Postmortem Biopsies: The Experience in Kuwait

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Key Words

Autopsy · Biopsy · Kuwait · Postmortem

Abstract

Objective: To report our 4-year experience in postmortem needle biopsy of liver, heart, kidney and lung tissues when formal autopsy could not be performed. **Subjects and Methods:** In the period from January 2000 to December 2003, postmortem biopsies were done at Al-Amiri Hospital, Kuwait, in 19 cases where the original diagnosis or cause of death was not clear. The procedure was performed by a dedicated trained medical team using a biopsy needle or limited incisions guided by the knowledge of the clinical presentation and results of laboratory and radiological investigations. **Results:** The actual diagnosis was established in 8 cases by postmortem histological findings and corrected in another 9 cases. In the remaining 2 cases with systemic sepsis, autopsy only confirmed the antemortem clinical diagnosis. **Conclusion:** Our study shows that needle biopsy is an adequate technique for postmortem examination and should be considered as the minimum alternative to conventional autopsy.

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Introduction

Failure to reach antemortem diagnosis is a common problem in medicine. Even with the exclusion of lack of facilities and diagnostic experience there are other un-

avoidable factors that include (a) limited time prior to demise, (b) cardiovascular instability of the patient for invasive investigations or exploratory laparotomy, (c) the presence of coagulopathy and (d) limitations of serological or radiological markers in diagnosis: hence, the need for autopsy that provides important information for both research and clinical practice [1]. Unfortunately, the ‘standard autopsy technique’ is declining due to difficulty in obtaining consent, financial reasons or technical difficulties [2]. In Kuwait, concerns of the next-of-kin about delaying the funeral and esthetic appearance of the deceased are other major factors that have limited autopsies to only 243 cases of the 1,854 (13%) medicolegal incidents during the past 4 years [3]. Since postmortem sampling of tissues from certain organs can provide ‘meaningful pathological alterations’ that aid in diagnosis of disease [4] we elected to prospectively investigate the role of this technique in Kuwait to enable us overcome the impact of cultural concerns that could lead to reviving the practice of autopsy and also improve future health care delivery and research.

Subjects and Methods

In the immediate postmortem period, multiple needle tissue samples of the liver, heart, kidneys and lungs were collected from patients who died at Al-Amiri Hospital, Kuwait, between January 1, 2000, and December 31, 2003. Trauma cases and those with ‘clear’ causes of death such as complicated ischemic heart disease, cerebrovascular accidents or central nervous system infections were excluded. Deceased children were avoided because of cul-

Fig. 1. Sections of lung tissue showing non-fibrotic alveolar septa having a 'tongue' of branching loose fibroblastic tissue growing into the alveolar air spaces (HE, $\times 300$).

Fig. 2. Sections from granulation tissue of a colonic mucosal ulcer containing a large stromal cell (arrow) with a large nucleus and a central nucleolus surrounded by a halo giving 'owl eye' appearance diagnostic of cytomegalovirus infection (HE, $\times 400$).

tural attitudes. Biopsies were done by a dedicated medical team trained by the investigators. For the liver, heart and kidneys, tissue samples were obtained by performing multiple biopsies using a Tru-cut needle (Travenol Laboratories, Deerfield, Ill., USA) from both lobes of the liver at the transabdominal line; the heart through the left third and fourth intercostal spaces just lateral to the sternum, and the kidneys at 1 cm below the 12th rib and 2 cm lateral to the lateral border of the quadratus lumborum muscle as previously described by Foroudi et al. [5]. For the lungs and its pleura, tissue samples were collected, directly through a 1-cm incision, from the suspected sites (or randomly from the 3rd left and right midaxillary line). The wound was closed with sutures. In addition to the systematic organ biopsy, other sites (muscle in case 1 and

pieces of the intestine in cases 2 and 4) were also sampled via an open incision, since they had clinical and/or radiological evidence of disease. The intestine was inspected and biopsied via a 5-cm midline incision in the anterior abdominal wall.

Tissue cores were (a) fixed in 10% formaldehyde for routine histology and special stains; (b) kept frozen for immunofluorescent staining, and (c) cultured in appropriate media. Also, whenever possible, patient's sera, tissue and blood cultures were obtained for laboratory testing to further enhance the accuracy of histological diagnosis.

The biopsies were examined with knowledge of the clinical presentation and results of antemortem laboratory and radiological investigations.

