

## ● Original paper

# PRENATAL 3<sup>RD</sup> TRIMESTER EXPECTATION OF FETAL OR NEONATAL DEMISE AND PERINATAL TEAM APPROACH



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## Abstract

**INTRODUCTION:** The aim of this study was to present our current practice of counseling patients and families with the most severe congenital malformations in the 3rd trimester of pregnancy and to develop practical guidelines for our team and involved healthcare/ socialcare professionals.

**MATERIAL & METHODS:** It was a retrospective evaluation of a series of fetal cases in 2017 from single tertiary center. Maternal obstetrical medical history, time of prenatal detection of the anomaly (1st, 2nd or 3rd trimester), time between last fetal echocardiography and delivery, type of delivery, neonatal birth weight and time of neonatal demise. The total study group was subdivided into early demise (during the 1st day after delivery) or late demise > 1st day after delivery.

**RESULTS:** Mean maternal age was 30,4 +/- 5,6 years, and varied between 26 and 38 years. No chronic maternal diseases were found in medical history and no congenital malformations were present in previous children. All women had 1st trimester ultrasound, in 9 cases, it was reported as normal (with NT measurement < 2 mm), in 2 cases extracardiac abnormalities were detected: diaphragmatic hernia and omphalocele ( in both fetal karyotype 46,XY). In nine cases, the abnormalities were detected in midgestation and with maternal wish to continue the pregnancies. There were 8 neonatal deaths within 60 minutes after delivery, including one intrapartum death and 3 "late" neonatal deaths in the intensive care unit (on 12th, 21st and 22nd day). We stress upon the prenatal team approach and counseling of future parents, in order to prepare them for poor neonatal outcome.

**CONCLUSIONS:** 1. In the most severe cases when fetal or neonatal demise was suspected, the two different opinions of specialists might not be enough and a third opinion should be recommended before final decision. 2. A Fetal Team of specialists is necessary in cases of expected fetal/neonatal demise in order to prepare a written report of recommended perinatal management for all sides involved in this difficult problem.

**Key words:** Prenatal cardiology, expected demise, congenital heart disease, protocol

## INTRODUCTION

The aim of this study was to present our current practice of counseling patients and families with the most severe congenital malformations in the 3<sup>rd</sup> trimester of pregnancy and to develop practical guidelines for our team and involved healthcare/ socialcare professionals. These situations are relatively rare and difficult for all sides involved, and no such protocol has been proposed so far in our institution

## MATERIAL & METHODS

It was a retrospective evaluation of a series of fetal cases in 2017 from single tertiary center, who had

prenatal ultrasound and echocardiographic diagnosis of congenital malformation. In addition to the diagnosis a dismal prognosis was presented to the parents-to-be. For this analysis we included only cases of singleton pregnancies, with decision to continue pregnancy and deliver in our hospital.

We included only cases that had at least two examinations in our Department.

We excluded cases with single visit in our Department, cases of terminations of pregnancies, in utero demise and cases with 13, 18 and 21 trisomy.

After prenatal ultrasound evaluation in our Department, the

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Nr	Cardiac diagnosis	Extracardiac malformation	Extracardiac anomalies
1	Ectopia cordis, CHD: AVC	Omphalocele	Lung hypoplasia Ventriculomegaly Reversal flow in MCA
2	Cong Heart Defect: HLHS, Mitral and Aortic atresia, Fibroelastosis, FO restriction, HA/CA 0,45		Pulm venous reversal flow Oligohydramnion
3	Cong Heart Defect: HLHS + giant LA		
4	Cong Heart Defect: Absent Pulm valve		Ascites, AFI 30
5	Cong Heart Defect: AVC, Complete Heart Block, VR 40/min, L-isomerism		Ascites, hydrops testis, cong heart failure
6	Cong Heart Defect: DORV, PA, Mapcasy, HA/CA 0, 45	Ventriculomegaly Cerebellar hypoplasia	Clubfoot Thymus hypoplasia
7	Cong Heart Defect: HLHS Fo closure, Mitral regurgitation, Aortic regurgitation, Fibroelastosis Z-score AoV 3,3		Pulm reversal flow Placentitis Oligohydramnios
8	Normal Heart Anatomy	Diaphragmatic hernia	
9	Normal Heart Anatomy HA/CA 0,55 Hipertrophy, Pericardial effusion	Renal agenesis	Lung hypoplasia Ahydramnion
10	Normal Heart Anatomy	Brain hypoplasia, no cerebellum	Micrognathia, Club foot Oligohydramnios
11	Normal Heart Anatomy	Skeletal malformation Thanatophoric dysplasia	

