Pregnancy Induced Hypertension

Mang thai gáy tàng huyãút aïp

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Definitions
Âënh nghéa

1. Hypertension
   Tàng huyãút aïp
2. Edema
   Phuì
3. Proteinuria
   Protein niãûu

Hypertension
Tàng huyãút aïp

(SBP) Systolic - Sustained > 140 mm Hg

(Huyãút aïp tám thu) Tám thu – Keïo daìi > 140 mmHg

(DBP) Diastolic - Sustained > 90 mm Hg

(Huyãút aïp tám træång) Tám træång – Keïo daìi > 90 mmHg

$$MAP = \left(\frac{SBP + SBP + DBP}{3} \right)$$

HUYÃÚT AÏP ÂÄÜNG MAÛCH TRUNG BÇNH $= \left(\frac{SBP + SBP + DBP}{3} \right)$

(ACOG, 1996)

Hypertension
Tàng huyãút aïp

SBP rise of 30 mm Hg or DBP rise of 15 mm Hg is probably not significant provided sustained BP is < 140/90 mm Hg

SBP tàng 30 mmHg hoàûc DBP tàng 15 mmHg coï leî khäng coï yï nghéa nãúu huyãút aïp duy trç < 140/90mmHg

(Villar and Sibai, 1989)

Proteinuria
Protein niãûu

1. Greater than 300 mg in 24 hour period
   Låïn hån 300 mg/24 giåì
2. Greater than 100 mg/dl dipstick (sustainable)
   Låïn hån 100 mg/dl que thæí (coï thãø âo âæåüc)

Edema
Phuì

Difficult Definition

(80 + % of normal gravidas exhibit edema)

Khoï âënh nghéa

(80 + % caïc thai phuû bçnh thæåìng coï biãøu hiãûn phuì)

Pregnancy Induced Hypertension (PIH)

1. Hypertension related to pregnancy
   Tàng huyãút aïp liãn quan âãún thai kyì
2. Hypertension returns to baseline by 6 weeks postpartum
   Tàng huyãút aïp tråí laûi bçnh thæåìng 6 tuáön sau sinh
3. PIH, by definition, after 20 weeks* gestation
   PIH, nhæ âënh nghéa, sau 20 tuáön* mang thai

(* exception = GTD)
(* ngoaûi træì = Bãûnh tãú baìo nuäi)

PIH

1. Preeclampsia
   Tiãön saín giáût
2. Eclampsia
   Saín giáût
3. Late transient HTN
   Tàng huyãút aïp muäün thoaïng qua

Preeclampsia = PIH with proteinuria

Tiãön saín giáût = PIH keìm protein niãûu

Eclampsia = PIH with seizure activity

Saín giáût = PIH keìm co giáût

Late transient HTN = HTN alone without other apparent organ involvement

HTN muäün thoaïng qua = HTN âån âäüc maì khäng bao gäöm cå quan biãøu hiãûn roî khaïc

Preeclampsia:
Tiãön saín giáût:

A. Mild
   Nheû

B. Severe
   Nàûng

   1. HELLP Syndrome
      Häüi chæïng HELLP

Severe Preeclampsia
Tiãön saín giáût nàûng

BP > 160/110 mmHg

Huyãút aïp > 160/110 mmHg

Proteinuria > 5 gm/24hr

Protein niãûu > 5 gm/24giåì

Azotemia/oliguria (< 500 mL/24 hr)

Nitå huyãút/thiãøu niãûu (< 500 ml/24giåì)

Microangiopathic hemolysis

Tan huyãút thuäüc bãûnh mao maûch

Thrombocytopenia

Giaím tiãøu cáöu

Severe Preeclampsia
Tiãön saín giáût nàûng

End organ symptoms:

Caïc triãûu chæïng cå quan âêch:

1. CNS (Hãû tháön kinh trung æång)
2. Visual (Thë læûc)
3. Hepatic (Gan)

Intrauterine growth delay (oligohydramnios?)

