Original Research Article

CLINICAL PROFILE AND EARLY POSTNATAL OUTCOMES OF INFANTS WITH PRENATALLY DETECTED HYDRONEPHROSIS: A RETROSPECTIVE COHORT STUDY

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Received : *02/02/2026*
Received in revised form : *08/04/2026*
Accepted : *23/04/2026*

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DOI: 10.70034/ijmedph.2026.2.167

Source of Support: Nil,
Conflict of Interest: None declared

Int J Med Pub Health
2026; 16 (2); 980-987

ABSTRACT

Background: Prenatal hydronephrosis (PNH) is one of the most commonly detected anomalies on antenatal ultrasonography and may represent a spectrum of congenital anomalies of the kidney and urinary tract (CAKUT). While many cases resolve spontaneously, a subset is associated with urinary tract infections (UTIs), structural abnormalities, and need for surgical intervention. **Objectives:** To evaluate the clinical profile, imaging characteristics, and early postnatal outcomes of infants with prenatally detected hydronephrosis, and to assess the association between urinary tract dilation (UTD) grading and clinical outcomes.
Materials and Methods: This retrospective observational cohort study was conducted at the Department of Pediatrics, Swamy Vivekanandha Medical College Hospital & Research Institute (SVMCHRI), Tamil Nadu, India, from April 2022 to October 2025. Infants with antenatally detected hydronephrosis (anteroposterior pelvic diameter ≥7 mm at 28–36 weeks gestation) and available postnatal imaging were included. Data on demographic characteristics, antenatal findings, postnatal imaging, and outcomes were collected. Statistical analysis was performed using SPSS v26, with p<0.05 considered significant.
Results: A total of 200 infants were included, with a male predominance (69%). Hydronephrosis was unilateral in 66% of cases, and the majority were classified as low-risk UTD P1 (56%). Structural urinary tract anomalies were identified in 32% of infants, with ureteropelvic junction obstruction being the most common (15%). Urinary tract infection occurred in 21% of infants, while 15% required surgical intervention. Overall, 66% of cases showed spontaneous resolution. Higher UTD grades (P2–P3) were significantly associated with increased risk of UTI (44%), need for surgery (50%), and lower resolution rates (25%) (p<0.001).
Conclusion: Prenatally detected hydronephrosis generally has a favorable prognosis; however, higher UTD grades and associated structural anomalies are important predictors of adverse outcomes. Risk stratification using UTD classification is essential for guiding follow-up and management.
Keywords: Prenatal hydronephrosis, urinary tract dilation, UTI, UPJO, VUR, infants, cohort study.

INTRODUCTION

Congenital anomalies of the kidney and urinary tract (CAKUT) are among the leading causes of chronic kidney disease in children.[11,12] Prenatal hydronephrosis (PNH), defined as dilation of the Fetal renal pelvis detected on antenatal ultrasonography, is the most frequently identified abnormality during routine prenatal screening. With the widespread use of antenatal ultrasound, the reported incidence of PNH has increased and is estimated to occur in approximately 1–5% of all pregnancies.[12,13]

Prenatal hydronephrosis represents a heterogeneous group of conditions ranging from transient physiological dilatation to significant structural abnormalities such as ureteropelvic junction obstruction (UPJO), vesicoureteral reflux (VUR), vesicoureteral junction obstruction (VUJO), posterior urethral valves (PUV), and other congenital anomalies.[1,5,11] While a substantial proportion of cases resolve spontaneously in the postnatal period, a subset of infants develop clinically significant complications, including recurrent urinary tract infections (UTIs), renal parenchymal damage, and may require surgical intervention.[2,9,13]

The postnatal evaluation and management of infants with PNH remain challenging due to variability in disease progression and lack of uniform follow-up protocols. The Urinary Tract Dilation (UTD) classification system has been developed to standardize assessment and stratify risk based on imaging findings.[11] Higher UTD grades (P2 and P3) have been associated with increased likelihood of persistent hydronephrosis, infection, and need for surgical correction, making it a valuable prognostic tool.[2,3]

Despite growing literature, there is limited regional data from developing settings on the clinical profile and early outcomes of infants with prenatally detected hydronephrosis. Understanding these patterns is essential to optimize follow-up strategies, avoid unnecessary interventions in low-risk cases, and ensure timely management in high-risk groups.[1,3]

Therefore, the present study was undertaken to evaluate the demographic characteristics, antenatal and postnatal imaging findings, and early clinical outcomes of infants with prenatally diagnosed hydronephrosis in a tertiary care center. Additionally, the study aims to assess the association between UTD grading and key outcomes such as urinary tract infections, need for surgical intervention, and resolution of hydronephrosis.