Table 1: Ultrasound diagnoses

\*46, XX t (1:9), (q42:g34)

fetal examinations were first presented to the medical team comprising of: an obstetrician, neonatologists, a pediatric cardiologist or surgeon and written consent was prepared. Later on the pregnant woman with her partner met with our group to discuss the situation, parents' expectations and to plan perinatal management and optimal way of delivery.

A total of 11 cases, were selected for this analysis from the year 2017.

Maternal obstetrical medical history, time of prenatal detection of the anomaly (1<sup>st</sup>, 2<sup>nd</sup> or 3<sup>rd</sup> trimester), time between last fetal echocardiography and delivery, type of delivery, neonatal birth weight and time of neonatal demise are presented in table 1.

The total study group was subdivided into early demise (during the 1<sup>st</sup> day after delivery) or late demise > 1<sup>st</sup> day after delivery (Table 2).

## RESULTS

Mean maternal age was 30,4 +/- 5,6 years, and varied between 26 and 38 years. In five cases, it was the first pregnancy and in 7 cases it was subsequent pregnancy. No chronic maternal diseases were found in medical history and no congenital malformations were present in previous children. All women had 1<sup>st</sup> trimester ultrasound scans, which in 9 cases was reported as normal (with NT measurement < 2 mm), in 2 a diagnosis of diaphragmatic hernia or omphalocele was made. In these two cases fetal karyotype was 46,XY.

At 28 weeks of gestation, in the case of diaphragmatic hernia FETO procedure was performed (in another hospital and at 31 wks of gestation balloon was removed). At 32 weeks of gestation in our unit maternal hyperoxygenation test was negative suggesting lung hypoplasia and poor result of prenatal treatment.

In 10 fetuses the following congenital malformations were detected in midgestation: at 18-20 weeks:

(tabl. 1) : 7 cases of congenital heart defects: two cases of hypoplastic left heart syndrome with restriction of the foramen ovale and reversal pulmonary vein flow and one case with giant left atrium; One fetus with absent pulmonary valve syndrome and cardiac insufficiency at the time of diagnosis, there was one case of left isomerism with complete heart block and ascites, and one case of atrioventricular canal, one ectopia cordis and one double outlet right ventricle, pulmonary atresia and MAPCAs.

Extracardiac malformations (ECM) were also present (Table 1): omphalocele, cerebellar hypoplasia with ventriculomegaly, diaphragmatic hernia, renal agenesis, brain hypoplasia and no cerebellum, clubfoot and thanatophoric dysplasia.

Extracardiac anomalies (ECA) were as follow (Table 1): lung hypoplasia, pulmonary venous reversal flow, oligohydramion, polyhydramnion, ascites, hydrops testis, thymus hypoplasia, placentitis, micrognathia.

There were 8 neonatal deaths during 60 minutes after delivery, including one intrapartum death and 3 "late" neonatal deaths in the intensive care unit (on 12<sup>th</sup>, 21<sup>st</sup> and 22<sup>nd</sup> day) .

