Ankara Üniversitesi Tıp Fakültesi Mecmuası 2005; 58:61-64

Clinical importance of neonatal autopsies

Yenidoğan otopsilerinin klinik önemi

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Aim: To asses the neonatal autopsy rate at a tertiary referral center and to investigate any discordance between the diagnosis before death and at autopsy.
Materials and Methods: This retrospective study was performed at neonatal intensive care unit (NICU) of Ankara University Hospital between January 1997 and June 2003. Written parental consent was obtained prior to autopsy. Each examination was performed by a pathologist using standard techniques including bacterial cultures, macroscopic and histological examination, postmortem radiography and chromosomal analysis if necessary. Clinico-pathologic concordance was divided into four categories: (1) change in diagnosis, (2) additional findings, (3) complete confirmation and (4) inconclusive.
Results: In this period 87/1876 (4.6%) neonates died and autopsy was performed in 34/87 (39%) of the cases. The studied population had a median gestational age, birth weight and a median age of 35 weeks, 1990 g. and 5 days respectively. After autopsy, diagnosis changed in 4/34 (11.7%), additional findings were found in 4/34 (11.7%), diagnosis was confirmed in 25/34 (73.5%) and diagnosis was inconclusive in 1/34 (2.9%).
Conclusion: Neonatal autopsies can be suggested when the cause of death is not evident or additional information is needed. Important information can be obtained from neonatal autopsies. Clinicians can confidently advise parents of the usefulness of the neonatal autopsy in ascertaining the cause of death or for counseling their future pregnancy.

Key words: ***Autopsy, Mortality, Neonate***

Amaç: Üçüncü basamak referans merkezi olan ünitemizdeki yenidoğan otopsi oranını ortaya koymak ve hastaların klinik tanısı ile otopsi yapıldıktan sonra tanıda ortaya çıkan uyumsuzlukları belirlemek.
Gereç Yöntem: Bu çalışma Ankara Üniversitesi Yenidoğan Yoğun Bakım Ünitesi'nde Ocak 1997-Haziran 2003 arasındaki dönemi kapsayan retrospektif bir çalışma olarak düzenlendi. Otopsi yapılmadan önce ailelerin yazılı izinleri alındı. Her inceleme bakteriyel kültür, makroskopik ve histolojik incelemeyi içeren standart teknikler ile gerektiğinde postmortem radyografi ve kromozomal analizi incelemelerle patologlar tarafından yapıldı. Klinikopatolojik uygunluk 4 grup altında incelendi: Tanıda değişme, ek bulgular, tam uyum ve tamamen uyumsuz.
Bulgular: Bu dönemde yenidoğanların %4.6'sı (87/1876) öldü ve ölenlerden 34'üne (%39) otopsi yapıldı. Çalışmaya alınan olguların median gestasyonel yaş, doğum ağırlığı ve postnatal yaşı sırası ile 35 hafta, 1990 g. ve 5 gün olarak tespit edildi. Otopsi sonrasında 25 olgunun (%73.5) tanısında bir değişiklik olmadığı, 4 olguda (%11.7) ek bulguların olduğu, 4 olguda (%11.7) tanının değiştiği ve 1 olguda (%2.9) ise tanının tamamen uyumsuz olduğu saptandı.
Sonuç: Ölüm nedeni tam olarak belirlenemeyen veya ek bilgilerin elde edilmesi gereken durumlarda otopsi gerekebilir. Yenidoğan otopsileri sonrasında önemli bilgilere ulaşılabilir. Hekimler, ölüm nedeninin tam olarak belirlenmesi veya gelecekte planlanacak gebeliklerin risklerinin önceden belirlenebilmesi amacıyla yenidoğan döneminde kaybedilen olgulara otopsi yapılmasını önermelidirler.

Anahtar kelimeler: ***Mortalite, Otopsi, Yenidoğan***

Received: 11.24.2004 • *Accepted:* 3.21.2005

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Autopsy has been important in medicine since the 15th century and has contributed to clinical knowledge (1,2). An unsuccessful outcome of pregnancy is a major catastrophe for parents (3). Seeking consent for performing an autopsy from the grieving parents can be difficult (4). However,

Table 1. Mortality and autopsy rates at NICU

	Total number of neonates n (%)	*Total number of deaths n (%)*	*Total number of autopsies n (%)*
Term	1352 (72.0)	29 (33.4)	10 (29.5)
Premature	524 (28.0)	58 (66.6)	24 (70.5)
< 1500 g	316 (16.8)	40 (45.9)	15 (44.1)
> 1500 g	208 (11.2)	18 (20.7)	9 (26.4)
Total	1876 (100.0)	87 (100.0)	34 (100.0)

Table 2. Clinico-pathologic concordance

Autopsies n (%)	*Change in diagnosis n (%)*	*Additional findings n (%)*	*Complete confirmation n (%)*	*Inconclusive n (%)*
34 (100.0)	4 (11.7)	4 (11.7)	25 (73.5)	1 (2.9)

neonatal autopsy has a particularly valuable role in the counseling of families after the loss of an infant as it can improve parental understanding, alleviate concerns over prenatal events and provide knowledge for research and teaching. Genetic conditions or obstetric factors of relevance to future pregnancies may also be identified (5).

The purpose of this study was to measure the neonatal autopsy rate at a tertiary referral center and to examine any discordance between the diagnosis before death and at autopsy.

