How to Cite
Koridze, N., Morchadze, M., Dadiani, T., Kargadze, N., Sulava, M., Kebadze, K., Modebadze, M., Dvaladze, M., Azikuri, K., & Gogshadze, S. (2025). Antenatal ultrasonographic detection of a rare intrauterine unilateral renal mass: A case of Congenital Wilms' Tumor. *International Journal of Health & Medical Sciences*, *8*(2), 30-38. https://doi.org/10.21744/ijhms.v8n2.2390

Antenatal Ultrasonographic Detection of a Rare Intrauterine Unilateral Renal Mass: A case of Congenital Wilms' Tumor

Niko Koridze, MD.
Lecturer, PhD researcher, Department of Obstetrics and Gynecology, Zhordania Medical Center, Tbilisi, Georgia Tbilisi, Georgia
Email: Nikokoridze2@gmail.com

Mariam Morchadze, MD.
Lecturer, Medical Expert in the Institution of Social Research, Tbilisi, Georgia
Email: Mmorchadze481@gmail.com

Tsotne Dadiani, MD.
Department of Obstetrics and Gynecology, Zhordania Medical Center, Tbilisi, Georgia
Endoscopic Surgeon Lecturer, Tbilisi, Georgia
Email: tsotnedadiani@yahoo.com

Nino Kargadze, MD., PhD.
Department of Obstetrics and Gynecology, Zhordania, Medical Center Neonatologist, Head of the Neonatal Intensive Care Unit (NICU) Tbilisi, Georgia
Email: nkargadze@gmail.com

Mariam Sulava, MD.
Department of Obstetrics and Gynecology, Reproductive Medicine, Zhordania Medical Center Tbilisi, Georgia
Email: m_sulava@yahoo.com

Keti Kebadze
Tbilisi State Medical University, Faculty of Medicine, Tbilisi, Georgia
Email: kebadze.k@gmail.com
https://orcid.org/ 0009-0001-5468-1804

Melita Modebadze
Faculty of Medicine Tbilisi, Caucasus International University, Georgia
Email: melita.modebadze@ciu.edu.ge

Mariam Dvaladze
Faculty of Medicine, Tbilisi State Medical University, Tbilisi, Georgia
Email: mariamdvaladze17@gmail.com

Ketevani Azikuri
Faculty of Medicine, Tbilisi State Medical University, Tbilisi, Georgia

Sofiko Gogshadze
Faculty of Medicine, Tbilisi State Medical University, Tbilisi, Georgia
Email: goshadzesofo1@gmail.com

ISSN 2632-9433
Submitted: 09 March 2025 |Revised: 27 April 2025 | Accepted: 18 May 2025

Abstract---*Congenital Wilms' tumor is an exceptionally rare variant of nephroblastoma, diagnosed either in utero or within the first 30 days of life. Its clinical presentation and biological behavior may differ from the typical pediatric form, requiring a specialized approach to diagnosis and treatment. We present a case of a full-term newborn with a unilateral congenital Wilms' tumor, initially detected during prenatal ultrasonography as an abdominal mass. Postnatal evaluations, including contrast-enhanced computed tomography (CT) and laboratory studies, confirmed the presence of a renal tumor confined to the left kidney. The patient underwent surgical resection via nephrectomy on day seven of life. Histopathological examination revealed Wilms' tumor stage II based on surgical and pathological findings. Postoperative recovery was uneventful, and the patient was started on adjuvant chemotherapy according to pediatric oncology protocols. This case underscores the value of early prenatal detection, multidisciplinary management, and individualized therapeutic planning in achieving favorable outcomes for neonates with congenital Wilms' tumor.*

Keywords---*congenital, infants, nephroblastoma, unilateral, Wilms tumor.*

Introduction

Wilms' tumor (nephroblastoma) is the most common primary renal malignancy in childhood, presenting between 3 and 5 years of age. It accounts for approximately 6% of all pediatric cancers, with an incidence of about 1 in 10,000 children. Diagnosis is usually made postnatally, following the identification of an abdominal mass or incidentally during imaging. Antenatal detection of Wilms' tumor is exceedingly rare, with only a few cases reported in the literature. This rarity presents significant clinical challenges, particularly in distinguishing Wilms tumor from other congenital renal masses such as mesoblastic nephroma, multicystic dysplastic kidney, or adrenal neuroblastoma (Martínez et al., 2010).