Objectives

Primary objective

1. To evaluate the clinical profile and early postnatal outcomes of infants with prenatally detected hydronephrosis.

Secondary Objectives

1. To determine the incidence of urinary tract infection (UTI), jaundice, and need for surgical intervention in these infants.
2. To assess the association between urinary tract dilation (UTD) grading and clinical outcomes, including UTI, surgical requirement, and resolution of hydronephrosis.
3. To compare outcomes between infants with and without structural urinary tract anomalies such as ureteropelvic junction obstruction (UPJO), vesicoureteral reflux (VUR), and posterior urethral valves (PUV).
4. To evaluate the pattern, timing, and frequency of postnatal follow-up and its relationship with clinical outcomes.

MATERIALS AND METHODS

Study Design and Setting

This was a retrospective observational cohort study conducted in the Department of Pediatrics, Swamy Vivekanandha Medical College Hospital & Research Institute (SVMCHRI), Elayampalayam, Tiruchengode, Namakkal, Tamil Nadu, India

Study Population

The study included infants with prenatally diagnosed hydronephrosis who were evaluated and followed up in the postnatal period at the study center.

Inclusion Criteria

- Infants with antenatally detected hydronephrosis, defined as an anteroposterior pelvic diameter (APD) ≥7 mm between 28 and 36 weeks of gestation
- Availability of postnatal imaging, including ultrasonography (USG) and/or voiding cystourethrogram (VCUG)
- Availability of complete clinical and laboratory data

Exclusion Criteria

- Stillbirths or abortions
- Incomplete medical records or loss to follow-up
- Infants with syndromic or multisystem anomalies unrelated to congenital anomalies of the kidney and urinary tract (CAKUT)

Sample Size Estimation

The sample size was calculated using a formula for comparison of two proportions:

$$n_1 = \frac{\left[Z_{(1-\alpha/2)}\sqrt{2P(1-P)}+Z_{(1-\beta)}\sqrt{p_1(1-p_1)+p_2(1-p_2)}\right]^2}{(p_1-p_2)^2}$$

Assumptions used:

- Expected proportion in Group 1 (p_1) = 0.50
- Expected proportion in Group 2 (p_2) = 0.30
- Effect size = 0.20
- Significance level (α) = 0.05
- $Z_{(1-\alpha/2)}$= 1.96
- Power = 80%
- $Z_{(1-\beta)}$= 0.84
- Allocation ratio = 1 (equal group sizes)

Based on these assumptions, the calculated sample size was **93 per group (total = 186)**. This was rounded to **200** to account for approximately **10% missing or incomplete data**.

Data Collection

Data were collected retrospectively from hospital medical records using a **predesigned and structured data collection proforma**. Eligible infants were identified from pediatric and neonatal records based on inclusion criteria, and relevant information was extracted systematically.

The collected data included:

1. Demographic and Perinatal Details

Demographic and perinatal data were collected from birth and hospital records, including age at presentation, sex, gestational age at birth, birth weight, and mode of delivery. Gestational age was categorized as term (≥37 weeks) and preterm (<37 weeks). Birth weight was recorded in kilograms, and mode of delivery was classified as vaginal delivery or lower segment caesarean section (LSCS). These variables were analyzed to describe the baseline characteristics of the study population and to assess their potential association with clinical outcomes.

2. Antenatal Data

Antenatal data were obtained from prenatal ultrasonography reports performed between 28 and 36 weeks of gestation. Information collected included the anteroposterior pelvic diameter (APD) in millimetres, which was used to define antenatal hydronephrosis (APD ≥7 mm), as well as the laterality of involvement (unilateral or bilateral). Where available, the severity of hydronephrosis (mild, moderate, or severe) was recorded. In addition, the presence of any associated antenatal anomalies was documented. These parameters were analyzed to assess their relationship with postnatal outcomes.

