

Maternal Autopsy Study: An Experience at Tertiary Care Centre at Nanded

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Abstract

Background: Maternal mortality rate is recognized as a social indicator and is dependent upon the general socioeconomic status, nutrition level and the level of maternal healthcare in the community. *Aims:* The present study was undertaken with a view to determine factors causing maternal deaths, to recognize cause of death and to discuss the utility of autopsy record as a useful and adjunct data source for ascertainment of maternal deaths and to study the cases that were subjected to pathological autopsy. *Material and Methods:* This was a retrospective study. The maternal autopsy data during the period 2009 to 2014 were analyzed. Clinical data was also obtained from the case record. The maternal death cases related only to pregnancy were included in the study. Paraffin sections were reviewed. Autopsy findings were correlated with clinical details and investigation in each case to establish an accurate cause of death. *Results:* 33 pregnancies related maternal death cases were studied. The age ranging from 15 -26 years. Cases belonged to lower socio-economic status. Haemorrhages were the predominant cause of maternal mortality. 70% of maternal deaths were occurred within the first 24 hour of hospital admission. Multigravidity was seen in 60% cases of maternal deaths. *Conclusion:* Maternal death is the index of health care in community. Forensic pathologist plays a crucial role in identifying the cause of maternal death. Findings of such studies and the RCH guidelines will improve the maternal care and helps to reduce the maternal mortality rate.

Keywords: Maternal Mortality; Autopsy; Haemorrhages; Forensic Pathologist; Maternal Death.

Introduction

A maternal death is defined as death of a woman occurring while pregnant or within 42 days of termination of pregnancy, irrespective of the duration or its management but not from accidental or incidental causes [1]. Maternal mortality rate (MMR) is recognized as a social indicator and is dependent upon the general socioeconomic status, nutrition level and the level of maternal healthcare in the community [2].

There is a large gap between the MMR in

developed countries and that in developing nations. The World Health Organization reports that the MMR in the South Asian region ranks second only to sub-Saharan Africa [3]. Over 600000 maternal deaths occur each year worldwide [4]. In India, many women dies due to pregnancy-related complications and those who survive suffer from severe maternal morbidity [5]. Maternal death rate in India was 1000 per 100000 live births in 1959 and it decreased to 301 per 100000 live births in 2003 [6].

To reduce the maternal mortality rate upto 109 by 2015 is one of the eight priorities of Millennium Development Goals set by Member States of the United Nations. A woman dies as a result of complication arising during pregnancy and childbirth every 90 seconds in the world, and every 7 minutes in India. The majority of these deaths are preventable. MMR for 2015 is 149. The current MMR of Maharashtra is 104 (Ranking 3rd in India) [7]. The causes of maternal deaths have been classified as direct (resulting from obstetric complications of pregnancy, labor or puerperium) or indirect (resulting from preexisting disease or disease aggravated by the physiological

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effects of pregnancy) depending upon their relationship with pregnancy [8].

The Forensic Pathologist plays a crucial role in identifying these cases and identifying the cause of death. Review of autopsy reports can prove to be one of the useful sources to identify pregnancy-related deaths and elucidating the emerging trends.

The present study was undertaken with a view to determine factors causing maternal deaths, to recognize cause of death and to discuss the utility of autopsy record as a useful and adjunct data source for ascertainment of maternal deaths and to study the cases that were subjected to pathological autopsy. The pathological autopsy study was done for the classification and confirmation of cause of death by correlating clinical findings. Pathological autopsy is important to know pathophysiological changes in various organs which is important to know the sequence of events leading to death.

Material and Method

This was a retrospective study carried out in the department of pathology at our institute. In a retrospective study, the maternal autopsy data during the period 2009 to 2014 (05 year) were analyzed. Clinical data was also obtained from the case record. The maternal death cases related only to pregnancy were included in the study.