We report the case of a male neonate, in whom a unilateral left renal mass was identified antenatally at 28 weeks of gestation via routine ultrasonographic evaluation. The pregnancy was complicated by fetal overgrowth, with an estimated fetal weight above the 99th percentile, and third-trimester polyhydramnios. While Wilms' tumor is not typically associated with macrosomia or polyhydramnios, such findings may reflect tumor-related physiological effects or syndromic overlap (Naggar et al., 2024).

Antenatal identification demands a multidisciplinary approach and impacts obstetric planning and neonatal care. This case emphasizes the need to include Wilms' tumor in the differential diagnosis of fetal renal masses and highlights the challenges and considerations inherent to prenatal tumor detection (Neville & Ritchey, 2000).

Case presentation

A 27-year-old primigravida (G1P0) underwent routine antenatal ultrasound at 28 weeks of gestation, which revealed a unilateral left renal mass in the fetus. The lesion measured 53 × 32 × 35 mm, had well-defined margins, and was located near the lower pole of the left kidney. A vascularized component measuring approximately 24 mm was also noted. There was no evidence of hydronephrosis, and the right kidney appeared normal in size and morphology (Safaei et al., 2023).

The pregnancy was additionally complicated by significant fetal overgrowth, with an estimated fetal weight above the 99th percentile, and polyhydramnios was noted in the third trimester. These findings prompted close monitoring and early involvement of a multidisciplinary team, including specialists in obstetrics, neonatology, radiology, and pediatric oncology. A follow-up ultrasound at 30 weeks showed progressive enlargement of the left renal mass. (*Figure 1.1, 1.2, 1.3*)