3. Postnatal Clinical and Imaging Data

Postnatal clinical and imaging data were obtained from hospital records and imaging reports. Information collected included the age at first postnatal evaluation and findings from ultrasonography, such as anteroposterior pelvic diameter (APD) and the presence of renal parenchymal thinning. Hydronephrosis was classified according to the Urinary Tract Dilation (UTD) classification system (P1–P3). Additional imaging studies, including voiding cystourethrogram (VCUG), were reviewed where indicated. The presence of structural urinary tract anomalies, such as ureteropelvic junction obstruction (UPJO), vesicoureteral reflux (VUR), posterior urethral valves (PUV), and other abnormalities, was also documented. These variables were analyzed to determine their association with clinical outcomes.

4. Follow-up and Outcome Data

Follow-up data were obtained from outpatient and inpatient records to assess clinical progression and outcomes. Information collected included the occurrence and number of urinary tract infections (UTIs), presence of jaundice, and the number of hospitalizations during the study period. Details regarding surgical intervention, including the need for surgery and type of procedure performed, were also recorded. The final outcome of hydronephrosis was determined based on serial imaging findings and categorized as resolved, persistent, or progressed. These follow-up parameters were analyzed to evaluate disease course and identify factors associated with adverse outcomes.

Data Quality Control

To ensure the accuracy and reliability of the data, only cases with complete clinical, imaging, and follow-up records were included in the study. Data extraction was performed using a standardized and predesigned proforma to maintain uniformity. Wherever necessary, information was cross-verified from multiple sources, including case sheets, laboratory reports, and imaging records. Inconsistent or ambiguous entries were carefully reviewed and clarified to minimize information bias. Data were checked for completeness and consistency before analysis.

Outcome Measures

The outcomes of interest were categorized into primary and secondary outcome measures, assessed during the postnatal follow-up period.

Primary Outcome Measures

The primary outcome measures included the occurrence of **urinary tract infection (UTI)** and the requirement for **surgical intervention** during the follow-up period. UTI was defined as the presence of clinical symptoms with a **positive urine culture**, and the number of episodes was recorded. Surgical intervention was documented as a **binary outcome (yes/no)**, along with the type of procedure performed.

Secondary Outcome Measures

The secondary outcome measures included the presence of jaundice, the number of hospitalizations, and the final outcome of hydronephrosis during follow-up. Jaundice was recorded as present or absent based on clinical and/or laboratory diagnosis. The number of hospital admissions was documented for each infant. The outcome of hydronephrosis was categorized as resolved, persistent, or progressed based on serial ultrasonographic findings.

Exploratory Outcome Analysis

An exploratory analysis was performed to evaluate the relationship between clinical outcomes and key predictor variables, including UTD grading (P1–P3) and the presence of structural urinary tract anomalies. Outcomes such as urinary tract infection (UTI), need for surgical intervention, and resolution status of hydronephrosis were compared across different UTD grades and anomaly groups. This analysis aimed to identify potential predictors of adverse outcomes and to assess the utility of UTD classification in risk stratification and clinical decision-making.

Statistical Analysis

Data were entered into Microsoft Excel and analyzed using the Statistical Package for the Social Sciences (SPSS) version 26.0 (IBM Corp., Armonk, NY, USA). Continuous variables such as age at presentation, birth weight, and anteroposterior pelvic

diameter (APD) were expressed as mean ± standard deviation (SD) or median with interquartile range (IQR) depending on data distribution. Categorical variables, including sex, UTD grading, presence of urinary tract infection (UTI), structural anomalies, and outcome categories, were presented as frequency and percentage.
The Chi-square test or Fisher's exact test was used to assess associations between categorical variables. For comparison of continuous variables between groups, the independent t-test was applied for normally distributed data, while the Mann–Whitney U test was used for non-normally distributed data.
The association between UTD grading and clinical outcomes (UTI, surgical intervention, and resolution of hydronephrosis) was evaluated using Spearman's rank correlation coefficient. To identify independent predictors of adverse outcomes, binary logistic regression analysis was performed, and results were expressed as odds ratios (OR) with 95% confidence intervals (CI). Variables with a p-value <0.20 in univariate analysis were included in the multivariate model.