Two neonates underwent cardiac surgery: case "2" with HLHS underwent Rashkind procedure on day 1, pulmonary artery banding on day 10 and Norwood procedure on day 17, demise was on day 21. A second newborn from this series "case nr 8" with diaphragmatic hernia, who underwent FETO procedure, negative prenatal oxygen test, had surgery on day 2 and died on day 22 of postnatal life.

Nr	Prenatal treatment	Time between last US+ ECHO exam and delivery	Way of delivery	Neonatal birth weight	Surgery	Time of the death
1	None	14 days	v	2000		60 min
2	Steroids, Oxygen test negative result	13 days	v	2600	Yes: Rashkind 1st day Pulmonary arteries banding (day 10th) Norwood (day 17th)	21st day
3	Digoxin	2 days	cs	2540		60 min
4	None	7 days	cs	2700		60 min
5	None	10 days	v	2750		2nd day
6	None	2 days	v	1700		5 min
7	None	1 day	v	1500		12th day
8	Steroids, Feto Oxygen test negative result	2 days	v	3000	yes	22nd day
9	None	2 days	cs	2450		30 min
10	None	7 days	v	1450		30 min
11	None	15 days	v	2690		30 min

Table 2: Way of delivery, neonatal birth weight and time of death

In all but one case autopsy was performed confirming prenatal findings. No autopsy was in case of thanatophoric dysplasia, but postmortem X-ray confirmed prenatal findings.

## DISCUSSION

The most frequent cause of death of fetuses and newborns from single pregnancies are congenital malformations and the majority of perinatal deaths may be predicted prenatally by means of ultrasound and fetal echocardiography<sup>1,2</sup>. The majority of babies die immediately prior to birth or in the neonatal period more than in any other time during childhood<sup>3</sup>.

Antenatal diagnosis in 3<sup>rd</sup> trimester (not only prenatal diagnosis in 1<sup>st</sup> and 2<sup>nd</sup> trimester) potentially allows targeted diagnostic testing, planning of delivery, counseling and education of couples and earlier postnatal intervention for newborns with congenital malformations<sup>4</sup>.

Here we focus on the results of advances in fetal evaluation and significance of ultrasound and echocardiography when the primary diagnosis is already known but fetal evaluation in the 3<sup>rd</sup> trimester might be crucial as well. For families who choose to carry the pregnancy to its natural end it is important to establish a personalized plan of care for their baby, both during pregnancy and after delivery.

Such a plan is determined by the accuracy of the diagnosis, therefore we underline the necessity of at least two visits and evaluation by at least two different specialists in cases with fetal life-limiting conditions. This aspect of prenatal evaluation in the most difficult cases, like those presented above, was not underlined so far in publications.

In our earlier publications, we stressed that coexistence of different fetal malformations, in two different organs, is usually an indicator for poor neonatal prognosis. In cases of diaphragmatic hernia and ductal dependent congenital heart defect we had 100% mortality<sup>5</sup>, however in isolated diaphragmatic hernia, the survival rate, even without any invasive prenatal procedures can reach 70%<sup>6</sup>. Other authors also stressed how important complete precise prenatal diagnosis is in such cases<sup>7</sup>.

As in multiple pregnancies there are specific other problems for prenatal life, such pregnancies we excluded from this analysis<sup>8</sup>.

In our group of cases, we had some fetal anomalies, which by definition exist usually only in prenatal life: thanatophoric dysplasia, renal agenesis or brain atrophy<sup>9</sup>. In such cases to foresee the neonatal outcome after proper prenatal evaluation was relatively easy. However in a case of renal agenesis, the first diagnosis was different than the second one because enlarged suprarenal glands were misinterpreted as kidneys. Having these two different opinions, obstetrician decided on cesarean section as a method of delivery. In such cases a third opinion should be taken into account.

The most difficult problems for prenatal counseling were cases with congenital heart defects. In our hospital we follow cases with HLHS, left isomerism or absent pulmonary valve syndrome or pulmonary atresia, who despite early prenatal diagnosis, did very well, were born at term, had successful cardiac surgeries and are still under the supervision of our institute. In 2017 we had total 29 such malformations: 25 HLHS, 1 left isomerism, 1 absent pulmonary valve syndrome and 2 pulmonary atresia.