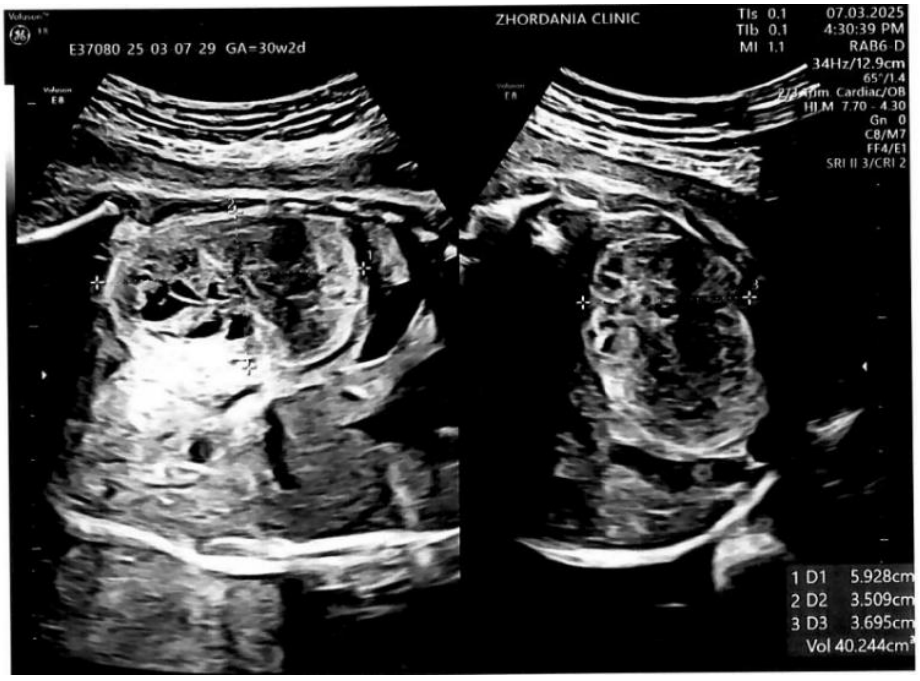

Figure 1.1

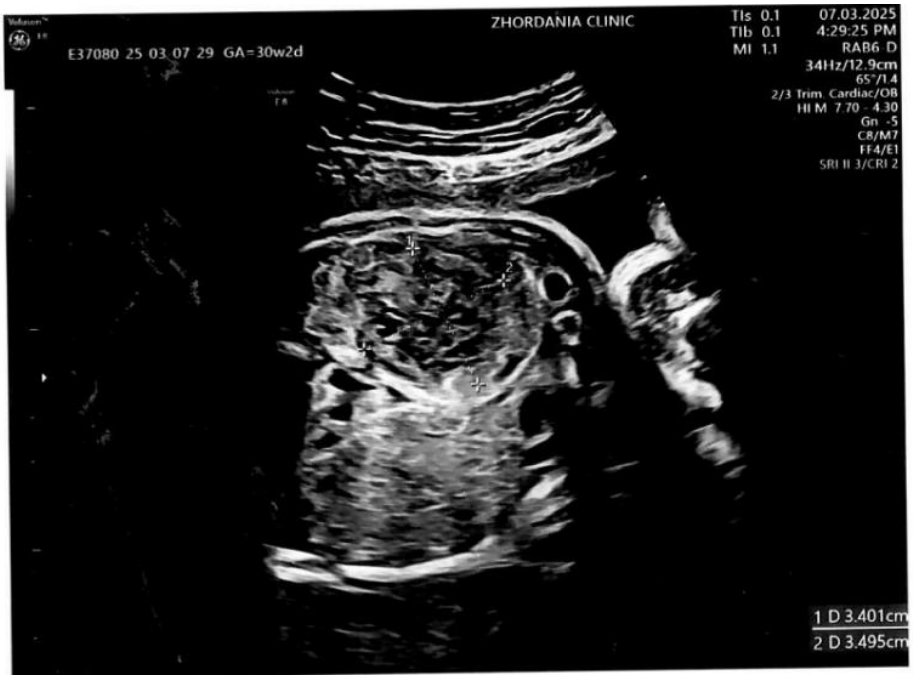

Figure 1.2

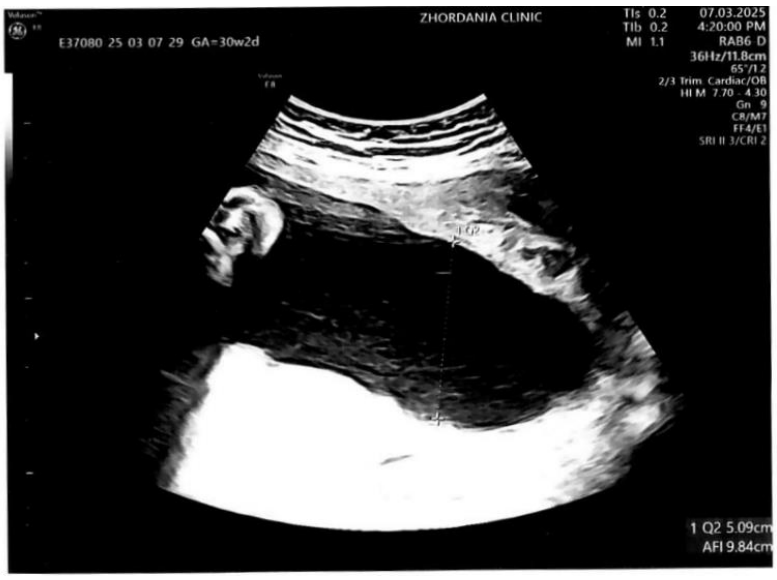

Figure 1.3

By 34 weeks' gestation, ultrasound revealed further changes. The left kidney measured 60 × 40 × 50 mm and maintained normal parenchymal echogenicity. The lower pole lesion appeared as a well-demarcated soft tissue mass measuring 34 × 32 mm, with internal anechoic regions and active peripheral vascularization on Doppler imaging (Figure 2.1, 2.2, 2.3, 2.4). The right kidney continued to appear normal. The amniotic fluid index (AFI) was elevated to 34 cm (reference range: 5–24 cm), confirming polyhydramnios. Estimated fetal weight remained above the 99th percentile for gestational age, consistent with marked fetal overgrowth.

