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CLINICO-PATHOLOGICAL CO-RELATION OF MATERNAL DEATH IN RURAL AREAS OF NORTH MAHARASHTRA

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ABSTRACT

To study pathogenesis & morphological changes in various organs with clinico-pathological co-relations of maternal death in rural areas of North Maharashtra. To compare maternal deaths of metropolitan cities with rural areas. To evaluate several factors which are responsible for maternal death in rural areas.This was a retrospective study of 122 maternal deaths tissue received for histopathological examination over a span of 5 years (January 2008-December 2012), in government Medical college Dhule. The tissue was received from Jalgaon, Nashik, Nandurbar and Dhule districts. Ten cases were excluded from present study due to improper fixation, partial organs & ill preserved specimens. Hence 112 cases of maternal deaths were studied.Out of 112 cases, 57 cases (50.89%) died due to direct obstetric cause, 58 cases (47.32%) died due to indirect causes and in 2 cases the cause was unknown. Anemia (27.67%), Pre-eclampsia/eclampsia (28%), were the main causes of death. In 10 cases vaso-oclussive crisis due to sickle cell anemia was responsible for death. Anemia is the main cause of death in rural places of North Maharashtra, while Pre eclampsia/eclampsia is the main cause in Metropolitans cities. Thus early marriage, lack of education, ignorance has led to unutilisation of antenatal care services.

KEY WORDS :- Maternal death, Autopsy, Anemia, Eclampsia.

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1. INTRODUCTION

Every minute a women dies as a result of pregnancy or child birth. Death of 5 lakhs women per year is beyond imagination[1]. Hence the main aim all over the world is reduction of maternalmortality[2]. The maternal mortality rate in India is very high as compared with developed countries[3].India ranks 3rd in the world for maternal death (19%).According to the recent Registration report of the Registrar general of India the maternal Rate in 2007-09 is 212/100000 live birth[4].The major causes of maternal mortality in India are anemia (64.4%), pre-eclamptic toxemia (PET) / eclampsia (25.5%),sepsis (20.6%) and hemorrhage (19.8%) [5]. Maternal death indicates social status of the country. It is every nation dream to reduce maternal death. Studies of maternal deaths are essential so as to help in achieving the goal of reducing maternal mortality to less than 100/100000 live birth.In India, for every case of maternal deathreferred from a rural area to a district or teaching hospital,10 women from rural areas deliver without complications[5]. An efficient system is needed to monitor maternal deaths and deliveries in rural areas. Hence the present study was undertaken to find out the histopathological changes, associated disorders and clinic-pathological co-relation of maternal deaths in rural areas of Maharashtra.

2. MATERIALS AND METHODS

This is a retrospective study of 122 maternal deaths received in Pathology Department of Govt. Medical College, Dhule over the period of five years from January 2008 to December 2012. Our department is referral center for histo-pathological examination of tissues from North Maharashtra region having Nandurbar, Jalgaon, and Nashik district including our district Dhule. Pieces of organs in formalin were send to the department with accompanying clinical history, laboratory investigations if done and post mortem findings from the retrospective hospitals. Lungs, whole heart, liver, spleen, kidneys, uterus and cerebrum were received. Gross and histopathological examinations were done on all the organs. Special stains like Zeil-Nielson, Prussian blue was done. Age, Gravidity, Trimester of pregnancy and method of delivery were noted (Table I).

Table I

Distribution of cases with respect to age, trimester and mode of delivery.

Age	No. of Cases.
19-25 yrs	85
26-30	24
Above 30	13
Trimester	
First trimester	17
Second trimester	12
Third trimester	45
During labour	17
Postpartum	41
Mode of Delivery	
Vaginal delivery	91
Home Delivery	10
Post Caesarean	10
Spontaneous abortion	5
MTP	3
Ectopic	3

From one hundred and twenty two cases, in 3 cases all the organs received were completely autolysed, while in 4 cases only uterus was received. Hence it was difficult to co-relate the cause of death. Death in 3 MTP cases was due to surgical complications. Hence a total of 112 cases of maternal deaths were co-related with the clinical history, investigations and postmortem findings to know the pathogenesis of maternal death.