The protocol followed during autopsy in a maternal mortality is similar to other pathological autopsies; other specific changes that were sought were frothy bubbles in the right atrium in search of air embolism, detection of acute fatty liver of pregnancy or evidence suggestive of pulmonary or amniotic fluid embolism. All cases underwent an external and *in situ* examination followed by dissection and preservation of the organs in 10% formalin. Blood culture and culture of other specimens was done when indicated. A gross examination of the organs and histopathological examination of at least one block each from the cerebrum, cerebellum, meninges, heart, liver, spleen, kidney, stomach, intestines, pituitary and adrenal glands was carried out. Multiple sections were studied from the lungs in an attempt to identify pulmonary emboli. Whenever indicated, more sections from these organs were studied. Paraffin sections were then stained and examined (Hematoxylin and Eosin). Autopsy findings were correlated with clinical details and investigation in each case to establish an accurate cause of death.

Results and Observations

A total 33 pregnancy related maternal death cases were studied. The age ranging from 15 to 26 years with a mean age 21 years. Nearly 70% women had education level below secondary level and remaining were illiterate. Cases belonged to lower socio-economic status and few belonged to below poverty line (BPL) group. None were from high socio-economic group.

The various causes of maternal mortality are listed in Table 1. Direct causes were responsible for 76% cases of maternal death. Among the various causes, haemorrhages (O072.0 and O072.1, ICD-10) act as the predominant cause leading to maternal mortality contributing for 45 % of cases. Haemorrhages occurs due to rupture of uterus in 02 cases, retained placenta in 03 cases, post partum haemorrhage due to atonic uterus in 03 cases and DIC in 05 cases. While in remaining 02 cases haemorrhages occurs due to abortion in second trimester.

09% cases were due to hypertensive disorder of pregnancy which includes 02 cases of eclampsia (O15.0, ICD-10) followed by 01 case of severe pre-eclampsia (O14.1, ICD-10). Among the indirect causes, anaemia (O99.0) and lobar pneumonia (J18.1) act as major contributory cause of maternal death.

Regarding the antenatal care, 79% of the deceased women had received adequate antenatal checkup as per the RCH guidelines. Remaining 21% cases were not registered even in primary health centre. Even, they had not received any type of antenatal care including tetanus vaccination and supplementation of iron and folic acid.

70% of the deceased women had institutional deliveries and remaining 30% cases were from home delivery. Later, the home delivery cases were admitted in the hospital due to delivery complications.

Other associated factors related with maternal death are shown in Table 2.

Majority of maternal deaths were seen between the age group of 19 – 22 years. 70% of maternal deaths were occurred within the first 24 hour of hospital admission. Multigravidity was seen in 60% cases of maternal deaths. In our study, we didn't found the case of grand-multiparity. 60% cases of maternal death were seen in last trimester of pregnancy followed by first trimester.

The histopathological findings were also studied in each case of maternal mortality.

The histopathological findings are illustrated in Table 3.

Table 1: Underlying causes of maternal mortality

(n=33)

Sl. No.	Cause	ICD -10 Code	No. of cases	Percentage
1.	Direct causes (n = 25)			
	Pre-eclampsia/eclampsia	O14.1 & O15.0	3	09.09%
	Haemorrhage	O072.0 & O072.1	15	45.45%
	Puerperal sepsis	O85	1	03.03%
	IUD	O36.4	2	06.06%
	Ruptured Ectopic pregnancy	O00.1	2	06.06%
	Pulmonary thromboembolism	I26.0	1	03.03%
	Amniotic fluid embolism	O88	1	03.03%
2.	Indirect causes (n = 8)			
	Anemia	O99.0	3	09.09%
	Lobar pneumonia	J18.1	3	09.09%
	Acute hepatitis	B17.9	1	03.03%
	Acute fatty liver	K76.0	1	03.03%
	Total		33	100%