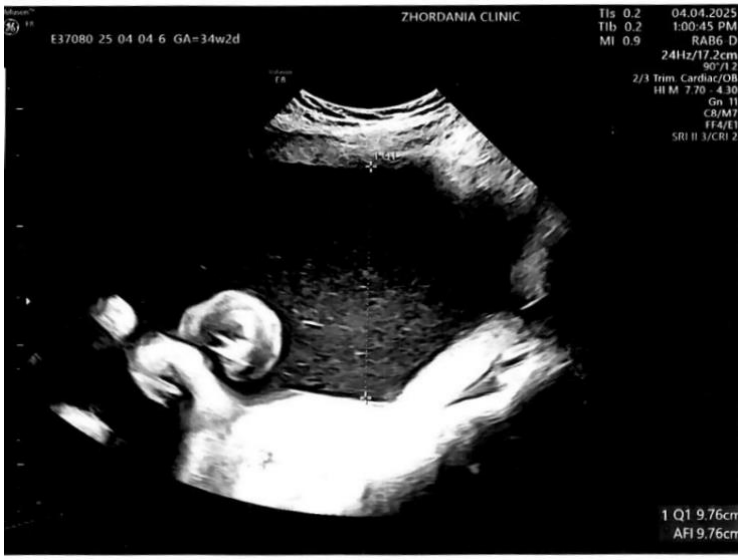

Figure 2.1

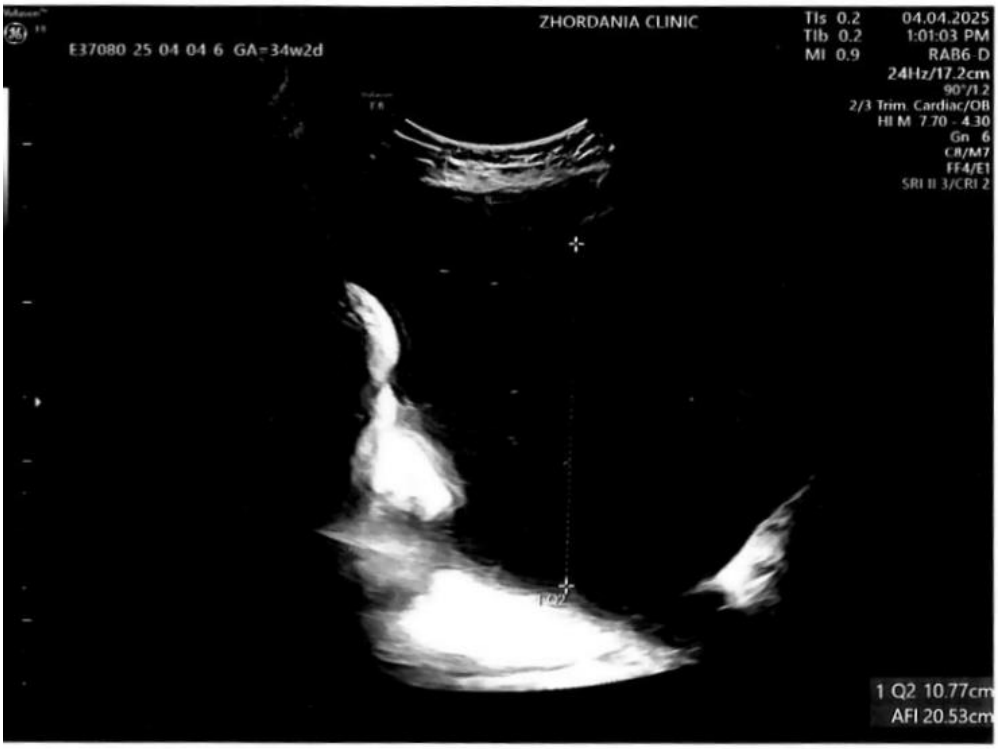

Figure 2.2

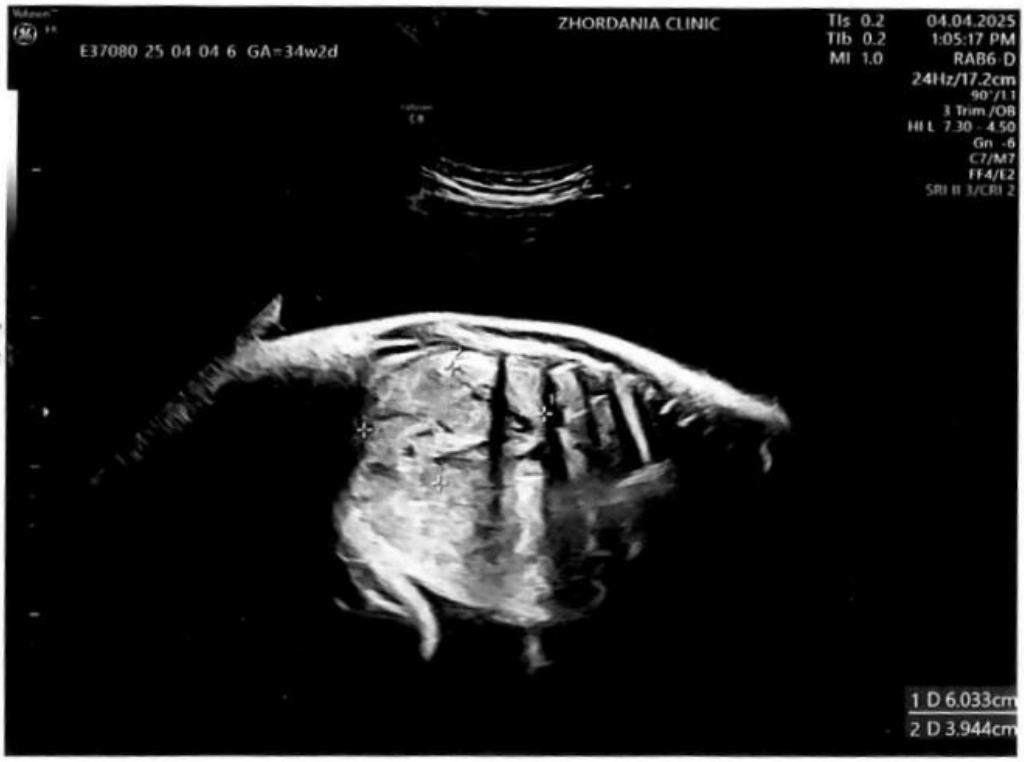

Figure 2.3

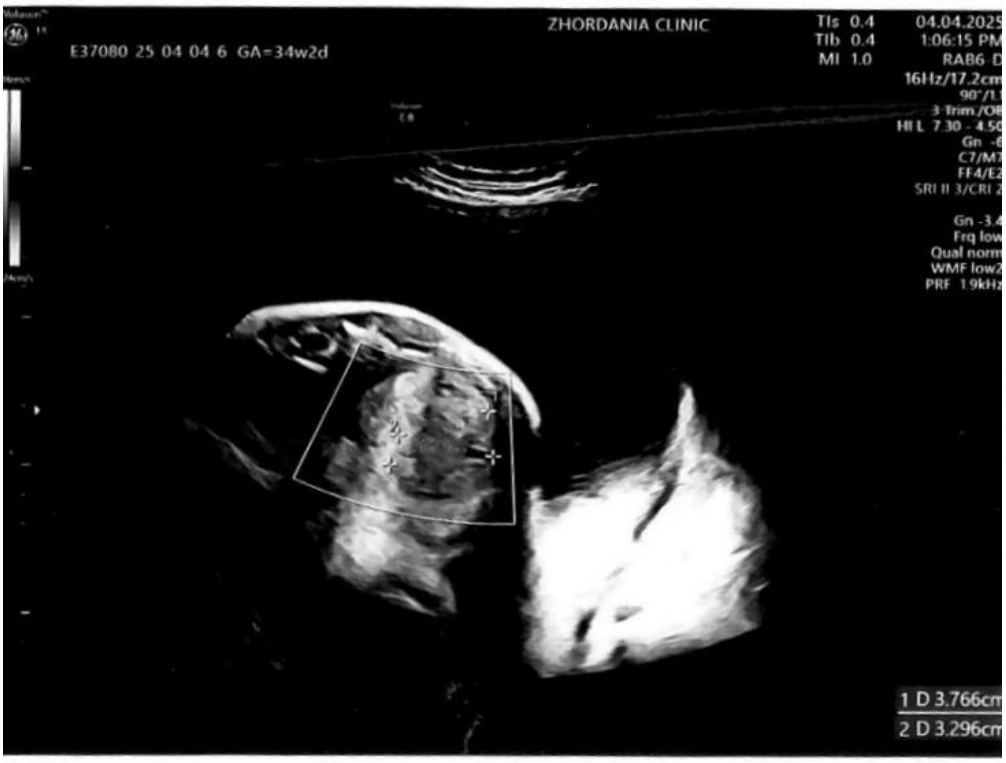

Figure 2.4

At 34 weeks and 2 days of gestation, the mother was admitted with the following clinical complications: large-for-gestational-age fetus, polyhydramnios of moderate severity, acutely progressing over the previous two weeks, suspected renal anomaly of the left kidney, doppler ultrasonography of the umbilical artery showed a Pulsatility Index (PI) above the 99th percentile. Cervical assessment using the Bishop score revealed a score of >6, indicating favorable conditions for labor induction. Due to the severity of polyhydramnios, fetal macrosomia, and progressive renal mass, induction of labor with oxytocin was initiated according to obstetric protocols. A full course of antenatal corticosteroids was administered to promote the prevention of respiratory distress syndrome. The patient delivered a preterm male neonate via epidural anesthesia. Neonate birth weight was 3000 g, length of 50 cm, and Apgar scores of 8/8 at 1 and 5 minutes, respectively. The total duration of labor was 9 hours and 10 minutes. Postpartum, the mother remained in stable condition and was transferred to the obstetric ward for further monitoring and care.

