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PERINATAL OUTCOMES OF THORACOAMNIOTIC SHUNTING FOR FETAL PLEURAL EFFUSION AT HANOI OBSTETRICS AND GYNECOLOGY HOSPITAL

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ABSTRACT

Objectives: To evaluate the perinatal outcomes of thoracoamniotic shunting for fetal pleural effusion at Hanoi Obstetrics and Gynecology Hospital.

Materials and Methods: A prospective descriptive study was conducted on 11 cases diagnosed with fetal pleural effusion indicated for thoracoamniotic shunting at Hanoi Obstetrics and Gynecology Hospital from May 2025 to March 2026.

Results: The mean gestational age at birth was 34.58 ± 1.71 weeks, with no cases of full-term delivery. 100% of cases were delivered via Cesarean section. The mean birth weight was 2486 ± 427.84 grams. Infants weighing over 2500 grams accounted for 54.5%. The average Apgar scores at 1 and 5 minutes were 7 ± 1.18 and 8.09 ± 0.94, respectively. Postnatal pleural effusion recurrence was recorded in 27.3% of cases. No mortality was recorded within the first 24 hours after birth. At 28 days postnatal, there were 4 deaths (36.36%).

Conclusion: Thoracoamniotic shunting helps prolong pregnancy and improves early neonatal status in fetuses with pleural effusion. The survival rate in the first 24 hours is high. However, the risk of postnatal mortality remains, primarily related to recurrent pleural effusion and respiratory distress.

Keywords: Fetal pleural effusion, drainage shunt, neonate.

1. INTRODUCTION

Fetal pleural effusion is a rare condition with an estimated incidence of approximately 1/15,000 pregnancies[1],[2]. Fetal pleural effusion, whether unilateral or bilateral, may be primary (due to chylothorax) or secondary (as part of systemic fluid accumulation related to immune or non-immune hydrops fetalis) [1], [3]. In general, the clinical course of fetal pleural effusion is unpredictable [4]. This fact poses challenges for both prenatal diagnosis and management.

The management of fetal pleural effusion is complicated by the difficulty in distinguishing between primary and secondary effusion. Regardless of the underlying etiology, fetal pleural effusion is a potential cause of fetal and neonatal mortality [3], [5]. Neonates with pleural effusion often present with severe respiratory distress and high mortality during the neonatal period. The overall neonatal mortality rate is 25%, ranging from 15% in isolated pleural effusion to 95% in cases of generalized hydrops [6].

Currently, thoracoamniotic shunting to drain fluid into the amniotic cavity is a preferred option in prenatal therapy for fetal pleural effusion, applied in many fetal medicine centers worldwide for continuous intrauterine decompression. In Vietnam, there are currently no studies on this treatment method, with a particular focus on neonatal outcomes. Therefore, we conducted the study: "Perinatal outcomes of thoracoamniotic shunting for fetal pleural effusion at Hanoi Obstetrics and Gynecology Hospital"

2. MATERIALS AND METHODS

2.1. Study Subjects

The study included all cases diagnosed with fetal pleural effusion and indicated for thoracoamniotic shunt placement at Hanoi Obstetrics and Gynecology Hospital from May 2025 to March 2026.

- Inclusion Criteria:

+ Pleural effusion causing compression of adjacent organs (lungs, heart, mediastinum).

+ Evidence of fetal heart failure or hydrops fetalis.

+ Recurrent pleural effusion following an initial thoracentesis.

+ Gestational age between 18 and 34 weeks.

+ Voluntary consent to participate in the study.

- Exclusion Criteria:

+ Fetal demise and/or severe congenital malformations, diagnosed chromosomal abnormalities, or genetic disorders.

+ Intrauterine infection.

+ Obstetric emergencies (e.g., eclampsia, placental abruption).

+ Systemic maternal infection.

+ Maternal allergy to all types of local or general anesthesia.

2.2. Methods

Study Design: Prospective descriptive study.

Sample Size: Convenience sampling was used, selecting all eligible cases during the study period, resulting in a sample of 11 subjects.

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2.3. Research Ethics

The study was approved by the Ethics Committee of Hanoi Obstetrics and Gynecology Hospital.

3. RESULTS

Table 1. Gestational age at birth and mode of delivery

Birth Characteristics		n =11	%
Gestational age (weeks)	< 28 weeks	0	0
	28-34 weeks	2	18.2
	34-37 weeks	9	81.8
	> 37 weeks	0	0
	Mean ± SD	34.58 ± 1.71	
	Min -Max	31 – 36.5	
Mode of delivery	Vaginal delivery	0	0
	Cesarean section	11	100

The mean gestational age at birth was 34.58 ± 1.71 weeks. There were no full-term births. 100% of cases were delivered by Cesarean section.

Table 2. Neonatal characteristics

Neonatal Characteristics		n =11	%
Birth weight (grams)	<1000gr	0	0
	1000– 1500gr	1	9.1
	1500– 2500gr	4	36.4
	>2500gr	6	54.5
	Mean ± SD (gram)	2486 ± 427.84	
	Min - Max	1350 - 2900	
Apgar 1 minute	Mean ± SD	7 ± 1.18	
	Min - Max	4	8
Apgar 5 minute	Mean ± SD	8.09 ± 0.94	
	Min - Max	6	9

The mean birth weight was 2486 ± 427.84 grams. Infants weighing over 2500 grams accounted for 54.5%. Average Apgar scores at 1 and 5 minutes were 7 ± 1.18 and 8.09 ± 0.94, respectively.

