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Expert diagnostics of diabetes mellitus in the cases of sudden death

Abstract: A complex of informative signs characteristic for diabetes mellitus was revealed as a result of the research and it will provide a possibility to make objective forensic-medical diagnosis in cases of death because of diabetes mellitus and its complications.

Keywords: sudden death, diabetes mellitus, forensic-medical expertise.

Topicality. During the recent decades there is noted sudden rise of diabetes mellitus (DM) morbidity. And every 10–15 years the numberof patients with DM double [2]. Diabetes mellitus leads to early invalidity and lethality, conditioned first of all by macro and micro angiopathic complications such as atherosclerosis and ischemic heart disease, neuropathia, retinopathia and osteoorthropathia [6]. Diabetic angiopathia is the most often cause of death — up to 80 % of the patients with diabetes mellitus [5]. It should be noted that in these cases most often there is sudden death when the corpse should undergo obligatory forensic-medical checking. According to the data of many researches [1; 3; 4] lethality among the patients with DM is 2 times greater in comparison with the group of those who died suddenly but didn't have diabetes mellitus. In these cases diabetes mellitus was met very rare (as the essential or associated pathology) in the posthumous diagnosis. That, apparently, was linked with the difficulties of posthumous diagnostics of DM as the main reason of death performed by forensic-medical experts.

Posthumous diagnostics of DM as the main reason of death is associated with a lot of difficulties such as absence of medical documentation about patient's lifetime health status available for a forensic-medical expert; absence of pathologic-morphologic signs specific for DM; no method of checking the corpses of those who died suddenly for reliable detection of diabetes mellitus [5].

Significant difference between the values of morbidity, data of lethality because of complications and the frequency of posthumous diagnostics of DM with the forensic-medical examination of a corpse testify the presence of multiple problems of posthumous forensic-medical diagnostics of diabetes mellitus, as well as the main reason of sudden death.

All the aforesaid served the objective basis for the performance of the given research of the problem of posthumous diagnostics of diabetes mellitus.

The aim of this research was working out of morphologic criteria for posthumous diagnostics of diabetes mellitus.

Materials and methods of the research. 140 forensic-medical expertises taken from the archive of the Town FME bureau of the RU of Tashkent city for 2005–2011 served to be materials for the research. For the analysis of the expert conclusions we took into account the following criteria:

1. Common criteria — remoteness of a death, place of a corpse detection, short data about the circumstances of death;
2. External features — appearance of a corpse; body weight and size, constitution, color and peculiarities of skin;
3. Internal features — macroscopic: the structure of organs and pathologic alterations there; microscopic: results of forensic-histologic analysis;
4. Forensic-medical diagnostics and expert conclusions.

The analyzed group was selected on the basis of principle of lifetime suffered various forms of diabetes mellitus verification (according to medical documents). The main accent of the work was done to the inner examination of a corpse.

Results and discussion. *The status of vessels of brain* — we pain attention to the thickness and winding of the walls and presence of atherosclerotic plaques. In the checked archive material the vessels of brain were described as "thin, elastic" — 9.5 %, "dense, winded" 20.5 % and "thick walls" 70 % of the cases. In 62.4 % of the cases we registered the presence of atherosclerotic plaques in the vessels of brain. Though the sizes and spread of the plaques were not mentioned in any of the cases.

Mass of heart was defined according to P. F. Kalitiyevski's classification (1987): as a guide heart mass less than 200 g. of an adult was considered to be atrophic one, and more than 300 g. for women and 360 g. for men — hypertrophic. According to our observations heart was hypertrophic in 78.8 % cases — heart mass was in the limits of normal range. It should be noted, that among 140 cases of the examined corpses only in 30 cases (21.4 %) hearts were weighted, others were not.

Sizes of heart. Aiming to make a system of possible values of heart sizes, we studied the normal value proposed by Sinelnikov: length 12–15 cm., width 8–11 cm., thickness 6–8 cm. If any of these three sizes of heart was over or less than normal ones, that heart was considered to be big or small correspondingly. Thus, we have got the following results: heart was hypertrophic in 81 corpses (51.9 %), in 16 cases the sizes of heart were not noted. In the rest of the cases heart sizes were in the normal limits.

The thickness of ventricular wall — normally it is as follows: left — 1.2–1.4 cm., right — 0.3–0.4 cm. The thickness of the right ventricle wall was not measured in 13 cases, left ventricle — 15 cases. The thickness of the wall of the

right ventricle exceeded the normal values in 20 cases (14.3 %). The thickness of the left ventricular wall exceeded the normal values more often — in 74 cases (52.9 %). In 2 cases the thickness of the left ventricular wall was much less the normal one (0.6 cm. and 0.8 cm.).

