



**VII CONGRESSO CATARINENSE
DE OBSTETRÍCIA E GINECOLOGIA**
II Congresso Catarinense de Perinatologia

25 a 27 de junho de 2015 | Expoville | Joinville | SC

Paulo Roberto Nasser de Carvalho

Declaração de conflito de interesse

Não recebi qualquer forma de pagamento ou auxílio financeiro de entidade pública ou privada para pesquisa ou desenvolvimento de método diagnóstico ou terapêutico ou ainda, tenho qualquer relação comercial com a indústria farmacêutica



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II CONGRESSO CATARINENSE DE
PERINATOLOGIA

Avaliação do bem estar fetal ante-parto: qual o melhor método para cada situação?

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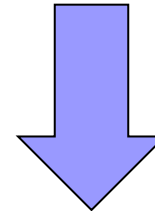
Antenatal Assessment for the Detection of Fetal Asphyxia

An Evidence-Based Approach Using Indication-Specific Testing

ANTHONY M. VINTZILEOS^a

Ann N Y Acad Sci. 2000;900:137-50

Division of Maternal-Fetal Medicine, Department of Obstetrics, Gynecology and Reproductive Sciences, University of Medicine and Dentistry of New Jersey, Robert Wood Johnson Medical School/St. Peter's University Hospital, New Brunswick, New Jersey 08903, USA

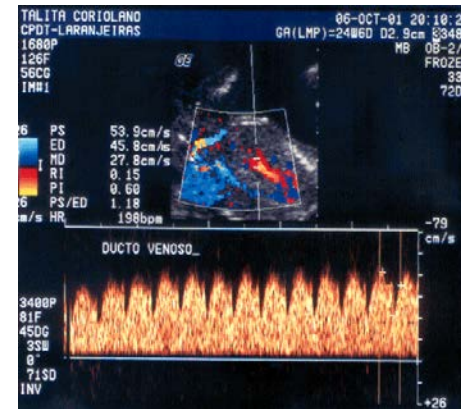
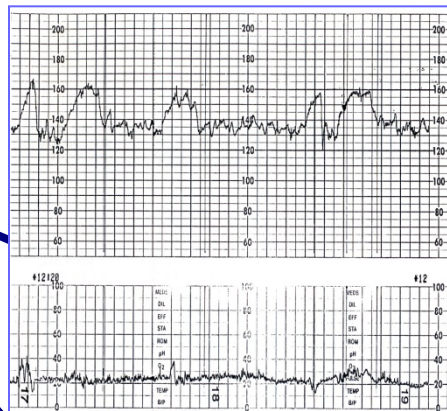
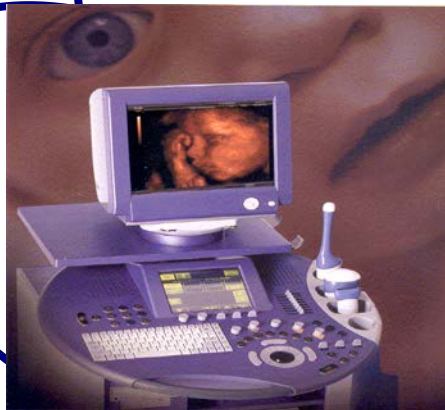


**MODELOS DE
COMPROMETIMENTO FETAL**

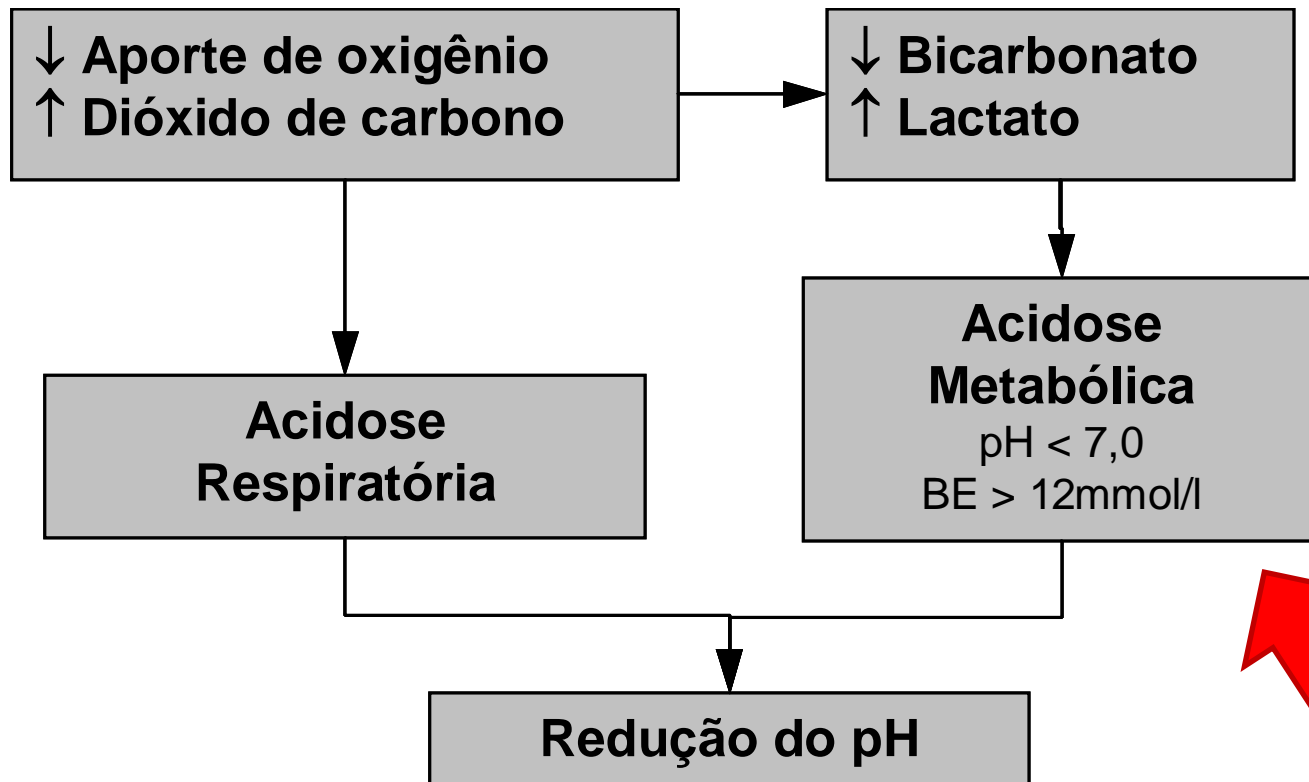
AVALIAÇÃO FETAL

O TESTE DE ESCOLHA DEVE SER DITADO PELO PROCESSO FISIOPATOLÓGICO SUBJACENTE E PELA IDADE GESTACIONAL

- Identificação do Feto de Alto-Risco
- Acompanhamento do Feto de Alto-Risco
- Momento Oportuno



Critérios para caracterização da asfixia fetal



**EVENTO
FINAL COMUM**

NATIMORTALIDADE – Aspectos Gerais

- Definição: óbito anteparto após 22 semanas de IG (OMS)
- Afeta 1/200 gestações



CAUSAS DE ÓBITO FETAL
??????

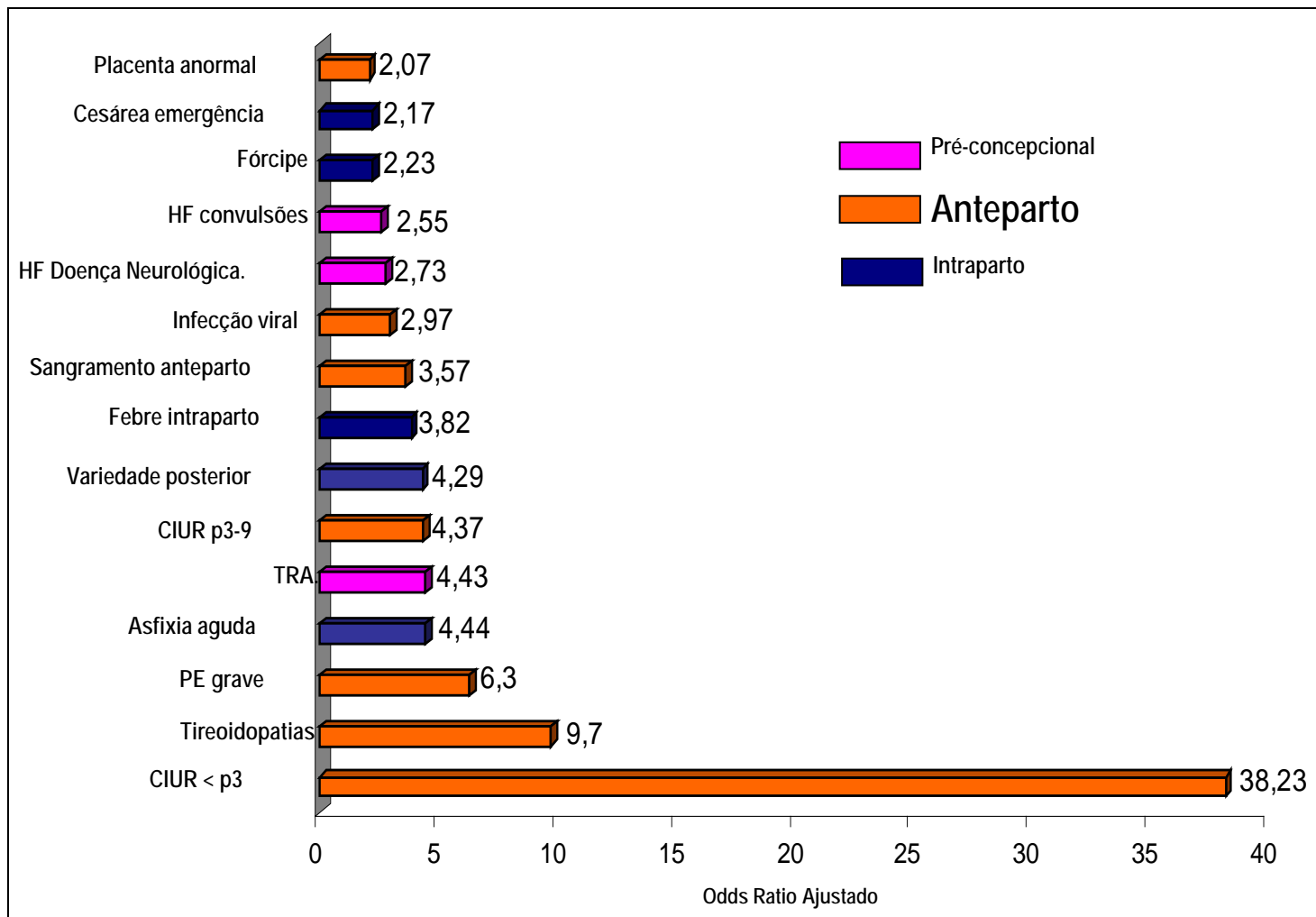
NATIMORTALIDADE – FATORES DE RISCO

Estimate of stillbirth risk for selected maternal risk factors

Condition	Prevalence, percent	Estimated rate of stillbirth, per 1000 total births	Odds ratio
All pregnancies		6.4	1.0
Low risk pregnancies	80	4.0-5.5	0.86
Nulliparity	40	7-8	1.2-3.0
Hypertensive disorder			
Chronic hypertension	6-10	6-25	1.5-2.7
Pregnancy induced hypertension			
Mild	5.8-7.7	9-51	1.2-4.0
Severe	1.3-3.3	12-29	1.8-4.4
Diabetes			
Treated with diet	2.5-5	6-10	1.2-2.2
Treated with insulin	2.4	6-35	1.7-7.0
Systemic lupus erythematosus	<1	40-150	6-20
Renal disease	<1	15-200	2.2-30
Thyroid disorders	0.2-2	12-20	2.2-3.0
Thrombophilia	1-5	18-40	2.8-5.0
Cholestasis of pregnancy	<0.1	12-30	1.8-4.4
Smoking >10 cigarettes	10-20	10-15	1.7-3.0

Obesity (prepregnancy)			
BMI 25-29.9 kg/m ²	21	12-15	1.9-2.7
BMI ≥30	20	13-18	2.1-2.8
Low educational attainment (<12 years vs. 12 years+)	30	10-13	1.6-2.0
Previous growth restricted infant (<10 percent)	6.7	12-30	2-4.6
Previous cesarean section	24-28	6-13	1.0-2.0
Previous stillbirth	0.5-1.0	9-20	1.4-3.2
Multiple gestation			
Twins	2.7	12	1.0-2.8
Triplets	0.14	34	2.8-3.7
Advanced maternal age (reference <35)			
35-39	15-18	11-14	1.8-2.2
40+	2	11-21	1.8-3.3
Black compared to White	15	12-14	2.0-2.2

Adapted with permission from: Fretts RC. Etiology and prevention of stillbirth. Am J Obstet Gynecol 2005; 193:1923.



