The Necessity of Systemic Ultrasound Examination for Neonate within One Week in Taiwan: Two Cases Reports

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Abstract: Many congenital abdominal anomalies and tumors are asymptomatic and easily miss early detection. Ultrasound examinations, non-invasive and safe, play a crucial role in diagnosing congenital abnormalities. We advocate neonatal ultrasound screening programs encompassing multiple systems, aiding early disease diagnosis and prompt intervention. This article reported two cases that missed prenatal examination and found abnormalities through a ultrasound program within one week after birth.

Keywords: Neonatal Ultrasound Screening, Congenital Abnormalities, Systemic Sonography, Congenital Mesoblastic Nephroma, Liver Hemangioma.

INTRODUCTION

In Taiwan, people are fortunate to have National Health Insurance and a screening program for every neonate [1]. The screening is conducted within a few days of the baby's birth by a laboratory blood test, focusing on detecting congenital metabolic diseases. However, many anatomical congenital diseases, such as heart defects or tumors, cannot be uncovered simply by laboratory tests [2]. According to the WHO database, the most common severe congenital disorders are heart defects and neural tube defects; those disease screenings were missed in our routine program because the image examination was not included. Hence, the importance of additional systemic Sonography, including examinations of the heart, brain, kidneys, abdomen, and hip joints after birth, should be emphasized, even though the National Health Insurance program does not currently cover this program. We reported two cases with incomplete prenatal exams that were asymptomatic but had determined the congenital disease by additional systemic Sonography. These examples proved the benefit of sonography examination for newborns.

CASE PRESENTATION

Case One

A male neonate (*In vitro* fertilization, IVF, DCDA Twin) was born to a 39-year-old mother via Cesarean Section (due to breech position and twin) at 36 weeks gestational age. She did not take antenatal examinations regularly. After delivery, there was no specific finding on routine physical examination and health screening. A serious ultrasound examination was suggested for detailed exams, including heart, brain, kidney, abdomen, and hip joints at an outpatient clinic. A kidney ultrasound revealed a well-defined hetero-echogenicity mass lesion from the left kidney lower pole, 3.1x3.0 cm in size, with vascular

Figure 1: Coronal CT image of a left hypodense renal tumor.

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enhancement. A further abdominal CT suspected left renal nephroma or nephroblastoma (Figure **1**). The lab test of tumor markers: B-HCG: 15.69 * mIU/mL, AFP(EIA): 139491* ng/mL, both elevated.

Therefore, under the tentative diagnosis of Wilms tumor, the patient received a left nephrectomy (Figure **2**). The operative finding showed a tumor on the left kidney surface, 4cm*3cm*3cm in size. There were few clean ascites, no paraaortic lymph node enlargement, and mild torsion of renal vessels. The final pathology reported classical congenital mesoblastic nephroma. The patient tolerated the operation smoothly. He was discharged at POD10 and following up at OPD for renal function (BUN/Cr) as well as kidney ultrasound monthly.

Figure 2: Postoperative image of left nephrectomy specimen.

Case Two

A female neonate was born to a healthy 28-year-old mother (Gravida1 Para1 Abortion0) via Normal Spontaneous Delivery at 40+1 weeks gestational age. The mother also did not receive regular antenatal examinations. After delivery, there was no significant finding on routine neonate screening. We suggested a systemic ultrasound examination due to an irregular prenatal examination. A hepatic mass lesion was found on abdominal Sonography, with the size of 3.87cm * 3.61cm over the right posterior segment, presenting a heterogeneous and hypoechoic nature. Besides, the tumor margin was unclear, and the surrounding blood flow increased (Figure **3**). The patient received abdominal CT and reported hemangioma or hepatoblastoma. Then confirmed hemangioma by MRI. After discussing with the surgeon, the patient did not receive a biopsy due to the high risk of bleeding. Now, the patient continues to follow-up liver Sonography monthly and starts Propranolol at an outpatient clinic.

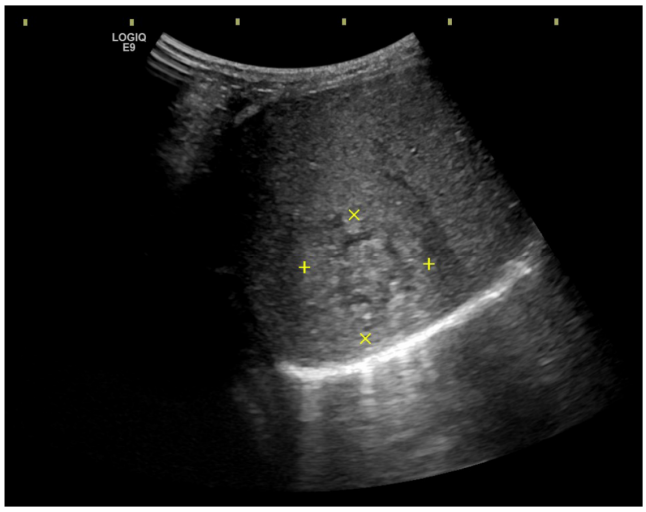

Figure 3: Abdominal ultrasound image of a neonate with a liver mass.

DISCUSSION

In 2022, Taiwan reported the lowest fertility rate in the world, and its growth was negative for the following three years [3]. Hence, newborn screening is essential in guaranteeing a baby's health after birth. Most congenital structural abnormalities are asymptomatic and cannot be diagnosed by external appearance or laboratory tests. The diagnosis is usually late to symptoms appear, and the damage is already done. Early detection is a manifest demand. Ultrasound examination is a non-invasive, safe, and painless way to inspect the organs inside the body and observe the structure from different angles using a probe. It is considered an essential tool for diagnosing congenital abnormalities in newborns. With early detection, various diseases can be diagnosed and treated promptly to avoid serious complications. We propose a systemic ultrasound examination performed within one week after birth, including five systems: brain, heart, abdomen, kidney, and hip joint, to detect congenital disease early [4]. The programs involve several key checks. Brain Sonography checks for abnormalities in

ventricles and structure and screens for congenital brain structural abnormalities such as cerebral hemorrhage, cerebral embolism, hydrocephalus, subdural hemorrhage, and other brain lesions. Heart Sonography is used to identify congenital structural heart diseases, which can't be diagnosed solely by prenatal fetal Sonography or newborn oxygen saturation screening [5]. Abdominal Sonography, currently the best tool for newborn abdominal screening, is used to examine abdominal organs, such as the liver, gallbladder, pancreas, spleen, and portal vein, to assess for abnormalities or other diseases [6]. Kidney Sonography screens for abnormalities in the urinary system and abnormal kidney structures and checks for abnormal tumor lesions [7]. Finally, Hip Joint Sonography is performed to assess the structure and stability of the hip joint [8]. These systemic screenings will benefit many families, especially those who missed antenatal examinations.

ETHICAL APPROVAL AND CONSENT

Parental consent was obtained for both reported cases. This study adheres to ethical guidelines and was approved by the institutional review board (IRB) of our medical institution.

LIMITATION

This study is limited by its small sample size, also the self-paid nature introduces selection bias. We will proceed with larger prospective studies to make more convincing evidence.

CONCLUSION

Our cases demonstrate the importance of systemic ultrasound in detecting congenital conditions, allowing for early intervention. We recommend that all newborns undergo an ultrasound within one week of birth, and National Health Insurance will cover the standard neonatal screenings. This is cost-effective and has significant health benefits. Furthermore, it would be beneficial to Taiwan's future if the systemic ultrasound program could be included in the National Health Insurance program.

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