Materials and Methods

This retrospective study was performed at neonatal intensive care unit (NICU) of Ankara University School of Medicine between January 1997 and June 2003. Written parental consent was obtained prior to autopsy. Each examination was performed by a pathologist using standard techniques including bacterial cultures, macroscopic and histological examination, postmortem radiography and chromosomal analysis if necessary. We recorded the cause of death from the original death certificate, which was normally completed by the attending neonatologist. We obtained information from the original medical records and abstracted autopsy findings from the concluding summary of the pathologist's report.

Clinico-pathologic concordance was divided into four categories: (1) change in diagnosis, (2) additional findings, (3) complete confirmation and (4) inconclusive (4).

Results

In this period 87 of 1876 (4.6%) neonates died and autopsy was performed in 34 of 87 (39%) cases. The population that had been performed autopsy had a median gestational age, birth weight and a median age of death, 35 weeks, 1990 g. and 5 days respectively. In Table-1 we showed the mortality and autopsy rates at NICU of Ankara University School of Medicine.

After autopsy diagnosis changed in 4 of 34 (11.7%), additional findings were found in 4 of 34 (11.7%), diagnosis was confirmed in 25 of 34 (73.5%) and diagnosis was inconclusive in 1 of 34 (2.9%) neonates (Table-2). In Table-3 we summarized the clinical characteristics and the results of autopsies of the cases which is classified in category 1, category 2 and category 4.

Discussion

According to the last two decades' literature the mortality rate of neonates from different NICU's ranged between 2.1% to 20.9% (6) and the mortality rate of our NICU was 4.6%. However, for neonatal deaths the percentage of autopsies ranged from 33% to 100% though classification criteria and procedures varied between studies (4,7). In our NICU it was 39%. The median gestational age and the median age of death were similar to the other NICUs (5,6), but there were no differences between the maturity of the cases and the autopsy rates.

For neonatal deaths the percentage of autopsies for which there were additional findings, whether these findings changed the main diagnosis or not, and which may have led to change in management or counseling ranged from 22% to 81% (4,8). In our study, after autopsies 4 of 34 (11.4%) cases diagnosis changed, 4 of 34 (11.4%) cases had additional findings.

The proportion of neonatal deaths attributed to major genetic or congenital abnormalities has increased. So, in such cases accurate diagnosis is very important for future counseling (5).

Table 3. Clinical characteristics and result of autopsies of the cases

CASES		**BW (g)*	**GA (week)*	*APGAR 1 and 5*	*Clinical findings*	*Treatment*	*Length of stay*	*Autopsy findings*
Change in diagnosis	Case 1	720	28	4-8	immaturity sepsis *DIC renal failure apnea	antibiotics plasma pentaglobulin inotrophic agents *MV	5 days	*CN
	Case 2	2200	34	7-9	sepsis *NS cerebral odema *PHT	antibiotics pentaglobulin albumine diuretics steroid *MV	16 days	*SCID
	Case 3	1990	35.3	4-7	sepsis *PHT	antibiotics *MV	8 hours	*RA *RDS
	Case 4	1330	32	3-6	*RDS pneumothorax	antibiotics surfactane *MV	5 hours	*RA
Additional findings	Case 1	1135	27	7-3	*RDS sepsis	antibiotics surfactane *MV	4 days	*RDS *IVH
	Case 2	900	25.3	4-6	*RDS sepsis	antibiotics surfactane *MV	3 days	sepsis *ASD
	Case 3	1420	34	2-4	perinatal asphyxia	antibiotics antiepileptic *MV	10 days	pneumonia
	Case 4	3000	38	4-8	*CHD	*MV inotrophic agents PGE1	7 days	*CHD *DGS
Inconclusive	Case 1	2180	35	3-7	Sepsis renal failure	antibiotics inotrophic agents	2 days	*RDS

***BW :** Birth weight, GA: Gestational age, DIC: Disseminated intravascular coagulation, CN: Congenital nephroblastoma, NS: Nephrotic syndrome,
PHT: Pulmonary hypertension, SCID: Severe common immuno deficiency, RA: Unilateral renal agenesis, RDS: Respiratory distress syndrome,
IVH: Intraventricular hemorrhage, ASD: Atrial septal defect, CHD: Congenital heart disease, DGS: Di George syndrome

In nearly a quarter of our cases new information was obtained at autopsy. In 2 cases important diagnosis identified with implications for genetic advice-namely, Di-George syndrome and severe common immune deficiency after autopsy. In addition to the future genetic advice, by the treatment of the immune deficiency before death these cases might have been alive for many months or years. In another 2 cases after autopsy unilateral renal agenesis were diagnosed that had an impact on the renal failure.

A premature neonate with gestational age of 28 weeks followed by diagnosis of immaturity and renal failure. After autopsy his diagnosis was identified as congenital nephroblastoma. It was a very important diagnosis that, had it been detected before death, would probably have led to change in management that might have resulted in cure or prolonged survival by the treatments of surgery, chemotherapy and radiation therapy.

If an autopsy includes detailed techniques like bacterial cultures, postmortem radiography, metabolic studies and chromosomal analysis, the usefulness of autopsies' increases (9).

We suggest that (1) neonatal autopsies can be offered when the cause of death is not evident or additional information is needed and important information can be obtained from neonatal autopsies, and (2) clinicians can confidently advise parents of the usefulness of the neonatal autopsy in ascertaining the cause of death or for counseling their future pregnancy.

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