



General versus Regional anesthesia for preeclapmtic Patient undergoing cesarean section.

**Protocol for an essay
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**Presented by
Mina Magdy Gergis
(M.B., B.CH.)**

Supervised by
Prof. Dr. Hazem M.Abd El Rahman
Fawzi

Professor of Anesthesia and intensive care
Faculty of Medicine – Ain Shams University

Dr. Sanaa Mohammed M. El Fawal
Lecturer of Anesthesia and intensive care
Faculty of Medicine – Ain Shams University

Dr. Hany Maher Salib
Lecturer of Anesthesia and intensive care
Faculty of Medicine - Ain shams University

**Ain Shams University
Faculty of medicine
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كلية الطب - جامعة عين شمس

تحت إشراف

الاستاذ الدكتور/ حازم محمد عبد الرحمن فوزي

أستاذ التخدير والرعاية المركزة

كلية الطب - جامعة عين شمس

الدكتورة / سناء محمد محمد الفوال

مدرس التخدير والرعاية المركزة

كلية الطب - جامعة عين شمس

الدكتور/ هاني ماهر صليب

مدرس التخدير والرعاية المركزة

كلية الطب - جامعة عين شمس

كلية الطب

جامعة عين شمس

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List of Appreviation

<	less than
ACOG	American College of Obstetricians and Gynecologists
ALT	alanine amino transferase
ARF	acute renal failure
AST	aspartate amino transferase
BMI	body mass index
BP	blood pressure
BUN	Blood Urea Nitrogen
CBC	complete blood count
CO	cardiac output
COP	colloid osmotic pressure
CSE	Combined Spinal Epidural
CSF	Cerbrospinal fluid
CVD	cardio vascular disease
CVP	central venous pressure
CVS	Cardio vascular system
DIC	disseminated intravascular coagulation
ESRD	end stage renal disease
ET-1	endothelin-1
ETA	endothelin type A

G/l	gram per liter
GFR	glomerular filtration rate
GM-CSF	granulocyte-macrophage colony-stimulating factor
h.	hour
HC03	Bicarbonate
ICP	intracranial pressure
ICU	intensive care unit
IL	Interleukin
IU	international unit
IV	intravenous .
L/min	liter per minute
LA	local anesthetic
LDH	lactic dehydrogenase
m Osm/kg	milli osmol per kilogram
MAC	Minimum alveolar concentration
mg/dL	milligram per deciliter
ml/min	milli per minute
mmHg	milli meter mercury
NADPH	Nicotinamide Adenine Dinucleotide Phosphate Hydrogen
NHBPEP	National High Blood Pressure Education Program
NK	natural killer
nm	nanomolar
NO	nitric oxide.
PaCO2	Arterial partial pressure of carbon dioxide
Pao2	Arterial partial pressure of oxygen

PCWP	pulmonary capillary wedge pressure
PE	preeclampsia
PG2	prostaglandin
PIH	pregnancy induced hypertension
PIGF	placental growth factor
PT	prothrombin time
PTT	partial thromboplastin time
RAS	renin-angiotensin system
RNS	reactive nitrogen species
ROS	reactive oxygen species
sEng	soluble endoglin
sFlt-1	soluble forms-like tyrosine kinase 1
SVR	systemic venous return
TGF	transforming growth factor
TNF-α	tumor necrosis factor-alpha
UPCR	urine protein/creatinine ratio
US	ultrasound .
VEGF	vascular endothelial growth factor
μm	micromolar

Introduction

Preeclampsia has been defined as hypertension developing after 20 weeks' gestation or in the early postpartum period and returning to normal within three months after delivery. The classic triad of preeclampsia includes hypertension, proteinuria, and edema. (*Miller RD, et al 2010*).

Patients often present for an emergency cesarean section. In this situation, there is limited time for preoperative optimization of clinical conditions. This poses a considerable challenge to the obstetric anesthetist. The choice of a safe anesthetic and maintenance of intraoperative stability to ensure the delivery of a healthy neonate, and to minimize maternal morbidity and mortality, is of particular concern (*Aya AGM, et al 2012*).

Dyer et al, showed that patients with severe preeclampsia undergoing Cesarean section were found to have clinically insignificant changes in cardiac output during spinal anesthesia(*Dyer RA, et al 2008*).

The drugs required for general anesthesia are multiple; Most of the drugs affect the baby in two ways: by direct effect from placental drug transfer and by indirect effect resulting from maternal physiological and biochemical changes, which appear to

be much more important. They may produce systemic effects in the baby like low APGAR score and sedation. In this technique there are risks of difficult intubation, maternal pulmonary aspiration, delayed recovery, nausea and vomiting. The incidence of maternal mortality may reach up to 10% (*Waris S., et al2012*).

