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Forensic Medicine

AN AUTOPSY BASED STUDY OF MATERNAL DEATHS

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ABSTRACT In 2015, approximately 830 women died worldwide every day due to complications of pregnancy or childbirth. Based on the world health statistics (WHS) 2016 the MMR (Maternal Mortality Ratio) of India is 174/ 100,000 live births[1]. Maternal Mortality Ratio has declined since 1990 still our MMR is higher than the developed countries. This study was conducted in the Department of Forensic Medicine, Government Coimbatore medical college and hospital, Coimbatore from January 2008 to December 2017. A total number of 25 medico-legal cases of maternal deaths were brought for postmortem during the study period. Postpartum haemorrhage remains leading cause of death (30%) followed by Amniotic Fluid Embolism (AFE) causes (20%), indirect (20%), sepsis (12%), undetermined (10%)and Thrombo-Embolism(8%). The clinical manifestation of AFE resembles both embolism and anaphylaxis. Encouraging hospital autopsy with histopathology along with immune histochemistry and microbiology examination in all maternal deaths will help in invention of novel treatment modalities.

KEYWORDS : Maternal Mortality Ratio; Postpartum hemorrhage; Amniotic fluid embolism; Histopathology.

INTRODUCTION:

Maternal death or maternal mortality is defined by the World Health Organization (WHO) as "the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management but not from accidental or incidental causes."[1]In 2015 Approximately 830 women died worldwide every day due to complications during pregnancy or childbirth. Based on WHS (World Health Statistics) 2018 Maternal Mortality Ratio (MMR) in India is 174/100,000 live births[2]. Maternal Mortality Ratio has declined since 1990 still our MMR is higher than the developed countries.

Maternal death is a measure of community health care system. To reduce the rate of maternal death, precise detection of causes and early management plays a vital role. In spite of the growth of novel research and treatment modalities in the field of obstetrics, maternal death remains a nightmare. This urges the research in the field of forensic medicine to ascertain the cause of maternal death to fill the lacunae.

To clarify the cause of maternal deaths, an autopsy is essential. This study is an attempt to analyze the cause of death in maternal death cases, in order to know the emerging trends in our district.

MATERIALS AND METHODS:

This study was conducted in Department of forensic medicine, Government Coimbatore medical college and hospital, Coimbatore over the period of 10 years i.e. from January 2008 to December 2017. We include all cases of deaths resulting from a medical cause related to pregnancy that occurs during pregnancy, at delivery or within 42 days of delivery or termination. During this period, a total of 25 cases were autopsied. These medico-legal cases were analyzed with respect to maternal age, past medical history, previous pregnancies, Gestational age, Pregnancy outcome, Autopsy findings,Histo-Pathological Examination (HPE) and Cause of death.

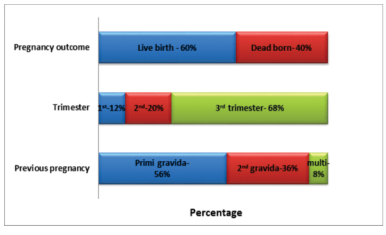
RESULTS:

A total number of 25 medico-legal cases of maternal deaths were encountered during the year 2008-2017. Their age ranged from 15 years to 40 years with a mean age of 26.32 years. It was observed that maximum numbers of deaths were recorded in the age group of 21-25 years (52%) (Table No. 1).

Age group	Maternal death
15-20 y	1 case (4%)
21-25 y	13 cases (52%)
26-30 y	7 cases (28%)
31-40 y	4 cases (16%)

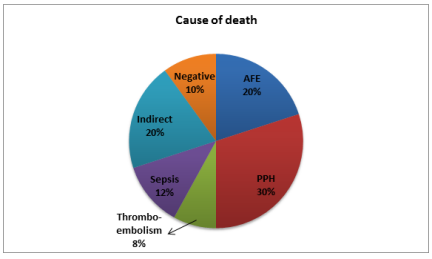
[Table 1: Shows the number of maternal death cases in various age groups.]

Analyzing the pregnancy outcome (Chart1), 10 women gave live birth to the child whereas 11 had a stillbirth and one had an abortion. Most of the women (16 cases) had pregnancy-related complications during their third trimester of gestation. There was one case of maternal death which occurred after delivery but within 42 days of postpartum (Chart1).



[Chart1: Shows details of previous pregnancy, gestational age of the mother and pregnancy outcome.]

In twenty patients, no significant past history could be known whereas one female had seizures and four had anaemia. Postpartum haemorrhage remains leading cause of death (30%) followed by Amniotic Fluid Embolism (AFE) causes (20%), indirect (20%), sepsis (12%), undetermined (10%)and Thrombo-Embolism(8%) (Char 2).



