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## Quality Assessment of Perinatal and Infant Postmortem Examinations in Turkey

**ABSTRACT:** An autopsy examination is important in identifying the cause of death and as a means of auditing clinical and forensic practice; however, especially in perinatal and infantile age groups determining the cause of death leads to some difficulties in autopsy practice. In this study, 15,640 autopsies recorded during the years 2000–2004 in the Mortuary Department of the Council of Forensic Medicine were reviewed. Autopsy findings of 510 cases between 20 completed weeks of gestation and 1 year of age were analyzed retrospectively. The quality of each necropsy report was assessed using a modification of the system gestational age assessment described by Rushton, which objectively scores aspects identified by the Royal College of Pathologists as being part of a necropsy. According to their ages, the cases were subdivided into three groups. Intrauterine deaths were 31% (158 cases), neonatal deaths were 24% (123 cases), and infantile deaths were 45% (229 cases) of all cases. Scores for the quality of the necropsy report were above the minimum acceptable score with 44% in intrauterine, 88% in neonatal and infantile deaths.

**KEYWORDS:** forensic sciences, perinatal, infant, autopsy, audit

The perinatal autopsy is important not only in establishing the cause of fetal, neonatal, or infant death, but also in appropriate and accurate genetic counseling of parents and immediate family members for future pregnancies, and for the audit of new diagnostic and therapeutic techniques for both the fetus and newborn infant (1). Postmortem examination is important in identifying the cause of death and as means of auditing clinical and forensic practice (2). The quality of the postmortem examination is also important as clinically relevant information is more likely to emerge from a high quality investigation (2–5). Yet, quality of many perinatal and infant necropsies has been criticized. The Royal College of Pathologists, in addressing the problem of poor quality autopsies, has recently published “Guidelines for Post-mortem Reports” in which those autopsies performed on late fetal, perinatal, and infant deaths should be based on the protocol recommended by the National Advisory Board for Confidential Enquiry into Stillbirths and Deaths in Infancy (CESDI), 1993. The CESDI found that 43% of necropsy reports were less than adequate (6).

The aim of this study was to investigate the quality of fetal, perinatal, and infant (<12 months of age) autopsy reports in a 5-year period between 2000 and 2004 in the Mortuary Department of the Council of Forensic Medicine.

### Methods

A total of 15,640 autopsies recorded during the years 2000–2004 in the Mortuary Department of the Council of Forensic Medicine were reviewed. Autopsy findings of 510 cases between

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20 completed weeks of gestation and 1 year of age were analyzed retrospectively. In this study, the quality of each necropsy report was assessed using a modification of the system gestational age assessment described by Rushton, which objectively scores aspects identified by the Royal College of Pathologists as being part of a necropsy (Table 1). Body measurements, organ weights, histologic, radiologic, microbiologic, and other relevant investigations were assessed, giving a maximum score of 700. The minimum acceptable score (MAS) was also based on the Royal College of Pathologists guidelines. For the fetal necropsy, MAS was set at 350 (body measurements, organ weights, main organ histology, and the examination of the placenta). The infant necropsy did not include the placental examination and so the MAS was 250.

All autopsies included in the study were performed by forensic medicine specialists, all histo-pathologic examinations by forensic pathologists, and some cases were consulted with pediatric pathologists.

### Results

Two-hundred eighteen of 510 cases were female, the remaining 277 were male. Due to autolysis, the gender was not determined in 15 cases. Considering the distribution according to years, 99 (19.4%) cases were determined in 2000, 111 cases (21.8%) in 2001, 93 cases (18.2%) in 2002, 104 cases (20.4%) in 2003, and 103 cases (20.2%) in 2004. According to their ages, the cases were subdivided into three groups. Intrauterine deaths constituted 31% (158), neonatal deaths 24% (123), and infantile deaths 45% (229) of all cases. Scores for the quality of the necropsy report were above the MAS with 44% and 88% in intrauterine, and neonatal and infantile deaths, respectively. Scoring system parameters are given in Table 2. As seen in Table 2, body weight was the most common evaluated parameter (98.8%), whereas microbiologic examination was the less common assessed parameter (2%).

TABLE 1—Scoring system for the quality of perinatal and infant necropsy examination.

Category	Score
Body weight	20
Crown-rump/heel length	20
Head circumference	20
Foot length	20
Gestational age assessment	20
Organ weights (main)*	40
Organ weights (other)	40
Normal values	20
Histology (main organs)*	50
Histology (other organs)	50
Placenta, macroscopic examination	50
Placenta, histology	50
Radiology	100
Microbiology	100
Other relevant investigations (e.g., toxicology, biochemistry)	100

\*Brain, liver, lungs, and heart.