Postnatal adaptation was satisfactory. Thermal regulation was maintained with skin-to-skin contact and radiant warmer support. The newborn tolerated early enteral feeding and passed urine and meconium spontaneously. On examination, a firm, non-tender mass was palpable in the left flank.

Vital signs remained within age-appropriate limits. As part of the routine neonatal workup, a venous blood gas (VBG) analysis was performed shortly after birth, which revealed findings consistent with metabolic acidosis, likely related to prematurity and perinatal stress (Govender, 2000).

Initial laboratory investigations, including complete blood count (CBC), C-reactive protein (CRP), blood glucose, and blood grouping, were performed upon admission. The patient's blood group was identified as B (III) Rh-positive. Although the CRP level was within normal limits, the CBC revealed subtle signs of an altered immune profile. Specifically, there was relative neutrophilia (neutrophils 60.4%), lymphopenia (lymphocytes 29.5%), monocytosis (monocytes 9.2%), and a slight decrease in eosinophils (absolute eosinophil count: 0.03 $\times 10^9$/L). These findings suggested a possible stress response or early inflammatory activity despite the absence of overt infection.

A postnatal abdominal ultrasound revealed a well-circumscribed cystic-solid mass measuring 89×83 mm in the region of the left kidney, with active vascularization and absence of a distinguishable left kidney. The right kidney and other abdominal organs appeared normal (Daniel, 2006).

The neonate was referred to a tertiary pediatric center for further evaluation. Contrast-enhanced CT imaging confirmed a large, heterogeneous, ovoid mass (6.7×6.8×8.5 cm) arising from the middle and lower poles of the left

kidney. The mass contained alternating regions of soft tissue and fluid density, with abnormally dilated vascular channels and significant mass effect on adjacent abdominal organs. The left adrenal gland was not visualized. No lymphadenopathy or distant metastasis was seen. A transthoracic echocardiogram revealed mild left ventricular hypertrophy (IVSd: 5.5 mm; LVPWd: 4.0 mm) and a patent ductus arteriosus (PDA). No structural heart defects were identified. A cranial ultrasound showed minor signs of perinatal hypoxia, without major hemorrhagic or structural abnormalities.

Further laboratory investigations were conducted as part of the neonatal evaluation. At that time, inflammatory markers were elevated, with a C-reactive protein (CRP) level of 12 mg/L and a procalcitonin (PCT) concentration of 0.329 ng/mL, findings consistent with a low-grade systemic inflammatory response.

Complete blood count revealed a slightly reduced eosinophil count (0.01 $\times 10^9$/L) and a modest increase in monocyte percentage (11.8%). Additionally, red cell distribution width was elevated (RDW-SD: 73.7 fL; RDW-CV: 19.0%), indicating a degree of anisocytosis that may reflect a response to physiological stress or ongoing hematologic adaptation.

Coagulation studies demonstrated a markedly decreased fibrinogen level (0.25 g/L), although all other parameters, including prothrombin time and activated partial thromboplastin time, remained within normal limits. Liver enzyme analysis showed a mildly elevated aspartate aminotransferase (AST) at 64 U/L and a significantly increased gamma-glutamyl transferase (GGT) at 198 U/L. Total bilirubin was elevated at 195.2 μmol/L, findings that could be associated with neonatal cholestasis or hepatic immaturity.

Renal function tests, including serum urea and creatinine, were within the expected neonatal reference ranges. Endocrine and hormonal screening showed normal levels of 17-hydroxyprogesterone, adrenocorticotropic hormone (ACTH), alpha-fetoprotein (AFP), dehydroepiandrosterone sulfate (DHEA-S), cortisol, and free thyroxine (fT4). However, thyroid-stimulating hormone (TSH) was decreased at 0.157 μIU/mL, raising the possibility of transient hypothyroxinemia or a non-thyroidal illness effect.

