Preliminary Report

Autopsy Findings of Fetal Death

Pilaiwan Kleebkaow MD*,
Thawalwong Ratanasiri MD*, Ratana Komwilaisak MD*

** Department of Obstetrics and Gynecology, Faculty of Medicine, Khon Kaen University, Khon Kaen*

Objective: *To study the autopsy findings associated with fetal death in the division of reproductive pathology.*
Material and Method: *Descriptive study of 35 fetal deaths with placentas after postmortem examinations in the division of reproductive pathology between January 2005 and December 2005. The fetal deaths and placentas were examined by a perinatal pathologist in the surgical pathology room, Department of Pathology and Department of Obstetrics and Gynecology, Faculty of Medicine, Khon Kaen University. The demographic data of the mothers, the gestational age from obstetric information, diagnosis before abortus or delivery. The postmortem examinations including abnormal macroscopic or microscopic findings were analyzed.*
Results: *The associated pathologies of fetal death could be identified 87.5% for groups of fetal weight less than 500grams and in 77.8% for groups of fetal weight 500 grams or more. The most common associated pathology of fetal death in both groups was congenital anomaly, was 50% and 25.9% respectively. Macerated fetuses were found in 48.2% of all cases. Causes of macerated groups were identified in 66.7% of cases. Hydropic fetuses were 14.3% (5 cases) of all fetal deaths in which the cause of death was identified before delivery in two cases and was identified in postmortem examination in one case. Thus, the identified causes of fetal death in hydrops fetalis were 60%.*
Conclusion: *Most common associated pathology of fetal deaths is congenital anomaly.*

Keywords: *Postmortem examinations, Fetal death, Associated pathology, Autopsy*

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Several studies have been conducted to demonstrate the value of the postmortem examinations of fetal death as a means of clinical audit and quality control[1]. Special attention has been focused on the perinatal postmortem examination[2].

The widespread use of ultrasound screening for congenital anomalies, the almost universal use of maternal serum α-fetoprotein screening, and the increasing use of amniocentesis, chorionic villous sampling and cordocentesis, for prenatal detection of specific abnormalities in families at risk, has placed a special responsibility upon the pathologist receiving cases from obstetric units. The importance of detailed examination of any fetus after termination of pregnancy for congenital anomaly has been repeatedly emphasized[3].

The objectives of the postmortem examination are composed of information to the family of a dead fetus, information to clinicians caring for the family, information to enable quality control and audit of management practices, accurate epidemiological data, stimulation of research and medicolegal evidence[4].

Several aspects of placental examination are worth emphasizing in the context of perinatal death. The placenta should always be submitted in as fresh a condition as possible, without fixative and without undue handling or stripping of membranes, particularly of twin placentas[4]. The mortality rate of low birth weight infants is eight times greater than normal-weight infants[5]. The prevalence of placental pathology in low birth weight infants in Srinagarind Hospital was 80.7%[6].

Srinagarind Hospital, the division of reproductive pathology has started the postmortem examinations of all fetuses from the department of Obstetrics and Gynecology since 2002. Almost all fetuses were sent from the labor room. In 2005, the perinatal death was 17.36 per 1000 live births. The limitation is that it

Correspondence to : Kleebkaow P, Department of Obstetrics and Gynecology, Faculty of Medicine, Khon Kaen University, Khon Kaen 40002, Thailand.

did not include late neonatal deaths. All fetuses weighed 500grams or more[7]. The postmortem examinations were performed in 26 of 46 fetuses (56.5%). The remaining fetuses are those who had postmortem examination performed at another division or the parents did not give consent.

There are many classifications of causes of fetal deaths such as Aberdeen clinicopathological classification, British necropsy classification, Wigglesworth classification, Nordic-Baltic classification and placental and fetal pathology classification of Naeye[8]. Classification of causes of fetal death in the present study followed the classification of Naeye[9].

Material and Method

The authors included all fetuses from fetal deaths from the departments of Obstetrics and Gynecology after obtaining a signed informed consent from their parents. All fetuses were postmortem examined by one perinatal pathologist, fellows and residents from the division of maternal fetal medicine, Department of Obstetrics and Gynecology. Fetuses with no consent forms and incomplete postmortem examinations were excluded. Between January 2005 and December 2005, 35 fetuses weighing between 40 and 2,340 grams aborted or delivered at Srinagarind Hospital were included retrospectively.