Fatores de Risco para Encefalopatia Neonatal

MODELOS DE COMPROMETIMENTO FETAL

- **MODELO OBSTRUTIVO**
- **MODELO ANÊMICO**
- **MODELO METABÓLICO**
- **MODELO INFECCIOSO**
- **MODELO DE MEMBRANA**
- **MODELO UMBILICAL**
- **OUTROS**
 - **GEMELAR**

MODELOS DE COMPROMETIMENTO FETAL

- **MODELO OBSTRUTIVO**
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Pré-eclâmpsia

Representação da Árvore Vascular



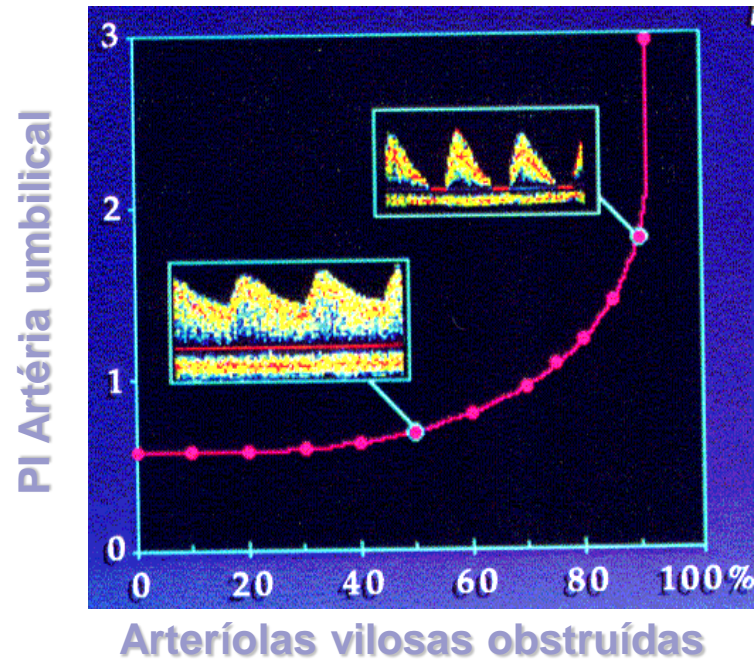
**PLACENTA
NORMAL**



**INSUFICIÊNCIA
PLACENTÁRIA**

DOPPLER OBSTÉTRICO NO CIUR

Resistência Feto-placentária



- Redução de arteríolas e de pequenos vasos musculares.
- Necessidade de redução de 60 a 70% dos canais arteriais para alterar doppler arterial.

Fase Pré Clínica

Fase Clínica

Deterioração

Doppler

UA

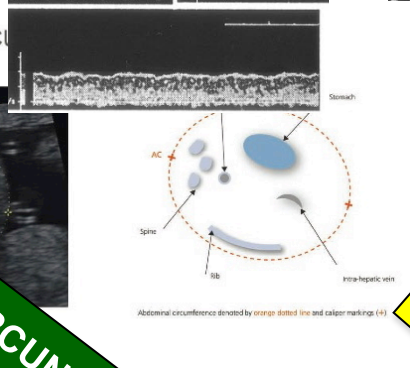
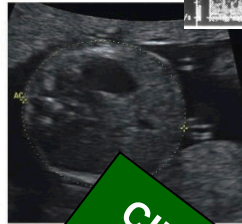
CA

DV

UV

Ultrassom & PBF

Abdominal circumference



CIRCUNFERÊNCIA ABDOMINAL

CIRCUNFERÊNCIA CEREBRAL

10TH PERCENTIL
05TH PERCENTIL
3RD PERCENTIL

Variação na FCF

Redução do LA

Desaceleração tardia

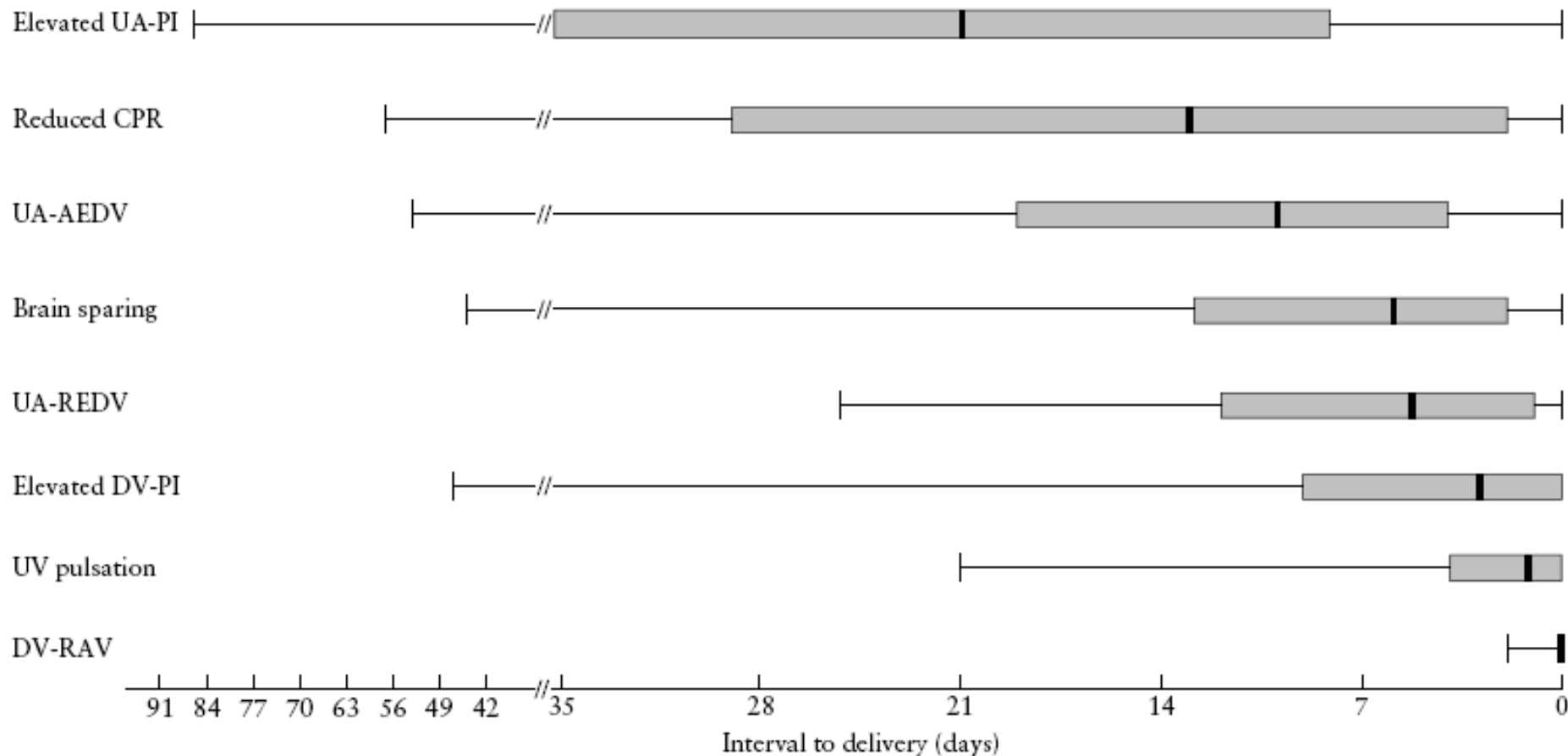
MR

MF

Tonus Anormal

Modelo Hipertensivo

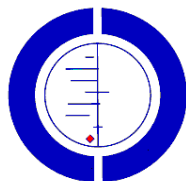
Sequência de alterações ao Doppler



O. M. TURAN et al. Progression of Doppler abnormalities in intrauterine growth restriction
Ultrasound Obstet Gynecol July 2008; 32: 160–167

Modelo Hipertensivo

Resistência Feto-placentária



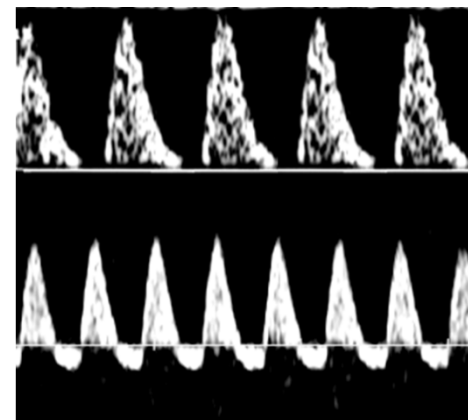
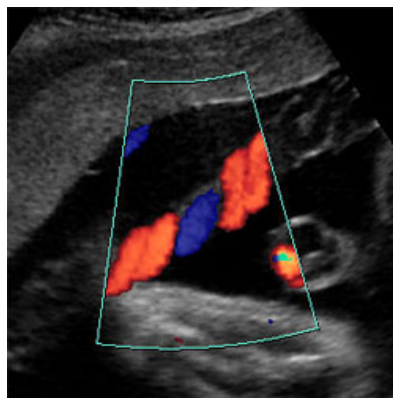
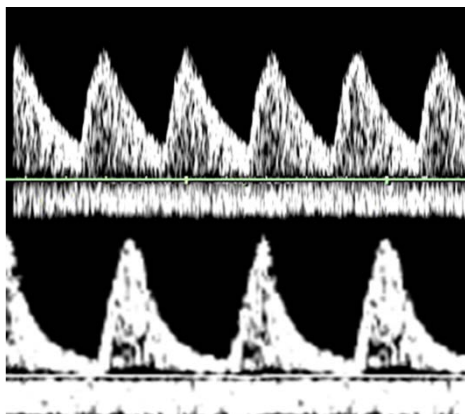
THE
COCHRANE
LIBRARY
2014 Issue 3

DOPPLER UMBILICAL:

Acometimento placentário



Efeitos no feto



- 1- Alfirevic Zarko, Neilson James P. Doppler ultrasound for fetal assessment in high risk pregnancies. Cochrane Database of Systematic Reviews. In: The Cochrane Library, Issue 02, Art. No. CD000073. DOI: 10.1002/14651858.CD000073.pub1
- 2- Garite TJ et al. Am J Obstet Gynecol, 2004; 191:481-487

Modelo Hipertensivo



DOPPLER ARTÉRIA CEREBRAL MÉDIA:

- ❖ Especial valor após 34 semanas / art Umbilical normal ¹
- ❖ Relação Umbilico/ Cerebral alterada
- ❖ Veloc Máx da ACM ²

1- HarknessUF.; Mari G. *Clin Perinatol.* v.31, p.743-764, 2004.

2-Mari, G. et al. *Ultrasound Obstet Gynecol.* v.29, p.310-316, 2007a.

Modelo Hipertensivo

Sequência de alterações ao Doppler

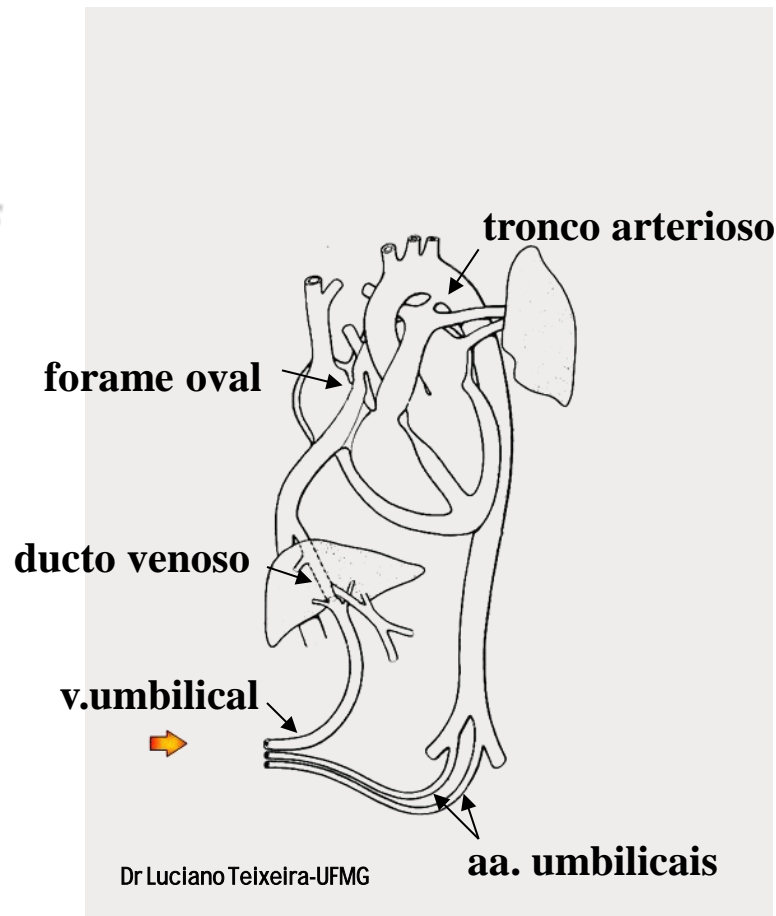
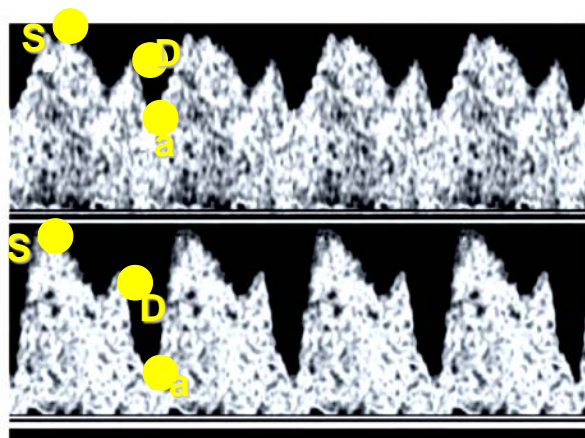
Placental insufficiency	Sequence of Doppler abnormalities
Mild <i>n</i> = 34	$\uparrow \text{UA} \xrightarrow{33 \text{ days}} \downarrow \text{CPR}$
Progressive <i>n</i> = 49	$\uparrow \text{UA} \xrightarrow{19 \text{ days}} \downarrow \text{CPR} \xrightarrow{14 \text{ days}} \text{Brain sparing} \xrightarrow{4 \text{ days}} \text{UA A/REDV} \xrightarrow{14 \text{ days}} \uparrow \text{DV} \xrightarrow{8 \text{ days}} \text{DV-RAV/UV pulsation}$
Severe early-onset <i>n</i> = 21	$\uparrow \text{UA} \xrightarrow{7 \text{ days}} \downarrow \text{CPR} \xrightarrow{9 \text{ days}} \text{UA A/REDV} \xrightarrow{7 \text{ days}} \text{Brain sparing} \xrightarrow{11 \text{ days}} \uparrow \text{DV} \xrightarrow{5 \text{ days}} \text{DV-RAV/UV pulsation}$