With the progress of prenatal ultrasound and perinatal medicine we might expect more difficult problems. In the past in some fetal malformations surgical correction could be not available, however it should be presented to expecting parents and discussed with them when other option also “new” one comes to light<sup>10</sup>.

In the past fetal neck masses would mean perinatal death with possible complications for the gravida, but today EXIT procedure can be applied for early relief of airway obstructions or to establish ECMO procedure and perform surgery<sup>11,12,13</sup>.

Furthermore, a rare and difficult case like ectopia cordis currently is not necessarily a lethal anomaly. In actively managed patients with cardiac surgical intervention just after delivery, survival is possible<sup>14,15,16,17</sup>.

Based on previous considerations, it is obvious that counseling parents-to-be, on the possible prenatal and perinatal management has become more and more difficult<sup>18</sup>. We are obliged to present not only the current medical achievements but also a possibility of palliative care<sup>19</sup>. Prenatal diagnosis of a very severe fetal anomaly is a monumental moment in a family's life. When parents-to-be are faced with a severe prenatal diagnosis, and termination of pregnancy was not an option for them, they are confronted with the decision either to delivery vaginally or by cesarean section. Frequently asked question is also how to proceed after the babies' death<sup>19</sup>.

Perinatal child loss due to lethal anomalies is a major life event and a source of serious psychological distress, which can sustain for many years to follow<sup>20-23</sup>. However it is also a stressful situation for the perinatal team, which should also be prepared for such a situation especially in tertiary centers<sup>24-27</sup>.

We would propose for our health system, a special nurse or midwife to be a permanent member of perinatal team serving as a coordinator of special delivery arrangement for such special situations separating them from normal, successful deliveries. Such a team, with the special role of nurse coordinator was already described as Fetal Concerns Program for instance in Medical College of Wisconsin<sup>24</sup>. The clinical psychologist for counseling these patients could also be available.

The limitations of this evaluation are a relatively small number of cases. However, only a limited period of time was evaluated: 12 months, the year 2017, to check how often we would need a “Special Delivery Team”. Average of once per month seems quite often for such difficult situations.

Presenting this data, we realized that in this series of cases, despite expectations of poor prognosis, some newborns died just after birth and in the other group intensive care was introduced with no space for comfort care as alternate method of care. Provision of intensive care did not prevent death of infants affected by life-limiting conditions. So it seems that despite the growing

recognition of importance of palliative and end-of-life care for the fetus or newborn<sup>26</sup>, this form of postnatal care was not implemented for patients from prenatal diagnosis from our unit in 2017. In clarification: comfort care does exist as a method of care in our hospital for newborns with multiple problems...but for some reason it was not considered for the presented series of fetuses with dismal prenatal diagnoses in our unit in 2017.

One of the explanations of this situation may be the presence of the Gajusz Foundation<sup>28</sup> in our city, which provides support to families in the form of prenatal hospice care. ([www.gajuszfoundation.org](http://www.gajuszfoundation.org))

## CONCLUSIONS:

In the most severe cases when fetal or neonatal demise was suspected, the two different opinions of specialist might not be enough and a third opinion should be recommended before final decision.

A Fetal team of specialists is necessary in cases of expected fetal/neonatal demise in order to prepare a written report of recommended perinatal management for gravida and fetus / neonate

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#### ● Comment to original paper

## PRENATAL 3<sup>RD</sup> TRIMESTER EXPECTATION OF FETAL OR NEONATAL DEMISE AND PERINATAL TEAM APPROACH - COMMENT



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Dr. Krekora and colleagues present a prospective evaluation of selected cases of third trimester pregnancies complicated by severe fetal anomalies from 2017.<sup>1</sup> They describe the importance of a multidisciplinary team approach to evaluation of the fetus, especially diagnosis-based prognosis. They address two central clinical ethical questions in the management of such pregnancies: When should obstetric non-intervention accompanied by palliative care be offered during the perinatal period to the pregnant woman?; and, When should neonatal non-intervention accompanied by palliative care be offered during the perinatal period to the parents?