A **p-value <0.05** was considered statistically significant, and all statistical tests were **two-tailed**.
The study cohort included all eligible infants identified through hospital records.

RESULTS

A total of **200 infants** with prenatally diagnosed hydronephrosis were included in the study after applying the inclusion and exclusion criteria.

Baseline Demographic and Perinatal Characteristics

Among the study population, there was a male predominance (n = 138, 69%), with females accounting for 62 (31%). The majority of infants were term (n = 168, 84%), while 32 (16%) were preterm.
The mean age at presentation was 18.6 ± 9.4 days, and the mean birth weight was 2.9 ± 0.5 kg. Most infants were delivered by vaginal delivery (n = 122, 61%), while 78 (39%) were delivered via caesarean section.

Table 1: Baseline Demographic and Perinatal Characteristics (n = 200)

Variable	Value
Age at presentation (days)	18.6 ± 9.4
Sex	
Male	138 (69%)
Female	62 (31%)
Gestational age	
Term	168 (84%)
Preterm	32 (16%)
Birth weight (kg)	2.9 ± 0.5
Mode of delivery	
Vaginal	122 (61%)
LSCS	78 (39%)

Notes: Values are expressed as mean ± standard deviation (SD) for continuous variables and frequency (percentage) for categorical variables. Gestational age was categorized as term (≥37 weeks) and preterm (<37 weeks). LSCS refers to lower segment caesarean section.

Figure 1: Comparative Distribution of Demographic and Perinatal Characteristics of Infants with Prenatally Detected Hydronephrosis (n = 200)

- **X-axis:** Clinical categories (severity, laterality, UTD grades)
- **Y-axis:** Percentage of infants (%)
- **Legend (Key):** Mild, Moderate, Severe; UTD P1, P2, P3

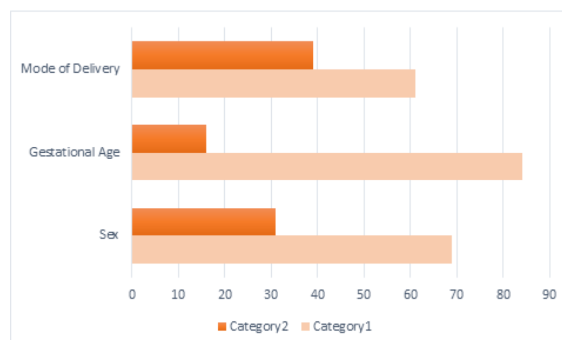

Figure 1: Comparative Distribution of Demographic and Perinatal Characteristics of Infants with Prenatally Detected Hydronephrosis (n = 200)

Notes: Data are presented as percentage of the total study population. The figure compares sex (male/female), gestational age (term/preterm), and mode of delivery (vaginal/LSCS). Gestational age was categorized as term (≥37 weeks) and preterm (<37 weeks). LSCS refers to lower segment caesarean section.

Antenatal Findings

Antenatal ultrasonography performed between 28 and 36 weeks of gestation was reviewed for all

included infants. The diagnosis of prenatal hydronephrosis was based on an anteroposterior pelvic diameter (APD) ≥7 mm.

The mean antenatal APD among the study population was 9.8 ± 2.6 mm. Hydronephrosis was found to be unilateral in the majority of cases (n = 132, 66%), while bilateral involvement was observed in 68 (34%) infants.

Based on available antenatal records, the severity of hydronephrosis was categorized as:

- **Mild:** 96 (48%)
- **Moderate:** 72 (36%)
- **Severe:** 32 (16%)

Associated antenatal anomalies were identified in 28 (14%) cases, which included suspected urinary tract abnormalities and other structural findings**.**

Table 2: Antenatal Characteristics of Infants with Prenatally Detected Hydronephrosis (n = 200)

Variable	Value
Antenatal APD (mm)	9.8 ± 2.6
Laterality	
Unilateral	132 (66%)
Bilateral	68 (34%)
Severity	
Mild	96 (48%)
Moderate	72 (36%)
Severe	32 (16%)
Associated antenatal anomalies	28 (14%)

Notes: Antenatal hydronephrosis was defined as an anteroposterior pelvic diameter (APD) ≥7 mm measured between 28–36 weeks of gestation. Severity was categorized based on standard antenatal ultrasound criteria. Values are expressed as mean ± standard deviation (SD) or frequency (percentage).

