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Evaluation of death cases in the 0-1 age group in Sivas, Turkey.

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Abstract

Introduction: In cases of infant deaths that have the legal nature, there are problems in determining the causes of death. Post-mortem assessments in this age group require the more different approaches than adults for both autopsy techniques and examinations.
Aim: By examining the infant death cases, it was aimed to draw attention to the points to be considered in the autopsy cases and the causes of death which can be reduced.
Method: The forensic autopsies of 44 cases at the age of 0-1 y been undergone between 2008-2015 y in Cumhuriyet University Medical Faculty Hospital morgue were included in our study. Age, gender, medical records, crime scene characteristics, autopsy and laboratory findings of these cases were discussed in the light of the literature.
Result: Sixteen of the 44 cases were male and 26 were female. Sex discrimination of two cases could not be done due to severe putrefaction. When evaluated according to age groups, the largest group (27.3%) was composed of cases between 2-6 months of age. When the causes of death determined in the reports were examined, natural causes of deaths detected at the majority of cases (45.5%).
Conclusion: Consequently, assessment of infant deaths requires an elaborate autopsy, careful crime scene investigation and detailed medical information of the infant and his/her family.

Keywords: Infant death, Autopsy, Death cause, Forensic medicine.

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Introduction

Infancy (0-12 months) is a period when the baby is exposed to the danger, and the causes of death in this period are important in terms of demonstrating the baby health related problems and evaluating the developmental status of a country [1]. The autopsy for the determination of the causes of death is the basis for taking the necessary precautions [2].

The approach in the post-mortem examinations of infants requires different external examinations, autopsy techniques and samples from adults [3-5].

Making differential diagnosis such as sudden infant death syndrome, infections, accidents, poisonings, congenital anomalies, metabolic and genetic disorders is important in determination of death causes. By the studies about infant deaths from our country, infective diseases and accidental deaths are reported to be the most common causes of death in this period [6,7].

Every child has principal life rights, and the maximum possible effort should be paid for survival and growing of the child. The person who has custody of a child is responsible for providing physically safe environment, protecting the child against possible danger, supplying the basic needs of the child such as education and medical care. The state is obliged to guarantee the child's life and development [8-10].

The aim of this study is to evaluate the causes and characteristics of deaths of infants whose autopsy was performed at the hospital morgue of Cumhuriyet University between 2008-2015 y. Infant deaths were investigated and it was aimed to draw attention to the points to be noticed in the autopsy findings of this period and the causes of death which can be reduced.

Materials and Methods

The study covers forensic cases under one-aged babies in Sivas province center, counties and villages with a population of 800,000 in Central Anatolia, maintains theirs life with its agriculture and farming. The Forensic Medicine Department of Cumhuriyet University Medical Faculty offers expert services in the field of forensic medicine to Sivas and surrounding provinces. With the participation of the lecturers in mortal incidents; dead examinations and autopsy services are conducted in the hospital morgue of Cumhuriyet University. The death causes of the cases are given by the forensic specialist making the autopsy as a result of histopathological and toxicological evaluations, medical documents, crime scene documents, dead examinations, samples taken with autopsies and judicial file examinations.

The forensic autopsies of 44 cases at the age of 0-1 y who been undergone between 2008-2015 y in Cumhuriyet University hospital morgue were included in our study. Age, gender, place of incident, place of sending, posting authority, date of event (year, season and month), predicted death cause at the time of autopsy, manner of death, origin of death, injured body region, accompanying bone fracture, procedures, autopsy findings, results of laboratory tests were discussed in the light of the literature. The data were evaluated using the SPSS 23 program.

Results

The forensic autopsies at the age of 0-1 y between 2008-2015 y in Cumhuriyet University hospital morgue were included in our study.

When a total of 44 cases included in our study was evaluated according to their genders; it was determined that 26 (59.1%) of them were female and 16 (36.4%) of them were male. Sex discrimination of two cases could not be done due to severe putrefaction and deformation.