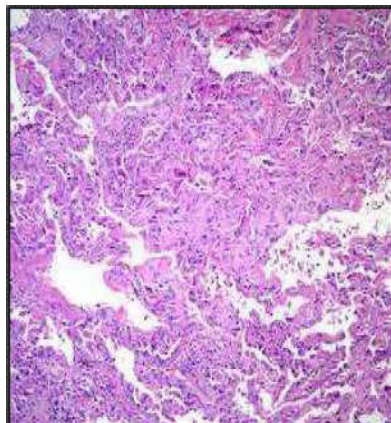
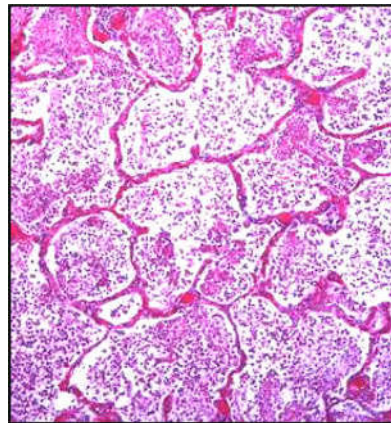
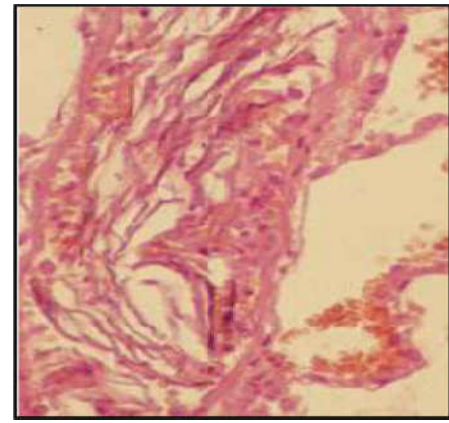
(IUD: Intra-Uterine Foetal Death)

(ICD: International Classification of Diseases)

Table 2: Associated factors of maternal mortality

Variables	No. of cases
Age (in year)	
15 - 18	06 (18.2%)
19 - 22	16 (48.5%)
23 - 26	11 (33.3%)
Ward stay	
< 24 hrs	23 (69.7%)
> 24 hrs	10 (30.3%)
Gravida	
Primigravida	13 (39.4%)
Multigravida	20 (60.6%)
Trimester of pregnancy	
First trimester	10 (30.3%)
Second trimester	03 (09.1%)
Third trimester	20 (60.6%)
Method of delivery	
Vaginal	15 (45.5%)
Abortion / MTP	02 (06.0%)
Undelivered	01 (03.0%)
Surgical (LSCS)	15 (45.5%)

(LSCS: Lower Segment Caesarean Section)