[Chart 2: Shows cause of death in maternal death cases.]

DISCUSSION:

The precise determination of the cause of death is inevitable in maternal deaths, in order to prevent and reduce its frequency. In our study, we noticed that young mothers in the age group of 21-25years

were met with pregnancy complications and death during their first pregnancy. In a study conducted by Dr R. V. Bardale et al in Nagpur government medical college shows the maximum number of deaths between the age group of 21-25 years our study also consistent with this finding. Whereas the study conducted by Zacharia Thomas et al in Thiruvananthapuram Medical college notified that maximum maternal death in the age group 25 to 29 years during their first pregnancy.

According to a study published in the Lancet which covered the period from 1990 to 2013, the most common causes are postpartum bleeding (15%), complications from unsafe abortion(15%) , hypertensive disorders of pregnancy (10%), postpartum infections (8%), and obstructed labour (6%).[5]

In our present study next to postpartum haemorrhage (30%) is the Amniotic fluid embolism (20%). Both in Postpartum haemorrhage and amniotic fluid embolism we noticed features of disseminated intravascular coagulation during the autopsy. Thus DIC accounts for 50% of maternal deaths. Five cases died of indirect causes. Three cases died due to sepsis among them one death was due to criminal abortion. Unfortunately, in three cases in spite of all the efforts made, the cause of death was undetermined.

DIC is a consumption coagulopathy and is a key contributor to primary postpartum haemorrhage. Because of hypercoagulable state in pregnancy, presence of any provocative factor (such as abruptio placenta, sepsis, liquor amnii embolism, severe pre-eclampsia, eclampsia& HELLP syndrome etc) can easily upset the normal balance culminating into disseminated intra-vascular coagulopathy. [6]In addition Hypertensive disorder in pregnancy, especially pre-eclampsia, increases perinatal mortality rate by five folds. [7]

The specific relation of anaphylaxis with AFE was first describedby Attwood in 1956.[8]Amniotic fluid embolism (AFE) is an acute, severe, and devastating complication of obstetrics. It is recognized as a type of syndrome characterized by the abrupt onset of hypoxia, hypotension, seizures, or disseminated intravascular coagulopathy (DIC), occurring during labor or delivery, caused by the inflow of amniotic components into the maternal circulation.[9]In clinical practice Amniotic fluid embolism (AFE) still remain as a diagnosis of exclusion, the confirmation of AFE is only possible with autopsy and histopathological examination. To confirm AFE routinehematoxylin and eosinstain is used, however, there some special stains are also be used in special conditions such as Alcian blue, which reacts with foetal mucin[10,11]. In addition to these stains there immune histochemical stains which could be used in cases of AFE such ascytokeratinAE1/AE3 to detect fetal squamous cells, ZnCp-1 stain to detect meconium and C5a receptor (CD88) stain is used to provecomplement activation and anaphylatoxin formation indifferent organs, including the lungs and uterus[12,13].

Recently, AFE was categorized into two types: the cardiopulmonary collapse type and DIC type. The DIC type of AFE has been proposed as a pathological condition with no evidence of amniotic components in the lung, but it meets the criteria for clinical AFE with the presence of PPH of an unknown etiology secondary to uterine atony with evidence of fetal components in the uterine vessels. Several reports demonstrated the close association of uterine atony with AFE.[9,14] PPH complicated with low coagulability identified as DIC type PPH also presents secondary to uterine atony.[15]The entry of amniotic fluid components into the uterine vessel circulation was a commonphysiological mechanism during labor.[16]Some women may tolerate the transfer of amniotic fluid or its components with no problems if an anaphylactoid reaction is adequately prevented by biological inhibitors such as the C1 inhibitor.[17]It was reported that low-level C1 inhibitoractivity was present in AFE patients and the administration of C1 inhibitor concentrates led to uterotonic activity,resulting in the prevention of further blood loss.[17,18]There are also experiments conducted on this C1 inhibitor concentrate, hemofiltration and plasma exchange transfusions as a treatment modality for AFE.[19,20]

CONCLUSION:

The clinical manifestation of AFE resembles both embolism and anaphylaxis. A reliable diagnosis could be made only upon histological evaluation.There is a necessity to incorporate newer technologies in forensic field in relation to maternal death to improve the quality and precision of cause of death, which could be of greater help in notifying the emerging trend to the medical professional as well as to the community. However, for autopsies to fulfil this role they must be of a very high standard and must be subjected to quality control measures. Encouraging hospital autopsy with histopathology along with immune histochemistry and microbiology examination in all maternal deaths will help in understanding the cause of death, as well as paths for invention of novel treatment modalities.

