

ANESTHESIA AND ANALGESIA IN OBSTETRICS

J. ZE MINKANDE

Postgraduate Training in Reproductive Health Research
Faculty of Medicine, University of Yaoundé 2007

Introduction

Solicitations of anesthetic doctors in obstetrics

- Analgesia for normal delivery
- Anesthesia before and after delivery for obstetrical maneuver: C/S, forceps, AD
- Anesthesia and analgesia for high risk pregnancy (maternal diabetes, prematurity, preeclampsia, maternal cardiovascular disease)
- Anesthesia for perioperative complications (severe bleeding, amniotic embolism...)

INTRODUCTION 2

Other indications: surgery in utero for fetal congenital malformations correction; surgery in pregnant women for non obstetrical problems; anesthesia for medically assisted procreation

Epidemiology:

England: 3th cause of maternal death (1982-1984)

INSERM (France, 1982): 110 maternal deaths due to complications of pregnancy, delivery, and postpartum (1.37 per 10000 births)

Introduction 3

Evolution in human idea and behavior

⇒ acceptance and request for analgesia in obstetrics

Necessity of an optimal security

Maternal information many weeks before delivery

⇒ anesthetic consultation+++

Physiological modifications of pregnancy

Physical status \Rightarrow important modifications of vital functions

Mechanical modifications / gravid uterus, hormonal, \uparrow maternal metabolism and consumption of O_2

➤ Respiratory modifications :

Hypervascularisation of superior airway mucous membrane \Rightarrow congestion, edema

Frequency of nasal obstruction and risk of bleeding (NGT, TI)

Edema in laryngeal and pharyngeal mucous membrane, cephalic edema, breast hypertrophy \Rightarrow difficulty of tracheal intubation

Preeclampsia \Rightarrow aggravation of edema

Respiratory modifications

Parameters	Type of variation	Mean variation (%)
Minute ventilation	↑	50
Alveolar ventilation	↑	70
Tidal volume	↑	40
Respiratory frequency	↑	15
Vital capacity	-	0
FRC	↓	20
Thoraco-pulmonary compliance	↓	45
Consumption of O ₂	↑	20

↓ reserves of oxygen ⇒ ↓ PaO₂ during induction
↑ ventilation/minute ⇒ rapid induction

Cardiovascular modifications

Parameters	Type of variation	Mean variation (%)
Cardiac output	↑	40
Pulse	↑	15
Systolic ejection	↑	30
SBP	↓	0-5 mm Hg
DBP	↓	10-20 mm Hg
Plasmatic volume	↑	45
Globular volume	↑	20
Total blood volume	↑	35
CVP	-	0
SAR	↑	15
Blood loss	↑	400ml 750 C/S

Coagulation factors

Parameters	Normal value	End of pregnancy
I (fibrinogen)	2-4,5 g/l	4-6,5g/l
II (prothrombin)	75-125%	100-125%
V	75-125%	100-150%
VII	75-125%	150-250%
VIII	75-150%	200-500%
IX	75-125%	100-150%
X	75-125%	150-250%
XI	75-125%	50-100%
XII	75-125%	100-200%
XIII	75-125%	35-75%
Antithrombin III	85-110%	75-100%
Anti-Xa	85-110%	75-100%
Platelets	-	↑moderate
Fibrin	-	↓moderate

Cardiovascular modifications

Syndrome of compression of big vessels : (DD)

- Hypotension, CF↑ or ↓
- Malaise, dizziness, nausea
- Pallor, sweating

Others: hypoproteinemia (↓ total protein 10% and albumin 20%)

⇒ **RISK OF OVERDOSE**

Digestives modifications

Anatomical and hormonal modifications \Rightarrow Esophageal regurgitations and inhalation of gastric contents

Gravid uterus : \uparrow intragastric tension, modification of normal angle of gastro-esophageal junction; \downarrow tonus of lower esophageal sphincter, \uparrow of gastric acid secretions

Progesterone : inhibition of gastric motility, alimentary transit \rightarrow difficulty to empty the stomach \Rightarrow **FULL STOMACH**

\uparrow Liver enzymes (SGOT, LDH, PAL)

\downarrow plasmatic pseudocholinesterases (28%) \rightarrow risk of prolonged neuromuscular block

CNS and kidney function modifications

Progesterone : \uparrow renal blood flow, glomerular filtration \uparrow 50%
 \Rightarrow \downarrow urea, uric acid, creatinin

Dilatation of urinary tract + compression of urethra / gravid uterus \Rightarrow frequency cystitis and pyelonephritis during pregnancy

\uparrow Progesterone and endorphin \Rightarrow \downarrow MAC of anesthetic gas
(25% halothane, 40% isoflurane)

Engorgement vx \downarrow vol. peridural and subarachnoidal space

Nervous fibers are very sensitive, rapid diffusion of LA

\uparrow Free fraction of LA \Rightarrow **RISK OF OVERDOSE**

Common characteristics of anesthetic techniques

- Risk of inhalation of gastric content
- Hemodynamic stability
- Maintain/reinforcement of uterine contractility
- Medical premedication
- Anti-thrombotic prophylaxis
- Reduction of infection risk
- Management of pain

General anesthesia

Advantages

- Rapid Induction (emergency)
- Reliability
- Adaptability
- Control of ventilation and hemodynamics
- Sleeping and amnesia
- Good surgical conditions

Disadvantages

- Risk of bronchial inhalation
- Difficulty of intubation
- Hemodynamic disadvantages of rapid induction
- Neonatal depression, acidosis, fetal hypoxemia
- Bleeding + stress-induced endocrine changes

General anesthesia

Indications

- CI of LRA, refusal of LRA, stenosing cardiopathy
- Coagulopathy
- Hemodynamic instability, severe bleeding
- Infectious status
- Progressive neuropathy
- Extreme emergency

Others: 1^{er} episode of genital herpes

Contraindications

- Patient refusal
- Past history of malignant hyperthermia
- Allergy

Spinal anesthesia

Advantages

- Simplicity of technique
- Efficacy
- Low rate of failure
- Rapid installation
- Good surgical conditions
- Prevention of thrombosis
- Relatively low cost

Disadvantages

- Hypotension
- Postoperative headache

Spinal anesthesia

Indications

- C/S (extreme emergency)
- Obstetrical maneuvers (episiotomy, forceps)

Contraindications

- Hemodynamic instability
- Infection at the puncture site
- Coagulopathy
- Patient refusal
- Eclampsia
- Neurological problems

Complications of spinal anesthesia

- Hypotension
- Total spinal anesthesia
- Failure
- Intra-vascular injection
- Headache