O. M. TURAN et al. Progression of Doppler abnormalities in intrauterine growth restriction *Ultrasound Obstet Gynecol* July 2008; 32: 160–167

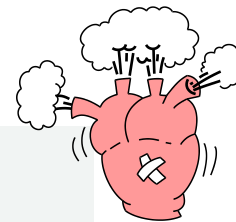
Respostas fetais compensatórias :

❖ *Redistribuição de fluxo para órgãos nobres (CENTRALIZAÇÃO)*

❖ *Restrição do crescimento*



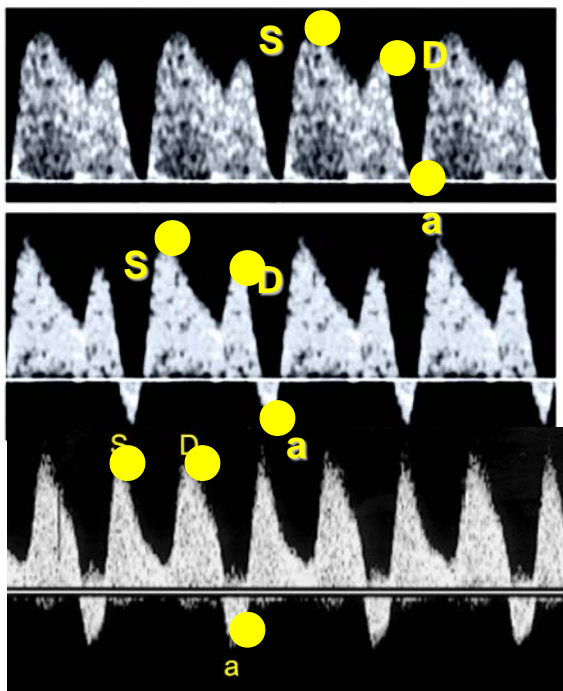
Perda dos mecanismos compensatórios:



❖ *Falência cardíaca*

❖ *Diminuição da perfusão para órgãos nobres*

❖ *Óbito fetal.*



Dr Luciano Teixeira-UFMG

Modelo Obstrutivo

Review

Fetal Diagnosis
and Therapy

Fetal Diagn Ther 2014;36:86–98
DOI: [0.1159/000357592](https://doi.org/10.1159/000357592)

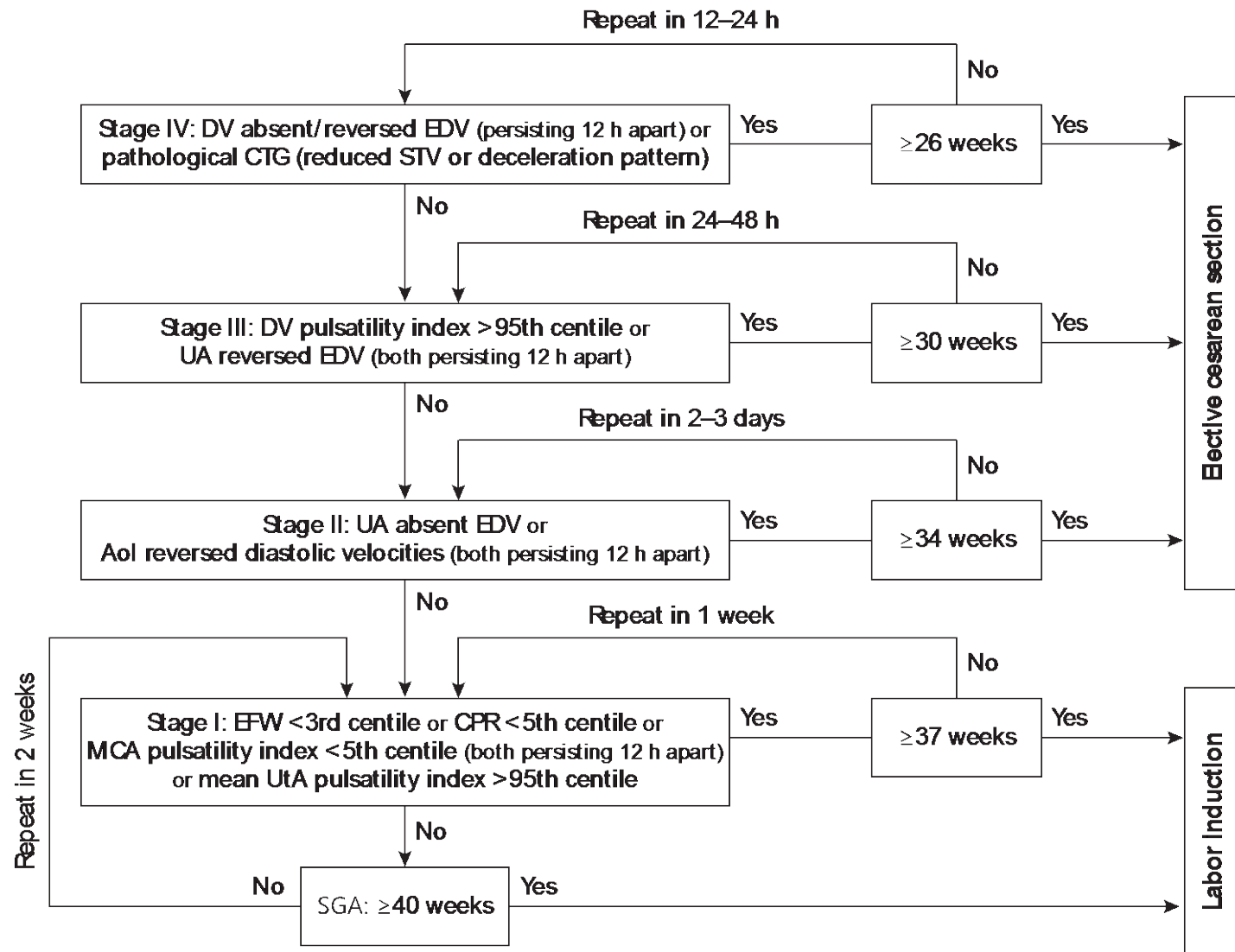
Received: November 19, 2013
Accepted: November 19, 2013
Published online: January 23, 2014

Update on the Diagnosis and Classification of Fetal Growth Restriction and Proposal of a Stage-Based Management Protocol

Francesc Figueras · Eduard Gratacós

Stage	Pathophysiological correlate	Criteria (any of)	Monitoring*	GA/mode of delivery
I	Severe smallness or mild placental insufficiency	EFW <3rd centile CPR <p5 UA PI >p95 MCA PI <p5 UtA PI >p95	Weekly	37 weeks LI
II	Severe placental insufficiency	UA AEDV Reverse AoI	Biweekly	34 weeks CS
III	Low-suspicion fetal acidosis	UA REDV DV-PI >p95	1–2 days	30 weeks CS
IV	High-suspicion fetal acidosis	DV reverse a flow cCTG <3 ms FHR decelerations	12 h	26 weeks** CS

Modelo Obstrutivo





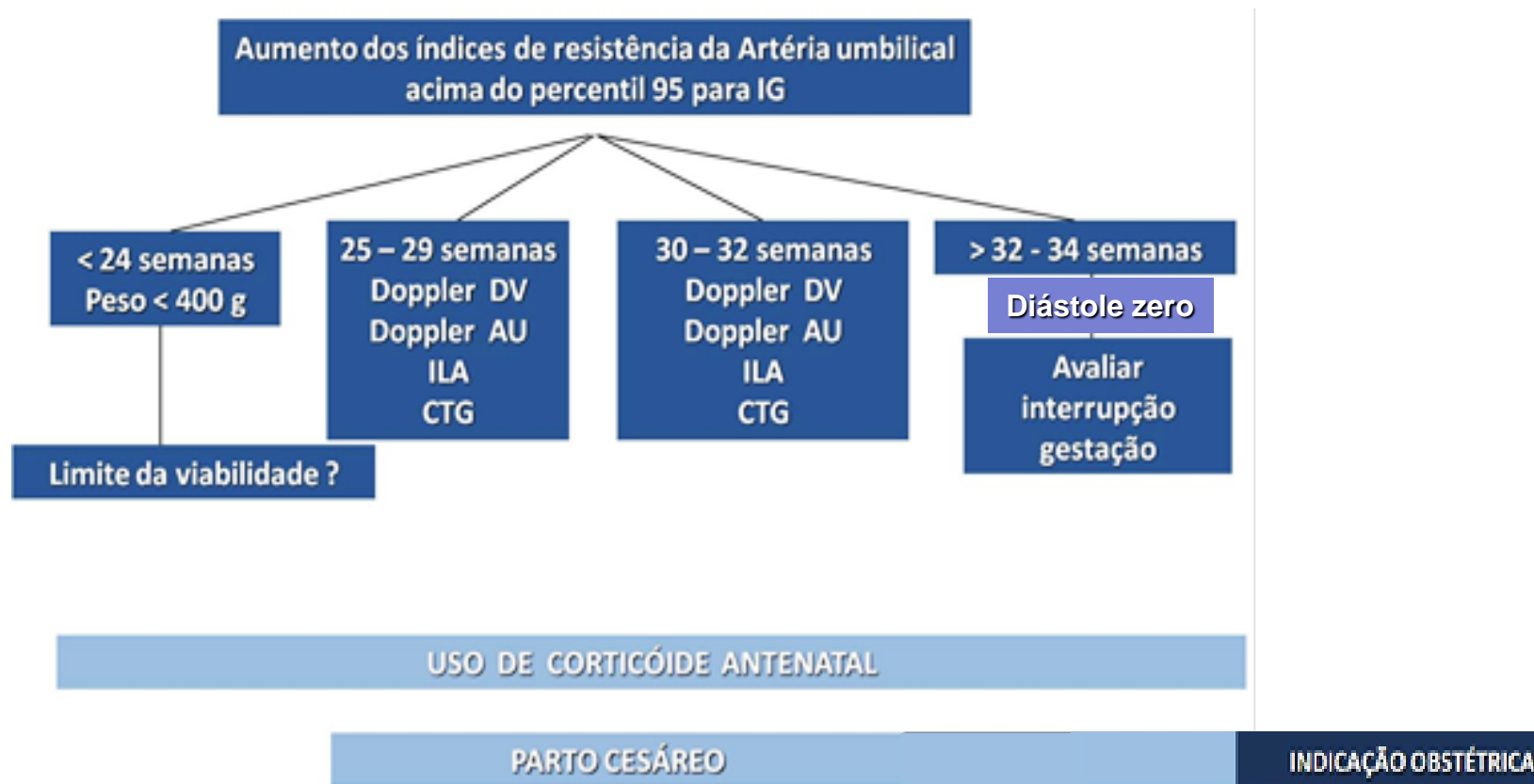
IFF

INSTITUTO NACIONAL
DE SAÚDE DA MULHER, DA CRIANÇA E DO ADOLESCENTE | FERNANDES FIGUEIRA



Perinatal

Proposta de Conduta – Parâmetros Biofísicos



**Aumento dos índices de resistência da Artéria umbilical
acima do percentil 95 para IG**



**Internação das gestações viáveis para
acompanhamento diário**

Sulfato de magnésio 24 / 31⁺⁶ semanas

- Como acompanhar o feto de alto-risco e estabelecer o momento do parto?



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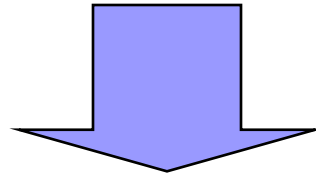
Modelo Anêmico

Anemia fetal altera a **pré-carga** (decorrente da baixa viscosidade sangüínea) e a **contratilidade miocárdica**.

Mecanismo de compensação

Anemia - aumento do lactato (depuração satisfatória até 2 mmol/l)

Aumento da concentração venosa de lactato



**ACIDEMIA
FETAL**

Modelo Anêmico

**ISOIMUNIZAÇÃO
RH**

Modelo Anêmico

DOI: 10.1111/j.1471-0528.2009.02255.x
www.bjog.org

Systematic review

Noninvasive methods of detecting fetal anaemia: a systematic review and meta-analysis

