Autopsy Based Audit of Medical Intensive Care Unit Deaths - Two Year Study in Western India

Patil Lalita Y.[1], Mane Annapurna V.[2], Manoorkar Snehal B.[3]

ABSTRACT

Introduction: Dissection and examination of a dead body along with its internal structures is known as autopsy or Post-Mortem. Autopsy rates have been declined worldwide, but recent retrospective intensive care unit (ICU) data indicate major discrepancies between more than 25% of clinical diagnosis. There is paucity of literature which correlate between clinical diagnosis made at autopsy, especially in patients in intensive care units (ICUs). Hence, we aim to correlate the clinical impression of the disease process with the histopathology based final cause of death in adult patients dying in medical intensive care unit (MICU).

Material and methods: 110 patients were included in this retrospective analysis. Only autopsies with age of 12 years and above were included in the study. The analysis was done to compare the ante mortem clinical diagnosis and post-mortem (PM) (final) cause of death to assess whether there were any discrepancies between these. Goldman classification was used to classify cases showing discrepancies between clinical diagnosis and final cause of death.

Results: Most common infectious cause of death in the present study was Pneumonia. Out of all non-infectious causes, the most common was death due to CNS involvement. Out of total 110 medical autopsies included in the study, autopsy rate in hospital varied between 23% to 37%. In 2011 there were 1480 total autopsies out of which 481 (32.50%) were pathological (Medical) where as 999 were medico legal autopsies.

Conclusion: Post mortem examination is crucial in identifying unexpected diagnosis even in patients receiving close monitoring and intensive care

Keywords: Autopsy, Post-Mortem

INTRODUCTION

Dissection and examination of a dead body along with its internal structures is known as autopsy or Post-Mortem. Indications of autopsy include determination of death's cause and observation and establishment of disease and mechanisms of disease process. The autopsy is derived from the Greek word "Autopsia", meaning "the Act of seeing for oneself". Autopsy technique is frequently used in describing newer diseases and assessment of newer methods in the operative and diagnostic fields.[1] For the care of acutely ill adult and geriatric patients, Medical Intensive Care Unit (MICU) has been formed. Severity of the illness of the patients decides the mortality rates in ICU. Studies quotes that mortality rate in ICUs have been reported to vary with reaching the maximum level upto 40%.[2] Autopsy rates have been declined worldwide, but recent retrospective intensive care unit (ICU) data indicate major discrepancies between more than 25% of clinical diagnosis.[3] there is paucity of literature which correlate between clinical diagnosis made at autopsy, especially in patients in intensive care units (ICUs).[4] Hence, we aim to correlate the clinical impression of the disease process with the histopathology based final cause of death in adult patients dying in medical intensive care unit (MICU).

MATERIAL AND METHODS

This retrospective study was carried out in the pathology department at a tertiary care and referral hospital in Mumbai from January 2011 to December 2012. 110 cases of the medical autopsies of medical intensive care unit (MICU) deaths were included in the study. Only autopsies with age of 12 years and above were included in the study. Ethical approval was taken in written from the ethical committee of the hospital by pre-informing them about the study protocol. The clinical details recorded including─clinical history general and systemic examination findings, ante-mortem investigation, and treatment in brief. Pathological findings includes Gross and microscopic examination of important organs including Brain, Heart, Lungs, Liver, spleen, kidneys, pancreas and intestine. H and E staining method was used for microscopic assessment of autopsy specimens. The analysis was done to compare the ante mortem clinical diagnosis and post-mortem (PM) (final) cause of death to assess whether there were any discrepancies between these. Goldman classification was used to classify cases showing discrepancies between clinical diagnosis and final cause of death.

STATISTICAL ANALYSIS

SPSS version 21 was used to generate the tables. Descriptive statitics were used to infer results.

RESULTS

Out of total 110 medical autopsies included in the study, autopsy rate in hospital varied between 23% to 37%. In 2011 there were 1480 total autopsies out of which 481 (32.50%) were pathological (Medical) where as 999 were medico legal autopsies. In 2012, pathological autopsies were 415 (26.40%) out of 1572 total autopsies. Autopsy Rate in MICU patient was 27.77% 31.65% in 2011 and 2012 respectively. In our study maximum autopsies were performed in middle age group ranging from 21-40 years 67 (60.90%). The minimum age was 12 years. In general population, males outnumbered females, however in our study, females 73 (66%) were more

[1]Associate Professor, Department of Pathology, T.N. Medical College and B.Y. Nair Hospital, [2]Associate Professor, [3]Resident, Department of Pathology, Seth G.S. Medical College and K.E.M. Hospital, Mumbai, India