Cháûm phaït triãøn trong tæí cung (thiãøu äúi?)

HELLP Syndrome
Häüi chæïng HELLP

Hemolysis (Tan maïu)

E Elevated Liver Enzyme

L Tàng men gan

L Low Platelet

P Tiãøu cáöu tháúp

Special Circumstances (PIH)
Caïc træåìng håüp âàûc biãût (PIH)

1. HTN before 20 weeks gestation = chronic HTN
   HTN træåïc 20 tuáön mang thai = HTN maûn

2. Superimposed PIH*
   PIH cuìng xaíy ra*

   Chronic HTN + Superimposed PIH
   HTN maûn + PIH âäöng thåìi

* Often difficult to ascertain
* Thæåìng khoï xaïc âënh

PIH Risk Factors
Caïc yãúu täú nguy cå cuía PIH

Nulliparity
Con so

Young or elderly gravidas
Thai phuû treí hoàûc låïn tuäøi

Family history
Tiãön sæí gia âçnh

Chronic HTN
HTN maûn

Renal disease
Bãûnh tháûn

PIH Risk Factors
Caïc yãúu täú nguy cå cuía PIH

Antiphospholipid syndrome
Häüi chæïng khaïng phospholipid

Diabetes
Âaïi âæåìng

Multiple gestation
Âa thai

Angiotensinogen gene T235 (?)

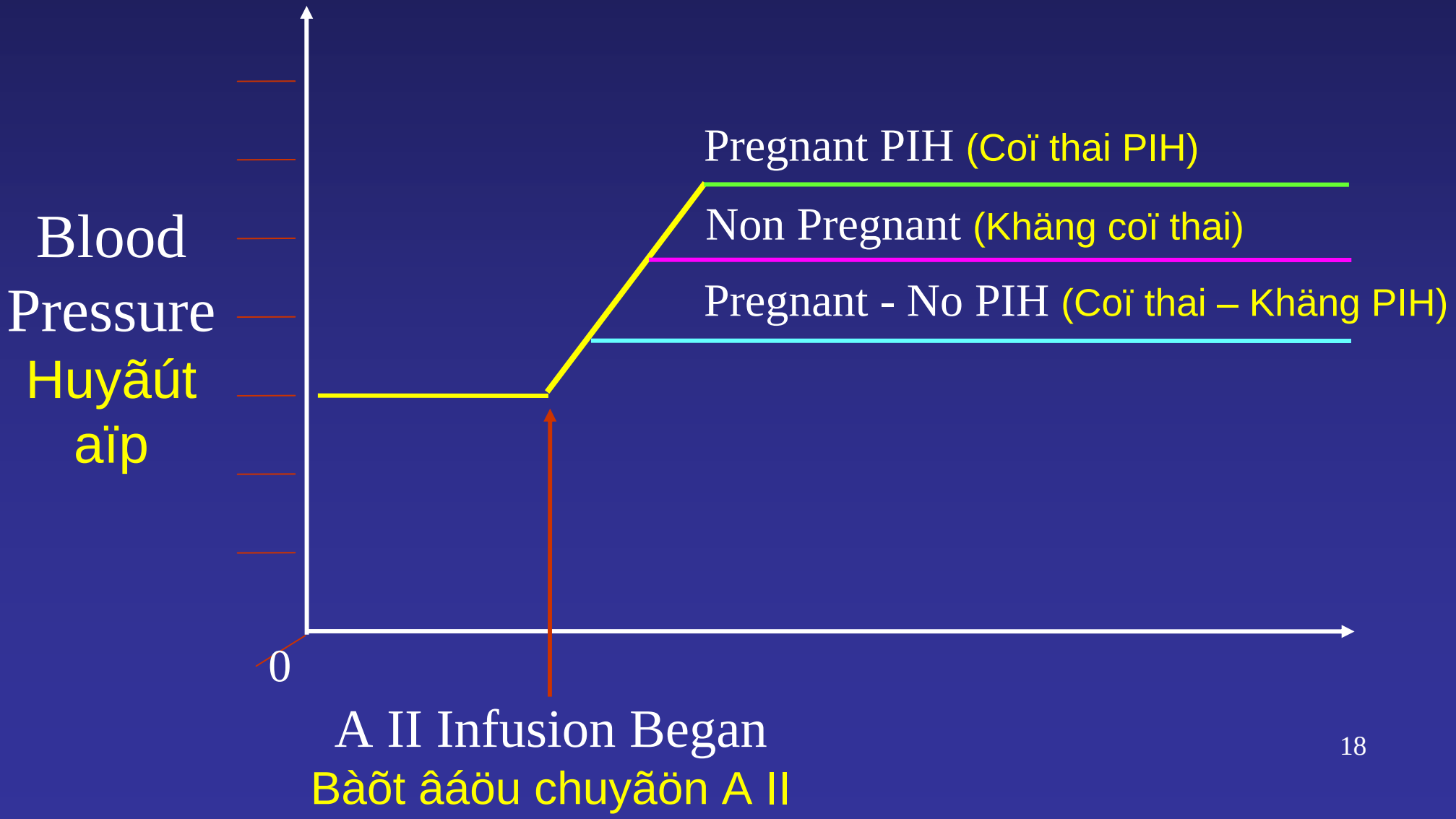
Previous severe PIH before 28 weeks
Træåïc âáy âaî bë PIH nàûng træåïc 28 tuáön

