OPEN ACCESS

Saudi Journal of Medical and Pharmaceutical Sciences
Abbreviated Key Title: Saudi J Med Pharm Sci
ISSN 2413-4929 (Print) |ISSN 2413-4910 (Online)
Scholars Middle East Publishers, Dubai, United Arab Emirates
Journal homepage: https://saudijournals.com

Original Research Article

'ACUTE PULMONARY EDEMA' – A Clinical Multi-Centric Study from Rural Haryana

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DOI: 10.36348/sjmps.2021.v07i10.004 | **Received:** 12.07.2021 | **Accepted:** 17.08.2021 | **Published:** 05.10.2021

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Abstract

Acute Pulmonary Edema (APE) is a condition affecting about 0.08-1.5 % of women during pregnancy and puerperium, accounting for 2.5-3.0 % of admission to obstetric ICU, constituting 9.8-11.5% of all patients of 'maternal near miss' criteria. This study was conducted across 3 tertiary care centres of Haryana, North India, to evaluate cases of APE in obstetrics ICU. 50 patients had acute pulmonary edema in the study period, with mean age 26.2 years, 60% were from rural setup, 76% were primigravidae, 56% had antepartum APE, 36% post partum and 2% intra partum, 8% had previous history of Pre-Eclampsia, 10 % relapsed during hospital stay, 4 % mortality rate. 80% had caesarean delivery, 76 % delivering preterm (<37 weeks gestational age), 40% were <34 weeks gestational age. Etiological causes – 64 % hypertensive, cardiogenic (16%) both cardiogenic & hypertensive (20%), fluid overload (2 %) irrespective of underlying etiology , 30% had fluid overload in the 24 hours preceding the acute PE event. Medium time from diagnosis to resuscitation was 5 minutes (within 25 min of diagnosis in 80 % of patients) Mean ICU stay was 6 days and hospital time was 13 days. APE is a medical emergency resulting in high maternal mortality rate (MMR). Most commonly occurring ante-partum period, with a hypertensive background and fluid overload being an important trigger.

Keywords: Complications of pregnancy, ICU, Obstetric ICU, Echocardiography, Pulmonary oedema, Acute Pulmonary Oedema.

INTRODUCTION

Acute Pulmonary edema (APE) affects 0.08-1.5 % of women in pregnancy and puerperium [1-3]. Hypertensive disorders of pregnancy, especially Pre-Eclampsia /Eclampsia being a major obstetric cause with (0.6-5%) developing APE [1, 4-6]. This condition constitutes 2.5-3 % of obstetric ICU admission and 9.8-11.5 % of all patients included in 'maternal miss criteria [1, 3, 6], Hypertensive disorders of pregnancy esp Pre-Eclampsia/Eclampsia constitutes 64%. Cardiovascular disorder with decompensation accounts for about 18-20 % of Pre-Eclampsia/ 1000 ante partum and 6-8/1000 hospitalization post-partum [1, 7]. Rheumatic valvular disease is the most prevalent from of cardiovascular disease in India. Fluid overload remains the most important causes of APE. When fluid balance > 2000ml, increasing hydrostatic pressure [1, 8, 9]. APE is strongly associated with fluid infusion in women with induced labour, C-section or Magnesium sulphate prophylaxis [1, 10].

Though the diagnosis of APE is clinical, nevertheless the underlying etiology remains unclear many a times. Additional diagnostic aids eg. Doppler, ECHO allow systolic & diastolic evaluations to be made to differentiate cause of cardiogenic from non-cardiogenic etiology [1, 11].

Lack of an accurate etiological diagnosis might delay initiation of specific treatment which potentially affects the maternal and perinatal outcomes adversely.

The high-risk factors associated with this condition are

- Hypertensive Disorders of Pregnancy (HDP) especially Pre-Eclampsia / Eclampsia
- Peripartum Cardiomyopathy (PPCM)
- Advanced maternal age
- Obesity
- Multiple gestation
- Prelabour Rupture of Membranes (PROM) with sepsis

- Drug induced pulmonary edema
- Preexisting cardiac conditions eg.
- Chronic hypertension
- Ischemic Heart Disease (IHD)
- Rhythm disturbances
- Congenital heart diseases
- Arrythmias
- Valvular lesions
- Iatrogenic IVF overload
- Other rare causes of pulmonary edema
- Amniotic Fluid Edema
- Pulmonary embolism
- Pheochromocytoma

This study was conducted to evaluate the clinical and epidemiological profile along with their clinical course and outcome in patients with Acute Pulmonary Edema in obstetrics ICU.