Third-trimester fetuses, including those with severe anomalies, are fetal patients when the pregnant woman presents for obstetric management. The physician

and other members of the interdisciplinary team have beneficence-based ethical obligations to the fetal patient, as well as beneficence-based and autonomy-based ethical obligations to the pregnant woman. None of these obligations is absolute, i.e., unlimited. Instead, each is *prima facie*: all three must be considered and, when they conflict, prioritized on the basis of reasoned clinical ethical judgment.<sup>2</sup> In the case of severe fetal anomalies, this means that the team should be attentive to diagnoses and prognoses that justify setting limits on the beneficence-based ethical obligation to intervene to prevent the death of the fetal and neonatal patient.

We have argued elsewhere that such limits are reached when either of two criteria for a severe fetal anomaly apply: (a) there is certain or near certain diagnosis of a condition

that, even with intervention, is expected to result in perinatal death; or (b) there is a certain of near certain diagnosis of a condition that, even with intervention, that results in short-term survival but with severe and irreversible loss of cognitive developmental capacity.<sup>2</sup> Examples of diagnoses that meet the first criterion include anencephaly or triploidy. Examples of diagnoses that meet the second criterion include alobar holoprosencephaly or trisomy 13.

When either criterion is satisfied in evidence-based clinical judgment, the beneficence-based ethical obligation to intervene to prevent death has reached its limit: obstetric non-intervention is ethically permissible, with perinatal management based only on maternal indications. Neonatal non-intervention is also ethically permissible, which includes foregoing resuscitation in the delivery room and transfer to the neonatal critical care unit. It follows that obstetric and neonatal non-intervention are both medically reasonable and should be offered during the perinatal counseling process.

Some pregnant women may indicate that they want to consider obstetric intervention to increase the probability of livebirth and time with their baby before death occurs. The interdisciplinary team should make clear that cesarean delivery carries clinical risk for the current and all future pregnancies and that the pregnant woman has no beneficence-based ethical obligation to her fetus or baby to take these risks to herself and that taking these maternal risks will not improve neonatal outcomes. If, after careful consideration on her part and having her questions and concerns addressed, she requests cesarean delivery for fetal indications, it is ethically permissible to implement this management plan to support what the woman and her partner view as an important psychosocial benefit. Religious and spiritual values may play a prominent role in such cases and should be respected.

At the same, the prospective parents should understand that, when the first criterion applies, neonatal critical care will not alter the outcome of perinatal death and will result in net clinical harm to the neonatal patient from intubation and other forms of critical care. This is not compatible with the best interests of the child standard in pediatric ethics.<sup>2</sup> The team should therefore make it very clear that obstetric intervention followed by palliative care is the only medically reasonable alternative. The team should therefore strongly recommend neonatal non-intervention.

When the second criterion applies, obstetric intervention is ethically permissible for the reasons just explained. The ethical permissibility of neonatal critical care is complex: while it may increase the probability of longer-term survival, it will not alter the cognitive developmental outcome. The team should support the prospective parents who are considering neonatal care to understand its considerable iatrogenic burdens and that, in such cases, there will no offsetting benefit other than mere survival. The neonatologist on team should make it very clear that, as iatrogenic burdens mount, the neonatology team may recommend discontinuation of neonatal care and initiation of palliative care.

Perinatal ethics<sup>2</sup> thus provides a clinically comprehensive approach to clinical ethical judgment about severe fetal anomalies diagnosed during the third trimester and perinatal counseling of prospective parents. Multidisciplinary teams should implement this approach when a severe fetal anomaly has been diagnosed in the third trimester.

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