TABLE 2—Distribution of cases according scoring system parameters.

	n	%
Body weight	504	98.8
Crown-rump/heel length	397	77.8
Head circumference	272	53.3
Foot length	221	43.3
Gestational age assessment	430	84.3
Organ weights (main)	480	94.1
Organ weights (other organs)	135	26.5
Normal values	491	96.3
Histology (main organs)	460	90.2
Histology (other organs)	304	59.6
Placenta, macroscopic examination	28	5.5
Placenta, histology	16	3.1
Radiology	2	0.4
Microbiology	10	2
Other relevant investigations (e.g., toxicology, biochemistry, cytogenetics)	502	98.4

**Discussion**

An autopsy examination is important in identifying the cause of death and as a means of auditing clinical and forensic practice (2); however, especially in perinatal and infantile age groups determining the cause of death leads to some difficulties in autopsy practice. The lack of placental examination and limitations of histo-pathologic, radiologic, and genetic analyses might be responsible for inadequate autopsy examinations in this age group. According to the report of CESDI in 1993, 43% of autopsy reports were found less than adequate (6).

In this study, body weight, crown-rump/heel length, main organ weights, and main organ histology parameters were evaluated in the vast majority of the cases (90.2–98.8%). Head circumference, foot length, other organ weights, and histology of other organs were parameters assessed in 43.3–59.6% of the cases; whereas the macroscopic and microscopic examinations of the placenta were performed only in a few cases.

Scores for the quality of the necropsy reports were above the MAS in 44% of intrauterine death cases, and 88% in neonatal and infantile death cases. Vujenic et al. (2) reported two different scores in two different periods: in 1993, 54% of the cases were above the MAS, whereas this figure rose to 93% in 1996. Percentages of MASs of neonatal and infantile autopsies of this study were consistent with the literature, but with lower scores in intrauterine deaths.

The lack of placental examination is considered as the major cause of low MASs. All cases included to this study were medico-legal cases. As placenta could not be provided in the majority of cases, the placental examination could not be performed. Radiologic, microbiologic, and genetic analyses were not performed in most cases as well. Because of the forensic nature of autopsies, toxicologic analyses were performed in almost all cases.

The CESDI pathology form recommends a minimum examination of at least one block of major organs, especially lung, kidney, liver, placenta, and membranes (6). We suggest that, in addition to the CESDI minimum examination, small and large intestine, thymus, gonad, neck organs, adrenals, spleen, bone, muscle, and brain should be examined histologically in all autopsies. In this study, 90% of cases were examined histo-pathologically according to CESDI criteria. Other organs including thymus, salivary gland, lymph nodes, tonsils, spleen, small and large intestine, and adrenals were additionally examined in 59%. Wright et al. (7) reported the examination of more than four organs in 53% of the cases.

Routine histologic examination of major organs such as lungs, kidneys, and liver provides useful information, even in macerated stillbirths. It contributes to the assessment of gestational age, can provide evidence of fetal hypoxia, and may allow the diagnosis of disorders not suspected on macroscopic examination (e.g., some infection, and maternal diabetes mellitus) (7). Bernardi et al. (8) indicated that histologic analyses have a major impact on macroscopic diagnosis, altering and refining previous diagnoses, especially in the lungs, liver, and kidneys. This study revealed that histologic examination was not performed in 10% of the cases, most of them found death on open ground displaying severe autolysis.

Placental morphology is very informative in cases of intrauterine death. Stillbirth and early neonatal death reports also indicated significant differences in the frequency of pathologic examination of the placenta. Horn et al. (9) reported that in one-fourth of unexplained death cases placenta was not available for pathologic examination. Wright et al. (7) reported that the placenta was not received in 9.6% for autopsy in stillbirths. Placental morphology may be very important in demonstrating that, for example, brain damage or intrauterine death resulted from placental or umbilical cord pathology and not from physician's failure (9–12). In this study, the placenta was examined only in 5% of all cases. In fact, the placenta should be provided for examination following all stillbirths. A strong argument for examining and reporting the placenta together with the infant is to allow appropriate correlation of findings, in both stillbirths and neonatal deaths. Nevertheless, the Royal College's guidelines do recommend making arrangements to store all placentas from infants admitted to special care baby units for 1 month.

Autopsy examination in perinatal and infantile age groups should be very detailed and always include body measurements, external and internal examinations, weight of all major organs, histology of all organs, bacteriology, and X-ray skeletal survey (2,3,13–16). Performing a complete and detailed autopsy will increase the number of cases with determined cause of death. On one hand, this will lead to an improvement in the legal procedure, on the other hand, it will diminish the concerns of the families and provide guidance for future pregnancies. Vujenic et al. (2) indicated that following the implementation of the Royal College of Pathologists guidelines, a significant improvement was observed in the standards. They recommended that perinatal and infant autopsies should be performed by pediatric pathologists.

## Conclusion

The Mortuary Department of the Council of Forensic Medicine Headquarters in Istanbul is the center with the highest autopsy figures in Turkey. About 3000 autopsies are performed in the Mortuary Department per year. This study aimed to determine the level of quality in perinatal and infant autopsies performed in this institution. Supplying the deficiencies in autopsy practices determined in the study will enhance the quality of the autopsy and enable the proper administration of the justice system.

The practices in Turkey are unequal as the infrastructure and facilities vary from one institution to another. Elimination of these discrepancies and enhancement of the reliability of autopsy practices are possible by the establishment of a standard perinatal–infant autopsy protocol in accordance with the country's requirements and the implementation of this protocol in all institutions.

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