**Fig. 1:** Diffuse alveolar damage**Fig. 2:** Lobar Pneumonia**Fig. 3:** Amniotic Fluid Embolism

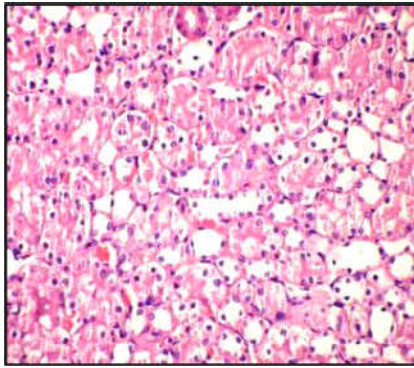


Fig. 4: Acute Tubular Injury

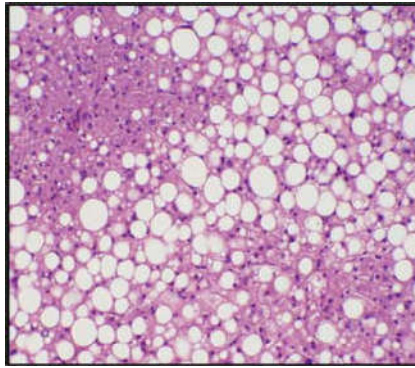


Fig. 5: Acute Fatty Liver

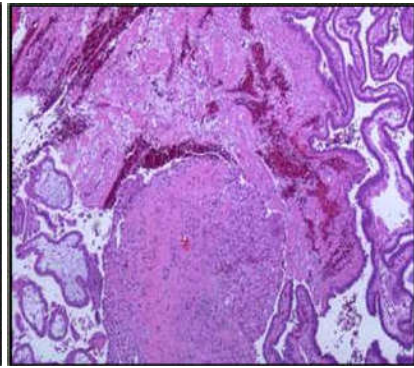


Fig. 6a: Tubal (Ectopic) Pregnancy

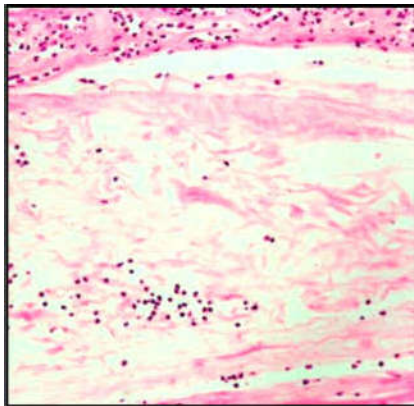


Fig. 6b: Acute Chorioamnionitis

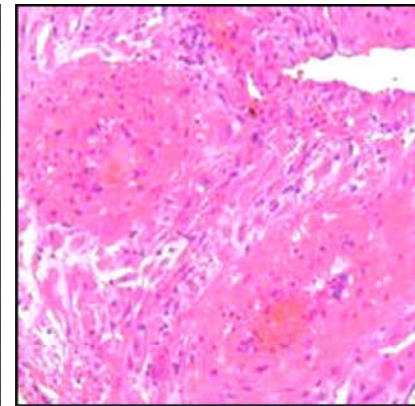


Fig. 7: Intervillous Thrombosis

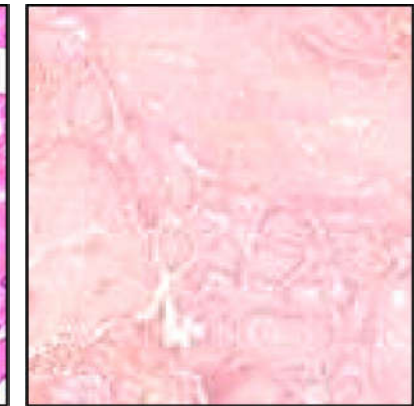


Fig. 8: Placental Infarct

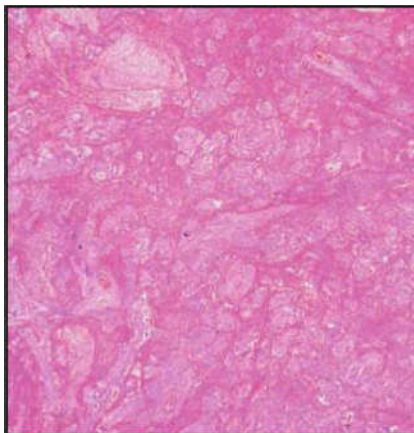


Fig. 9: Perivillous Fibrin Deposition

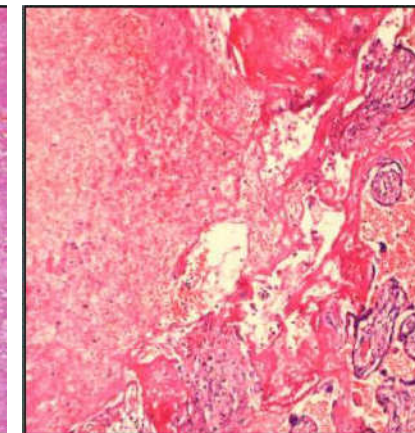


Fig. 10: Intervillous Haemorrhages

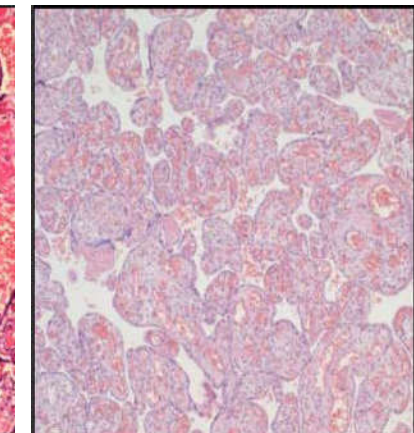


Fig. 11: Villous Capillary Hypervascularity

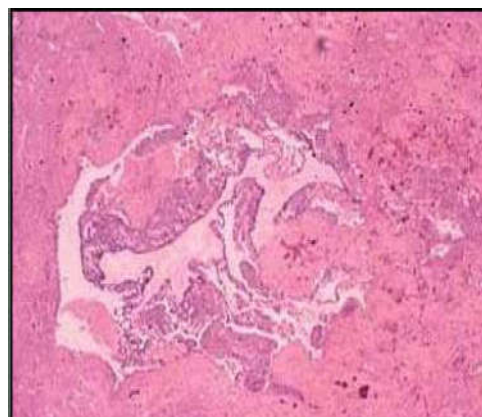


Fig. 12: Retained placental bits with massive Intramyometrial haemorrhage

Table 3: Histopathological findings according to underlying cause of maternal death