3. RESULTS

The 112 cases of maternal deaths were classified into Direct obstetrics cause, Indirect obstetrics cause and Unknown cause. (Table II)

Table II
Causes of maternal death. (n=112)

SL.NO.	CAUSE	NO. OF CASES	PERCENTAGE
1.	**DIRECT CAUSE**	**57**	**50.89%**
	Pre-eclampsia/ eclampsia	26	23
	Hemorrhage	21	18.75
	Acute Fatty liver	03	2.67
	Puerperal Sepsis	02	1.7%
	Intra uterine fetal death	02	1.7%
	Ectopic Pregnancy	02	1.7%
	Amniotic Fluid embolism	01	0.8%
2.	**INDIRECT CAUSE**	**53**	**47.32%**
	Anemia	31	27.67%
	Sickle cell anemia	06	5.3%
	Malaria	03	2.67%
	Lobar Pneumonia	02	1.7%
	H1N1	03	2.67%
	Gastroenteritis	01	0.8%
	Hepatitis	01	0.8%
	Typhoid	01	0.8%
	Tuberculosis	01	0.8%
	Diabetes Mellitus	01	0.8%
	Rheumatic Carditis	01	0.8%
	Epilepsy	01	0.8%
	Tetanus	01	0.8%
3.	**UNKNOWN CAUSE**	**02**	**1.7%**
	TOTAL	**112**	**100%**

3.1 Mode of death, Clinical conditions and Morphological findings associated with the terminal event

3.1. a. Pre-eclampsia/eclampsia

This was present in 26 cases. Modes of death were D.I.C.(9 cases), Renal Failure (6 cases), Hepatic failure (HELLP Syndrome- Hemolysis, Elevated liver enzyme and low Platelet count 5 cases), Left ventricular failure (2 Cases), Intracranial Hemorrhage (1 Case), Rupture of Subscapular hematoma leading to Retroperitoneal hemorrhage and Shock (1 Case), Septicemia (1Case), Lobar Pneumonia
(1 Case), anemia of mild to moderate (5 cases).

Morphological changes noted in various organs were-

1. Lungs- Pulmonary edema, lobar pneumonia, pulmonary hemorrhage.
2. Heart- Left ventricular Failure.
3. Liver- Hepatic necrosis, sub capsular hematoma, fatty liver.
4. Kidney- Acute tubular necrosis (Fig 1), -Hemorrhage in Kidney, Tubular interstitial nephritis.
5. Brain- Intra cerebral hemorrhage.
6. Uterus- Retro placental clot.

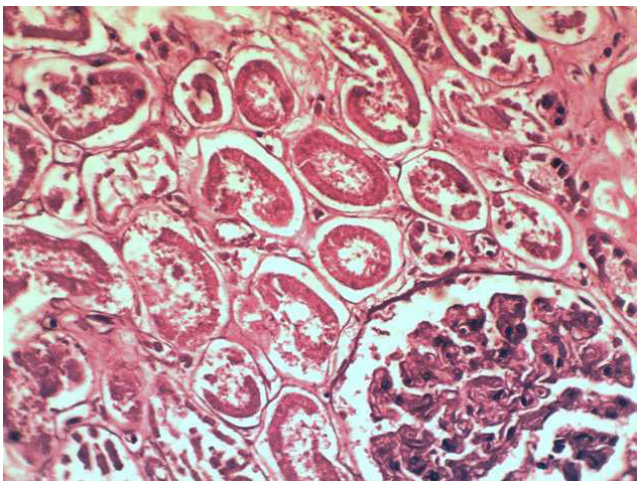

Figure 1
Acute tubular necrosis of kidney.

