

Study of Acute Kidney Injury Secondary to Obstetric Complications in the Third Trimester of Pregnancy and the Puerperium

Thesis

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List of Abbreviations

Abb.	Full term
ACE	Angiotensin converting enzyme
ACEIs	Angiotensin converting enzyme inhibitors.
aCL	Anti cardiolipin
ACR	Albumin to Creatinine ratio
ADAMTS13	Adisintegrin and metalloproteinase with thrombospondin type 1 motives
ADH	Anti diuretic hormone.
AFLP	Acute Fatty Liver of Pregnancy
AHT	Arterial hypertension
AIDS	Acquired immunodeficiency syndrome
AKI	Acute kidney injury
AKIN	Acute kidney injury network
ANA	Anti nuclear antibody
ANCA	Anti-neutrophil cytoplasmic antibody
Anti-GBM	Anti glomerular basement membrane
APS	Antiphospholipid Syndrome
aPTT	Activated partial thromboplastin time
ARBs	Angiotensin receptor blockers
ARDS	Adult respiratory distress syndrome
ATN	Acute tubular necrosis
BTx	Blood transfusion
BUN	Blood urea nitrogen
CAPS	Catastrophic antiphospholipid syndrome
CBC	Complete Blood Count
CD94	Cluster of Differentiation 94
CE	Calcium excretion
CFB	Complement factor B
CFH	Complement factor H
CFHR	complement factor H-related genes

Abb.	Full term
<i>CFI</i>	Complement factor I
CKD	Chronic kidney disease
CT	Computed Tomography
DDAVP	Desmopressin acetate
DIC	Disseminated intravascular coagulopathy
ESRD	End stage renal disease
EVT	Extravillous trophoblast
FENa	Fractional excretion of Na
FFP	Fresh frozen plasma
GFR	Glomerular filtration rate
Hct	Hematocrit.
HD	Haemodialysis
HIT	Heparin-induced thrombocytopenia
HIV	Human immunodeficiency virus
HLA	Human leukocytic antigen
HUS	Hemolytic uremic syndrome
ILT	Immunoglobulin-like transcript
KDIGO	Kidney Disease Improving Global Outcomes
KIM-1	Kidney injury molecule 1
KIR	Killer Immunoglobulin-like Receptors
LA	Lupus anticoagulant
LDH	Serum lactate dehydrogenase
LGA	Large for gestational age
MCP	Membrane cofactor protein
MI	Myocardial infarction
NGAL	Human neutrophil gelatinase-associated lipocalin
NK cells	Natural killer cells
NSAIDs	Non-steroidal anti-inflammatory drugs.
P/C ratio	Protein to creatinine ratio

Abb.	Full term
PEx	Plasma exchange
PIGF	Placental induced growth factor
PIH	Pregnancy induced hypertension.
PN	Pyelonephritis
PPH	Postpartum haemorrhage
PRAKI	Pregnancy related acute kidney injury
PRES	post reversible leukoencephalopathy syndrome
PT	Prothrombin time
PTH	Parathyroid hormone
P-TMA	Pregnancy-associated thrombotic microangiopathy
PV	Plasma volume
RAAS	Renin-angiotensin-aldosterone system
RBC	Red blood cells
RCN	Renal cortical necrosis
RF	Rheumatoid factor
RRT	Renal replacement therapy
Scr	Serum creatinine
sEndoglin	Soluble endoglin
sFlt-1	Soluble fms-like tyrosine kinase-1
SIADH	Syndrome of inappropriate antidiuretic hormone
STEC	Shiga toxin-producing <i>E. coli</i>
TLC	Total leucocytic count
TMG	Transport maximum for glucose
TTP	Thrombotic thrombocytopenic purpura
U/P	Urine-to-plasma ratio
UTI	Urinary Tract Infections
VEGF	Vascular endothelial growth factor
VOD	Veno occlusive disease
WHO	World Health Organization

Study of Acute Kidney Injury Secondary to Obstetric Complications in the Third Trimester of Pregnancy and the Puerperium

Abstract

Background: Acute kidney injury (AKI) includes a group of clinical syndromes that primarily manifest as a rapid decline in the kidney function in association with the accumulation of metabolic waste.

