IMPACT OF MEDICAL AUTOPSY ON FINAL DIAGNOSIS

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ABSTRACT

Objective: To determine the difference between diagnosis & misdiagnosis after medical autopsy.

Study Design: Prospective study.

Place and Duration of Study: Histopathology Dept Army Medical College Rawalpindi & Military Hospital (MH) Rawalpindi from Jan 2009 to May 2012.

Material and Methods: A retrospective cross sectional descriptive study of medical autopsies was conducted on patients at Histopathology Department Army Medical College & MH Rawalpindi who expired at or was brought in dead at MH Rawalpindi during a 41 months period between January 2009 to May 2012. Permission from the ethical committee was obtained for the study. Autopsy for medical purpose was performed on the deceased after receiving written consent from the next of kin. Medical autopsies were performed to determine & find the medical cause of death and to evaluate any disease or injury that may be present. Total of 72 medical autopsies were conducted during the above period. All these consecutive autopsies were included in the study. Ratio of total autopsies done was 0.17% of total hospital deaths at MH Rawalpindi in the duration of study. All subjects were male, military persons, aged between 19 & 50 years. Mean age was 35.5 years. Data was analyzed in excel. Descriptive statistics was applied on qualitative variables. Frequency and parentages was used.

Results: Ante mortem diagnosis confirmed as correct on total of 25/72 Autopsies. Clinically missed / wrong diagnosis was found on 47/72 autopsies.

Conclusion: Medical autopsy even today in the environment of a tertiary care hospital has irrefutable contribution in establishing final diagnosis & determining errors & omissions. Consequently it has pivotal role in continued improvement in medical care & in study of evolving disease patterns in real time.

Keywords: Brought in dead, Hospital Death, Medical audit, Medical autopsy, Myocarditis.

INTRODUCTION

Medical autopsy is a dreaded & rare entity in Pakistan due to its social unacceptability. Autopsies are important in clinical medicine as they can identify medical errors and assist in continuous improvement in medicare. Detailed medical reasons for the advice, lays down the objectives for the autopsy. The term "autopsy" derives from the Ancient Greek autopsia, "to see for oneself"[1]. Around 3000 BC ancient Egyptians were one of the first civilizations to practice the removal and examination of the internal organs of humans in the religious practice of mummification[1,2]

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Autopsies that opened the body to determine the cause of death were attested at least in the early third millennium BC, although they were opposed in many ancient societies where it was believed that the outward disfigurement of dead persons prevented them from entering the afterlife[3].

The history of autopsy is intimately connected with that of anatomy & medicine in general[4]. Anatomic studies of humans evolved slowly. In ancient Egypt records from 17th & 16th century BC dealt with medical & surgical diseases but attributed changes to magic rather than pathologic process. The first recorded dissection of human body occurred in 3rd century BC by greek physicians Herophilus & Erasistratus in Alexandria Egypt . No new autopsy of human body were done till 14th century AD. The first law authorizing human

dissection is credited to Roman Emperor Frederick 1231[4].

There are four main types of autopsies:[5]

Medico-Legal Autopsy or Forensic or coroner's autopsies seek to find the cause and manner of death and to identify the decedent[5]. They are generally performed, as prescribed by applicable law, in cases of violent, suspicious or sudden deaths, deaths without medical assistance or during surgical procedures[5].

Clinical or Pathological autopsies are performed to diagnose a particular disease or for research purposes. They aim to determine, clarify, or confirm medical diagnoses that remained unknown or unclear prior to the deceased's death[5].

Anatomical or academic autopsies are performed by students of anatomy for study purpose only.

Virtual or medical imaging autopsies are performed utilizing imaging technology only, primarily magnetic resonance imaging (MRI) and computed tomography (CT)[6,8].

Without autopsies, hospitals bury their mistakes[7].

Much of what we know about medicine comes from the autopsy[1].

One such study found that "autopsies in 25% of cases revealed major diagnostic error with172 missed diagnoses, including 21 cancers, 12 strokes, 11 myocardial infarctions, 10 pulmonary emboli, and 9 endocarditis[7]."

MATERIAL AND METHODS

Complete autopsy of the individual subjects were performed followed by their detailed histopathological report of each individual case. All accompanying documents medical documents were analyzed in detail to study & highlight the correlations and discrepancies between progress of the disease & clinical appreciation of the condition.