Table 1. The findings in the cases subjected to limited postmortem examination

Case No.	Age years	Sex	Nationality	Comorbid conditions	Antemortem presentation	Clinical diagnosis	Hospital stay days	Postmortem histological diagnosis	Main diagnostic organ
1	55	F	Kuwaiti	DM with NS and advanced RF	fever, collapse, swollen calf muscles	DVT, PE	2	vasculitis	muscle, kidney
2	23	M	Arab	NS	fever, NS, collapse and abdominal pain	membranous GN, peritonitis	1	bowel gangrene due to vasculitis	kidney
3	70	M	Kuwaiti	DM, COAD	dyspnea for weeks	pneumonia	3	nocardiosis	lung
4	50	F	Arab	ESRD for 7 years	GI bleed, bowel perforation	ischemic colitis	4	cytomegalovirus infection	colon and lung
5	17	F	Kuwaiti	arthritis for 1 year	hemorrhagic cerebral, brain-stem infarcts, collapse, RF	autoimmune	1	systemic lupus erythematosus	kidney
6	35	M	Kuwaiti	vasculitis	dyspnea, collapse	active vasculitis	2	pneumocystis pneumonia	lung
7	34	M	Srilankan	–	fever, jaundice, ascites, cerebral edema, DIC	sepsis	6	massive fatty infiltration in liver, myocardium and tubules	all
8	8	M	Kuwaiti	–	fever, collapse, limb gangrene	sepsis	1	meningococcal septicemia	all
9	70	M	Kuwaiti	–	fever, NS, RF	vasculitis	2	sepsis	all
10	60	M	Kuwaiti	DM, IHD, COAD, CVA	acute collapse	PE	1	aspiration pneumonia	lung
11	23	F	Kuwaiti	–	fever, rash, multiorgan failure	–	3	influenza A	liver and lung
12	45	M	Kuwaiti	cirrhosis due to hepatitis C	hepatorenal syndrome	–	7	multifocal hepatomata	liver
13	45	F	Indian	fever for 2 months, dyspnea	collapse, DIC	–	4	miliary tuberculosis	all
14	20	F	Kuwaiti	psychosis	collapse, hepatic, RF	–	2	paracetamol intoxication	liver
15	35	F	Arab	arthritis for 1 year	fever, dyspnea, collapse	–	4	BOOP	lung
16	40	M	Kuwaiti	ESRD for 3 years	dyspnea, collapse	acute myocarditis	2	coxsackie virus B myocarditis	heart
17	36	F	Kuwaiti	–	fever, seizures, petechiae	TTP	2	TTP	kidney
18	16	M	Kuwaiti	–	collapse, multiorgan failure	acute myocarditis	1	coxsackie virus B myocarditis	heart
19	50	M	Indian	COAD	fever, jaundice, DIC	sepsis	2	sepsis	all

BOOP = Bronchiolitis obliterans organizing pneumonia; COAD = chronic obstructive airway disease; DM = diabetes mellitus; IHD = ischemic heart disease; DIC = disseminated intravascular coagulation; DVT = deep venous thrombosis; ESRD = end-stage renal disease; GI = gastrointestinal; GN = glomerulonephritis; NS = nephrotic syndrome; PE = pulmonary emboli; RF = renal failure; TTP = thrombotic thrombocytopenic purpura; IHD = ischemic heart disease.

Results

Of the 23 cases that fulfilled the criteria of the study, only 19 (83%) were biopsied due to failure to obtain consent of the next-of-kin in the other 4 cases. Table 1 provides a list of the patients' characteristics, comorbid conditions, antemortem presentation, clinical and postmortem histological diagnosis, and the main organs that were

sampled. Sampling the various organs was deemed adequate as represented by the lung (fig. 1) and intestinal (fig. 2) tissues. The exact cause of death was ascertained in all the cases. Of the 19 cases, 10 (cases 1–10) were incorrectly diagnosed antemortem, 5 (cases 11–15) were not diagnosed, and in the remaining 4 (cases 16–19), diagnosis was suspected and confirmed by postmortem examination. Two cases, 9 and 19, died from disseminated sep-

sis; unfortunately, the exact source of infection could not be detected at the postmortem examination. As shown in table 1, failure to establish antemortem diagnosis by invasive investigations and/or exploratory laparotomy was due to multiple interacting factors that include limited time prior to demise (cases 2, 5, 6, 8 and 10); cardiac instability (cases 1–3, 10, 15, 16 and 18), and the presence of coagulopathy due to shock liver as a part of extensive multiorgan failure or disseminated intravascular coagulopathy associated with sepsis (cases 2, 4, 7, and 11–14).

Discussion

The technique of postmortem needle biopsy is not new [6]. The technique offers two major advantages over the conventional approach: it is less time-consuming and is performed at bedside before decomposition occurs, thereby, making it possible to apply a wide range of investigational methods that include microbiological and immunological studies, frozen sections, and electron microscopy [7]. Unfortunately, the postmortem needle biopsy technique did not gain popular acceptance due to failure to obtain adequate tissues in the sampled areas and, more importantly for pathologists, it could not provide the macroscopic appearance of organs in situ and might fail to 'sample' focal lesions or small organs, e.g. parathyroid glands or lesions in the nervous system [4]. For the latter reasons, it was deemed 'unacceptable for coronial jurisdiction' [4]. However, in Kuwait where autopsy is infrequently performed because of cultural bias, this technique, as shown in this preliminary study, has proven to

be valuable despite the small number of cases. Among the cases diagnosed, bronchiolitis obliterans organizing pneumonia (fig. 1), disseminated meningococcal meningitis, adult Rye syndrome, unsuspected paracetamol intoxication, thrombotic thrombocytopenic purpura, fulminant influenza A viral infection, cytomegalovirus infection (fig. 2) and vasculitis were not considered common findings in our area. Compared to the study by Wellman [6], in this study, adequate tissue was sampled for determining 'meaningful pathological alterations' because we made three basic adjustments: trained staff performed the 'tissue harvesting'; pieces of the lung (and intestine) were sampled, and guided biopsies were made based on prior knowledge of history, physical examination, laboratory investigations and radiological findings. Acceptance of the 'limited postmortem sampling' technique by next-of-kin was higher (83%) than conventional autopsy (13%) [3] primarily due to the 'non-deforming' nature of needle biopsy. Equally important was the professional approach of our dedicated team to the relatives of the deceased. The relatives were made aware of the importance of autopsy, that included the possibility of an infectious process in the deceased, the underlying hereditary or familial factor predisposing to death and the exact causes of death.

Conclusion

Our study shows that needle biopsy is an adequate technique for postmortem examination and should be considered as the minimum alternative when conventional autopsy could not be performed.

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