Loose myocardium, characteristic for cardiomyopathy, was described in 67 cases (47.9 %), and in 42 cases (30.0 %) — elasticity of myocardium was not noted. In the rest of the cases there were variants of the normal values.

One more important symptom of cardiomyopathy — excessive fat accumulation on the surface of heart — was observed in 46 cases (32.9 %). Though, it should be noted, that in 40.2 % of the cases there was no information about fat accumulation.

Color of myocardium. Only in 15 cases (10.7 %) cardiac muscle had red-brown color (mature meat color). In 6 cases (4.2 %) there were descriptions of brown color or hue of myocardium. Yellow color, characteristic for myocardial fatty dystrophy was mentioned in 19 cases (13.6 %), brown color of cardiac muscle in 10 cases (7.1 %), and in the rest of cases — myocardium looked putrid.

We registered focal alterations of myocardium: in 25 cases (17.9 %) post-infarction cardiac sclerosis, and it was natural, taking into account the spread of atherosclerotic processes in that group. Small-focal cardiosclerosis was registered in 52 cases (37.1 %).

Areas of uneven blood saturation, characteristic for secondary cardiomyopathies, were observed in 63 cases (45.0 %).

Often there were noted signs of coronary vessels atherosclerosis — 92 cases (65.7 %), in the 8 cases the area of atherosclerotic alterations reached 90 %, in 23 cases — up to 70 %, 50 cases to 50 %, 20 cases to 30 %. Atherosclerotic alterations of aortal wall were noted in 102 cases (72.9 %).

Mass of liver. For the detection of the mass of liver were studied the data proposed by Kalitiyevski P. F. (1987): a liver mass more than 2300 g. for men and 1800 g. for women was considered to be pathologically enlarged; and the mass less than 1200 g. for both sexes — reduced.

In 20 cases of our observations (14.3 %) liver was enlarged, and in 84 cases the mass of liver was not mentioned. In the rest of the cases (25.7 %) — the mass of liver was in compliance with the normal values. The margin of liver was described only in 46 cases among which 14 (10 % from the total number) — the margin was sharp.

Color of liver: for the systematization of possible colors of liver we introduced the code of hues and color of spectrum. Yellow hue of liver, indicating the presence of fatty dystrophy, was noted in 62 cases (44.3 %).

Pathologic alterations in hepatic tissue were noted in 72 cases (51.4 %). Most often descriptions included yellow inclusions, impregnations or total yellow color of liver, which is characteristic for fatty dystrophy. In rare cases there was description of meg-nut liver (16 cases — 11.4 %) and loose hepatic tissue (8 cases — 5.7 %).

Main pathologic morphologic signs of diabetes mellitus are alterations of pancreas. It should be taken into account that insult, hyalinosis and amyloidosis of Largenhanse islands, glycogen infiltration of renal tubules and nodular glomerula sclerosis, so "typical" for diabetes mellitus, were met in few cases (16 cases, 11.4 %) and these data are not considered to be informative and pathognomic at the moment. At the same time diabetes mellitus is often accompanied by non-specific alterations such as fibrosis and linomatosis of pancreas. Information about mass and sizes of pancreas was rarely met in the archive data; only in 6 forensic-medical conclusions, it is 4.3 % from the total number of cases.

Sizes of pancreas were often described in words (very small, normal sized, thin, etc). It should be noted, that in 67 cases (47.9 %) the gland was reduced in its size, indicating the presence of pathologic processes in it — specifically atrophy of island apparatus.

The density of the gland: loose or a little bit loose gland was described in 17 cases (12.1 %), in 68 cases (48.6 %) — there was condensation of pancreas. Hemorrhage to the tissue of pancreas was noted in 16 cases (11.4 %). In 4 cases (2.9 %) — vessels were described to be "widened, filled with blood". Other cases had no description of the vessels of pancreas.

Insufficient attention of the experts to pancreas caused sub-quality sample prescription from pancreas for forensic-histologic analysis (in 35 cases — 25 %). In the most cases the checked samples of pancreas contained the following microscopic alterations: fibrosis (45 %), linomatosis (33 %), sclerosis (21 %) and atrophy (9 %) of pancreas.

Thus, the results of our research showed that any of 140 cases of sudden death had no diabetes mellitus or diabetic coma diagnosis as the main cause of death. Poor quality of forensic expert conclusions also should be noted, as it had negative effect on the gathering and analysis of archive data. Anyway we were able to detect the most informative pathologic morphologic criteria of diabetes mellitus, which can be surely useful for forensic diagnostics in the cases of sudden death.