SJ Pretlove,^a CE Fox,^b KS Khan,^b MD Kilby^{a,b}

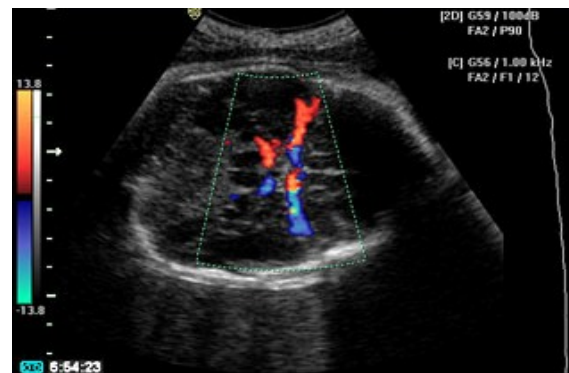
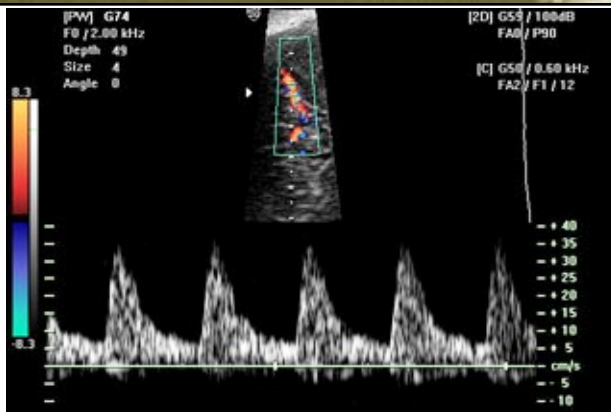
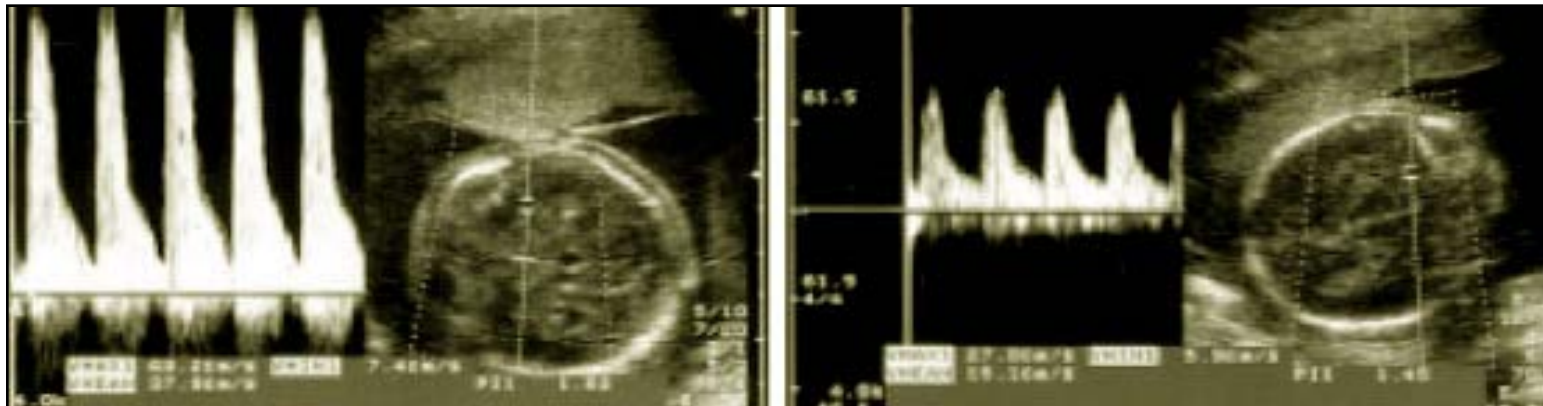
The sensitivity and specificity of MCA-PSV are markedly similar to that of OD450 from amniocentesis.³² This was previously noted in our comparative cohort study published in 2004,³² noting similar ROC for both of these screening tests. MCA-PSV is chosen as superior as it is noninvasive and therefore carries little fetal risk. Ideally, a

Discussion Although middle cerebral artery peak systolic velocity Doppler has limited diagnostic accuracy, it remains the gold standard for noninvasive screening of fetal anaemia.

Modelo Anêmico

Doppler

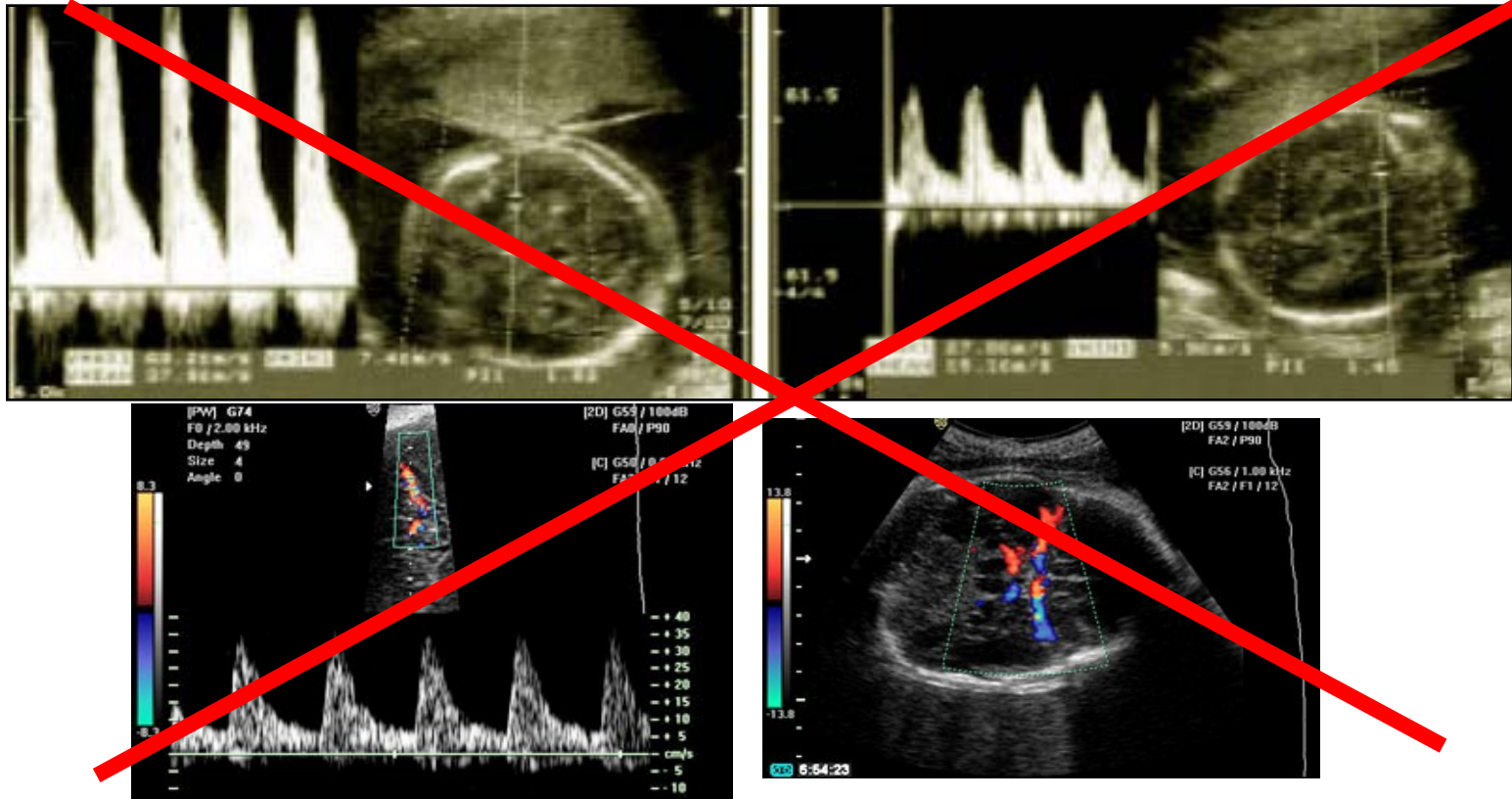
-Circulação Hiperdinâmica (viscosidade)

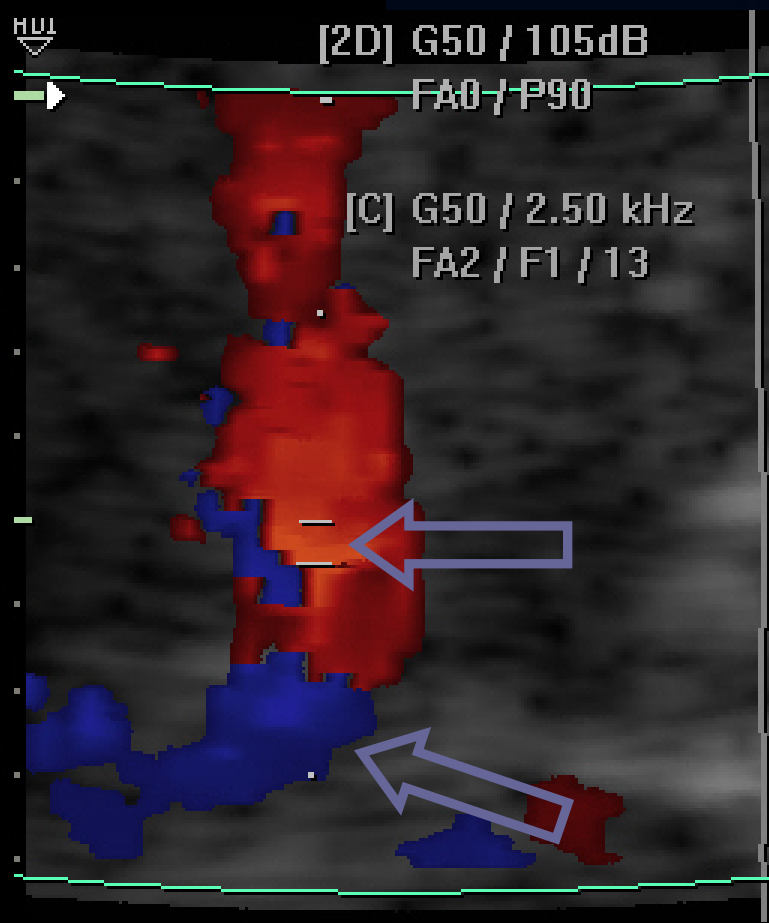


Modelo Anêmico

Doppler

-Circulação Hiperdinâmica (viscosidade)





[PW] G93
F1 / 3.50 kHz
Depth 59

Error introduced into velocity measurements by inappropriate Doppler angle assignment

+105.00 cm/s

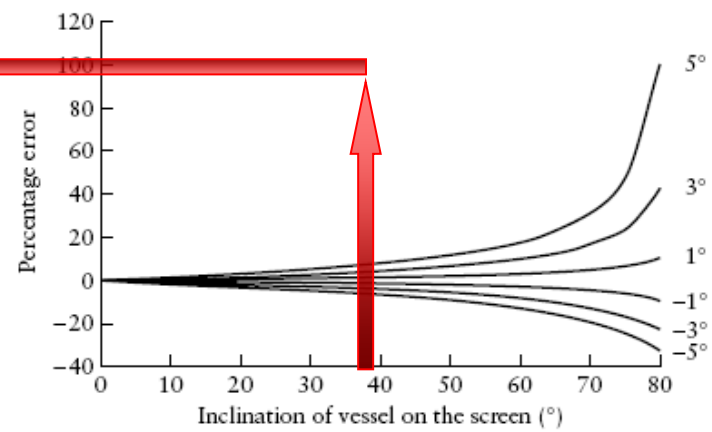


Figure 1 Percentage error introduced into velocity measurements at different vessel inclinations with +5° to -5° faulty angle assignment

M. Yamamoto
Ultrasound Obstet Gynecol 2006; 28: 853-858
Published online in Wiley InterScience (www.interscience.wiley.com).

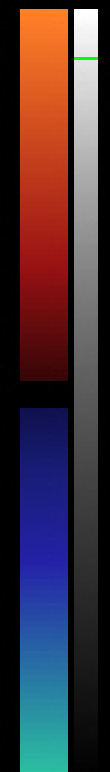
1,5 MOM
Mari 2000 - S 100% E 88% - VPP 65% VPN 100%

S/D 75.02
PI 3.06

HUI
[2D] G50 / 105dB
FA0 / P90
[C] G50 / 2.50 kHz
FA2 / F1 / 13

[PW] G93
F1 / 3.50 kHz
Depth 59
Size 1.00
Angle 0

37.5



-37.5

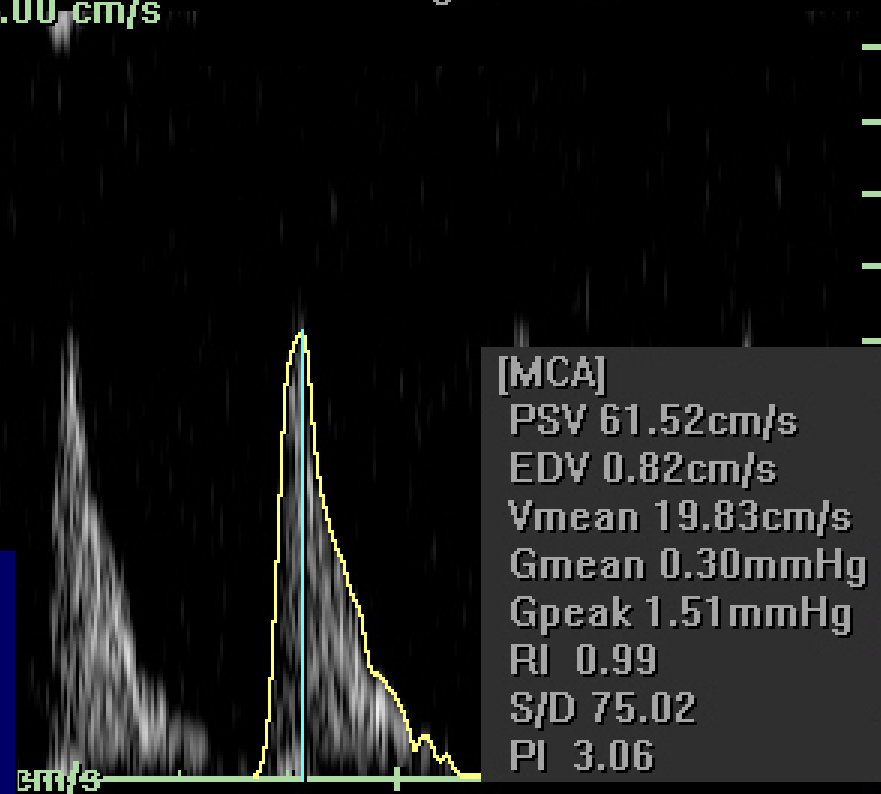
+105.00 cm/s

TÉCNICA DE INSONAÇÃO DA VMAX ACM

- PLANO AXIAL DA CABEÇA – NÍVEL ESFENÓIDE
- DOPPLER COLORIDO NO P WILLIS
- MAGNIFICAÇÃO DA IMAGEM P WILLIS
- ACM É MAGNIFICADA