After receiving written informed consent, the data were collected from 1) request forms; 2) labor records; and, 3) postmortem records (*i.e.* demographic and baseline variables of age, gestational age by obstetric information, timing of death, characteristics of fetuses, prenatal investigation and pre and postmortem findings).

The fetuses and placentas were stored at 6 C to ensure 'fresh state' pathological examination. A few fetuses were formalin-fixed from miscommunication of the staff. *Macroscopic studies* included: 1) clinical photography, 2) body weight, 3) measurements of fetal parameters and 4) placenta examinations. *Microscopic studies* were performed on the tissue samples taken from each organ and placentas. Baby grams, microbiology and electron microscopy were performed in selected cases. All samples were stained with hematoxylin and eosin. Sections of bones were fixed with EDTA solutions.

The causes of fetal death were post-mortem examined (Naeye, 1977) according to placental and fetal pathology, as follows: 1) acute amniotic fluid infection syndrome, 2) abruptio placentae, 3) premature rupture of membranes, 4) congenital anomalies, 5) large placental infarcts, 6) intervillous thrombi of placenta, 7) umbilical cord compression, 8) cord knots, 9) placental growth retardation, 10) placenta previa, 11) rhesus erythroblastosis, 12) birth trauma, 13) polyhydramnios, 14) cesarean section, 15) marginal syndrome, 16) severe fetal undernutrition, 17) uterine rupture, 18) post maturity, 19) congenital syphilis, 20) other disease and 21) unexplained[9]. The associated pathologies of fetal deaths, demographics and baseline variables were presented as percentages.

Results

The demographic and baseline data of 35 fetal deaths enrolled in the present study are presented in Table 1. Maternal age was between 20-35 years old in 70.6%, mostly abortion and delivery in the labor room (91.4%) and gestational age from 22 to $\leq$ 37 weeks by obstetrics record (65.7%). One woman had twins. The fetuses were equal in sex and showed one unidentified sex (in one limb body wall complex). The 77.1% fetuses

Table 1. Demographic data of the studying groups (n = 35 cases)

Characteristics	Number	%
Age of 34 mothers (years)*		
< 20	2	5.9
20-35	24	70.6
> 35	8	23.5
Place of abortion or delivery		
Srinagarind Hospital		
Labor room	32	91.4
Gynecologic ward	2	5.7
Other hospital	1	2.9
Gestational age by obstetric data		
< 22 wks or < 500 g	8	22.9
$\geq$ 22 - < 37wks	23	65.7
$\geq$ 37 wks	4	11.4
Sex of fetuses		
Female	16	45.7
Male	18	51.4
Unidentified	1	2.9
Timing of fetal deaths		
<500grams	8	22.9
During termination	5	14.3
Before termination	3	8.6
$\geq$500grams	27	77.1
Antepartum death	15	42.8
Intrapartum death	8	22.9
Early neonatal death	4	11.4

* One mother had twins

Table 2. Characteristics of fetal deaths (n = 35 cases)

Maceration	Number	%
<500 g	8	22.9
Non maceration	5	14.3
Maceration	3	8.6
≥500 g	27	77.1
Non maceration	15	42.8
Maceration	12	34.3
Fresh or formalin-fixed		
<500 g	8	22.9
Fresh	5	14.3
Formalin-fixed	3	8.6
≥500 g	27	77.1
Fresh	24	68.5
Formalin-fixed	3	8.6

Table 3. Associated pathologies of fetal deaths before and after postmortem examinations (n = 35 cases)

Identified causes	Number	%
<500 g	8	100
Before postmortem examination	5	62.5
After postmortem examination	7	87.5
Unexplained	1	12.5
≥500 g	27	100
Before postmortem examination	15	55.5
After postmortem examination	21	77.8
Unexplained	6	22.2

Table 4. Details of associated pathologies of fetal deaths after postmortem examinations (n = 35 cases)