Conclusions:

Absence of the "Diabetes mellitus" or "Diabetic coma" diagnosis in the medical certificates testifies the expert ignoring of the case materials and medical document, and also poor quality of corpse expertise.

Incompetent analysis and wrong interpretation of the data of inner checking of corpses often leads to inaccurate forensic-medical diagnostics.

Definition of criteria self-descriptiveness in cases of diabetes mellitus make them available for using in posthumous diagnostics.

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The character of dysbiotic changes in the acute period of stenosing laryngotracheitis of respiratory tract

Abstract: There is a high degree of contamination of mucous URT with Staphylococcus aureus (in 20 %), α-hemolytic streptococci (20 %), complex associations (30 %) in the recurrence of SLT at an early age and in remission.

Keywords: respiratory tract, acute period of stenosing laryngotracheitis.

Relevance. The mucous membranes of the respiratory tract carry out a barrier function is to prevent fixation and penetration extraneous substances and microorganisms in the internal environment of the human body and for this reason the study of the microbial landscape is of scientific interest [1; 3; 4; 5].

Material and methods. In 275 children aged from 6 months to 5 years with the generated recurrent of stenosing laryngotracheitis studied the microbial landscape of the mucous membranes of the upper respiratory tract (URT) by conventional methods of bacteriological examination including crops of secretions from nasal and oropharynx on nutrient medium with subsequent identification.

Results and discussion. We compared the character of dysbiotic changes of the respiratory tract in the acute period of the disease depends on the age of our patients and we have marked frequent infection of mucous membranes with Staphylococcus aureus in all age's periods [2]. In the acute phase of the primary Stenosing laryngotracheitis in children from 6 months, up to 3 years are determined most denominated violations of microbiocenosis of mucous of respiratory tract in the nasopharynx and in the oropharynx (normal microflora composition is present in 9.5 % and 9 % of patients, respectively). We have not identified such regularities in the acute period of RSLT. During remission at PSLT the normal microbial composition of the respiratory tract is reversed only in a half of the surveyed from 6 months. up to 3 years, at an older age structure of the normal flora in the nasopharynx in 33 % of children aged 3–6 years and 22 % at the age of 6 years and older. The normal microbial landscape of the oropharynx in children up to 3 years in remission of PSLT was determined in 50 % of cases, in the other two groups — only 25 %. In the remission of RSLT restoration of normal flora from 0 to 3 years was observed only in 16 % over 3 years — in 50 % cases the normal microflora is saved. In the acute period are marked a significant shift in the microbiocenosis of the respiratory tract in both type of SLT. Disbiotic processes characterized by settling in the mucous membranes of URT pathogenic and conditionally pathogenic Gram-positive and Gram-negative flora with reduction of releasing of normal saprophytic microflora. Undoubted the leadership in this process in the acute period of the disease is Staphylococcus aureus. It occurs as a monoculture and as associations — in combination with other pathogenic agents. The prevalence of S. aureus of the respiratory tract in the acute period of high in both type PSLT and RSLT. In the acute period of PSLT Staphylococcus aureus was isolated from the nasal in 28 % of the surveyed children, and in 25 % from the oropharynx. In RSLT this microbe is found in 39 % of cases in the nasopharynx and in 23 % of children in the oropharynx. In associations S. aureus often sown from oropharyngeal in patients with RSLT — in 22 % of cases.

In the acute phase of the disease α-hemolytic streptococcus is determined more frequently in oropharyngeal in patients with PSLT (17 %), while in RSLT it was determined extremely rare (2 % of cases). E. coli was detected on the mucous of URT in the acute period of RSLT as in PSLT (6 and 8 %, respectively). Candida species in the oropharynx in PSLT revealed in 25 % of cases, RSLT — in 18 % from the nasopharynx also were secreted the mycelium of the fungus, as in PSLT as well as in RSLT. The complex associations of microorganisms were observed only in the nasopharynx in patients with PSLT, in RSLT they were found in the nasopharynx (15 %) and in the oropharynx (23 % of the patients). Gram-positive pathogens in the acute phase of SLT are found mainly in the form of associations, especially with Staphylococcus aureus, and do not have such a high representation in the URT, as S. aureus.

In the acute period of RSLT complex associations pathogens were more common in older children in the oropharynx (43 %). The presence of such changes of microbiocenosis characterizes the severity of dysbiotic processes and the duration of their existence. In the acute period of PSLT above regularities are not detected, although such pathogens as Candida, E. coli, Klebsiella, often are secreted in older children. Affection of mucous membranes of the respiratory tract with Staphylococcus