OVF DA ACM

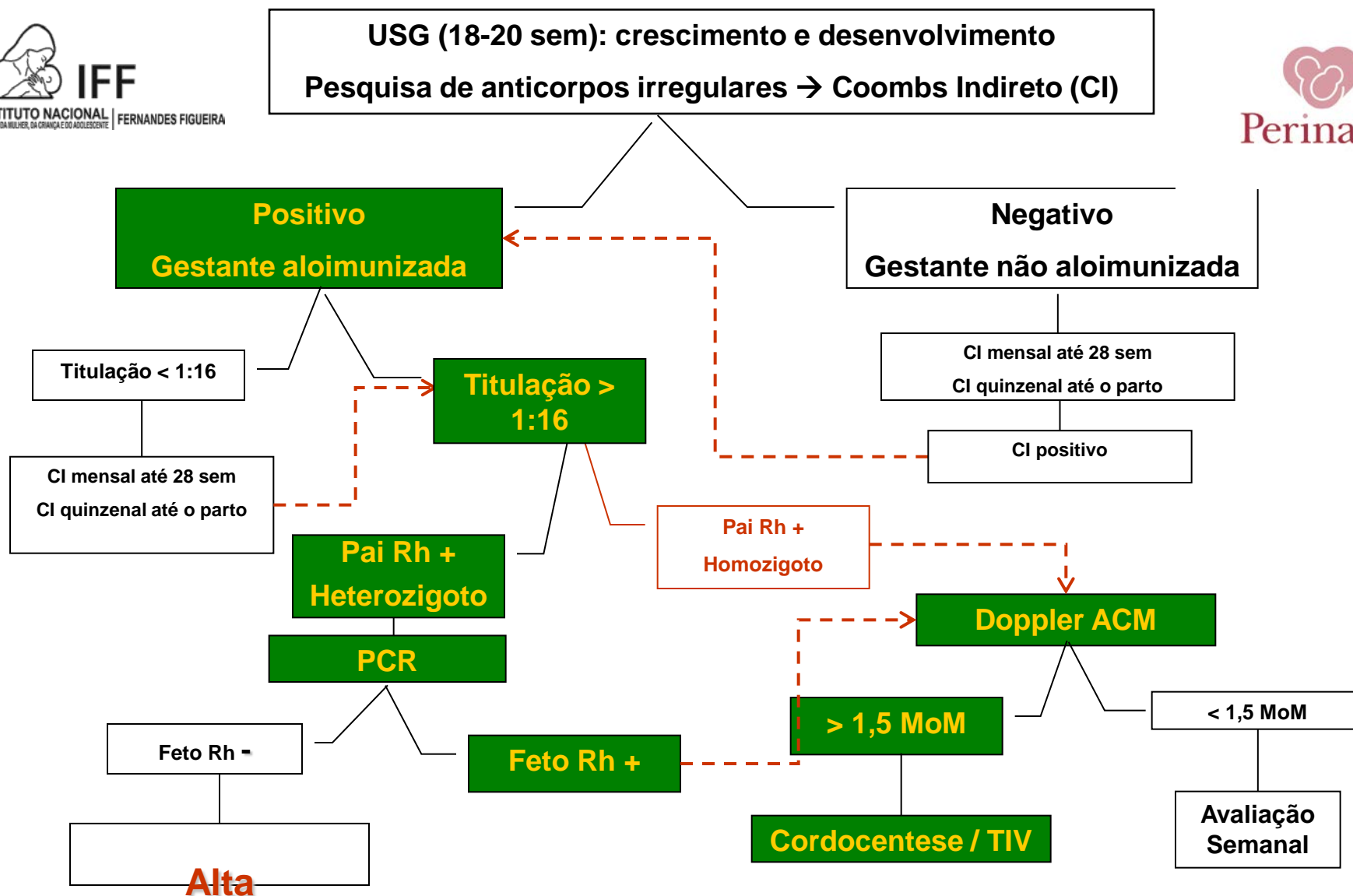
- > VELOCIDADE
- REGULARIDADES DAS OVF
- REPETIÇÃO 3 VEZES



[MCA]

PSV 61.52cm/s
EDV 0.82cm/s
Vmean 19.83cm/s
Gmean 0.30mmHg
Gpeak 1.51mmHg
RI 0.99
S/D 75.02
PI 3.06

Modelo Anêmico: Aloimunização RH



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Modelo Metabólico - Diabetes

Introdução:

■ Prevalência:

- ✓ DM tipo I : 0,1%
- ✓ DM tipo II: 2-3%
- ✓ **Diabetes gestacional: 7,4% (1-14%)**



- Diagnóstico na 2ª. Metade da gestação
- Afeta o crescimento fetal
- Riscos perinatais e de longo prazo

Modelo Metabólico - Diabetes



MANEJO DO DIABETES



MANTER A GESTANTE NORMOGLICÊMICA

CONTROLE GLICÊMICO

Níveis ideais

- 60 - 105 mg/dl → Antes das refeições, na hora de dormir e entre 02:00 e 04:00h.
- 100 - 140 mg/dl → 1h após o início das refeições.



Modelo Metabólico: Óbito Fetal

Perda de 32/1000 após 24 semanas*

HIPOXEMIA CRÔNICA- ACIDEMIA

- Policitemia
- Hematopoiese

ALTERAÇÕES FLUXO SANGUÍNEO

- Vasculopatia
- Pré-eclâmpsia

ALTERAÇÕES METABOLISMO

- Hiperinsulinemia
- ↑ Consumo de O₂
- ↑ □ Lactato
- ↓ PO₂ Arterial

MALFORMAÇÕES 20% do total*

ÓBITO FETAL

* Macintosh MC et al. Perinatal mortality and congenital anomalies in babies of women with type 1 or type 2 diabetes in England, Wales, and Northern Ireland: population based study. BMJ. 2006;333:177.

Modelo Metabólico

ÓBITO FETAL

Ocorre quando as necessidades metabólicas fetais de O_2 são maiores do que a placenta é capaz de transportar.

A placenta supre 08ml/min/Kg de peso fetal.

Modelo Metabólico: Vigilância Fetal- Diabetes

Controle sem insulina

Ultrasound and fetal echocardiography at 18-22 weeks gestation

Institute fetal kick counts at 28-32 weeks gestation

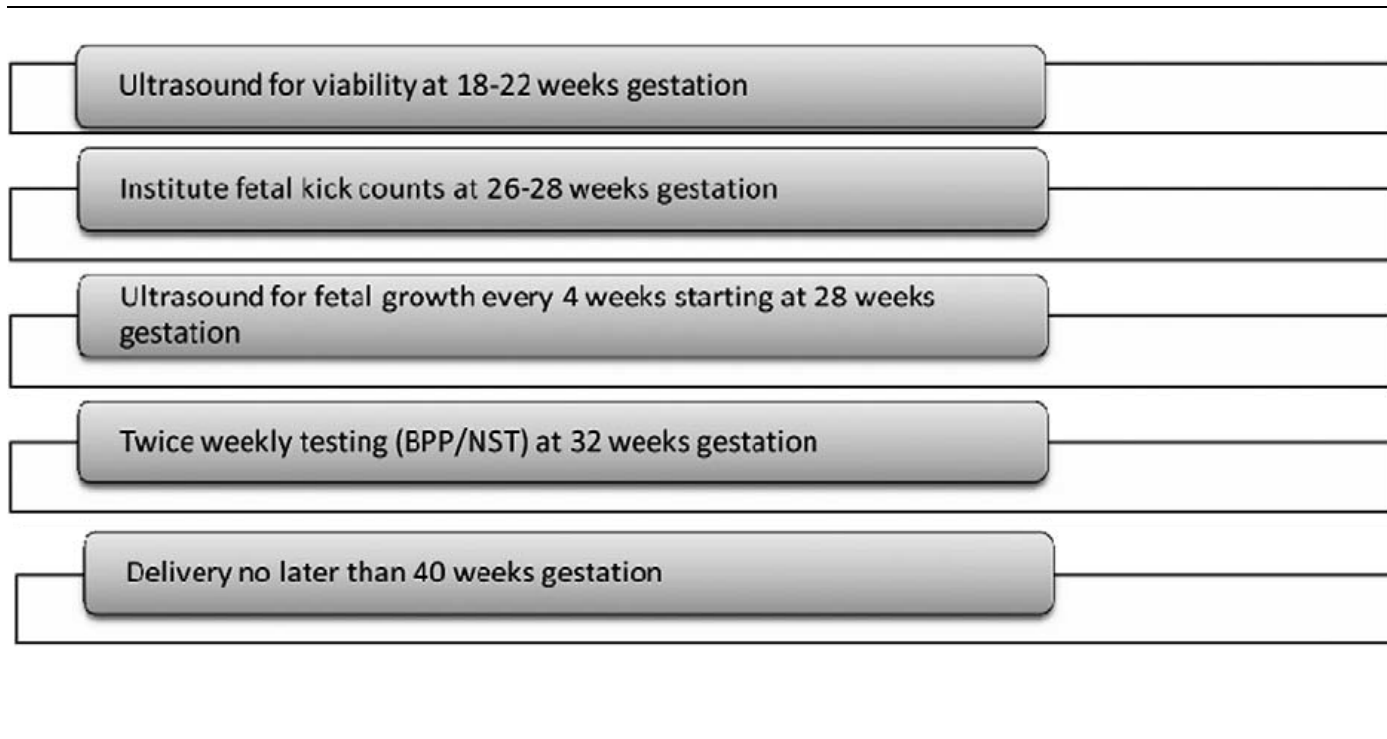
Ultrasound for fetal growth every 4 weeks starting at 28 weeks gestation

Delivery no later than 40 weeks gestation

litus (class A1).

Modelo Metabólico: Vigilância Fetal- Diabetes

Controle com insulina



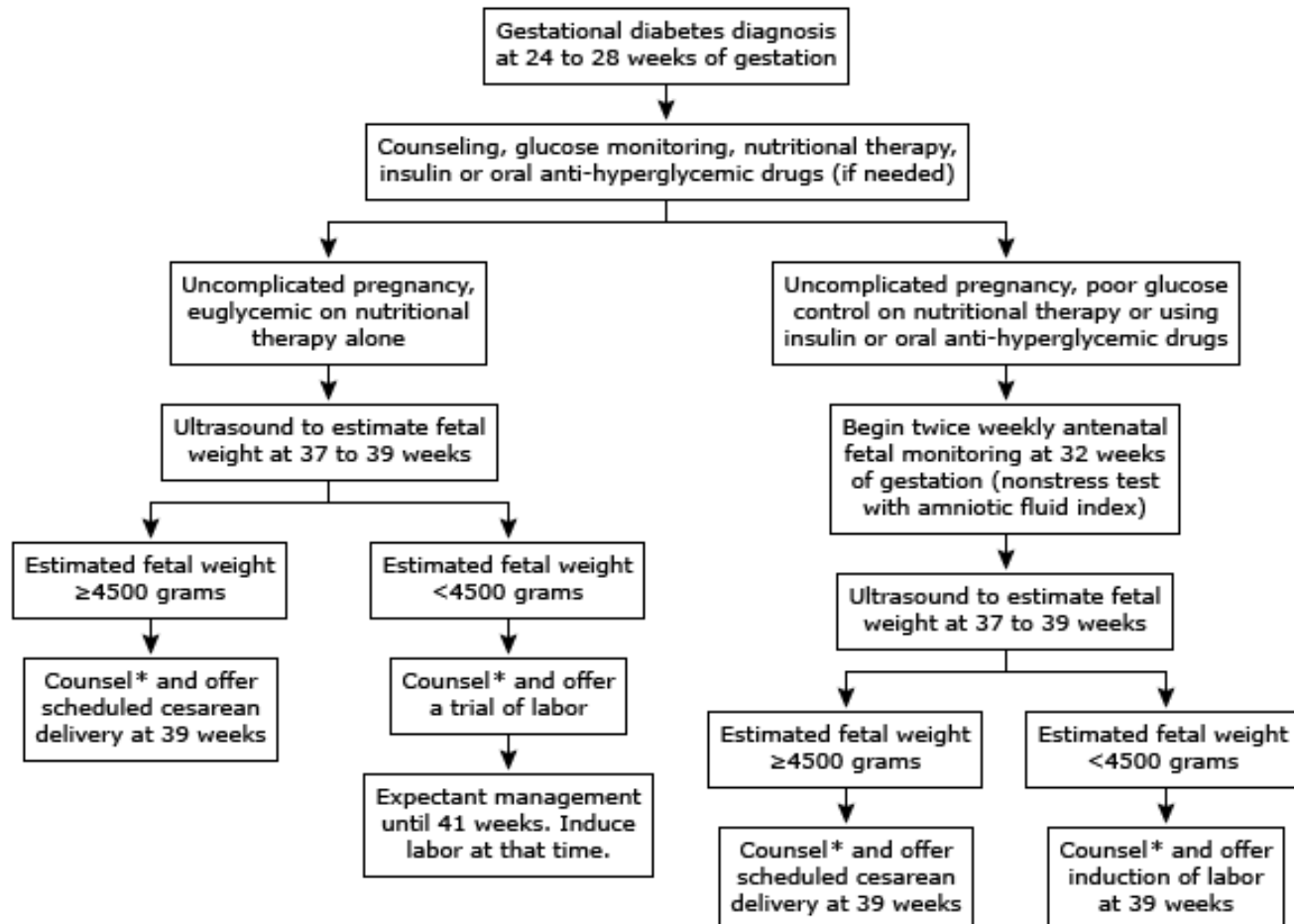
Modelo Metabólico: Vigilância Fetal- Diabetes

Controle com insulina + vasculopatia

asculopathy.