It was seen that 15 (34.1%) of the cases were stillbirths within the first month, six (13.6%) were at the age of 1-2 months, 12 (27.3%) were 2-6 months, 11 (25%) were 6-12 months of age.

When the cases were assessed according to the place where they were found, it was determined that most of the cases were found as death in a house (38.6%) or hospital (34.1%). Clear information could not be reached in a case (2.3%) who was examined after burial (Table 1).

Seventeen (38.6%) of the cases were sent for post-mortem examination and autopsy from the city center, 12 (27.3%) of them were from provinces and 15 (34.1%) of them were from villages.

Infant deaths mostly occurred in winter with a rate of 31.8% and at least 18.2% in spring (Table 2).

When we looked at the distributions of the cases according to the months in the year; September was the highest with 18.2% and the lowest were March and November with 2.3%.

The highest numbers of cases between 2008 and 2015 were observed with 27.6% in 2009 and 22.7% in 2013. When the cases were initially evaluated according to possible causes of death; mostly an unknown death cause with 38.6%, 18.2% was pregnant mother death and stillbirth, 11.4% was an infectious disease, 9.1% was gastrointestinal system disease, 9.1% was a traffic accident and 4.5% was asphyxia (Table 3).

It was seen that 25.0% of the cases were found as death in a cot or the bed sharing with the mother while sleeping. At 31.8% of the cases, the deaths were occurred after infections or gastrointestinal and respiratory system diseases (Table 4).

One (2.3%) case was alleged to have been burned by the mother. A case referred to as stillbirth was diagnosed as intrauterine death due to maternal intracranial hemorrhage and another cause of stillbirth was detected as perinatal trauma due to traffic accident (Table 5).

It was seen that 22.7% of the cases were treated in emergency clinic and 9.1% in intensive care unit. It was determined that 47.7% of the cases hadn't been taken to a health institution just before or at the moment of death.

By examining of the death origins according to the findings obtained from judicial files, medical documents and post-mortem examinations, it was observed that death was originated from natural causes with 45.5% of the cases. In 20.5% of the cases, death was caused by trauma due to traffic accidents, falling, and asphyxia. Burning was the cause of death in one (2.3%) case with murder origin (Table 6).

In four (9.1%) cases, exhumations were done due to their being buried without a certification of the death.

In five (11.4%) cases, the external examination only was performed. In the rest of the cases (88.6%), the autopsy was also done after physical examination.

Toxicologic and histopathologic samples were taken from 32 (72.7%) cases. One of the cases was only toxicologically and one case was only histopathologically examined.

According to macroscopic findings obtained from external examination and autopsy; purulent findings due to lung infection in eight (18.2%) cases, congenital heart defects such as septal defect, mitral and aortic stenosis in five (11.4%) cases, anencephalus in one (2.3%) case, prematurity findings in five (11.4%) cases, asphyxia findings such as alveolar hemorrhage, bloody fluid exudation from the lung sections, petechial hemorrhage on internal organ surfaces and serous membranes, foreign body aspiration findings with occlusion of the lumens in five (11.4%) cases were observed. In nine (20.5%) cases of traffic accidents and falling injuries, soft tissue damage, skull fracture, extremity fractures and internal organ injuries were detected (Table 7).

Discussion

In forensic medicine practice, there are many difficulties in diagnosing 0-1 age group infant deaths. Inadequate clinical findings and lacking of information about death scene can

often make it difficult to determine the cause of death [4,7]. Prematurity, intrauterine growth retardation, multiple pregnancies are the most important risk factors in antenatal and perinatal deaths [11]. The cases in our study constitute 34.1% of stillbirths and deaths in the first month.

The ability to live is an important sign in determination of the legal rights of the fetus. In Article 88 of the Code of Turkish Criminal Procedure, pathologists are asked whether the fetus is mature enough to be surviving outside the womb or not [12]. Perinatal autopsies need to be done carefully because they include guiding and deciding features in terms of legal regulations and outcomes [7].