PIH Etiology - Uncertain?
Bãûnh nguyãn cuía PIH – Khäng chàõc chàõn

1. Altered sensitivity to pressor effects of angiotensin II
   Thay âäøi âäü nhaûy âäúi våïi hiãûu quaí tàng huyãút aïp cuía angiotensin II
2. EDRF?
   Yãúu täú giaíi phoïng cháút endotherlin-1?
3. Prostaglandin synthesis?
   Täøng håüp prostaglandin?

Sensitivity - Angiotensin II

Âäü nhaûy – Angiotensin II



PIH – Prostaglandin

1. Thromboxane (TXA2)

   Aggregates platelets (Kãút dênh tiãøu cáöu)

   Vasoconstricts (Co maûch)

2. Prostacyclin (PGI2)

   Inhibits platelet aggregation

   ÆÏc chãú sæû kãút dênh cuía tiãøu cáöu

   Vasodilators

   Giaîn maûch

PIH Prostaglandins

Uterus (Tæí cung)

1. Altered Implantation?
   Thay âäøi sæû laìm täø
2. Altered TXA2 and/or PGI2 Production
   Thay âäøi sæû saín xuáût TXA2 vaì/hoàûc PGI2

Vascular Endothelial Vasoconstriction
Sæû co maûch do näüi mä maûch maïu

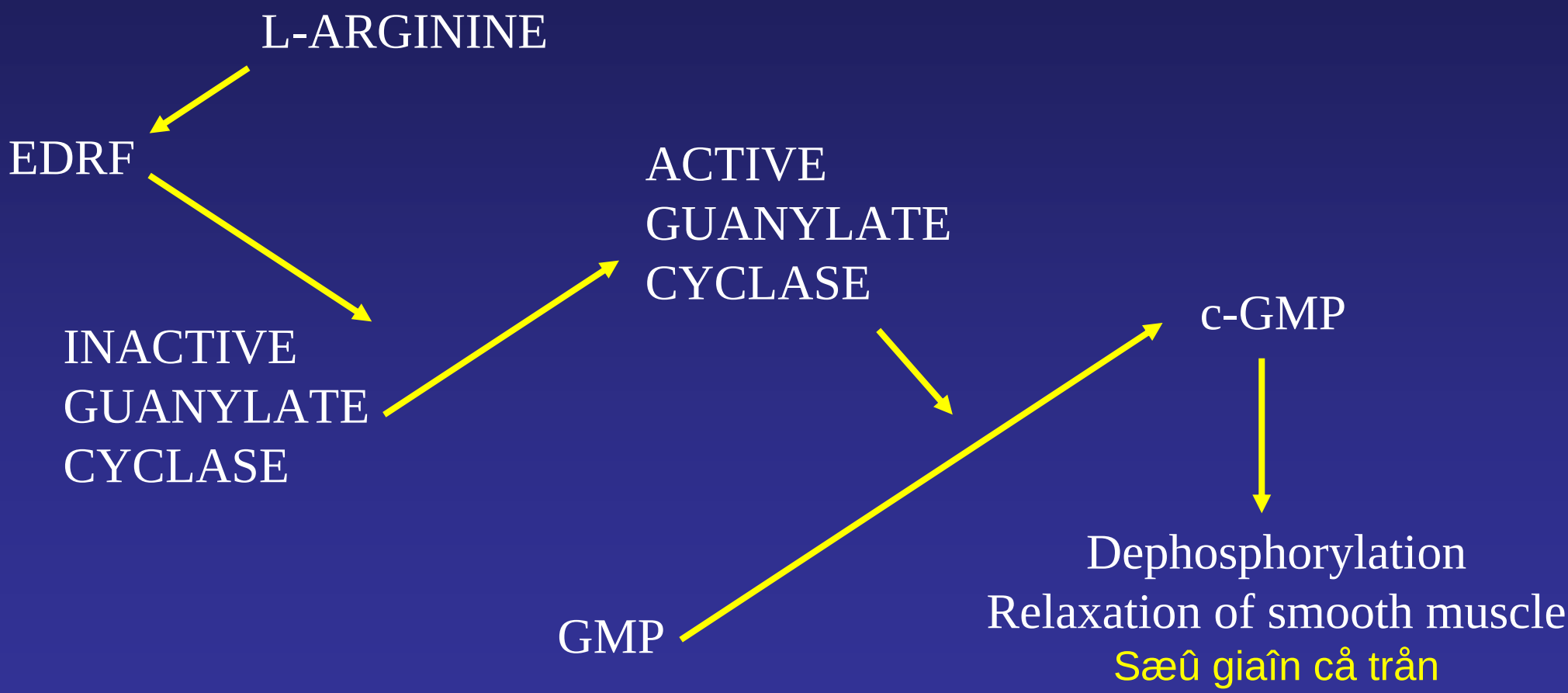
End Organ Damage
Täøn thæång cå quan âêch

PIH Prostaglandin

1. Low dose ASA Inhibits TXA2
   ASPIRINE liãöu tháúp æïc chãú TXA2
2. Low dose ASA did not improve outcome in normal gravidas or high risk patients