Sr. no.	Diagnosis	Histopathological findings
1	Pre-eclampsia and Eclampsia	Petechial haemorrhages were noted over the external surface and cut surface of internal organs of body. Also noted large blood clot (on gross and on microscopy) in posterior partial region in 01 case. DIC changes (microthrombi) were noted in the internal organs. Also, renal tubular necrosis and arteriosclerosis along with fibrinoid necrosis of uterus seen.
2	Haemorrhages	Areas of haemorrhages were noted within the myometrial tissue. In 3 cases, retained placental bits were seen. Also, changes of DIC were seen.
3	Puerperal Sepsis	Heart: Mononuclear cell infiltrate within the interstitium of heart. Lung: Diffuse alveolar damage with parenchymal infiltrate seen. Liver: Hyperplasia of kuffer cell and sinusoidal endothelial cells. Centriacinar necrosis was noted. Periportal neutrophilic infiltrate seen. Kidney: Acute Tubular Injury (ATI) was noted. Features of ATN are: Interstitial oedema, hydropic degeneration, Shedding of tubular epithelial cells in to the lumen. Uterus: Inflammatory infiltrate within the decidual tissue, myometrial and parametrial tissue.
4	Intra-uterine death of foetus	Placenta: Utero-placental vascular insufficiency noted. Perivillous acute inflammatory infiltrate. Perivillous fibrin deposition. Intervillous thrombi & haemorrhages. Villous capillary hypervascularity seen.
5	Ruptured Ectopic pregnancy	Entrapment of chorionic villi within the wall of the fallopian tube along with large areas of haemorrhages.
6	Amniotic fluid embolism	Epithelial squames, meconium material and fatty material seen within the pulmonary vasculature and parenchymal tissue.
7	Pulmonary thromboembolism	Microthrombi were seen within the pulmonary vasculature.
8	Lobar pneumonia	Pulmonary alveoli were studded with neutrophilic infiltrate. Diffuse alveolar damage seen.
9	Acute fatty Liver	Microvesicular steatosis with focal hepatocellular necrosis.
10	Acute hepatitis	Hepatic parenchymal inflammation. Periportal inflammatory infiltrate. Focal hepatocellular necrosis seen.

(DIC: Disseminated Intravascular Coagulation)

(ATN: Acute Tubular Necrosis)

Table 4: Comparative studies of associated parameters

Studies	Age (year)		Factors Gravida		Ward stay	
	15 - 25	> 25	Primi	Multi	< 24 hrs	> 24 hrs
	Jashnani et al [9]	70%	30%	44%	56%	--
Panchbhai et al [2]	57%	43%	37%	63%	31%	69%
Varikar et al [10]	85%	15%	--	--	--	--
Varsha et al [11]	52%	48%	46%	54%	46%	54%
Bardale et al [12]	53%	47%	57%	43%	44%	56%
Present study	67%	33%	33%	67%	70%	30%

Discussion

Maternal mortality rate (MMR) is recognized as a social indicator and is dependent upon the general socioeconomic status, nutrition level and the level of maternal healthcare in the community. Most of the causes of maternal mortality can be preventable with the help of proper ante-natal care according to RCH guidelines.

The comparison between the various associated parameters of maternal mortality of different studies

are shown in Table [4].

Majority of the maternal death were seen in the age group of 15 – 25 years. Multi-gravidity was most commonly associated with maternal mortality. Bardale et al [12] found that maternal mortality was most commonly seen in primigravida. During the present study, the 70% cases of maternal death were occurred within the first 24 hours of admission. This finding was not correlated with the findings of other studies.