Perinatal and neonatal mortality rates are important indicators of comparing international health status. These ratios are a measure of education, public health systems and socio-economic development of a country [7,11]. In our study; the medical records of the cases, the documentation of the socioeconomic status of the families, and the lack of data of judicial authorities in the crime scene investigation and criminal proceedings can be said to be limitations.

The major causes of infant mortality in developed countries are listed as congenital anomalies, prematurity and morbidities associated with low birth weight, sudden infant death syndrome, maternal morbidities and accidents [13]. Korkmaz et al. [14] evaluated the data in the national registry system used in our country, and they found that the prematurity and related health problems were the most frequent cause of infant mortality [15]. Similar health problems also play as an important role in infant deaths in the forensic cases in our study (Table 7).

In developed countries, Sudden Infant Death Syndrome (SIDS) is the main cause of infant mortality under 11 months of age [7,16]. SIDS is not a specific disease; it is a condition that occurs because of various reasons. It is reported that it is more common in infants of young and lonely mothers who have low socioeconomic status, mostly in the 2-5 months period, in winter, in male and non-breast-fed infants [17,18]. Our study also showed similarities with literature on which infant mortality rate was highest in winter with 31.8% (Table 2).

There is a high number of cases that cannot be diagnosed in this age group in studies [11,19]. It is thought that death occurs by natural causes when there is no traumatic finding in the body, negative toxicological analyses and non-specific macroscopic-microscopic findings at autopsy. In these cases, when the cause of death is determined, self-existing disease is diagnosed in baby [7]. The rate of deaths due to natural causes in our study was 45.5%. It was seen that 11.4% of the cases were as unknown causes of deaths (Table 6).

New-born deaths cause great sadness for families and are also causing concern for later pregnancies. Determination of the cause of death in these cases accelerates the psychological recovery in the families, and it also gains importance in planning of the next pregnancy and the identification of the risk which can be repeated. In the study, postpartum anoxia which is detected among the causes of perinatal deaths gives rise to thought of lack of close follow-up in the pregnancy and delivery process. Inadequate maternal follow-up and care during prenatal or postnatal periods and inadequate postnatal care for babies are among the important reasons for the high number of deaths in this period [7,11,20]. In our cases, reasons such as high rates of indoor deaths, infant's not being brought to the hospital immediately, obstruction of the airway in the infant's bed or cot obstruction were found to be compatible with the predisposing factors mentioned above (Table 1).

Deaths related to infectious diseases are reported in the first place during perinatal period by studies from our country [7]. Pneumonia, sepsis, meningitis are known as infectious conditions that cause death [21]. In one study, infection-related deaths were reported in 21.3% [7]. In our study, this rate was 27.3% (Table 5).

When the cases were initially evaluated according to the possible causes of death (Table 3); the largest group was found to be the unknown death group with 38.6%. When we looked at the distribution of death causes which detected at medico-legal evaluation, it was seen that the percent of unknown group was reduced to 25% (Table 5).

When we looked at the origins of the cases according to the findings obtained from the judicial files, medical documents and post-mortem examinations; 45.5% of the cases were found to be natural deaths, 20.5% accidental deaths (fall, traffic accidents, asphyxia), and 2.3% burning for murder. It was determined that the results of toxicological and histopathologic examinations were not reached by us and the death cause could not be determined in 31.9% cases (Table 6).

At indoor death cases, professional usually faced with the problems as absence of a detailed investigation of the scene, delays on the baby immediately being taken to the nearest health unit and judicial case reports being made [7]. In our study, a total of four (9.1%) cases were found to be buried without receiving death certificates. In these cases, due to the request of the legal authorities, the tomb is opened and the deceased baby is removed and the autopsy is carried out. Due to the decomposition that lasted during this process, investigation of soft tissues, lesions and to making medical identification becomes difficult.