   ASA liãöu tháúp khäng caíi thiãûn âæåüc háûu quaí åí caïc thai phuû bçnh thæåìng hoàûc åí caïc bãûnh nhán coï nguy cå cao

(Sibai, 1995; Hauth, 1998)

PIH - Nitric Oxide (NO or EDRF)



(Morris et al, 1996)

NO in PIH
NO trong PIH

1. NO may mediate AII refractoriness
   NO coï thãø âiãöu hoaì âæåüc taïc duûng keïo dça cuía A II
2. NO may inhibit uterine contractility
   NO coï thãø æïc chãú sæû co boïp cuía tæí cung
3. NO may modulate uteroplacental blood flow
   No coï thãø âiãöu chènh doìng maïu tæí cung nhau

(Molnar and Hertelenay, 1992; Hull, 1994; Yallampalli, 1993)

NO in PIH
NO trong PIH

1. In murine model “FALSE” precursor diet (reduces substrate for NO) results in “preeclampsia”
   ÅÍ chuäüt duìng tiãön cháút “GIAÍ” (giaím cháút nãön cho NO) gáy ra “tiãön saín giáût”
2. Nitrovasodilators (precursors for NO) reduce BP in PIH patients
   Caïc cháút giaîn maûch thuäüc nhoïm Nitric (tiãön cháút cuía NO) laìm giaím huyãút aïp åí caïc bãûnh nhán PIH

(Yallampalli et al, 1993; Gonzalez, 1997)

Etiology of PIH
Bãûnh nguyãn cuía PIH

1. Etiology still uncertain
   Bãûnh nguyãn váùn coìn chæa chàõc chàõn

2. Mediator responses may be effect or causal (??!!)
   Sæû âaïp æïng cuía cháút trung gian coï thãø aính hæåíng hoàûc gáy ra (??!!)