3.1. b. Hemorrhage from Genital tract

This was seen in 21 cases. Modes of death were DIC (7 cases). Postpartum hemorrhage uterine atony (4 cases), Retained placenta (3 cases), Uterine rupture (2 Cases), Abruptio placenta (1 Cases), hepatic failure with submassive hepatic necrosis (4 cases) (Fig 2).

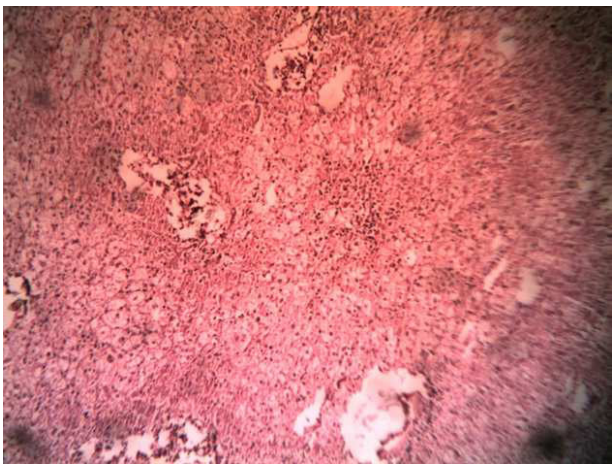

Figure 2
Submassive Hepatic necrosis.

3.1. c. Acute Fatty liver

This was seen in 3 cases. Modes of death were HELLP Syndrome.Liver showed pan lobular fatty change in hepatocytes. Dilatation of hepatic sinusoids and kupffer cell hyperplasia (Fig 3).

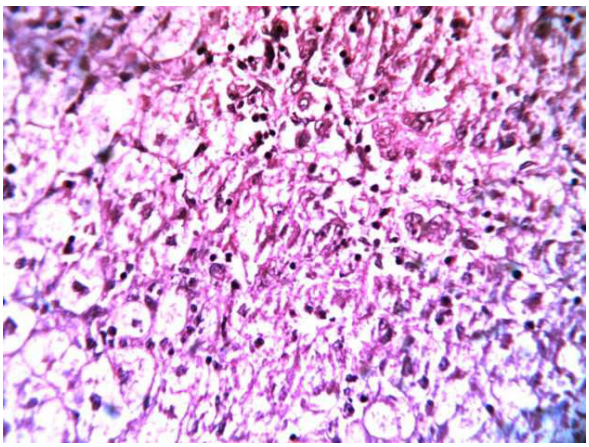

Figure 3
Acute fatty liver.

3.1. d. Puerperal sepsis

This was seen in 2 cases. 1 case was seen in the home delivery patient. The patient presented with fever after delivery, while the other was in a hospital delivery. Morphological findings were abscess at the placental bed and evidence of septicemia in all the organs.

3.1. e. Amniotic fluid embolism

This was seen in one case with capillaries of lung showing fetal squames (Fig 4).

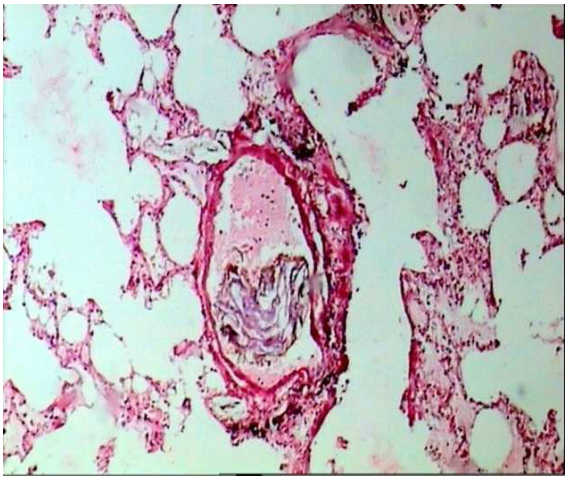

Figure 4
Amniotic Fluid embolism.

3.1. f. Anaemia (27.67%)

This was seen in 31 cases. Hemoglobin less than 10 gm% was the criteria laid down for labeling the patient as anemia. The contributory factor was congestive cardiac failure. In cases where hemoglobin levels were not mentioned but HPE findings of congestive cardiac failure with ruling out other causes of congestive cardiac failure were included in this group. Complications associated with anemia were PIH, postpartum hemorrhage, typhoid fever.