Table 3. Postnatal pleural effusion status

Postnatal Pleural Effusion	n =11	%
Yes	4	36.36
No	7	63.64

Postnatal pleural effusion recurrence was recorded in 36.36% of cases.

Table 4. Postoperative survival rate

Survival Rate		n =11	%
24h Postnatal	Alive	11	100
	Deceased	0	0
> 28 days Postnatal	Alive	7	63.64
	Deceased	4	36.36

No deaths were recorded within the first 24 hours. At 28 days postnatal, there were 4 deaths (36.36%).

Table 5. Characteristics of deceased infants

Characteristics of deceased infants		n = 4	%
Postnatal pleural effusion		4	100
Pre-intervention characteristics	Bilateral pleural effusion	3	75.0
	Pre-intervention Hydrops Fetalis	4	100

There were 4 deaths, and 100% of these cases had recurrent pleural effusion after shunt removal, leading to respiratory failure and death.

4. DISCUSSION

The study recorded a mean gestational age at birth of 34.58 ±1.71 weeks (31 to 36.5 weeks). Although no cases reached full term (≥ 37 weeks 0 day), maintaining most pregnancies until after 30 weeks is a positive signal. This result demonstrates that for fetal pleural effusion, which typically has a severe prognosis, shunt intervention and active monitoring helped prolong the pregnancy to a stage where neonatal adaptation and survival rates improved significantly compared to extremely preterm groups.

Notably, 100% of cases underwent cesarean sections. The primary reasons for early termination included signs of spontaneous labor, fetal distress, or concerns regarding worsening clinical progression. The preference for cesarean delivery reflects a risk management strategy to ensure maximum fetal safety and active control of the neonatal resuscitation process, particularly for high-risk pregnancies following fetal intervention. The gestational age results are similar to the study by Y. Yinon et al. (34.2 weeks); however, there were distinct differences in full-term delivery rates (47.3%) and vaginal delivery rates (52.7%) [6]. Compared to Ba-Da Jeong et al., the mean gestational age was 33.6 weeks with a high preterm birth rate (88.89%), but their cesarean section rate was only 58.7% [7]. These differences may stem from variations in termination criteria, post-intervention management strategies, neonatal resuscitation capacity, and clinical practice conditions between centers. The mean birth weight reached 2486 ± 427.84 grams, with more than 54.5% of infants weighing ≥ 2500 grams and no cases of extremely low birth weight (< 1000 grams). Apgar scores improved markedly from 1 minute (7 ± 1.18) to 5 minutes (8.09 ± 0.94), indicating good postnatal recovery. Because the timing of delivery was not too early and the fetal lungs were well-decompressed by the intrauterine shunt, the lung parenchyma had the opportunity to develop and expand effectively immediately after birth. At Hanoi Obstetrics and Gynecology Hospital, the obstetric-neonatal coordination protocol is strictly implemented; neonatal teams are always present for timely resuscitation. This multidisciplinary approach optimizes clinical outcomes for neonates with complex medical histories and prior invasive interventions.

Immediately after birth, the thoracoamniotic shunt is removed, and the site is secured with pressure dressing to prevent pneumothorax. However, 36.36% of cases still experienced recurrent postnatal pleural effusion with increasing severity, causing acute respiratory distress requiring invasive or non-invasive ventilation (CPAP/Intubation). Most recurrences occurred within the first 24 hours, suggesting this is a "golden" window requiring

close monitoring of respiratory function and pleural imaging for infants with a history of intrauterine shunting.

Although the survival rate after the first 24 hours was 100%, the late neonatal mortality rate (after 28 days) was 36.36% (4 cases). While specific causes of death after 28 days were not clearly defined through clinical and paraclinical evaluations, clinical data showed that postnatal effusion recurrence (4/4 cases) was the triggering factor for irreversible respiratory distress syndrome. This represents the greatest barrier in neonatal resuscitation and a primary concern for the medical team.

Retrospective analysis of pre-intervention prognostic factors showed a close correlation between disease severity and neonatal outcomes. Specifically, 100% (4/4) of deaths involved hydrops fetalis, and 75% (3/4) presented with bilateral pleural effusion prior to shunt placement. In the context of fetal pleural effusion, hydrops and extensive effusion reflect not only severe hemodynamic disturbance but also poor prognostic indicators, predicting a high risk of mortality despite intrauterine decompression intervention.

5. CONCLUSION

Thoracoamniotic shunt placement is an effective fetal intervention that prolongs mean gestational age to 34.58 ± 1.71 weeks and facilitates better lung development post-decompression. The selection of Cesarean delivery and multidisciplinary Obstetric-Neonatal coordination play crucial roles in risk management and resuscitation optimization. Although the 24-hour survival rate reached 100% with marked Apgar improvement, the study still recorded a late postnatal mortality rate of 36.36%. Postnatal recurrence of pleural effusion leading to irreversible respiratory failure, along with pre-intervention hydrops and bilateral effusion, are key poor prognostic factors. These results affirm the need for specialized respiratory monitoring in the first 24 hours postnatal for children with a history of intrauterine shunting and highlight the need for further in-depth research to improve neonatal outcomes, especially in high-risk groups.

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