Naeye's classification	Number	%
<500 g	8	100
Congenital anomalies	4	50
Twin twin transfusion syndrome	2	25
β-thal E	1	12.5
Unexplained	1	12.5
≥500 g	27	100
Congenital anomalies	7	25.9
PROM with chorioamnionitis	4	14.8
Abruptio placentae	3	11.1
Placental growth retardation	2	5.7
Severe fetal undernutrition	2	5.7
Umbilical cord compression	1	3.7
Bart hydrops fetalis	1	3.7
Unexplained	6	22.2
- Hydrops fetalis	2	7.4
- Idiopathic polyhydramnios	1	3.7

Table 5. Associated pathologies of fetal deaths in macerated groups (n = 15 cases)

Maceration	Number	%
<500 g	3	20
Twin twin transfusion syndrome	2	13
Single fetal death of twins	1	7
≥500 g	12	80
Identified causes	8	53.3
Unexplained causes	4	26.7

weighed 500 g or more. Fetal deaths during the antepartum period were 42.8%. The fetuses revealed non-maceration in 57.1% and fresh status in 82.8% (Table 2).

In the present study, 57.1% were identified associated pathologies of death before delivery or abortion and 80% with postmortem examination. The unexplained causes were 20% (Table 3).

According to Naeye's classification, most common causes of fetal deaths were congenital anomalies (31.4%) (Table 4). One case was detected with postmortem in groups of hydrops fetalis (Fig. 1).

The macerated groups were 66.67% of identified causes. The unexplained causes were 33.3% (Table 5). One macerated fetus of an unexplained group was severe maceration with one survived monozygotic twin at term.

Causes of deaths in hydrops fetalis were identified in only three of five cases (60%) although the electron microscopy was performed. The two unexplained fetuses were anemia, cardiomegaly, hepatospleenomegaly and placentomegaly.

Discussion

The authors selected Naeye's classification due to complete details of clinical and pathological findings. Most common associated pathologies of fetal and neonatal deaths in United States of America were amniotic fluid infection in 17.7%, congenital anomalies in 9.5% and unexplained causes in 13.8%[10]. In Durban, South Africa, causes of fetal deaths were amniotic fluid infection in 26%, congenital anomalies in 4.9% and unexplained in 1.5%. In the present study, more unexplained causes and no amniotic fluid infec-

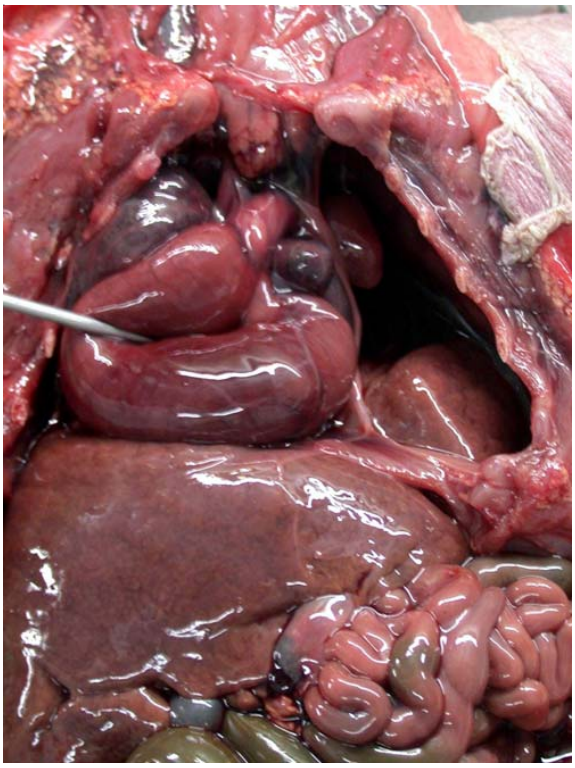

Fig. 1 Case of macerated hydrops fetalis with diagnosis of congenital diaphragmatic hernia and pulmonary hypoplasia on postmortem examination (big pointer at left lobe of liver in left chest and small pointer at left lung hypoplasia)

tion were found due to not included early neonatal death in pediatric units. There were 42.8% of macerated groups that caused difficulty in finding out the etiology. In recent times, the prenatal diagnosis is worldwide then congenital anomalies as cause of fetal death increased.

According to Wigglesworth classification, a review of southeast Thames perinatal statistics from 1988-1995, showed antepartum fetal death in 41% of the cases and malformation in 14%[8]. The rate of antepartum fetal deaths is similar to the present study. The malformation in the present study was lower due to the different cases of prenatal diagnosis. In the present study, the authors found a case of limb body wall complex with amniotic band and a case of anencephaly in 41 weeks of gestational age. The latter case was undiagnosed by ultrasound in the first half of antepartum period. One case of skeletal dysplasia was detected in the antepartum period.