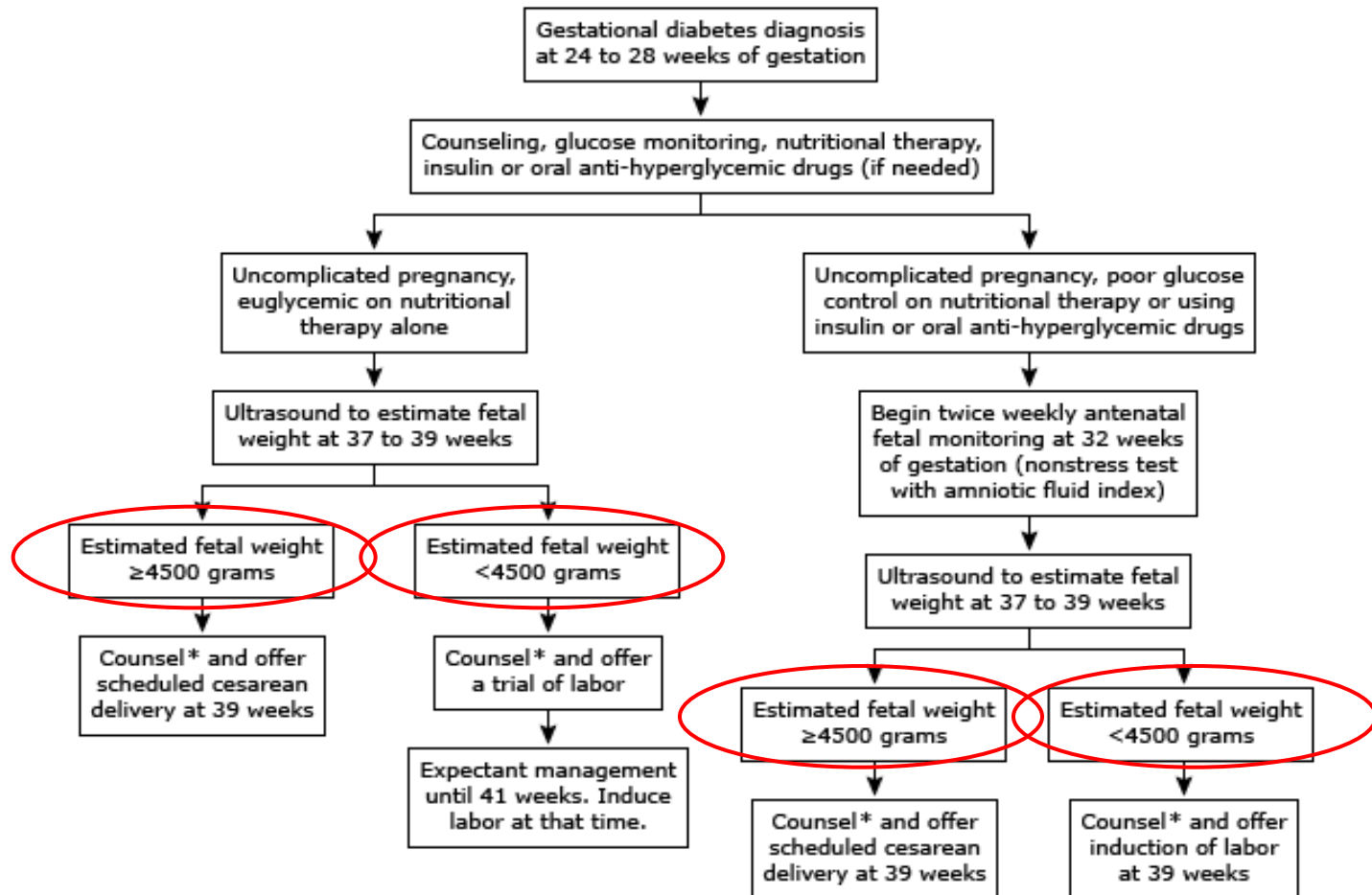
Modelo Metabólico - Diabetes

General approach to obstetrical management of uncomplicated GDM



Modelo Metabólico - Diabetes

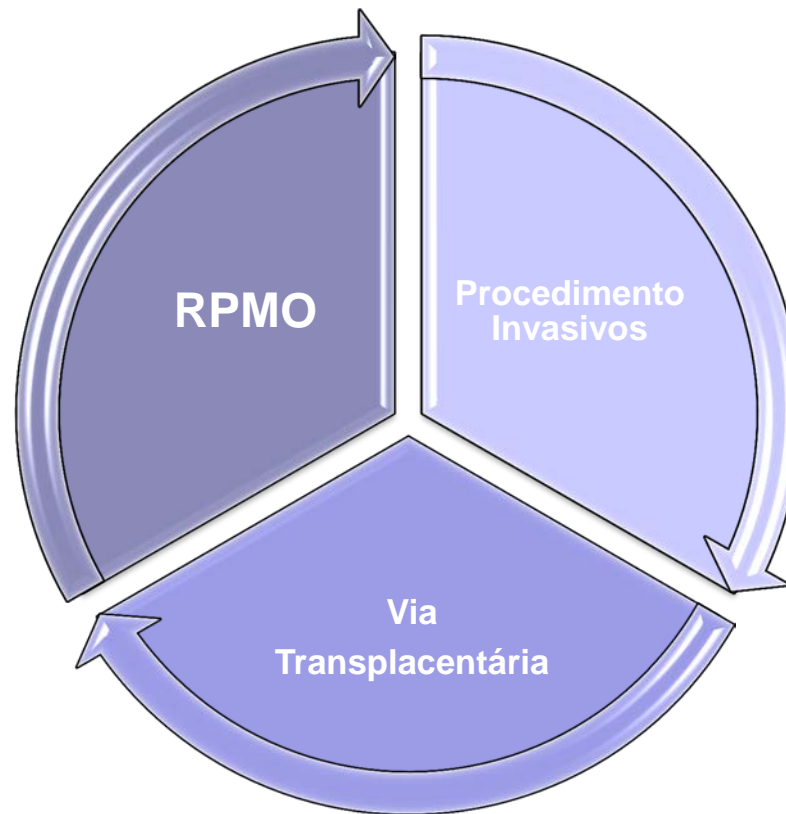
General approach to obstetrical management of uncomplicated GDM



MODELOS DE COMPROMETIMENTO FETAL

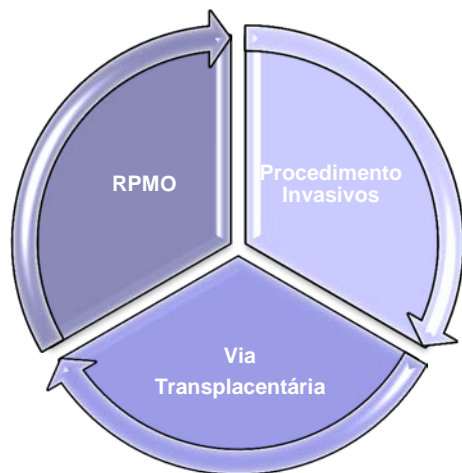
- **MODELO OBSTRUTIVO**
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Modelo Infeccioso



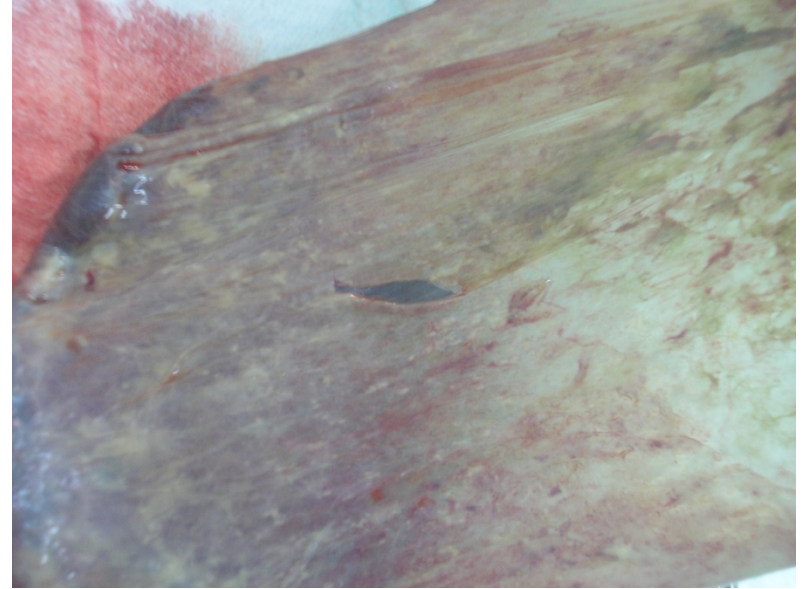
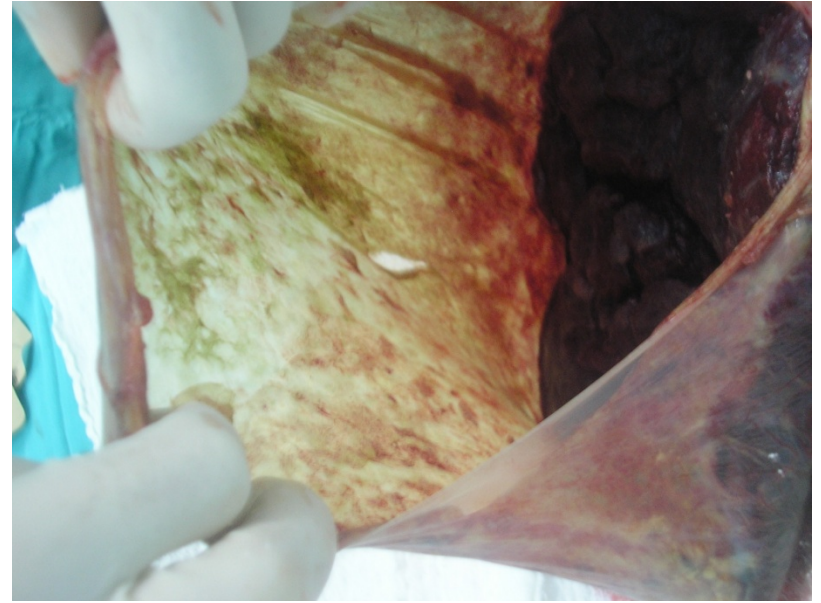
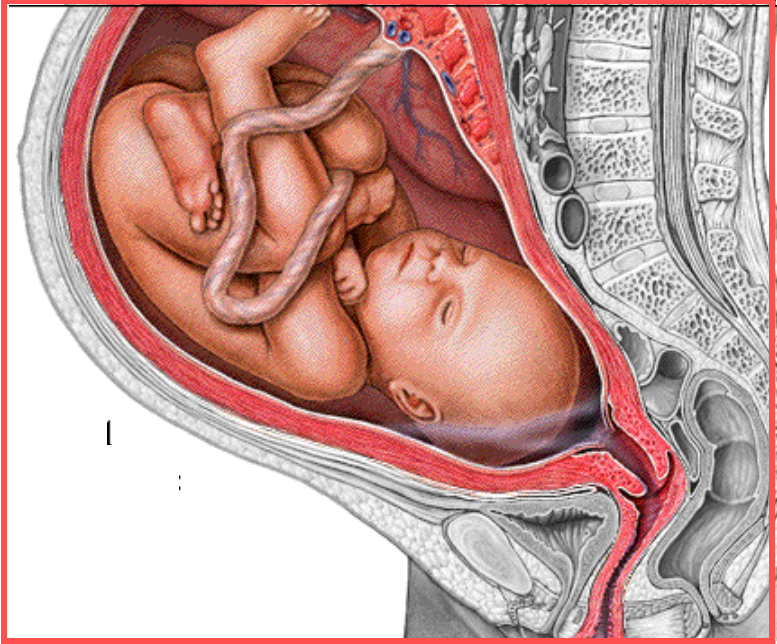
Modelo Infeccioso

Organisms isolated in the amniotic fluid of 404 patients with intraamniotic infection



Organism	Number	Percent
Group B streptococcus	59	14.6
Escherichia coli	33	8.2
Enterococci	22	5.4
Gardnerella vaginalis	99	24.5
Peptostreptococcus sp.	38	9.4
Bacteroids bivius	119	29.5
Bacteroides fragilis	14	3.5
Fusobacterium sp.	22	5.4
Any gram-negative anaerobe	155	38.4
Mycoplasma hominis	123	30.4
Ureaplasma urealyticum	190	47.0

Data adapted from: Sperling, RS, Newton, E, Gibbs, RS. J Infect Dis 1988; 157:113.



Modelo Infeccioso

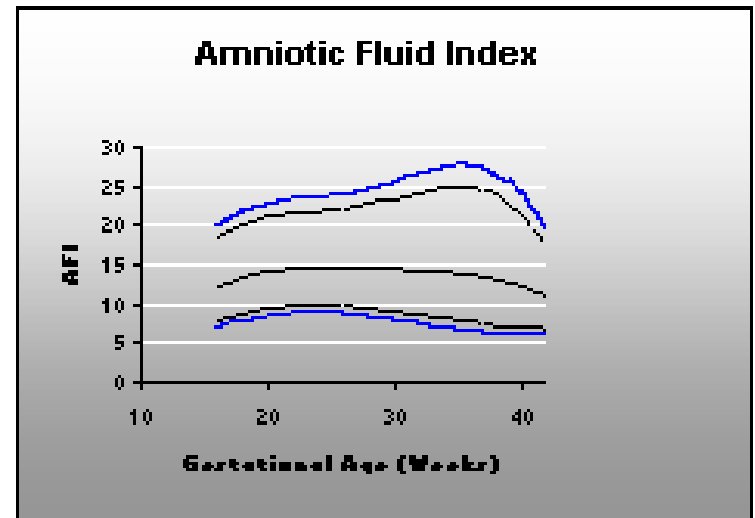
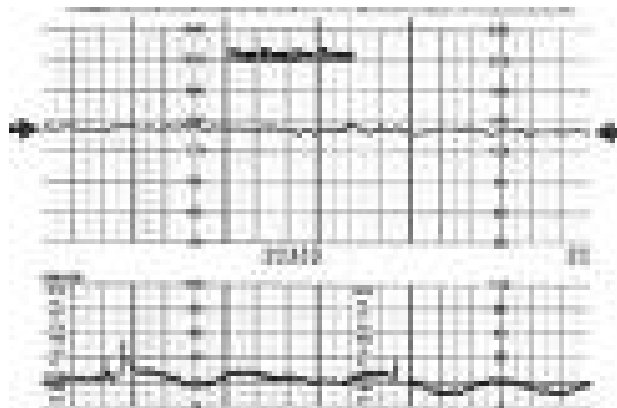
- Edema de vilosidades
- Descolamento placentário
- Diminuição do fluxo uterino.
- Aumento da demanda de oxigênio causando hipoxia tecidual local em especial no sistema nervoso central que controla os reflexos do perfil biofísico.