Aim: The aim of our study is to assess the prevalence and outcome of acute kidney injury secondary to obstetric complications in the third trimester of pregnancy and the puerperium. **Subjects:** study is a retrospective study that was conducted on 80 patients presented with acute kidney injury secondary to obstetric complications in third trimester of pregnancy and puerperium. All pregnant females aged more than 18 years old who experienced an episode of AKI during the third trimester of pregnancy and puerperium. The commonest cause of AKI in the third trimester of pregnancy and puerperium was obstetric haemorrhage (50%) followed by hypertensive disorders of pregnancy (35%) including preeclampsia, eclampsia and HELLP then TMA (7.5%) and septic AKI (7.5%). The diagnosis of AKI in pregnancy and the subsequent management usually depend on the clinical evaluation and routine investigations but in some cases the diagnosis is very challenging that calls for renal biopsy (6.3%). AKI in pregnancy is associated with high fetal mortality of (73.8%).

Conclusion: In developing countries, AKI in pregnancy remains a frequent and grave complication. It reflects the absence of prenatal care and early detection of high-risk pregnancies, the delay in transfer of patients and the paucity of relevant human and material resources. It is certainly preventable and treatable complication, but one that imposes a heavy burden of maternal morbidity and mortality if its diagnosis and treatment are delayed. **Recommendations:** Larger number of patients & multi-centre studies will provide more information about incidence and prevalence of acute kidney injury in pregnancy. Give special attention to pregnant women with preeclampsia or any other risk factors during the pregnancy and during the postpartum period and care with doing routine investigations and document the results for further future studies.

Keywords: AKI, HELLP, TMA, pregnancy.

Introduction

Acute kidney injury (AKI) includes a group of clinical syndromes that primarily manifest as a rapid decline in the kidney function in association with the accumulation of metabolic waste (**Srisawat and Kellum, 2011**).

Obstetric Acute Kidney Injury is a rare and sometimes fatal complication of pregnancy, the incidence of which is declining worldwide, yet which is a matter of concern in developing countries (**Khanal et al., 2012, Prakash et al., 2007**).

Paradoxically the prevalence is increasing in some developed countries, the increase being attributed to hypertensive disorders of pregnancy and their management (**Mehrabadi et al., 2014**).

During the first trimester of gestation, acute kidney injury develops most often due to hyperemesis gravidarum or septic abortion. In the third trimester, the differential diagnosis is more challenging for the obstetrician and the nephrologist (**Machado et al., 2012**).

Obstetric acute kidney injury is associated with poor access to antenatal care, multiparity and rural background (**Archana et al., 2015**).

Early treatment for AKI typically includes optimization of the hemodynamic status and correction of any volume deficit. This will have a salutary effect on kidney function, helping to minimize progression of further kidney injury and potentially facilitating recovery from AKI with a minimization of any residual chronic impairment of kidney function (**Karvellas et al., 2011**).

Aim of the Work

The aim of our study is to assess the prevalence and outcome of acute kidney injury secondary to obstetric complications in the third trimester of pregnancy and the puerperium.

Chapter (1):

Changes of Kidney Function during Normal Pregnancy

Within pregnancy, several changes affecting organs and systems occur for the lady to adapt to the new state she is in. This new state afford adequate environment for sustaining fetal life and pregnancy progression. These changes include anatomical changes, physiological adaptation biochemical alterations, endocrinal re-adjustments (**Yanamandra and Edwin, 2012**).

Estrogen and progesterone hormones, first secreted by the ovary and later by the placenta, perform these much changes within different tissues and organs of the pregnant lady. All these changes permit the continuation and progression of pregnancy for both fetus and mother (**Heidemann and McClure, 2003**).

As a result of enormous changes occurring within the kidney of pregnant lady the reference laboratory ranges for different kidney function tests don't apply any more to this situation (**Ashwood and Burtis, 1999**).

Normal physiological changes occurring within renal system during normal gestation include glomerular and tubular functional changes. There is much increase of renal

plasma flow glomerular filtration rate (GFR). This is added to increased kidney size and dilation of pelvicalyceal system of each kidney (**Odutayo and Hladunewich, 2012**).

Increased both metabolic and circulatory loads within normal gestation leads to physiological changes within renal system. Renal system has to get rid of metabolic wastes of both mother and fetus and accommodate itself to the hemodynamic changes caused by the increase in blood volume and also the decreased resistance within vascular system tree (**Derricott and Cartwright, 2013**).

Cheung et al reported that every aspect of physiological renal function is affected by normal gestation (**Cheung and Lafayette, 2013**).

Tran has reported that many laboratory values could be considered out of normal range during gestation, if we apply normal non-gestational ranges to these test values. During normal pregnancy increased effective intravascular volume results in lower concentrations and values of most analytes. In spite of this, free active fractions concentrations, such as ionized calcium, remain at the same range values of non-gestational state. Getting increased values of some laboratory test above non-gestational state,