When we look at the rate of external examinations and autopsies in infant deaths, domestic studies are similar to ours. 88.6% of our cases were autopsied while Yilmaz et al. [7] had performed autopsy at 88.4% of their cases.

Stillbirths, abandoned babies, and infantisid suspicious cases are included in perinatal deaths [11,22]. In our study, the rate of stillbirth and maternal deaths were detected as high as 18.2%.

Congenital malformation (13.7%), infectious disease (18.2%), and asphyxia (4.5%) rates were found to be coherent with the most common death causes in neonatal deaths that were reported previous studies in our population [23].

In the forensic autopsy proceedings in our country, the legal authorities require a decision about the certain cause, manner

and time of death, live birth-stillbirth seperation, maturity and viability [11]. It has been observed that the results of the report have been arranged about the most frequently asked question being the certain cause of death in the cases included in our study.

Table 1. *Distribution of cases by place of death.*

	Frequency	Percent
Home	17	38.6
Hospital	15	34.1
Motorway	6	13.6
Open area	5	11.4
Unknown	1	2.3
Total	44	100

Table 2. *Distribution of events by season.*

	Frequency	Percent
Winter	14	31.8
Autumn	12	27.3
Summer	10	22.7
Spring	8	18.2
Total	44	100

Table 3. *Distribution of cases according to possible cause of death.*

	Frequency	Percent
Asphyxia	2	4.5
Heart anomaly	1	2.3
GIS disease	4	9.1
Lung infection	5	11.4
Traffic accident	4	9.1
Pregnant maternal mortality and intrauterine mortality	8	18.2
Fall	2	4.5
Burn	1	2.3
Unknown	17	38.6
Total	44	100

Table 4. *Distribution of cases by deadline.*

	Frequency	Percent
Finding dead	11	25
Post-illness	14	31.8
Traffic accident	4	9.1
Stillbirth	8	18.2
Fall	2	4.5
Combustion	1	2.3
Unknown	4	9.1
Total	44	100

Table 5. *Distribution of events by event type.*

	Frequency	Percent
Intrauterine death (stillbirth, pregnant maternal death)	8	18.2
Fall	2	4.5
Infection disease	12	27.3
Asphyxia	4	9.1
Congenital anomaly	2	4.5
Traffic accident	4	9.1
Burn	1	2.3
Unknown	11	25
Total	44	100

Table 6. *Distribution of cases according to death origin.*

	Frequency	Percent
Natural death	20	45.5
Accident death	9	20.5
Murder	1	2.3
No results	9	20.5
No fixation	5	11.4
Total	44	100

Table 7. *Findings detected by autopsy macroscopy.*

	Frequency	Percent
Congenital heart defect	5	11.4
Pulmonary discharge from lung	8	18.2
Anencephaly	1	2.3
Findings of dehydration	1	2.3
Skull bone fracture and brain damage	5	11.4
Extremity fracture	1	2.3
Internal organ injury	2	4.5
Subdural and subarachnoid haemorrhage	1	2.3
Foreign body aspiration	5	11.4
Alveolar edema-pulmonary edema	1	2.3
Decay findings	1	2.3
Prematurity	5	11.4

No feature	7	159
Burn	1	2.3
Total	44	100

Conclusions

It will increase the number of cases in which autopsies are detected at the appropriate centers, with sufficient information about the event, scene investigation, adequate clinical data and in the case of forensic medicine experts. In infants, explaining the cause of death may be difficult because clinical history and autopsy findings of cases are mostly inadequate. In forensic medicine practice, the most important problem in these cases is to reveal that death is the result of accident or an intent activity. Again, SIDS should be evaluated at the differential diagnosis because it is often a cause of death in this age group. Therefore, in infant death cases, a specific protocol including detailed autopsy, scene investigation, familial and medical history should be applied.

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