Most unexplained causes of deaths in the present study were in hydrops fetalis. One case congenital diaphragmatic hernia was detected (Fig. 1). There were many limitations in the present study groups; therefore, the investigation should be done to improve the cause of fetal death identification.

The strength of the present study was good obstetric data and good quality of post mortem examinations. The weakness was the small sample size because of only preliminary report in one year. The authors could not perform postmortem examinations in early neonatal death in the pediatric ward, because there were incomplete microbiologic studies, such as anaerobe. No tissue culture or cytogenetic study was performed in the authors' faculty.

The usefulness of the present study was the preliminary data to improve the data collection, counseling parents, and improved quality of prenatal diagnosis.

Conclusion

In conclusion, the identified causes of fetal death were rather high (80.7%). The most common cause was congenital anomaly (31.4%). Postmortem examination is very useful for obstetrician practice. Available antepartum data and placental examinations improved identification of the causes of fetal deaths.

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พยาธิสภาพที่พิสูจน์แล้วที่พบร่วมกับการตายของทารก: การศึกษานำร่อง

พิไลวรรณ กลีบแก้ว, ถวัลย์วงค์ รัตนสิริ, รัตนา คำวิลัยศักดิ์

วัตถุประสงค์*: เพื่อศึกษาพยาธิสภาพที่พบร่วมกับการตายของทารก หลังจากได้ตรวจพิสูจน์ทางพยาธิวิทยา จากสาขาพยาธิวิทยาการเจริญพันธุ์*

วัสดุและวิธีการ*: เป็นการศึกษาแบบพรรณนา ของทารกตายและรกที่ได้ทำการตรวจพิสูจน์ทางพยาธิวิทยา ในระหว่าง 1 มกราคม พ.ศ. 2548 ถึง 31 ธันวาคม พ.ศ. 2548 จำนวน 35 ราย โดยทำการตรวจที่ ห้องตัดชิ้นเนื้อ ภาควิชาพยาธิวิทยา และ สาขาพยาธิวิทยาการเจริญพันธุ์ ภาควิชาสูติศาสตร์และนรีเวชวิทยา คณะแพทยศาสตร์ มหาวิทยาลัยขอนแก่น โดยพยาธิแพทย์ปริกำเนิดทำการตรวจ รวบรวมข้อมูลต่าง ๆ ของมารดาได้แก่ ลักษณะประชากร อายุครรภ์ทารกที่ประเมินจากข้อมูลทางสูติศาสตร์ การตรวจวินิจฉัยก่อนแท้งหรือคลอด วิเคราะห์ผลการตรวจ จากการตรวจของทารกและรก ทั้งมหกายวิภาคหรือทางจุลพยาธิวิทยา*

ผลการศึกษา*: พบพยาธิสภาพร่วมกับการตายของทารก ร้อยละ 87.5 ในกลุ่มทารกน้ำหนักน้อยกว่า 500 กรัม และร้อยละ 77.8 ในกลุ่มทารกน้ำหนักตั้งแต่ 500 กรัมขึ้นไป พยาธิสภาพที่พบบ่อยที่สุดเป็น ความพิการ ของทารกแต่กำเนิดพบร้อยละ 50 และ ร้อยละ 25.9 ตามลำดับ ในทารกทั้ง 2 กลุ่มพบทารกมีลักษณะเปื่อยยุ่ย ร้อยละ 42.8 ในจำนวนนี้พบมีสาเหตุการตาย ร้อยละ 66.7 นอกจากนั้นพบทารกที่มีอาการบวมน้ำจำนวน 5 ราย คิดเป็นร้อยละ 14.3 พบพยาธิสภาพก่อนคลอด 2 ราย พบสาเหตุเพิ่มจากการตรวจพิสูจน์ทางพยาธิวิทยา 1 ราย คิดเป็นพบสาเหตุรวมร้อยละ 60*

สรุป*: พยาธิสภาพที่พบร่วมกับการตายของทารกเป็นความพิการแต่กำเนิดมากที่สุด*