Table-1: Medical Audit Summary of 72 Autopsies

Ante mortem diagnosis confirmed on total of 24/ 72 Autopsies		**Clinically Missed / Wrong diagnosis confirmed on 48/ 72 Autopsies**	
IHD *	6	IHD	20
Malaria	2	Myocarditis	7
Acute hepatic failure	2	Hypertrophic cardiomyopathy	2
Tuberculosis meningitis	2	Congenital bicuspid aortic valve stenosis	2
Cancers	2	Peumothorax	1
Intracerebral hemorrhage	2	Atrial septal defect (patent foramen ovale)	1
Herpes Viral encephalitis	1	Infective endocarditis	1
Systemic CMV infection	1	Restrictive cardiomyopathy	1
Head injury	1	Subhepatic abscess-	1
Drowning	1	Cerebral Tuberculosis	1
Pyogenic meningitis	1	Viral meningoencephalitis	1
Angioinvasive aspergilosis	1	Acute hepatic failure	1
SSST** with right parietal infarct	1	Gangrene gut Intestinal perforation	1
Pulmonary embolism	1	Chronic Granulomatous hepatitis	1
		Massive Hepatic necrosis	1
		Erythema multiforme	1
		Renal Amyloidosis leading to renal failure	1
		Splenic infarction	1
		Arnold Chiari malformation type	1
		Dandy Walker Variant with agenesis of corpus callosum	-- 1
		Tuberculous hepatitis	1

Key *IHD=Ischemic Heart Disease SSST** superior saggital sinus thrombosis.

A total of 35% (25/72) of subject deceased were brought in dead to the hospital and 65% (47/72) of subject deceased were already admitted to the hospital at the time of their death.

RESULTS

Major diagnostic errors were observed in

Table-2: Detail autopsy findings of 72 autopsies.

S.No.	Clinical diagnosis of Disease	Confirmed on Autopsy	Missed diagnosis /Additional diseases & findings
1.	25 Brought in dead (BID) (unknown / Not established)		IHD =19 Hypertrophic cardiomyopathy =2 Asphyxia due to FB aspiration=1 Patent foramen ovale ASD with intracardiac thrombosis=1 Arnold Chiari malformation type I=1 Dandy Walker Variant with agenesis of corpus callosum=1
2.	9 IHD *	IHD-7	(Additional)Centrilobular hepatic necrosis =1 (Missed)Cong calcified bicuspid aortic valve stenosis=1
3.	3 TB meningitis	2 Desseminated TBM	(Wrong)Viral meningoencephalitis=1 (Additional) IHD=1
4.	1=Pyogenic meningitis	1=Pyogenic meningitis	
5.	1 Herpes encephalitis	Viral encephalitis	(Additional)IHD
6.	1 Viral meningoencephalitis		Tuberculous meningoencephalitis
7.	2 Acute Hepatic Failure	2 Acute Hepatic Failure (ATT associated)	
8.	2 Gullian Baree syndrome		Myocarditis =2
9.	2 Malaria	Cerebral malaria 2	
10.	2 High altitude pulmonary & cerebral edema		(Wrong)Peumothorax=1, IHD=1 (Additional)Bronchopeumonia,Right pul embolism, centrilobular Hepatic necrosis,ATN
11.	1 Hemorrhagic fever		Erythema multiforme 1
12.	1 RPGN-ARDS-**Intracerebral hemorrhage	Intracerebral hemorrhage-ARDS	(Additional)Left ventricular intracardiac thrombosis
13.	1 Wegeners granulomatosis Renopulmonary syndrome		(Wrong)Fungal myocarditis & Cresentric GN
14.	1 RT-Retro-orbital fungal mass + MCA Infarct	Rt-Episcleral fungal mass	(Additional)Rt-temporal hydrocephalus , basilar artery + Rt posterior cerebral artery fungal thromboarteritis
15.	1 Chronic granulomatous disease+pancytopenia+ hepatosplenomegaly		(Wrong)Fungal myocarditis
16.	1 Progressive systemic sclerosis		(Missed) Myocardial fibrosis
17.	1Deep Vein Thrombosis	Pulmonary Embolism	
18.	1 DENGE/viral shock	Viral Myocarditis	
19.	1 Operated duodenal perforation		(Missed) Subhepatic abscess IHD
20.	1 DM-HTN-IHD- PTB MGN		(Missed)Centrilobular necrosis Liver+Massive intracadiac thrombosis leading to cor-pulmonale
21.	1 Epilepsy-DM*-II		(Missed) Congenital calcific bicuspid aortic valve stenois +multiple cerebral microinfarcts
22.	1 Potop Death in recovery from GA after viterectomy		(Missed) Myocarditis
23.	1 Space occupying lesion Brain	Oligodendroglioma II	IHD
24.	1-Carcinoma pancreas	1- Carcinoma pancreas	
25.	1 Left Bundle branch block with Ventricular premature contractions		(Missed) Myocarditis
26.	1 Unconscious with fever		(Missed)Acute infective endocarditis + multiple cerebral septic embolism
27.	1 Acute renal failure received ATT 07years ago		(Additional) IHD +amyloidosis kidney
28.	1 Bronchopulmonary fistula + hepatitis+Honeycomb lung on CT	Irregular emphysema	(Missed)Pericarditis,Pericardial effusion& Myocarditis
29.	1 Fever vomiting abdomen pain		(Missed)Massive hepatic necrosis Renal infarction + IHD
30.	1 Fever hepatitis		(Additional)Gangrene gut + Intestinal perforation + ARDS – Acute tubular necrosis.
31.	1 Diabetic ketoacidosis		(missed)IHD
32.	1 Cytomegalovirus Entritis	Systemic CMV Infection	NIL
33.	1 Head injury	1	NIL
34.	Granulomatous hepatitis	Preiportal phase primary biliary cirrhosis	(additional) Splenic & Hepatic infarction
35.	Membranous Glomerulonephritis	Membranous Glomerulonephritis	(Missed)Tuberculous hepatitis

65% of cases. Antemortem diagnosis confirmed as correct in cases were 35%. Additional diseases discovered (excluding major errors) in autopsy were found in 13 subject cases with percentage of 14%.