Guytonian Theory of Hypertension

Lyï thuyãút Guytonian vãö tàng huyãút aïp

Salt intake → Volume expansion

Læåüng muäúi tiãu thuû → Sæû tàng thãø têch

↓

Increased cardial output → Increased preload

Tàng cung læåüng tim → Tàng tiãön taíi

↓

Endothelial damage → Increased vascular resistance

Täøn thæång näüi mä → Tàng khaïng læûc maûch maïu

(Easterling et al, 1989)

Management of PIH (1)
Âiãöu trë PIH (1)

Goals:

Muûc tiãu:

1. "Termination of pregnancy with least possible trauma to mother and fetus"
   "Cháúm dæït thai kyì våïi sang cháún täúi thiãøu cho meû vaì thai"
2. "Birth of an infant who subsequently thrives"
   "Âæïa treí sau sinh phaït triãøn täút"
3. "Complete restoration of health to the mother"
   "Phuûc häöi täút sæïc khåí cho meû"

(Cunningham et al, Williams Obstetrics, 1997)

Management of PIH (2)
Âiãöu trë PIH (2)

1. At term (“easy”) – delivery
   Âuí thaïng (“dãù”) - âeí

2. Preterm - risk/benefit analysis
   Thiãúu thaïng – Phán têch haûi/låüi

   mild disease - expectant care
   bãûnh nheû – theo doîi cáøn tháûn

   severe disease - controversial
   bãûnh nàûng – coìn baìn caîi

Expectant Management-Severe Preeclampsia (1)
Theo doîi âiãöu trë – Tiãön saín giáût nàûng (1)

1. Some investigators note improved outcome (fetal/neonatal) without differences in outcome (maternal) by expectant management of the 24-32 (34?) week patient with severe preeclampsia

   Mäüt säú nghiãn cæïu chæïng toí sæû caíi thiãûn háûu quaí (trãn thai/treí måïi sinh) nhæng khäng coï sæû khaïc biãût vãö háûu quaí (âäúi våïi meû) khi theo doîi âiãöu trë bãûnh nhán mang thai 24-32 (34?) tuáön bë tiãön saín giáût nàûng

Expectant Management-Severe Preeclampsia (2)
Theo doîi âiãöu trë – Tiãön saín giáût nàûng (2)

1. Neurodevelopmental outcome not impaired by expectant management
   Kãút quaí phaït triãøn tháön kinh khäng xáúu âi nhåì theo doîi âiãöu trë
2. Daily AFS testing advocated and felt to be effective
   Tràõc nghiãûm thai træåïc sinh haìng ngaìy âãø âaím baío täút

(Chari, 1995; Sibai, 1994; Spinillo, 1994)

Expectant Management-Severe Preeclampsia (2)
Theo doîi âiãöu trë – Tiãön saín giáût nàûng (2)

3. Daily maternal evaluation necessary as inpatient treatment

   Cáön âaïnh giaï meû haìng ngaìy nhæ khi âiãöu trë bãûnh nhán näüi truï

4. TERTIARY CARE TREATMENT

   ÂIÃÖU TRË CÁØN THÁÛN BA THAÏNG CUÄÚI CUÍA THAI KYÌ

(Chari, 1995; Sibai, 1994; Spinillo, 1994)

Expectant Management-Severe Preeclampsia (3)

Theo doîi âiãöu trë – Tiãön saín giáût nàûng (3)

1. Amniotic fluid volume - somewhat predictive of IUGR. NOT predictive of fetal distress
   Thãø têch næåïc äúi – pháön naìo giuïp âaïnh giaï sæû cháûm phaït triãøn thai trong tæí cung. KHÄNG âaïnh giaï âæåüc tçnh traûng suy thai