MATERIALS & METHODS

- Study type : Hopsital based, retrospective, cross sectional
- Study design & population:

All obstetric patients (Ante-natal/Intra-natal /Post -natal) admitted with or developed Acute Pulmonary Edema –> Obstetrics ICU admission over 3 year duration (August 2018-July 2021)

- Sample size : 50
- Exclusion criteria :

Ectopic Pregnancy, Hydatidiform mole, Abortion
Not confirmed Diagnosis

Acute Pulmonary Edema (APE) is defined as an acute respiratory event occurring in pregnancy or within 42 days of delivery , diagnosed by presence of sudden onset dyspenoea, crackcling rales, and/or decreased oxygen (O_2) saturation [1,12].

- **Outcomes Evaluated were**

Socio-demographic parameters

Age, parity, Socio-Economic status, urban/rural background, booked/unbooked status.

Presenting symptoms, resuscitation manoeuvres (time between diagnosis and treatment initiation esp. Furosemide injection).

ECHO results, types and duration of mechanical ventilation, anesthesia during delivery used, days of hospital stay, duration of ICU stay, time of development of acute Pulmonary Edema – ante-partum/Intra-partum/Post-partum), etiology, 'maternal near miss' criteria (WHO-2010 guideline)
Maternal & Perinatal outcomes

STATISTICAL ANALYSIS

Epidemiological information were analyzed with version 7.1.5, frequency distribution was used to describe the categorical variables with measures of central tendency and dispersion being used to describe the numerical variables.

RESULTS AND OBSERVATIONS

Patients particulars observed were

- 50 cases total
- 35 (retrospectively) + 15 prospectively (follow up)
- Mean age ≃ 26.2 ± 7.2 years (±SD)
- 60 % rural , 40 % urban areas
- Primigravidae – 38 (76%), Multigravidae – 12 (24.00 %)
- Time duration of development of stmptoms:
- Antepartum APE – 28 (56.00 %)
- Intrapartum APE – 4 (8.00 %)
- Postpartum APE – 18 (36.00 %)
- 4 had previous history of APE – 8.00 %
- Maternal Mortality Rate (MMR) – 2 (4.00 %)
- Median ICU stay – 6 days
- Median hospital stay – 13 days

Obstetrics outcome

- Cesarean-Section: 40 (80%)
- Ante-Partum- APE (27)
- Post-Partum - PPE (13)
- Anesthesia: Spinal Anesthesia /Epidural Anesthesia (33)
- General Anesthesia (10)
- Without anesthesia (7)
- Hypertensive Disorders of Pregnancy (HDP) – 32 (64%)

Pre-Eclampsia	**22**
Chronic Hypertension with superimposed PreEclampsia	10
Chronic Hypertension	2
Eclampsia	6

- Decompensated cardiac disease – 8 (16 %)
- Combination of Decompensated Cardiac Disease + Hypertensive Disorder of Pregnancy – 10 (20 %)
- Fluid overload – 3(6%)

Table-1: Clinical Presentation

Symptom	Number (percentage -%)
Crackling rales	33 (66.00)
Dyspnoea	35 (70.00)
Tachypnoea	18 (36.00)
Cough	10 (20.00)
Wheeze	6 (12.00)

- Median Systolic BP (SBP) -160 mm Hg (IQR: 136-192 mm Hg)
- Median Diastolic BP (DBP) – 98 mm Hg (IQR: 86.4 – 105.8 mm Hg)
- Median heart rate (HR) – 122 bpm (IQR: 100-136 bpm)
- Median O_2 saturation : 91% (IQR: 85-96%)
- Median time between diagnosis and treatment initiation : 5 minutes (with rescucitative manoeuvres began within 30 minutes of diagnosis in 76% of cases)
- 100% patients required ventilator support with median time of O2 therapy – 35.0 hours (IQR: 28.0 – 73.0 hours)
- Median near miss (MNM) criteria was present in30 (60%) pts with 27 (54%) having >3 criteria.
- 10 pts required vasoactive drugs and oliguria (unresponsive to IVF / diuretics was observed in 8 (16%) patients.
- Trans-thoracic ECHO was done in 48 (96%) patients

A. In cardiac cause related Acute Pulmonary Edema

- Rheumatic Heart Disease (RHD) – 6 (12%)
- Peripartum Cardiomyopathy (PPCMP) – 3(6%)

B. In Hypertensive Disorders of Pregnancy (HDP) group of patients :

- 12 (24%) has CCF associated heart disease present along with hypertension in 6 pts
- 4 (8 %) had PPCMP
- 2 (4 %) had RHD

In ECHO the parameters analysed were

- EF (Ejaction Fraction)
- LV EDD (left ventricular end diastolic diameter)
- LVESD (Left ventricular end systolic diameter)
- Size of LA (Left atrium)
- LA volume (Left Atrial volume)
- TC (tricuspid) annular plane systolic excrusion
- PA systolic pressure (Pulmonary artery systolic BP)

38 (76%) had preterm labour (PTL) & deliveries with 20 (40%) delivering at gestation < 34 weeks.