3.1. g. Sickle cell anemia

This was cause of death in 6 cases. The cases were not diagnosed antenatally. On HPE vaso-occlusive crisis due to sickle cell RBC's was seen in all organs along with placental bed (Fig 5).

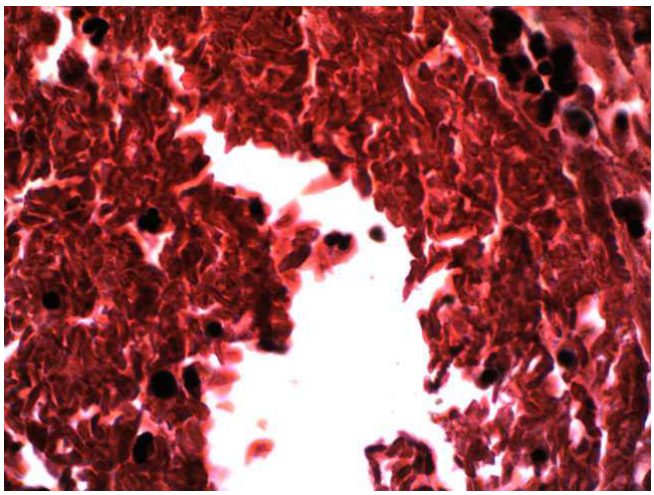

Figure 5
Placental Vaso-occlusive Sickle cell crisis.

3.1. h. Infections

Malaria and H1N1 had 3 cases each. 2 cases of Malaria and H1N1 cases were diagnosed antenatally. Patient with malaria showed hemozoin pigment at placental site, spleen and in cerebrum. The pigment was confirmed by Prussian blue. H1N1 cases showed characteristic changes in lungs. Grossly lungs showed consolidation of upper lobe. On HPE alveoli showed fibrinous exudates, pulmonary edema, hyaline membrane formation lining the alveoli, widening of intra alveolar septa along with infiltration of polymorpho nuclear cells. HPE reveals diffuse alveolar damage (Fig 6).

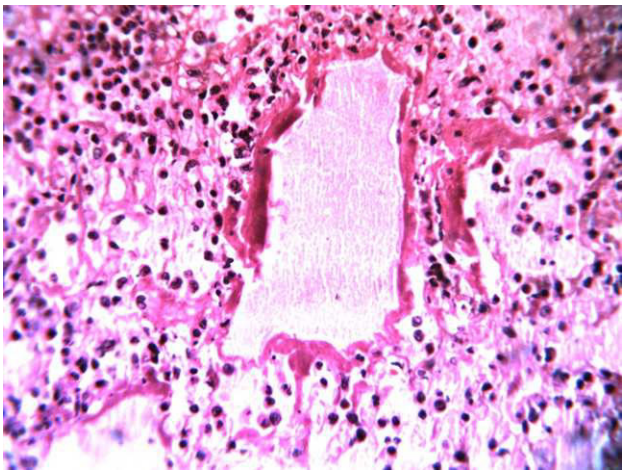

Figure 6
Hyaline Membrane in H1N1

Typhoid was diagnosed clinically; it was complicated with moderate to severe anemia, while tuberculosis was not diagnosed antenatal. In case of HbsAg positive hepatitis, liver cell failure was responsible as the cause of death. Patient with chronic Rheumatic carditis associated with Mitral stenosis and Diabetes Mellitus were diagnosed antenatally. The cause of death in Rheumatic carditis was left ventricular failure. While the patient of Diabetes mellitus had IUD does leading to DIC and death.

3.1. i A known case of epilepsy died due to aspiration pneumonia
3.1. j. Tetanus was responsible for death in home delivery patient. The patient developed tonic clonic convulsion 5-6 days after delivery.
In 2 cases due to inadequate history the histopathological changes were difficult to co-relate.
Home delivery was present in 10cases.The cause of death in home delivery were (Table 3)

Table 3
Distribution of cause of death in home delivery cases (n= 10).

