

Anesthetic Management of Eclampsia

Essay

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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

(...رَبِّ أَوْزَعْنِي أَنْ أَشْكُرَ نِعْمَتَكَ الَّتِي
أَنْعَمْتَ عَلَيَّ وَ عَلَى وَالِدَيَّ وَ أَنْ
أَعْمَلَ صَالِحاً تَرْضَاهُ وَ أَدْخِلْنِي
بِرَحْمَتِكَ فِي عِبَادِكَ الصَّالِحِينَ)

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List of Abbreviations

ACOG	: The American College of Obstetrics and Gynecology
ALT	: Alanine aminotransferase
ASA	: American Society of Anesthesiologists
AST	: Aspartate aminotransferase
bid	: bis in die, Latin for "twice daily"
BIS	: Bispectral index
BP	: Blood Pressure
CHS	: Canadian Hypertension Society
CMAJ	: Canadian Medical Association Journal
CO	: Cardiac output
CSA	: Continuous spinal anesthesia
CSE	: Combined Spinal–Epidural
CT	: Computed tomography scans
CVP	: Central venous pressure
ETAGC	: End - tidal anaesthetic gas concentration
GETA	: General endotracheal anesthesia
HELLP	: Hemolysis, Elevated Liver enzymesLow, Platelet count
HDP	: Hypertensive disorder of pregnancy
HLA	: Human leukocyte antigen
HRV	: Heart rate variability
ICU	: Intensive care unit
IOL	: Induction of labor
KDR	: Kinase insert domain receptor
KIRs	: Killer immunoglobulin receptors
LDH	: Lactate dehydrogenase
LF	: Low frequency
LF/HF	: Low-to-high frequency ratio
LMA	: Laryngeal mask airway
MAC	: Minimum alveolar concentration
MgSo₄	: Magnesium sulfate
MRI	: Magnetic resonance imaging
NK	: Natural killer
PCIA	: Patient-controlled IV analgesia
PDPH	: Post dural puncture headache
PIH	: Pregnancy-Induced hypertension

List of Abbreviations *(Cont.)*

PlGF	: Placental growth factor
PO	: Per oral
PRES	: Reversible leukoencephalopathy syndrome
Qid	: Four times each day (from Latin quarter in die)
sENG	: Soluble endoglin
sFlt¹	: Soluble fm like tyrosin- ¹
SOGC	: Society of Obstetricians and Gynecologists of Canada
TEG	: Thromboelastography
TGF-β	: Transforming Growth factor-beta
TTP	: Thrombotic thrombocytopenic purpura
UKOSS	: UK Obstetric Surveillance System
VEGF	: Vascular endothelial growth factor

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Introduction

Hypertensive disorders of pregnancy are an important cause of severe morbidity, long term disability and death among both mothers and their babies. In Africa and Asia, nearly one tenth of all maternal deaths are associated with hypertensive disorders of pregnancy, whereas one quarter of maternal deaths in Latin America have been associated with those complications. Among the hypertensive disorders that complicate pregnancy, pre-eclampsia and eclampsia stand out as major causes of maternal and perinatal mortality and morbidity. The majority of deaths due to pre-eclampsia and eclampsia are avoidable through the provision of timely and effective care to the women presenting with these complications. Optimizing health care to prevent and treat women with hypertensive disorders is a necessary step towards achieving the Millennium Development Goals (WHO, 2011).

Eclampsia is one of the 3 leading causes of maternal morbidity and mortality worldwide. During the past 20 years, there has been a significant reduction in the rates of eclampsia, maternal mortality, and maternal morbidity in the developed countries. In contrast, the rates of eclampsia, maternal complications, and maternal mortality remain high in the developing countries. Most of maternal deaths and complications are due to lack of prenatal care, lack of access to hospital care, lack of resources, and inappropriate diagnosis and

management of patients with eclampsia in the developing countries (**Ghulmiyyah and Sibai, ۲۰۱۲**).