Neonatal / Fetal outcomes observed were

- Intrauterine fetal death (IUFD) was observed in 3 (6%) cases
- APGAR score 1 minute & 5 minutes (<7) in 35 babies (70 %) & 2 (4.00 %) respectively
- Baby after birth: 7 (14 %) required neonatal rescucitation at delivery table itself
- 9 (18 %) requiring non invasive ventilation
- 5 (10 %) requiring endotracheal (ET) intubation

Most common co -morbidity observed

- Respiratory distress 25 (50 %)
- Jaundice 19 (38 %)
- Perinatal asphyxia (mild to moderate) in 9 (18 %)

NICU admission was warranted in 18 (26 %) & neonatal death (NND) in 4 (8%) cases were observed.

DISCUSSION

Acute Pulmonary Edema is known to be a major cause of maternal and perinatal morbidity and mortality. Though the most common underlying etiological factor was hypertensive disorders of pregnancy (HDP), nevertheless ECHO detected a significant percentage of patients having an associated heart condition too, emphasizing the importance of Trance Thoracic Echocardigraphy (TTE) as a diagnostic tool for etiological evaluation of APE.

The association between APE and hypertension during pregnancy especially PreEclampsia/Eclampsia syndrome is well established, as observed by various studies from different parts of the world [1, 3, 8, 9, 13, 10].

Most cases of APE occurred antepartum, our findings correlated with those of other studies eg [1, 3, 4]. Which could be attributed to cardiovascular changes in pregnancy namely increased plasma volume and cardiac output along with a reduced colloid osmotic pressure [3, 4].

In those patients who had APE of cardiogenic and mixed etiology (Cardiogenic + hypertensive). Transthoracic ECHO detected various degree of ventricular dysfunction. ECHO thus can be used to distinguish between APE of the cardiogenic and non-cardiogenic origin [1, 8, 13].

CONCLUSION

Acute Pulmonary Edema though relatively rare in occurrence, is the cause of substantial maternal and

perinatal morbidity and mortality. A keen clinical eye and suspicion along with a protocol for diagnosis and treatment of APE including routine TTE is imperative so as not to miss the diagnosis and start of treatment immediately so as to avoid and reduce the adverse feto-maternal outcome due to the same.

Abbreviations

- APE: Acute Pulmonary Edema
- CCF: Congestive Cardiac Failure
- ICU: Intensive Care Unit
- PE: Pre-eclampsia
- PPCM : Peripartum Cardiomyopathy
- SD: Standard Deviation
- WHO: World Health Organization
- ECG: Electrocardiogram
- ECHO: Echocardiography

REFERANCES

1. Anna, Carolina, B. (2018). APE in an Obst. ICU – case series study – Medicine, 97; 28 (ell 508).
2. AC Sciscione. (2013). APE in pregnancy. *Obstet Gynecol, 101*; 511-515.
3. Amonim, M.M. (2016). Admission profile in an obst ICU in Brazil maternity hospital. Rev Bras Saude Matern Infant, 6 (suppll) es 55-62.
4. Poole, J.H. (2015). APE in preg. *J perinatal neonatal Nurs, 19;* 316-31.
5. Altman, D. (2012). PE & MgSO4 & APE. Lancet, 359; 1877-90.
6. Amoriu, M.M. (2018). Severe maternal morbidity in an obst ICU in NE Brazil assoc Med Bras, 54; 261-266.
7. Kuklina, E.V. (2010). Cardiomyopathy & other myocardial disorder among hospitalization for preg. In USA. *Obstet. Gynecol*. 115; 93-100.
8. Tedoldi, C.L. (2009). Pregnancy in women with heart disease, AHQ Bras Cardiol, 93 (Suppl 6): e110-78.
9. Denni's, A.T. (2012). APE in preg. Women. Anesthesia, 67; 646 – 59.
10. Yeast, J.D. (2013). The risk of Pulm. Edema & colloid osmotic pressure changes during MgSO4 infusion. *Am J obstet. Gynecol, 169*; 1566-1571.
11. Montera, M. (2019). Guideline update on Acute Heart failure. *Arq Bras Cardiol, 93* (3 suppl): 2-65.
12. Ogunyemi, D. (2017). Risk factors for APE in PTD – Eur J. Obstet. Gynecol. *Reprod. Biol; 133*; 143-147.
13. Linhares, J.J. (2014). Fcators associated with mode of delivery in women with PE. Rev. *Bras. Gynecol. Obstet*; 36: 259 – 63.
14. Gandhi, S. (2014). The pulmo. Edema PE Evaluation (PEPE) studies J. Obstet. *Gyneco. Can. 36*; 1065-70.
15. Mentel, G.D. (2014). Pulmonary complications of pregnancy clin. Chest Med, 25; 299-310.
16. Helve, O. (2019). Pulmonary fluid balance in the newborn. *Neonatology*; 95:347 – 52.
17. Sweet, D.G. (2018). Severe Acute Maternal morbidity: a pilot study of a definition for near miss, *Br. J. Obstet. Gynecol*; 105; 985-990.