Cause of Death	No. of cases.
Retained Placenta	3
Hemorrhage from genital tract	2
Sickle cell anemia	2
Tetanus	1
Septicemia	1
Epilepsy	1

4. DISCUSSION

There are many clinical studies of maternal deaths in India[5, 6, 7, 8]. Autopsy study is helpful in knowing the pathogenesis and clinical co-relation of the cause of death. There are few autopsy studies of maternal death in India[9, 10, 11]. All these studies are done in metropolitan city like Pune, Mumbai. The health status of rural population is cause of great concern. This is reflected in the life expectancy (63 yrs), infant mortality rate (80/1000 live birth) and maternal mortality rate (488/100000 live birth). To improve this scenario the present study was carried out in rural Maharashtra.

Table 4
Illustrates the various autopsy studies of maternal mortality in India

Series	Kavatkar et al	Panchbhai et al	Jashnani et al	Present Study
StudyPeriod	1993-2000	1998-2006	2003-2007	2008-2012
Cause of Death				
Pregnancy induced hypertension	24.2%	14.44%	13.4%	23.0%
Hemorrhage from genital tract	8.4%	11.55%	5.6%	18.75%
Septicemia	12.6%	5.78%	11.2%	1.7%
Anemia	34.7%	2.89%	5.6%	27.67%
Sickle cell anemia		2.89%	1%	5.3%
Liver cell failure	14.7%	2.89%		2.67%
Tuberculosis	4.2%		2.25	0.8%
Malaria	4.2		3	2.67%
Hepatitis		6.50	41.5	0.8%

It is seen that pregnancy induced hypertension followed by anemia was the main cause of death in Kavatkar et al while in Panchbhai et al pregnancy induced hypertension followed by haemorrhage from genital tract was the main cause of death.In our study the major causes of maternal death were anemia (27.67%), pre-eclampsia/eclampsia (23%), hemorrhage from genital tract (18.75%). Thus illiteracy, ignorance, early marriages, malnutrition is responsible for making anemia the main cause of maternal death in rural area. We had six cases of vaso-occlusive crisis due to sickle cell anemia responsible for maternal death. The endemic zone of hemoglobinopathy of our

district along with our referral district is responsible for the increased cases. The oxidative stress in pregnancy is responsible for causing the vaso-occlusive crisis in sickle cell anemia [9]. Pregnancy induced hypertension and hemorrhage from genital tract were the causes which followed after anemia in our study. In both the above causes disseminated intravascular coagulation (DIC) was responsible for death. The findings co-relates with other studies[, 10, 11,12]. We had 3 deaths due to H1N1. All the causes were in the year 2009 when there was pandemic of Swine flu. We had 10 home delivery cases. There are no reports of home delivery cases neither in clinical nor in autopsy studies of maternal death. Remote places which are not accessible by road in Satpuda ranges and social taboos are responsible for home delivery.All the causes of maternal death in home delivery can be easily prevented by training dais. However the present study could have been better interrupted if the clinical autopsy were done in our department itself. Because gross appearance of the organs, Pulmonary-thrombo-embolism, changes in placenta, pituitary is very informative in maternal autopsies for better clinic-pathological co-relatio[13], which is lacking in our study. Due to this short coming 2 of our cases were not co-related for cause of death or there may be functional problem instead of organic problem responsible for failure in co-relation. There are many national programs which are meant for reducing the maternal death. But unutilisations of this programs are responsible for making Anemia the main cause of mortality in rural areas. This could have been easily prevented by doing regular antenatal check up. Hence we all should join our hands together to uplift the rural area and try to eliminate the predisposing factors like ill literacy, early marriage, and poor health status of women in society. Hence autopsy study of maternal death is an eye-opener in case of maternal deaths.

5. Conflict of Interest

Conflict of interest declared none.

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