It is unlikely that the differences in maternal hemodynamics and neonatal outcomes between the spinal anesthesia and general anesthesia groups can be solely attributed to this vasopressor difference, But rather to a combination of factors, as discussed previously. With regard to fluid therapy, blood product usage was significantly higher in the general anesthesia group, But this may relate to the large proportion of patients in the general anesthesia group who developed HELLP syndrome, for which platelet transfusions were administered. (*Morgan GE. , et al 2013*).

Aim of the work

The aim of this work is to focus light on comparison of different anesthetic techniques (general and regional anesthesia) for preeclamptic patient undergoing cesarean section.

Physiological Changes In Pregnancy

Normal pregnancy involves major physiological and anatomical adaptation by maternal organs. It is important for anesthetists involved in the care of the pregnant woman to understand these changes, to provide safe maternal anesthetic care which is compatible with safe delivery of the baby. (*Duvekot JJ. et al, 2009*)

Pregnancy affects virtually every organ system. Many of these physiological changes appear to be adaptive and useful to the mother in tolerating the stresses of pregnancy, labor and delivery. (*Morgan GE. et al, 2013*)

I. Cardiovascular System Changes:

The cardiovascular system (CVS) adjusts throughout pregnancy to meet the changes that occur. Where there is increased oxygen consumption to meet the metabolic demands of the growing fetus. Although the physiological changes in the CVS appear to begin in the first trimester, these changes continue into the second and third trimesters, when cardiac output increases by approximately 30-50% of non pregnant values. (*Santos et al, 2006*)

a) Changes in blood volume:

Expansion of plasma volume and an increase in red blood cell mass begin as early as the fourth week of pregnancy, peak at 28 to 34 weeks of gestation, and then plateau until parturition. Plasma volume expansion is accompanied by a lesser increase in red cell volume. As a result, there is a mild reduction in hematocrit, with peak hemodilution occurring at 24 to 26 weeks. The blood volume in pregnant woman at term is about 100 ml/kg. (*Jensen E. et al 2002*)

b) Changes in vascular resistance and blood pressure:

The blood pressure typically falls early in gestation and is usually 10 milli meter mercury (mmHG) below baseline in the second trimester, declining to a mean of 105/60 mmHG. In the third trimester, the diastolic blood pressure gradually increases and may normalize to non pregnant values by term. (*Katherine W Arendt, et al 2012*)

The factors responsible for vasodilatation are incompletely understood, but one of the major findings is decreased vascular responsiveness to the pressor effects of angiotensin II and norepinephrine. Several additional mechanisms for the fall in vascular resistance have been proposed:

1-Increase endothelial prostacycline.

2-Enhanced nitric oxide production.

3-Reduced aortic stiffness. (*Thompson LP, et al 1997*)

c) Changes in cardiac output:

The cardiac output rises 30-50 percent (1.8 L/min) above baseline during normal pregnancy; one-half of this increase occurs by 8 weeks of gestation. The elevation in cardiac performance results from changes in three important factors that determine cardiac output:

1. Preload is increased due to the associated rise in blood volume.
2. Afterload is reduced due to decline in systemic vascular resistance.
3. Maternal heart rate rises by 15-20 beats/minute. (*Semin 2009*)

“**Maternal supine hypotension syndrome**” results when the gravida assumes a supine position, leading to uterine compression of inferior vena cava. Venous blood return to the heart is decreased. The decreased preload reduces stroke volume and may result in a 25 to 30 % decrease in cardiac output.

Maternal symptoms include pallor, sweating, nausea, vomiting, hypotension, tachycardia, and mental status changes. Symptoms are more pronounced in the third trimester because of the expanding uterus and are alleviated by maintaining a left lateral decubitus position and displacing the uterus laterally. (*Metcalf J, et al 2008*)

Table (1): Cardiovascular changes in pregnancy.

Parameter	Changes	Amount (%)
Heart rate	Increased	20 – 30
Stroke volume	Increased	20 – 50
Cardiac output	Increased	30 – 50
Contractility	Variable	±10
Central venous pressure	Unchanged	-
Pulmonary capillary wedge pressure	Unchanged	-
Systemic vascular resistance	Decreased	Midtrimester 10 - 15 mm Hg, then rises
Systemic blood pressure	Decreased	30
Pulmonary vascular Resistance	Decreased	-
Pulmonary artery pressure	Slightly decreased	-

(Birnbach et al., 2000)