- **Diminuição do débito urinário**
 - Redução do volume de líquido amniótico.
- **Em estágios mais avançados**
 - Acidemia
 - Encefalopatia hipóxico-isquêmica

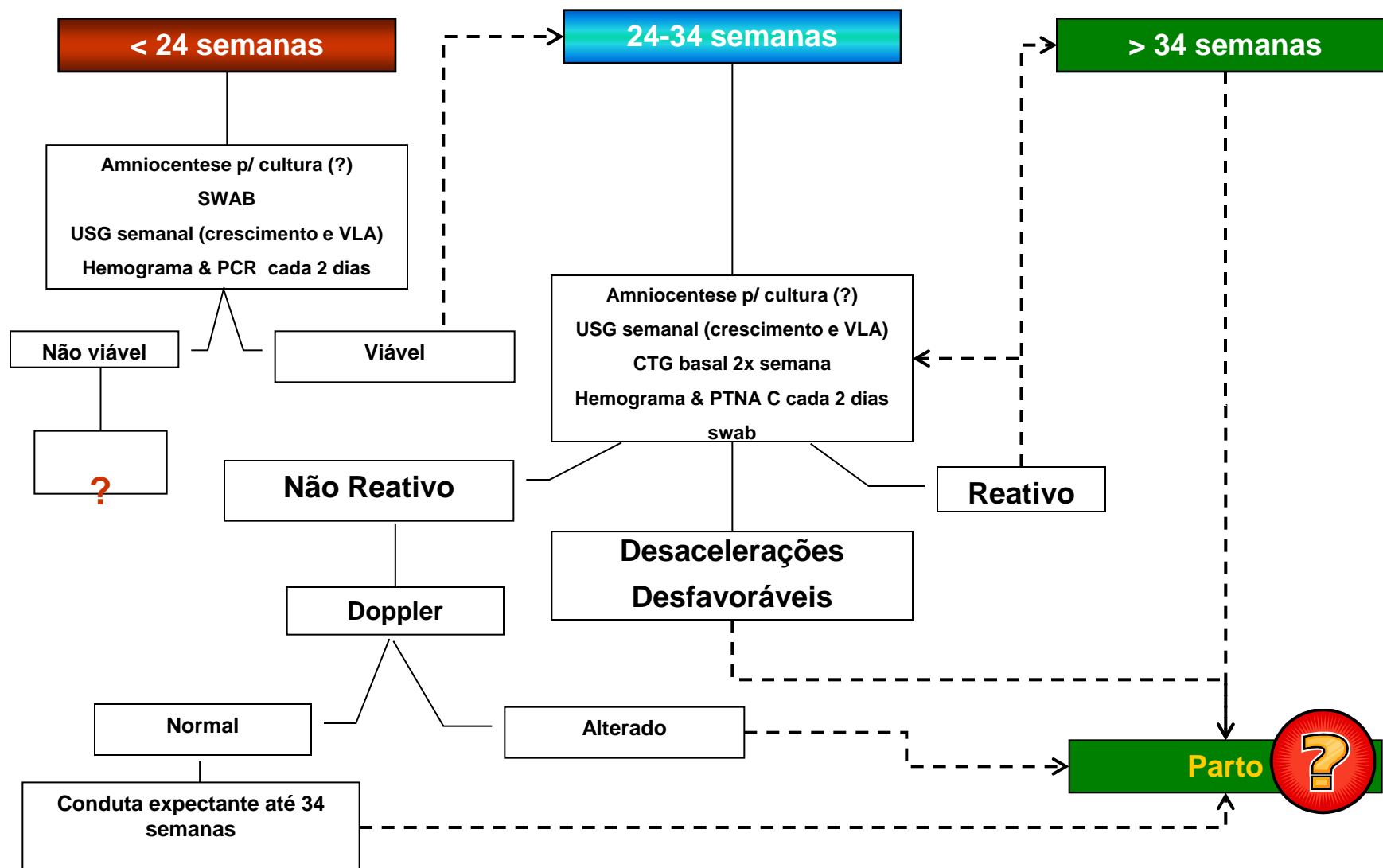
Modelo Infeccioso

Ultra-sonografia

- Volume de Líquido Amniótico (bolsão >2cm)
- PBF



Modelo Infecioso - RPMO



Modelo Infeccioso

< 24 semanas

THE JOURNAL OF
MATERNAL-FETAL
& NEONATAL
MEDICINE

Table 2. Neonatal outcomes: absolute values (percentage).

Total mortality ^a	33 (54.1)
Morbidity and mortality ^a	56 (91.8)
Discharged from the NICU ^b	28 (68.2)
Discharged from the NICU without morbidity ^c	5 (17.9)
Discharged from the NICU with at least one morbidity ^c	23 (82.1)
ROP ^c	19 (67.8)
BPD ^c	13 (46.4)
Intracranial hemorrhage ^c	8 (28.6)
Leukomalacia ^c	3 (10.7)

^aPercentage based on the total number of PPROM ($n = 61$).

^bPercentage based on the number of neonates admitted in the NICU ($n = 41$).

^cPercentage based on the number of neonates discharged from the NICU ($n = 28$).

Nevertheless, it is important to highlight that only 8.2% (5/61) of newborns were discharged with no morbidity from the hospital, and in this group all deliveries occurred after 27 weeks and the birth weight was above 960 g. These findings confirm that the earlier PPROM, the worse the perinatal outcome, with a higher frequency of mortality and major morbidities such as BPD, ROP, PVL and PIH [5].

MODELOS DE COMPROMETIMENTO FETAL

- **MODELO OBSTRUTIVO**
- **MODELO ANÊMICO**
- **MODELO METABÓLICO**
- **MODELO INFECCIOSO**
- **MODELO DE MEMBRANA**
- **MODELO UMBILICAL**
- **OUTROS**
 - **GEMELAR**

Modelo de Membrana

■ Definição de gestação pós-termo:

**Partos IG \geq 42 sem (294 dias): 5,6% nos EUA
0,4% na Áustria
8,1% na Dinamarca**

Fatores relacionados:

- Primiparidade
- Taxa de prematuridade
- Complicações da gestação
- Prática Obstétrica
- **USG 1º Trimestre**

Modelo de Membrana

■ Riscos associados:

Mortalidade perinatal:

IG \geq 42 sem \rightarrow 2x (IG 38-40 sem)

IG \geq 43 sem \rightarrow 4 x (IG 38-40 sem)

IG \geq 44 sem \rightarrow 5-7x (IG 38-40 sem)

CONDUTA EXPECTANTE MORTE ANTEPARTO

- 40 a 41 sem: 0.86 a 1.08 por 1000
- 41 a 42 sem: 1.2 a 1.27 por 1000
- 42 a 43 sem: 1.3 a 1.9 por 1000
- >43 sem: 1.58 a 6.3 por 1000

RISCO FETO e RN

- Macrossomia
- Hipoglicemia
- Distócia de ombro
- Aspiração de mecônio
- Síndrome da pós-maturidade (20% dos fetos)

Modelo de Membrana

- O transporte de nutrientes e oxigênio pela placenta decrece após o termo.
- O desenvolvimento da pós-maturidade envolve o processo de falência placentária em prover o feto e realizar adequadamente a troca de gases.

Modelo de Membrana

- infartos placentários
- calcificação
- trombose intervilosa
- depósito de fibrina
- hematoma retro-placentário
- endarterite obliterativa
- crescimento vilositário compensatório quando comparado à placenta de termo.

Modelo de Membrana



Modelo de Membrana

SOGC CLINICAL PRACTICE GUIDELINE

No. 214, September 2008

Guidelines for the Management of Pregnancy at 41+0 to 42+0 Weeks

Recommendations

1. First trimester ultrasound should be offered, ideally between 11 and 14 weeks, to all women, as it is a more accurate assessment of gestational age than last menstrual period with fewer pregnancies prolonged past 41+0 weeks. (I-A)
2. If there is a difference of greater than 5 days between gestational age dated using the last menstrual period and first trimester ultrasound, the estimated date of delivery should be adjusted as per the first trimester ultrasound. (I-A)
3. If there is a difference of greater than 10 days between gestational age dated using the last menstrual period and second trimester ultrasound, the estimated date of delivery should be adjusted as per the second trimester ultrasound. (I-A)
4. When there has been both a first and second trimester ultrasound, gestational age should be determined by the earliest ultrasound. (I-A)
5. Women should be offered the option of membrane sweeping commencing at 38 to 41 weeks, following a discussion of risks and benefits. (I-A)
6. Women should be offered induction at 41+0 to 42+0 weeks, as the present evidence reveals a decrease in perinatal mortality without increased risk of Caesarean section. (I-A)

Modelo de Membrana

SOGC CLINICAL PRACTICE GUIDELINE

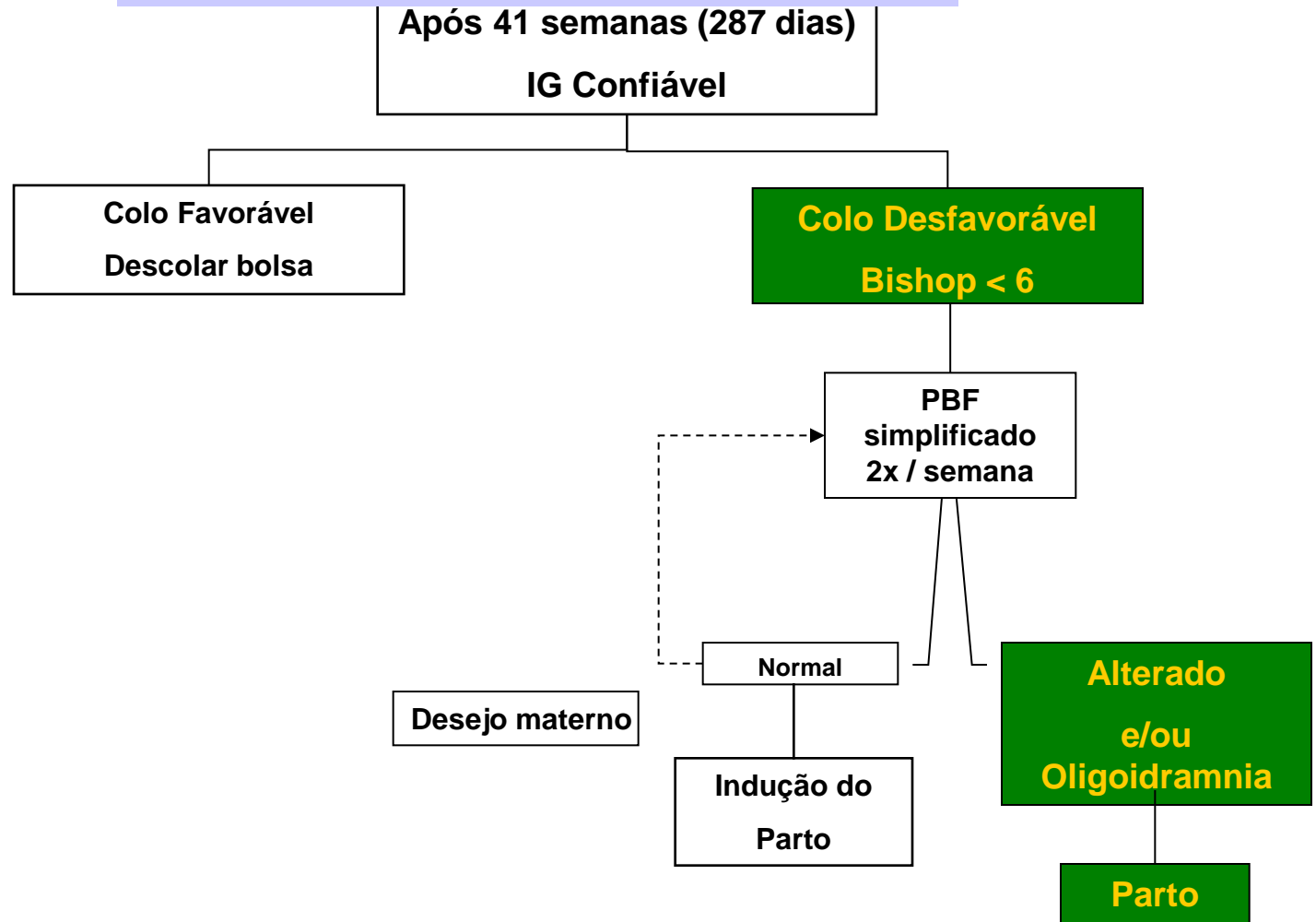
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Modelo de Membrana



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Modelo Umbilical

Interrupção abrupta ou intermitente do fluxo feto-placentário.