Based on the clinical presentation and imaging findings at the time, a provisional diagnosis of congenital mesoblastic nephroma was considered. However, Wilms' tumor remained a significant differential diagnosis pending histopathological confirmation.

The patient underwent a left nephrectomy with adrenalectomy. Intraoperatively, the tumor was well-circumscribed but had entirely replaced and distorted the architecture of the left kidney. The adrenal gland appeared uninvolved but was removed due to its proximity to the tumor (*Figure 3*)

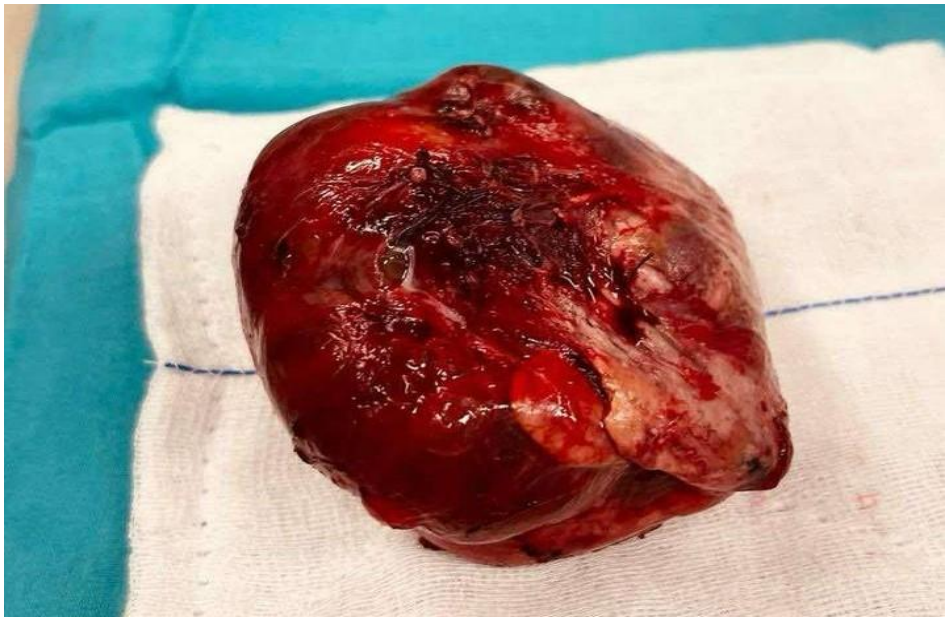

Figure 3

Histopathological analysis confirmed the diagnosis of Wilms' tumor. The resected mass measured 9×8×5 cm and was unifocal. Microscopically, the tumor exhibited a classic triphasic pattern, composed of approximately 50%

blastemal, 30% epithelial (both well and moderately differentiated), and 20% stromal components. No heterologous differentiation or tumor necrosis was identified.

The tumor infiltrated extensive areas of the renal parenchyma and extended into the subepithelial connective tissue of the pelvicalyceal system; however, the epithelial lining of the collecting system remained intact. Invasion of the renal sinus was observed, consistent with stage II disease. There was no evidence of direct extension into adjacent organs, and Gerota's fascia was intact. Although the renal vein and artery could not be identified macroscopically, no vascular invasion was noted in the sections examined. No lymph nodes were retrieved for pathological evaluation. Additionally, a poorly developed tubular structure lined by urothelium, likely a remnant of the ureter, was identified microscopically within the tumor mass.

Following confirmation of Wilms' tumor on histopathology, the case was staged as Stage II due to renal sinus invasion, without lymph node involvement or distant metastasis. The multidisciplinary pediatric oncology team planned adjuvant chemotherapy for approximately six months, following established treatment protocols for intermediate-risk Wilms' tumor. The goal of chemotherapy is to prevent recurrence and target any potential microscopic residual disease.

Discussion

Nephroblastoma, also known as Wilms' tumor, is a malignant neoplasm that primarily affects children and can present as either a unilateral or bilateral renal mass. It most commonly occurs between the ages of two and five years, with prenatal detection being extremely rare. However, when present at the embryonic stage, diagnosis is not particularly challenging due to the possibility of identifying an abdominal mass either prenatally or at birth. These masses often exhibit a heterogeneous structure, intermediate echogenicity, multiple dense inclusions, and vascularization on imaging (Fitria et al., 2022).