2. Proteinuria NOT correlated with outcome
   Protein niãûu KHÄNG tæång æïng våïi háûu quaí

(O'Brian 1993; Schucker, 1996; Schiff, 1996)

Expectant Management-Delivery Endpoints (4)

Theo doîi âiãöu trë – Kãút thuïc cuäüc âeí (4)

1. Gestational age < 24 weeks or > 32-34 weeks
   Tuäøi thai < 24 tuáön hoàûc > 32-34 tuáön

2. H E L L P
   Häüi chæïng HELLP

3. Uncontrollable HTN
   Tàng huyãút aïp khäng thãø kiãøm soaït âæåüc

Expectant Management-Delivery Endpoints (4)
Theo doîi âiãöu trë – Kãút thuïc cuäüc âeí (4)

4. Fetal issues
   Säø thai

5. Neurological symptoms
   Caïc triãûu chæïng tháön kinh

6. Treatment must be in tertiary care center
   Âiãöu trë phaíi chuï yï ba thaïng cuäúi thai kyì

Delivery Route - Severe Preeclampsia
Âæåìng âeí trong tiãön saín giáût nàûng

- Attempts at vaginal delivery supported
  Nãn cäú gàõng âãø âæåìng dæåïi
- Considerations for C-section
  Cán nhàõc viãûc mäø âeí
  - Fetal intolerance
    Khäng dung naûp thai
  - Obstetric consideration (low threshold)
    Cán nhàõc vãö saín khoa (ngæåîng tháúp)
  - Previous C-section (VBAC?)
    Tiãön sæí mäø âeí (Âeí âæåìng dæåïi coï mäø âeí cuî?)

Gravida One Delivery With Preeclampsia (INDUCTION?)

Thai phuû âeí láön âáöu bë tiãön saín giáût (Gáy chuyãøn daû?)

- Length of labor and C-section rate higher in those induced with preeclampsia
  Tyí lãû chuyãøn daû keïo daìi vaì mäø âeí cao hån åí caïc thai phuû âæåüc phaït khåíi chuyãøn daû bë tiãön saín giáût

- Majority do deliver vaginally
  Pháön låïn âeí âæåìng dæåïi

(Elly et al, 1997; ACOG, 1995; DeValle, 1996; Regenstein, 1995)

Gravida One Delivery With Preeclampsia (INDUCTION?)

Thai phuû âeí láön âáöu bë tiãön saín giáût (Gáy chuyãøn daû?)

- PGE_2 gel probably safe
  Gel PGE2 háöu nhæ an toaìn
- "Off label" PGE_1 methyl analogue reported as safe
  "Off label" tæång tæû methyl PGE1 âaî baïo caïo laì an toaìn
- Induction probably safe in low birth weight cohort
  Phaït khåíi chuyãøn daû coï leî an toaìn åí treí tháúp cán

(Elly et al, 1997; ACOG, 1995; DeValle, 1996; Regenstein, 1995)

Anesthetic Technique – Preeclampsia
Kyî thuaáût vä caím trong tiãön saín giaáût

- Some controversy exists
  Váùn coìn mäüt säú baìn caîi
- Risks from all techniques
  Nguy cå tæì kyî thuaáût

(Wallace, 1995; ACOG, 1996)

Anesthetic Technique – Preeclampsia
Kyî thuáût vä caím trong tiãön saín giáût

- Recent U.S. study reports no difference in outcome with regional or general techniques if given correctly

  Nghiãn cæïu åí Myî gáön âáy cho tháúy khäng coï sæû khaïc biãût vãö háûu quaí giæîa kyî thuáût vä caím vuìng hoàûc toaìn thãø nãúu duìng âuïng

(Wallace, 1995; ACOG, 1996)

Eclampsia
Saín giáût

- Incidence in those with PIH varies between 2-5% (if not treated)
  Tyí lãû thai phuû bë PIH thay âäøi giæîa 2-5% (nãúu khäng âæåüc âiãöu trë)