Jashnani K D et al [9] found that acute viral hepatitis was emerged as the leading cause of

maternal death followed by PIH. Paul B [14] et al found that eclampsia was the predominant cause of death followed by PIH, Haemorrhages and then sepsis. Panchabhai T S [2] got the different results in their study. They found that high number of maternal death were attributed to infectious diseases and cardiovascular diseases. Similar findings were not seen in the previous Indian literature. Bardale et al [12] stated that haemorrhages was the predominant cause of maternal death. Varsha Patil et al [11] also noticed that haemorrhages was the most common cause of maternal death. In the present study, we also found that haemorrhages was the leading cause of death.

Amongst the indirect causes, anaemia was responsible for leading cause of maternal death which was comparable with the findings of Varsha et al [11] and Dileep Mavalankar et al. [15] In the present study, Multigravidity was most commonly associated with maternal death which was comparable with Jashnani et al [9] , Panchbhai et al [2] Varsha et al [11] Bardale et al [12].

Conclusion

Maternal death is the index of health care in community. With the help of advanced technology and advanced medical management, it is possible for us to reduce the incidence of maternal death in some extent. But, still India has higher MMR as compared to developed countries. Thus, forensic pathologist plays a crucial role in identifying the cause of maternal death using autopsy record and findings. Forensic pathologist also plays the role in elucidation of new emerging trends in maternal deaths. Thus, findings of such studies and the RCH guidelines will improve the maternal care and helps to reduce the maternal mortality rate.

References

1. Smith JC, Hughes JM, Pekow PS and Rochat RW. An assessment of the incidence of maternal mortality in the United States. *Am J Public Health* 1984; 74(8): 780-783.
2. Panchabhai T S, Patil P D, Shah D R, Joshi A S. An autopsy study of maternal mortality: A tertiary healthcare perspective. *J Postgrad Med* 2009; 55:8-11.
3. World Health Organization (WHO). WHO Health Report 2005. [accessed on 2008 Sep 18]. Available from: http://www.who.int/whosis/mme_2005.pdf
4. McClure EM, Goldenberg RL, Bann CM. Maternal mortality, stillbirth and measures of obstetric care in developing and developed countries. *Int J Gynecol Obstet* 2007; 96:139-46.
5. Khosla AH, Mehra R, Dua D, Gupta P. Maternal morbidity and mortality: an assessment of prevalence and aetiological factors. *Obs Gynae Today* 2006; 11:447-9.
6. Park K. Preventive medicine in obstetrics, pediatrics and geriatrics. In: *Parks Textbook of Preventive and Social Medicine*, 19th ed 2007. Banarsidas Bhanot Publishers, Jabalpur. 414-79.
7. Park K. *Textbook of Preventive and Social Medicine: 21 SL edition* 2011; Banhasidas Bhanol Publishers 515:16.
8. Fox H. Pathology of maternal death. In *Haines and Taylor obstetric and gynaecological pathology*. 6th ed. Churchill Livingstone; 1995.p.1837-51.
9. Jashnani KD et al. maternal mortality: An autopsy audit. *J Postgrad Med* 2009 Jan-Mar; 55(1):12-16.
10. Vasaikar MS, Kanthikar SN, Tambse MP. Clinicopathological correlation of maternal death in rural areas of north Maharashtra. *Int J Pharm Bio Sci* 2014 Jan; 5(1):(B)449-456.
11. Patil VN, Shinde MA, Surve M, Sonone SG. Maternal mortality - A challenge? *JKIMSU*, 2013 Jan-June; 2(1):58-61.
12. Bardale RV, Dixit PG. Pregnancy-related deaths: A Three-year retrospective study. *J Indian Acad Forensic Med*, 32(1):15-18.
13. Kavatkar AN et al. Autopsy study of maternal deaths. *Int J Gynecol Obstet*; 2003; 81(1):1-8.
14. Paul B, Mohapatra B, Kar K. Maternal Deaths in a Tertiary Health Care Centre of Odisha: An In-depth Study Supplemented by Verbal Autopsy. *Indian J Community Med*. 2011 Jul-Sep; 36(3):213-216.
15. Mavalankar DV, Kranti S, Vora KV, Ramani, Parvathy Raman, Bharati Sharma, and Mudita Upadhyaya. Maternal Health in Gujarat India: A case study. *J Health Popul Nutr* 2009; 27(2):235-248.