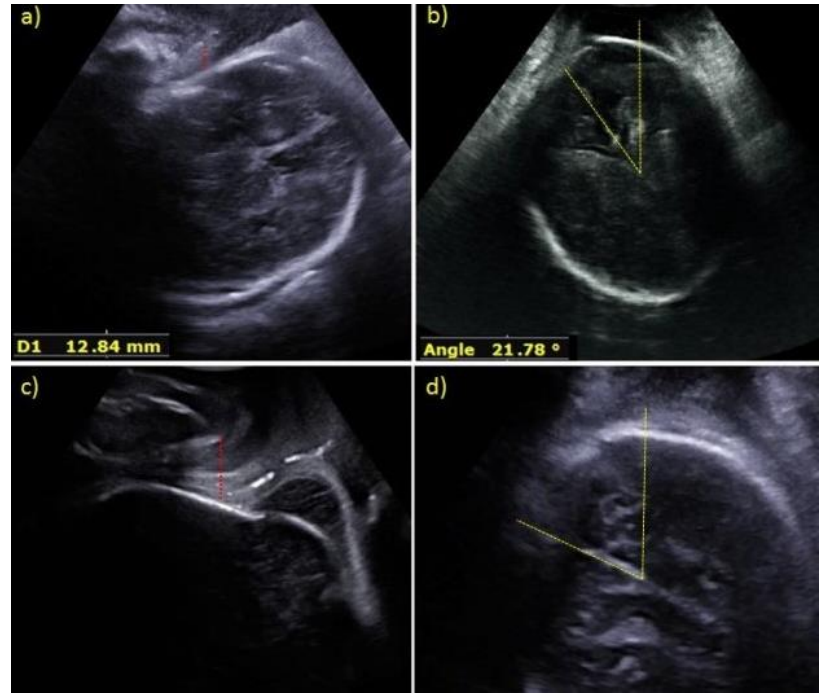
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LO STUDIO

Obiettivo | Materiali e Metodi | Risultati | **Discussione**







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Conclusioni

- Una >tolleranza della durata del secondo stadio entro certi limiti puo' ridurre il tasso di TC
- Se il secondo stadio si prolunga oltre 3 h il rischio di interventi ostetrici o complicazioni aumenta
- L'ecografia in sala parto sembra promettente nell'identificare tra le pazienti con stadio 2 prolungato quelle a >maggior rischio di parti operativi

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Ultrasound Obstet Gynecol 2018; **52**: 128–139
Published online in Wiley Online Library (wileyonlinelibrary.com). **DOI:** 10.1002/uog.19072

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GUIDELINES

ISUOG Practice Guidelines: intrapartum ultrasound

Ghi T, Eggebø T, Lees C, Kalache K, Rozenberg P, Youssef A, Salomon LJ, Tutschek B. on behalf CSC

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Labor Ultrasound Guidelines

Slow/lack of progress in the 1st stage of labor (Level of Evidence II-B. Grade of Recommendation B)

Slow/lack of progress in the 2nd stage of labor (Level of Evidence II-B. Grade of Recommendation B);

THE END