REFERENCES:

1. World Health Organization, Regional Office for South East Asia. Maternal Health in South East Asia Region 2015. New Delhi, India: WHO; 2015.
2. World Health Statistics 2018. Geneva: World Health Organization;2018 (http://www.who.int/gho/publications/world_health_statistics/2018/en/)
3. Dr. Zachariah Thomas ,DIRECT CAUSES OF MATERNAL DEATH AN AUTOPSY STUDYInt. J. Adv. Res. 5(7), 2278-2285.
4. R. V. Bardale, MD, **P. G. Dixit, MD (Path), MD (FMT),Pregnancy-related deaths: A Three-year retrospective study,J Indian Acad Forensic Med, 32(1)ISSN 0971-0973
5. GBD 2013 Mortality causes of death collaborators (January 2015). "global, regional, and national age-sex specific all cause and cause-specific mortality for 240 causes of death, 1990-2013: a systemic analysis for the Global Burden of disease study 2013". Lancet. 385 (9963): 117-71. Doi:10.1016/S0140-6736(14)61682-2. PMC 4310604. PMID 25530442.
6. Patel A., Shukla D., Hazra M. retained placenta: the third stage threat (12 years study). J ObstetGynecol India 1991; 41: 606-10.
7. KalurJS., Martin JN. Jr., Kirchner KA., Morrison JC. Postpartum pre-eclamsia-induced shock and death: A report of three cases. Am J ObstetGynecol 1991; 165: 1362-8.
8. Attwood HD. Fatal pulmonary embolism by amniotic fluid. J Clin Pathol 1956; 9: 38–46.
9. Courtney LD. Amniotic fluid embolism. ObstetGynecolSurv 1974; 29: 169–177.
10. Lau G. Amniotic fluid embolisom a cause of sudden maternal death. Med Sci Law 1994; 34: 213–220.
11. Marcus BJ, Collins KA, Harley RA. Ancillary studies in amnioticfluid embolism: a case report and review of the literature.Am J Forensic Med Pathol 2005; 26: 92–95.
12. HikijiW, TamuraN, Shigeta A, KanayamaN, Fukunaga T. Fatalamniotic fluid embolism with typical pathohistological, histochemicaland clinical features. Forensic SciInt 2013; 226:e16–e19.
13. Furuta N, Yaguchi C, Itoh H et al. Immunohistochemical detectionof meconium in the fetal membrane, placenta and umbilicalcord. Placenta 2012; 33: 24–30.
14. Matsuda Y, KamitomoM. Amniotic fluid embolism: a comparisonbetween patients who survived and those who died. J IntMed Res 2009; 37: 1515–1521.
15. Kobayashi T. Obstetrical disseminated intravascular coagulationscore. J ObstetGynaecol Res 2014; 40: 1500–1506.
16. Kobayashi H. The entry of fetal and amniotic fluid components into the uterine vessel circulation leads to sterile inflammatory processes during parturition. Front Immunol 2012; 3: 321.
17. Tamura N, Kimura S, Farhana M et al. C1 esterase inhibitor activityin amniotic fluid embolism. Crit Care Med 2014; 42:1392–1396.
18. Todo Y, Tamura N, Itoh H, Ikeda T, Kanayama N. Therapeuticapplication of C1 esterase inhibitor concentrate for clinical amnioticfluid embolism: a case report. Clin Case Rep 2015; 3:673–675.
19. Ogihara T, Morimoto K, Kaneko Y. Continuous hemodiafiltration for potential amniotic fluid embolism: dramatic responses observed during a 10-year period report of three cases. Ther Apher Dial 2012; 16: 195–197.
20. WekslerN,Ovadia L, StavA, Ribac L, IuchtmanM. Continuous arteriovenous hemofiltration in the treatment of amniotic fluid embolism. Int J Obstet Anesth 1994; 3: 92–96.
21. NaoakiTamura ,MustariFarhana , TomoakiOda, Hiroaki Itoh and NaohiroKanayama, Amniotic fluid embolism: Pathophysiology from the perspective of pathology, J. Obstet. Gynaecol. Res. Vol. 43, No. 4: 627–632, April 2017.doi:10.1111/jog.13284.
22. NaohiroKanayama, Junko Inori, HatsueIshibashi-Ueda, Makoto Takeuchi, Masahiro Nakayama, Satoshi Kimura, Yoshio Matsuda, Jun Yoshimatsu and Tomoaki Ikeda, Maternal death analysis from the Japanese autopsy registry for recent 16 years: significance of amniotic fluid embolism, J. Obstet. Gynaecol. Res. Vol. 37, No. 1: 58–63, January 2011,doi:10.1111/j.1447-0756.2010.01319.x.