Corresponding author: Dr. Lalita Yoganand Patil, Department of Pathology, T.N. Medical College and B.Y. Nair Hospital, Mumbai Central, Mumbai 400008, India

than males. As the duration of MICU stay was considered maximum numbers of autopsies were performed in patients with MICU stay of > 48 hours (60%). The minimum MICU stay was 30 min and maximum stay was 45 days. There were total 37 (33.64%) cases of total study population that showed

Infections	Cases (n=38)	Percentage (%)
Septicaemia	7	18.42
Pneumonia	8	21.05
Malaria	1	2.63
Dengue/ Leptospirosis	4	10.53
Tuberculosis	6	15.79
Meningitis	2	5.26
Hepatitis	5	13.16
Myocarditis	2	5.26
Others	3	7.9
Total	38	100
Table-1: Infectious cause of death.		

System wise Non-infection Causes of death	Number of cases (n=72)	Percentage (%)
CNS	20	27.78
Pregnancy related complication	13	18.05
CVS	11	15.28
RS	11	15.28
Hepatic System G I System	4	5.56
Hemolymphatic system	1	1.39
Renal system	5	6.94
Respiratory + Renal	5	6.94
Malignancy	1	1.39
Other (DIC and multiorgan failure	1	1.39
Total	72	100
Table-2: Non-Infections causing death		

discrepancy between the clinical diagnosis and PM. Findings. There were 73 (66-36%) cases of total study population where PM. findings were in agreement with clinical diagnosis. Table-1 shows the infectious cause of death. Most common infectious cause of death in the present study was Pneumonia. Out of all non-infectious causes, the most common was death due to CNS involvement as shown in Table-2. Table-3 highlights the Post-Operative Deaths. Figure-1 shows brain specimen prepared for autopsy. Figure-2 shows Milliary Tuberculosis associated infection in ICU Deaths.

DISCUSSION

One of the most reliable methods of validating clinical diagnosis is Autopsy. Diagnostic discrepancies between the frequency of ante-mortem to post-mortem have been investigated by various workersand have been reported to range from 6 to 60%. However, there are only few such studies in adult ICUs and are in the pediatric ICU.[5] Majority of the autopsies 67 (60.90%)

Figure-1: Brain specimen for autopsy

Operation Performed	Number of cases	Post-mortem cause of death
Clipping of intracranial	5	Raised ICT and haemorrhage
	5	Raised ICT and Cerebral edema
Aneurysm	2	Raised ICT and Cerebral infarction
CNS Tumours – Total Excision	3	Raised ICT and Cerebral edema
	1	Intracranial haemorrhage and cerebral infarction
	1	Respiratory failure following intrapulmonary haemorrhage
Decompression craniotomy	1	Raised ICT, cerebral edema, pyogenic meningitis and SDH
D12-L1 Decompression	1	ARF milliary TB in liver and spleen
D1-D4 Laminectomy excision of epidural tumor	1	ATN and Cerebral edema
Bronchial artery embolization	1	Respiratory failure and ARDS
Caesarean section	1	ARDS and DIC
	1	Sickle cell Crises
	1	Cardiac Failure due to rheumatic MS
Hysterectomy for fibroids	1	Renal failure
Incision and Drainage of Axillary abscess	1	Septicemia, Acute on Chronic Renal Failure
TIPS (shunt between portal vein and IVC) in case of BCS with Portal HTN	1	Pulmonary Embolism
Exploratory laparotomy and inter naliliac arterymbolisation for broad ligament hematoma	1	Hypo-volumic shock, ATN and DIC
Expl. Laparotomy and obstetric hysterectomy for uterine rupture	1	Hypo-volumic shock following uterine rupture
Total	29	
Table-3: Post- Operative Deaths		