Modelo Umbilical

Condições que predisõem o acidente com o cordão:

- Gestação gemelar monoamniótica,
- Oligoidramnia
- Patologias próprias do cordão
 - inserção velamentosa
 - “nó verdadeiro”
 - brevidade
 - procidência

MODELOS

- AGUDO (v.g., DPP) (0)
- TOXÊMICO/CIR (I)
- ANÊMICO (v.g., DOENÇA Rh) (II)
- DIABÉTICO (III)
- PÓS-MATURO (IV)
- GEMELAR (V)

VALOR PROPEDEÚTICO

+

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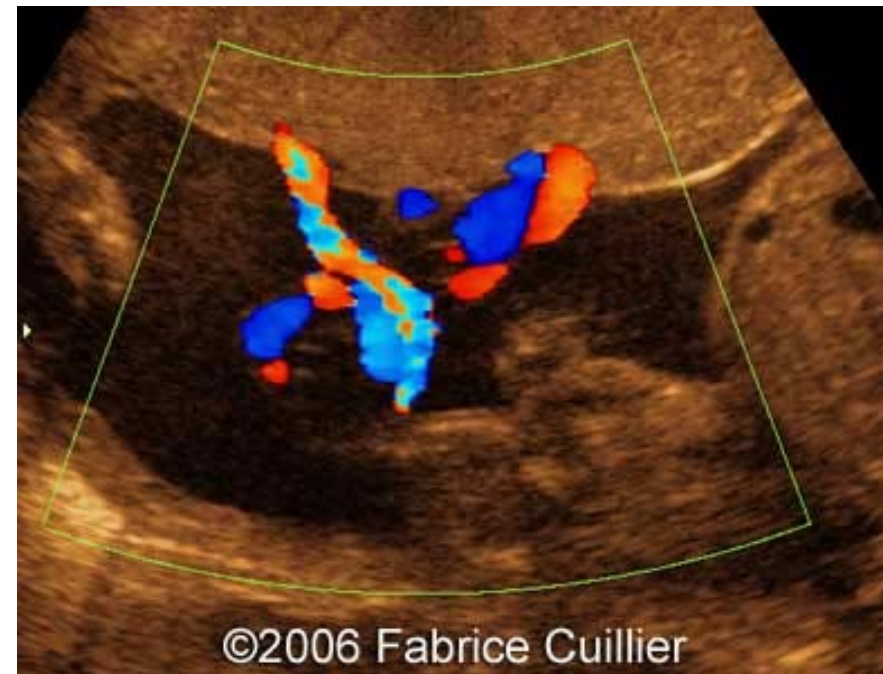
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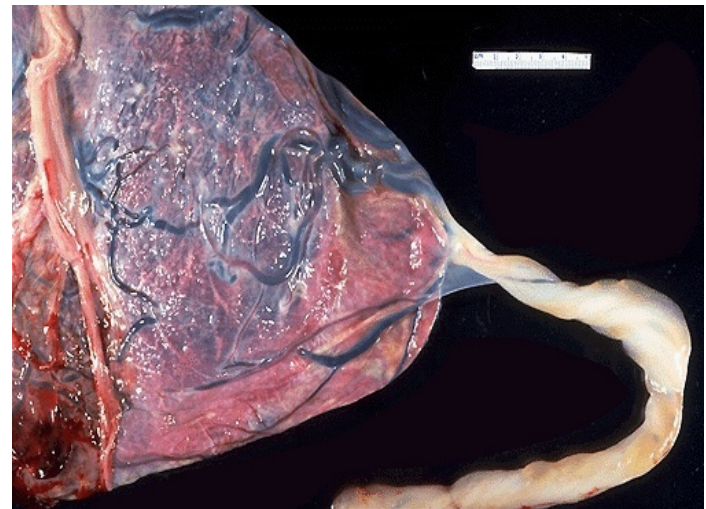
Modelo Umbilical

Gestação gemelar monoamniótica: 1% dos gemelares

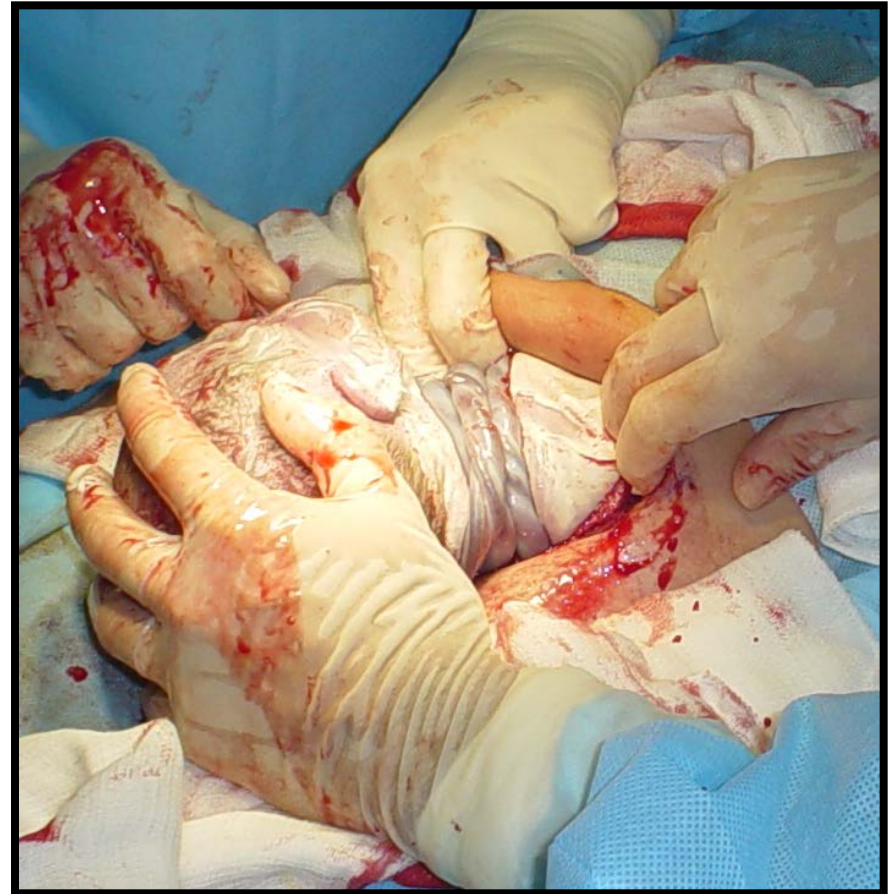


INTERRUPÇÃO COM 32 SEMANAS

● Modelo Umbilical



Modelo Umbilical



MODELOS DE COMPROMETIMENTO FETAL

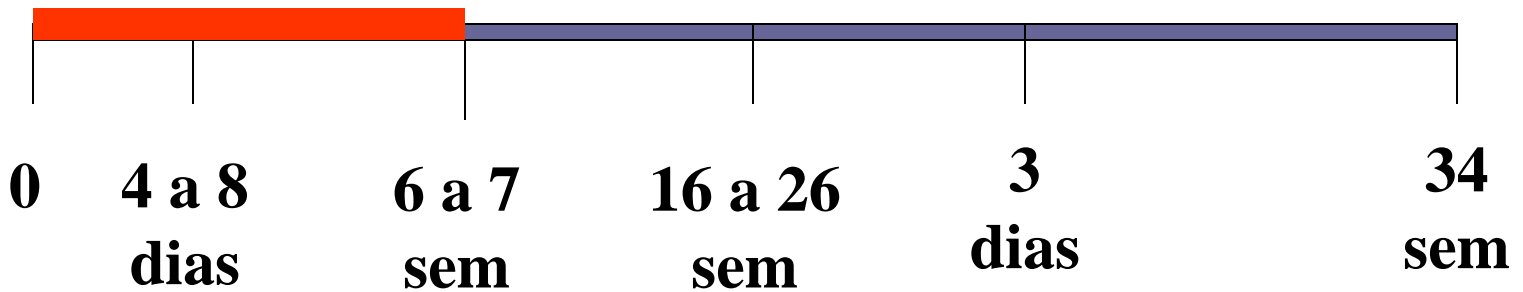
- **MODELO OBSTRUTIVO**
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Modelo Gemelar

GEMELAR - STFF



Diagnóstico da Corionicidade



Controle – Gemelar - STFF

Doppler Vmax
CM

→ Anemia

→ Transfusão

Ultra-sonografia

→ Vitalidade Fetal



Colo Uterino

→ Circlagem



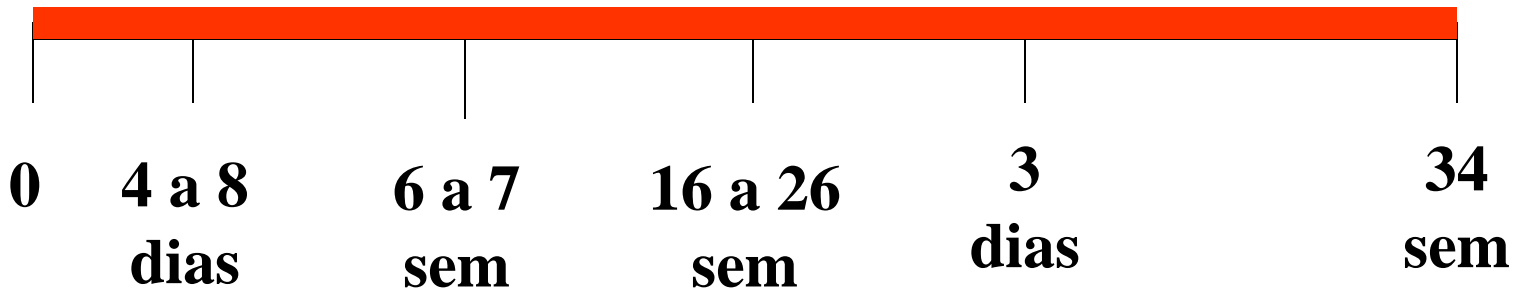
SNC

→ Coagulação de cordão

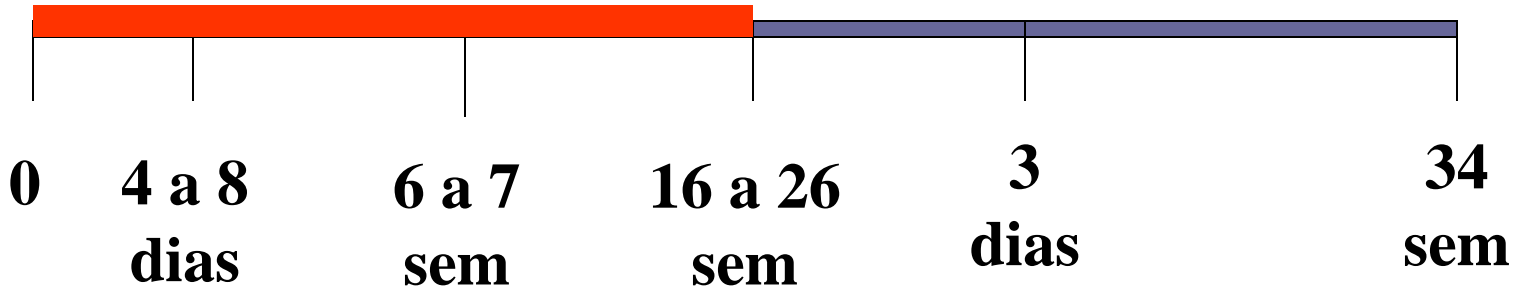
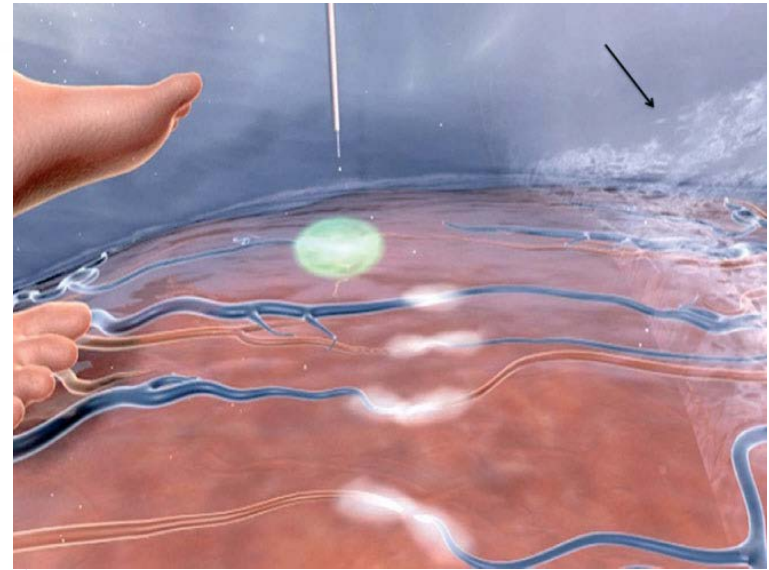
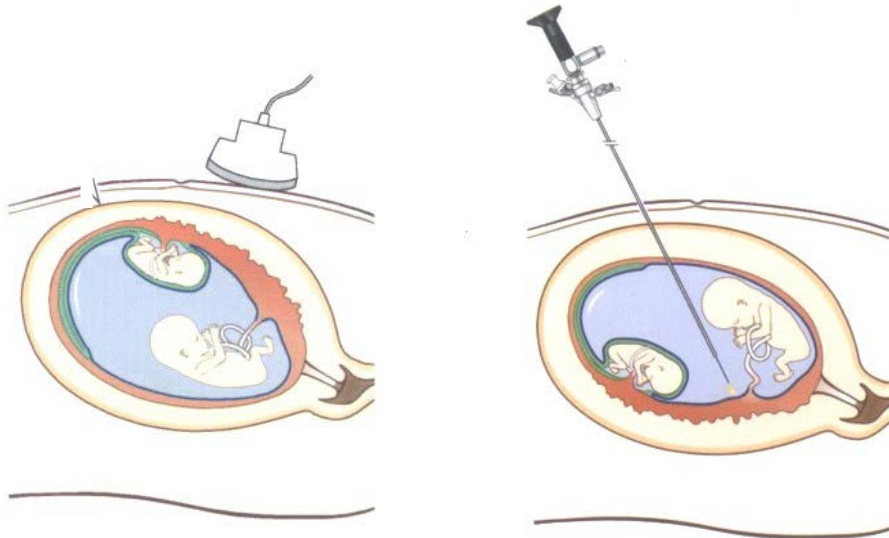
Exame Clínico

→ Amniorrexe

→ Conduta Individual



Diagnóstico e Tratamento da STFF



Pós-Graduação Médica em Medicina Fetal



Setor de Medicina Fetal
Departamento de Obstetrícia
Instituto Fernandes Figueira - Fiocruz
Av. Rui Barbosa, 716, Flamengo - RJ
Tel: 21- 2554-1893

Centro de Diagnóstico
Clínica Perinatal Barra
Av. Emb. Abelardo Bueno, 201,
Barra da Tijuca - RJ
Tel: 21-3722-2021



email: paulonassar@cpdt.com.br