Eclampsia
Saín giáût

- Associated with what appears to be cerebral arterial vasospasm (etiology)
  Phäúi håüp våïi yãúu täú laìm co thàõt maûch naîo (bãûnh nguyãn)
- May occur without appreciable HTN or proteinuria
  Coï thãø xaíy ra maì khäng coï tàng huyãút aïp hoàûc protein niãûu âaïng kãø

Magnesium Sulfate

- Long empiric experience
  Âaî qua kinh nghiãûm láu daìi
- Several regimens are probably effective
  Mäüt vaìi chãú âäü âiãöu trë háöu nhæ chàõc chàõn coï hiãûu quaí

(Lucas, 1995; Eclampsia Collaborative Trial, 1995)

Magnesium Sulfate

- Magnesium treats vasospasm (?) versus other ill-defined mechanisms of action
  Magnesium âiãöu trë âæåüc co maûch (?) ngæåüc våïi caïc cå chãú hoaût âäüng chæa roî khaïc
- Efficacy recently validated as compared to phenytoin
  Hiãûu læûc gáön âáy âaî âæåüc cäng nháûn nhæ âäúi våïi phenytoin

(Lucas, 1995; Eclampsia Collaborative Trial, 1995)

Questions Regarding Magnesium Sulfate
Caïc cáu hoíi vãö Magnesium Sulfate

- Do patients with mild PIH need prophylaxis?
  Coï phaíi caïc bãûnh nhán bë PIH nheû cáön âiãöu trë dæû phoìng?
- Does magnesium sulfate increase postpartum hemorrhage?
  Coï phaíi magnesium sulfate laìm tàng tçnh traûng xuáút huyãút sau sinh?
- Will other treatments of cerebral vasospasm work better?
  Caïc âiãöu trë co thàõt maûch naîo khaïc seî taïc âäüng täút hån?

Treatment of HTN in Preeclampsia / Chronic HTN

Âiãöu trë tàng huyãút aïp trong tiãön saín giáût/tàng huyãút aïp maûn

1. Currently, no data suggests a preventive role for treatment of hypertension
   Hiãûn nay, khäng coï bàòng chæïng chæïng toí vai troì dæû phoìng cuía âiãöu trë tàng huyãút aïp

2. HTN and treatment of HTN can both produce decreased uteroplacental blood flow
   HTN vaì âiãöu trë HTN coï thãø laìm giaím doìng maïu tæí cung nhau

(ACOG, 1996)

Treatment of HTN in Preeclampsia / Chronic HTN

Âiãöu trë tàng huyãút aïp trong tiãön saín giáût/tàng huyãút aïp maûn

3. Chronic HTN - available data does <u>not</u> suggest outcome improved with treatment unless DBP > 90-100 mmHg.

   HTN maûn – Caïc dæî kiãûn sàôn coï khäng chæïng toí âæåüc háûu quaí âæåüc caíi thiãûn nhåì âiãöu trë træì khi huyãút aïp tám træång > 90-100 mmHg

(ACOG, 1996)

Treatment of HTN in Preeclampsia / Chronic HTN

Âiãöu trë tàng huyãút aïp trong tiãön saín giáût/tàng huyãút aïp maûn

1. Maternal consideration for treatment of HTN in labor
   Læu yï âiãöu trë tàng huyãút aïp cho meû khi chuyãøn daû

   SBP > 160-180

   DBP > 105-110

2. Choice of agents?
   Choün læûa thuäúc?

   Hydralazine

   Labetalol

Patients With Chronic HTN Who Conceive

Bãûnh nhán mang thai keìm tàng huyãút aïp maûn

1. Most agents not well studied - Aldomet - most data
   Háöu hãút caïc thuäúc chæa âæåüc nghiãn cæïu kyî – Aldomet
2. Current recommendations are to continue already started therapy - (exception: ACE inhibitors)
   Caïc khuyãún caïo hiãûn naïy laì tiãúp tuûc liãûu phaïp âaî âiãöu trë træåïc âáy – (ngoaûi træì: caïc thuäúc æïc chãú men chuyãøn)

