



# **General versus Regional anesthesia for preeclapmtic Patient undergoing cesarean section.**

**Protocol for an essay  
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## List of Appreviation

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

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

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

<b>Parameter</b>	<b>Changes</b>	<b>Amount (%)</b>
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)*