Most frequently missed diagnosis was IHD 26/72. Among admitted cases, prominent omissions were myocarditis 7 followed by Hypertrophic cardiomyopathy 2, congenital bicuspid aortic valve stenosis 2, Pneumothorax 1, cerebral tuberculosis 1.

DISCUSSION

Although the most frequent cause of sudden cardiac death among brought in dead cases is coronary artery disease,[8,9]. Other causes include, non-atherosclerotic coronary artery abnormalities, hypertrophy of ventricular myocardium , cardiomyopathy[10].

All 7 cases of death due to myocarditis had prolonged hospital admission of more than 3 months, pointing towards hospital acquired disease. Myocarditis or inflammatory cardiomyopathy is inflammation of myocardium. Myocarditis is most often due to infection by common viruses, such as parvovirus B19, less commonly nonviral pathogens such as Borrelia *burgdorferi* (Lyme disease) or Trypanosoma *cruzi*, or as a hypersensitivity response to drugs[11]. The definition of myocarditis varies, but the central feature is an inflammatory infiltrate, and damage to the heart muscle, without the blockage of coronary arteries that define myocardial infarction[12]. Myocarditis may or may not include death (necrosis) of heart tissue. It may include dilated cardiomyopathy[11]. Myocarditis is often an autoimmune reaction. Streptococcal M protein and coxsackievirus B have epitopes that are immunologically similar to cardiac myosin. During and after the viral infection, the immune system may attack cardiac myosin[11]. Two cases of myocarditis were proven to be of aspergillosis fungal myocarditis while in rest of the five cases the cause of myocarditis could not be established. Although established fungal etiology includes candidiasis, cryptococcosis, histoplasmosis, actinomycosis, blastomycosis, co-ccidioidomycosis, & aspergillosis myocarditis[14]. Both deceased of aspergillus myocarditis were immunocompromised, one was under treatment for Wegeners granulomatosis & second patient was of pancytopenia. A deseased with retro-orbital angioinvasive aspergilus infection had no evidence of myocarditis.

Two cases of malaria were confirmed as cerebral *p. falciparum* malaria. One deceased was evacuated from Wana .The other was evacuated from Sudan. Five species of Plasmodium can infect and be transmitted by humans. Severe malaria is largely caused by *P. falciparum* while the disease caused by P. vivax, P. ovale, and P. malariae is generally a milder form that is rarely fatal. The zoonotic species *P. knowlesi,* prevalent in Southeast Asia, causes malaria in macaques but can also cause severe infections in humans. The World Health Organization has estimated that in 2010, there were 216 million cases of malaria. Around 655,000 people died from the disease[15,16].

Congenital bicuspid aortic valve, one of the most common congenital heart abnormalities, may become infected, may calcify, and may cause progressive stenosis or progressive insufficiency. Cerebral emboli in the absence of valvular infection can occur[17] deseased case of epileipsy was found suffering from congenital bicuspid aortic valve stenosis without infection & multiple intracerebral microbleeds[19]. During adolescence and adulthood, the causes are more likely to be secondary to any CNS lesion. Further, idiopathic epilepsy is less common. Other causes associated with these age groups are stress, trauma, CNS infections & cerebral microbleeds[19].

In miliary tuberculousis blood born spread & tuberculous meningitis occurs in upto 25% cases, presumably by crossing the blood–brain barrier[12]; but a proportion of patients may get TB meningitis from rupture of a cortical focus in the brain (a so-called Rich focus)[13].

Deceased with cytomegalovirus enteritis was immunocompetent[18].

Two cases of high altitude pulmonary edema & cerebral edema were aggravated by

underlying pre-existing pneumothorax & IHD by high altitude[20].

Deceased of membranous glomerulonephritis was on steroids for duration of one year and was confirmed as tuberculous hepatitis. Case of granulomatous hepatitis was found on autopsy to be primary biliary cirrhosis Stage 2-Periportal Stage[21]. Radiological report of multiple space occuping lesions in liver & spleen were found to be of liver & splenic infarction & intrahepatic gallbladder.

CONCLUSION

Even in the present environment of modern tertiary care hospital medical autopsy as medical audit, has irrefutable role in continued improvement of Medicare.

CONFLICT OF INTEREST

The authors of this study reported no conflict of interest.

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