Wilms' tumors typically present as poorly defined masses with heterogeneous solid-cystic composition. They often appear to distort the normal renal parenchyma and demonstrate reduced contrast enhancement, indicating hypovascularity. These tumors may or may not contain calcifications. When calcifications are present, they are usually localized and well-differentiated, often associated with slow-growing tumors and a more favorable prognosis.

Magnetic resonance imaging (MRI) is considered the gold standard for staging renal tumors. On T2-weighted MRI, Wilms' tumors are usually iso- or hypointense compared to the surrounding renal parenchyma, in contrast to most hypervascular renal tumors, which are typically hyperintense and heterogeneous. This contrast allows for reliable differentiation of Wilms' tumor from other hypervascular renal masses when using MRI and computed tomography (CT). Additionally, angiographic imaging typically reveals a hypovascular mass with several tortuous neovessels, but without signs of arteriovenous shunting—another feature suggestive of Wilms' tumor.

Although Wilms' tumor predominantly occurs in children, it may also rarely present in adults. In such cases, diagnosis is often delayed and typically involves large renal masses with regional lymph node involvement. However, in the case under discussion, characteristic CT findings were observed without evidence of lymphadenopathy or metastasis.

Imaging revealed an ovoid, volumetric mass arising from the middle and lower thirds of the left kidney. The lesion was composed of anomalously enlarged vascular branches and alternating regions of soft tissue and fluid density. The mass exerted pressure on adjacent structures, including the liver, stomach, pancreas (body and tail), nearby intestinal loops, the renal artery and vein, and partially on the aorta.

Based on the imaging and clinical data, a diagnosis of stage II Wilms' tumor was established. The patient underwent partial nephrectomy, followed by histopathological evaluation of the excised tissue. As no metastasis to surrounding tissues was identified, the patient received adjuvant therapy consisting of a six-month course of chemotherapy.

Conclusion

Wilms' tumor, or nephroblastoma, is a pediatric renal malignancy with distinct imaging characteristics that facilitate early diagnosis, especially when detected prenatally or at birth. In the case discussed, imaging modalities such as CT and MRI played a crucial role in identifying a stage II Wilms' tumor, characterized by a heterogeneous, hypovascular mass without evidence of metastasis. The absence of lymphadenopathy and clear delineation of the tumor allowed for successful surgical intervention via nephrectomy. Subsequent histopathological confirmation and adjuvant chemotherapy underline the importance of a multidisciplinary approach in managing Wilms' tumor, aiming to ensure favorable outcomes through timely diagnosis and treatment.

References

Daniel, S. J. (2006). The upper airway: congenital malformations. *Paediatric respiratory reviews*, *7*, S260-S263. https://doi.org/10.1016/j.prrv.2006.04.227

Fitria, F., Ahmad, M., Hatijar, H., Argaheni, N. B., & Susanti, N. Y. (2022). Monitoring combination of intermittent auscultation and palpation of contractions on oxygen saturation of newborns. *International Journal of Health & Medical Sciences*, *5*(3), 221-227. https://doi.org/10.21744/ijhms.v5n3.1930

Govender, D. (2000). The pathology of nephroblastoma. *Current Diagnostic Pathology*, *6*(1), 45-54. https://doi.org/10.1054/cdip.2000.0012

Martínez, C. H., Dave, S., & Izawa, J. (2010). Wilms' tumor. *Diseases of DNA Repair*, 196-209.

Naggar, A., Assila, S., Laasri, K., Andour, H., Izi, Z., Lamalmi, N., ... & Chat, L. (2024). Bilateral Nephroblastomatosis With a Unilateral Wilms Tumor: A Case Report Highlighting Imaging Characteristics. *Global Pediatric Health*, *11*, 2333794X231224566.

Neville, H. L., & Ritchey, M. L. (2000). WILMS'TUMOR: Overview of National Wilms' Tumor Study Group Results. *Urologic Clinics of North America*, *27*(3), 435-442. https://doi.org/10.1016/S0094-0143(05)70091-4

Safaei, N., Kamran, H., Anbardar, M. H., Bordbar, M., Zekavat, O. R., & Forooghi, M. (2023). Large retroperitoneal teratoma presenting with unilateral hydronephrosis in an infant: a case report and review of the literature. *Case Reports in Oncology*, *16*(1), 1041-1047.