Over half a million women die each year from pregnancy related causes, ۹۹% in low and middle income countries, complications of pregnancy and childbirth are the leading cause of death amongst women of reproductive years. The Millennium Development Goals have placed maternal health at the core of the struggle against poverty and inequality, as a matter of human rights. Ten percent of women have high blood pressure during pregnancy. Overall, ۱۰% to ۱۵% of direct maternal deaths are associated with pre-eclampsia and eclampsia. Where maternal mortality is high, most of deaths are attributable to eclampsia, rather than pre-eclampsia. Perinatal mortality is high following preeclampsia, and even higher following eclampsia (**Duley, ۲۰۰۹**).

Eclampsia is characterized by the occurrence of generalized seizures in women with pre-eclampsia, provided that the tonic-clonic seizures are not attributable to other causes (**WHO, ۲۰۱۱**).

Eclampsia is a life threatening complication of pregnancy that typically is viewed as the end stage of preeclampsia (**Yaqub et al., ۲۰۱۱**).

Pre-eclampsia in pregnancy describes a condition where women have excess levels of protein in urine, and where they have high blood pressure. Other symptoms like a lower platelet

count and swelling (edema) can be present too. Though symptoms may be managed to a degree, the condition can't be cured by anything but childbirth, and in about 1% of women eclampsia develops, which can cause violent seizures and coma, and which risks maternal and fetal death in some instances (Yaquib et al., 2011).

Historical overview

It wasn't until 1619 that the word "eclampsia" first appeared in Varandaeus' treatise on gynecology. After the introduction of the word "eclampsia," Bossier de Sauvages (1739) differentiated eclampsia from epilepsy (Bell, 2010).

In 1897, Vaquez and Nobecourt were credited with the discovery of eclamptic hypertension. As a result of these contributions, the concept of the preeclamptic state was recognized. Physicians were now aware that the presence of edema, proteinuria, and headaches should raise concern about the possibility of convulsions (Bell, 2010).

In the 13th edition of Williams Obstetrics (1966), preeclampsia-eclampsia fell under the category of the toxemias of pregnancy. In the 15th edition of Williams Obstetrics (1976), the term toxemia of pregnancy was replaced with hypertensive disorders of pregnancy. In 21st century, eclampsia is classified as the presence of seizures, non-attributable to other causes, in a woman diagnosed with preeclampsia (Bell, 2010).

Pre-eclampsia/eclampsia produces multiple systemic derangements that can involve a diversity of organ systems including hematologic, hepatic, renal, and cardiovascular systems as well as the central nervous system. The severity of these derangements often correlates with maternal medical (eg, preexisting renal or vascular pathology) or obstetric factors (eg, multifetal gestations or molar pregnancy) (**Ross, ٢٠١١**).

Cardiovascular concerns

Eclampsia is associated with cardiovascular derangements such as generalized vasospasm, increased peripheral vascular resistance, increased left ventricular stroke work index, decreased central venous pressure, and decreased pulmonary wedge pressure (**Ross, ٢٠١١**).

Hematologic concerns

Hematologic problems associated with eclampsia can include decreased plasma volume, increased blood viscosity, hemoconcentration, and coagulopathy (**Ross, ٢٠١١**).

Renal concerns

Eclampsia-associated renal abnormalities can include decreases in glomerular filtration rate, renal plasma flow, and uric acid clearance (**Ross, ٢٠١١**).

Hepatic concerns

Hepatic derangements associated with eclampsia can include periportal necrosis, hepatocellular damage, and subcapsular hematoma (**Ross, ٢٠١١**).

Central nervous system concerns

Eclampsia can result in central nervous system (CNS) abnormalities such as cerebral overperfusion due to loss of autoregulation, cerebral edema (**Ross, ٢٠١١**).

Aim of the Work

This essay is designed to discuss pathophysiology, presentations, complications and recent modalities of management of eclampsia.