Figure-2: Milliary Tuberculosis

in our study were in the age group of 21 to 40 years. Campion et al[6] in their prospective study reported a significant drop in autopsy rate from 60% for those aged 16 to 34 yrs, to 23% for those aged > 85 Years in the Indian study done by sarode et al.[7] maximum autopsies were performed in the age group 20-45 years (61.50%). This study is in comparison with this study but in comparison with the western world study done by Perkins et al[8] which shows that maximum autopsies were performed in older age group i.e. 45years which shows discordance with this study. In our study majority of the autopsies were performed on females 73 (66%) as compared to males 37 (34%) material mortality is important issues and accounts for sizable number of autopsies in our institute as compared to study by Viktora D Mayer et al[2] and john Roosen et al[9] which shows maximum number of males in their study population which is in discordant with our study. 72 cases out of all the subjects in our study, cause of death was non infectious origin and in rest 38 (34.55%) cases the cause of death was of infections origin. Similar results were obtained by Alan et al.[10] Who observed non-infectious factors as the most common cause of death. Among the non infectious causes of death, maximum number constituting 20 (27.78%) cases were of CNS lesions. These findings comparable with study done by Calliope Maris et al[11] in their study also majority of patients were with neurological problems. There were 13 (18-05%) cases of death due to pregnancy related complications. This explains the increased ratio of female autopsies in our study. In our study, there were 29 post operative cases (26.36%) admitted in MICU. Majority of them were CNS lesions 18 cases and 5 cases were of obstetric complications. It is comparable with study by Calliope Maris et al,[11] which had 19.5% post-operative cases.

Out of 110 Cases the ante mortem impression and post-mortem diagnosis matched in 73 (66.36%) cases the overall discrepancies were found in 37 (33.64%) cases. There were 32 (29.9%) study population, which fall under major (Class I and II) discrepancy category in our study. Using Goldman system[12,13] of classification of discrepancies such cases were classified into 4 groups. This finding comparable with many recent and old studies on MICU deaths. In our study, infections were the most commonly missed group of diagnosis 45-94% and formed the maximum class I discrepancies (12 cases) which is comparable with study by Nadrous et al[14] with a total of 26

missed infection Calliope Maris et al also found infections as major missed diagnosis in their study. In this study tuberculosis was most common discrepancies, four cases of Goldman class I and two cases of Class II which is comparable with a study by Fabio Tavora et al[15] found tuberculosis as major undiagnosed infection.

Pneumonia was missed twice in our study both were class I discrepancies which in concordance with study by Goldman et al.[12] All in their study bacterial pneumonia was missed infection and accounting for 26-29% also in a study by Petersen et al[16] pneumonia was major missed diagnosis. In our study only one case of fungal infection of class I discrepancy which was missed clinically which is in concordance with study by Nadrous et al.[14] also in concordance with study DU et al.[17] Only one case of pyogenic meningitis which was class II discrepancy in a study by Hassani et al[18] meningitis was missed in two out of forty three cases. Septicemia was missed in three cases (Two class I and One Class II discrepancy). There were two cases of acute myocarditis and both were class I discrepancies. Acute gastroenteritis – Class I discrepancy constituted one case. Complication of Acute febrile illness (AFI). In our study among non- infection cases maximum number of discrepancy cases was from cardio respiratory system which is comparable with study done by Alan Combes et al.[3] They found 48 cases of misdiagnosis of Cardio respiratory system. In our study; we found two cases of pulmonary thromboembolism missed pulmonary embolism was the most prevalent discrepancy in studies done by Fabio Tavora et al.[15] In our study one case in which IHD (MI) was missed clinically studies by Alan Combes et al,[3] and Alan et al[10] found MI linfar as major misdiagnosis. In our study we found 2 cases of cerebral edema under class I Goldman classification.[12,19] Single case of lung adenocarcinoma with metastasis in liver and spleen was missed. There are two cases of Acute respiratory distress syndrome (ARDS) class II discrepancy. Acute hemorrhagic pancreatitis (class II discrepancy) was missed in a single case. There was one case in are study which was diagnosed as acute MI but on autopsy found to have aortic dissection (Class II discrepancy). There were no correlation found between duration of MICU study and discrepancies. From the above discussion factors contributing to discrepancies are mainly low sensitivity of investigation, low level of suspicion, Short duration of hospital stay (< 24 hrs), Atypical presentation disease, Inadequate or incorrect interpretation of clinical information provided by patients.

Limitation of Study
However, the present study had certain limitations. Post mortem examinations in the present study were indicated in only in those cases in which diagnosis was uncertain. Therefore, there may exist falsely high incidence of missed diagnosis. Goldman's criteria used in the present study, is not simple and straight forward procedure. Also discrepancies may arise as few autopsies performed in the present study were partial. This study is retrospective analysis and the diagnostic work up of each individual was not critically reviewed.

CONCLUSION

From the above results, it can be concluded that post mortem examination is crucial in identifying unexpected diagnosis even in patients receiving close monitoring and intensive care. The

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post mortem examination should not be seen as a means of providing evidence of clinical malpractice rather as a positive educational tool to improve patient care in an attempt to reduce the number of clinically missed diagnoses. For patients dying in ICU, Autopsy should be considered.

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