Patients With Chronic HTN Who Conceive

Bãûnh nhán mang thai keìm tàng huyãút aïp maûn

3. Target BP in “Low” hypertension range
   Muûc tiãu laì huyãút aïp trong phaûm vi tháúp
4. Third trimester AFS testing
   Tràõc nghiãûm thai træåïc sinh vaìo ba thaïng cuäúi cuía thai kyì
5. Bedrest?
   Nghè ngåi taûi giæåìng?
6. Observe for IUGR and superimposed PIH
   Theo doîi sæû cháûm phaït triãøn cuía thai trong tæí cung vaì PIH âäöng thåìi

HELLP Syndrome
Häüi chæïng HELLP

Hemolysis (Tan maïu)

E Elevated Hepatic Transaminases
L Tàng men gan

L Low Platelets (Thrombocytopenia < 100,000/mm^3)
P Tiãøu cáöu tháúp (Giaím tiãøu cáöu < 100.000/mm3)

HELLP

1. Usually an indication for delivery
   Thæåìng laì mäüt chè âënh cho âeí
2. May occur without appreciable HTN
   Coï thãø xaíy ra maì khäng coï tàng huyãút aïp âaïng kãø
3. Is indicative of multisystem disease
   Laì biãøu hiãûn cuía bãûnh âa hãû thäúng

Differential Diagnosis – HELLP

Cháøn âoaïn phán biãût häüi chæïng HELLP

1. Acute fatty liver of pregnancy
   Gan nhiãùm måî cáúp trong khi mang thai
2. Thrombotic thrombocytopenia purpura
   Ban xuáút huyãút giaím tiãøu cäöu do huyãút khäúi
3. Systemic lupus erythematosis
   Lupus ban âoí hãû thäúng
4. Hemolytic uremia syndrome
   Häüi chæïng huyãút taïn tàng ure maïu

Developing Therapies – HELLP

Caïc liãûu phaïp âiãöu trë häüi chæïng HELLP âang phaït triãøn

1. Plasmapheresis
   Liãûu phaïp truyãön maïu cuía bãûnh nhán âaî trêch boí huyãút tæång
2. Corticosteroids
3. Oxygen delivery therapy
   Liãûu phaïp cung cáúp oxy

(Belfort, 1993; Wheeler, 1996; Martin, 1997; Martin, 1995)

Pulmonary Artery Catheters – Preeclampsia

ÄÚng thäng âäüng maûch phäøi trong tiãön saín giáût

1. NOT usually needed
   Thæåìng KHÄNG cáön thiãút
2. Indicative - Refractory HTN
   Chè âënh – Tàng huyãút aïp khoï chæîa

   Unresponsive oliguria

   Thiãøu niãûu khäng âaïp æïng âiãöu trë

   Underlying conditions

   Caïc tçnh traûng suy suûp

   Unresponsive pulmonary edema

   Phuì phäøi khäng âaïp æïng âiãöu trë

Conclusions
Kãút luáûn

1. PIH is a multifaceted disease of uncertain etiology
   PIH laì mäüt bãûnh âa daûng våïi bãûnh nguyãn khäng chàõc chàõn

2. At its worst, PIH is a multisystem disease
   ÅÍ giai âoaûn nàûng, PIH laì mäüt bãûnh âa hãû thäúng

Conclusions
Kãút luáûn

3. Expectant management of severe or worsening preeclampsia needs to be a tertiary care process
   Cáön theo doîi âiãöu trë trong træåìng håüp tiãön saín giáût nàng hoàûc täöi tãû trong suäút ba thaïng cuäúi cuía thai kyì

4. Developing trends may affect future outcome
   Caïc khuynh hæåïng âiãöu trë âang phaït triãøn coï thãø aính hæåíng âãún kãút quaí trong tæång lai