Figure 2: Antenatal Characteristics of Infants with Prenatally Detected Hydronephrosis (n = 200)

- **X-axis:** Antenatal variables (severity, laterality)
- **Y-axis:** Percentage (%)
- **Legend (Key):** Mild, Moderate, Severe; Unilateral, Bilateral

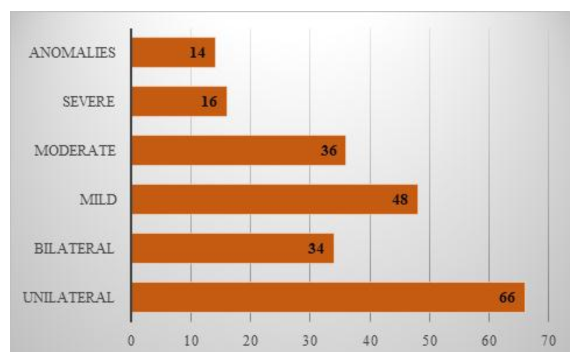

Figure 2: Antenatal Characteristics of Infants with Prenatally Detected Hydronephrosis (n = 200)

Notes: Data are presented as percentage of the total study population. Antenatal hydronephrosis was defined as an anteroposterior pelvic diameter (APD ≥7 mm) measured between 28–36 weeks of gestation. Laterality (unilateral/bilateral), severity (mild, moderate, severe), and associated anomalies were determined based on antenatal ultrasonographic findings.

UTD Classification

- **UTD P1:** 112 (56%)
- **UTD P2:** 56 (28%)
- **UTD P3:** 32 (16%)

Renal parenchymal thinning, suggestive of chronicity or severity, was observed in 26 (13%) infants.

Structural Anomalies

Structural urinary tract abnormalities were identified in 64 (32%) infants. The most common anomaly was ureteropelvic junction obstruction (UPJO), followed by vesicoureteral reflux (VUR) and posterior urethral valves (PUV). Other less common anomalies were also noted.

- **UPJO:** 30 (15%)
- **VUR:** 22 (11%)
- **PUV:** 8 (4%)
- **Others:** 4 (2%)

Additional imaging such as VCUG and renal scans were performed in selected cases to confirm diagnosis and guide management.

Table 3: Postnatal Imaging Findings and Structural Urinary Tract Anomalies (n = 200)

Variable	Value
Age at first postnatal evaluation (days)	7.2 ± 3.1
UTD Grade	
P1	112 (56%)
P2	56 (28%)
P3	32 (16%)
Parenchymal thinning	26 (13%)
Structural anomalies	
UPJO	30 (15%)
VUR	22 (11%)
PUV	8 (4%)
Others	4 (2%)

Notes: Postnatal hydronephrosis was classified using the UTD grading system (P1–P3) based on ultrasonographic findings. Structural anomalies were identified using postnatal imaging (USG ± VCUG) and are presented as frequency (percentage).

Figure 3: Comparison of Clinical Outcomes Between Low-Risk and High-Risk UTD Groups

- **X-axis:** UTD grades and structural anomalies
- **Y-axis:** Percentage (%)
- **Legend (Key):** UTD P1, P2, P3; UPJO, VUR, PUV

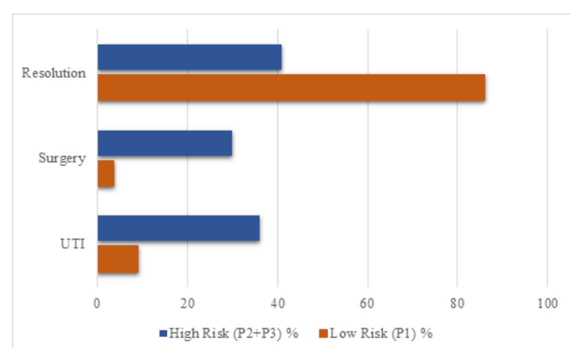

Figure 3: Comparison of Clinical Outcomes Between Low-Risk and High-Risk UTD Groups

Notes: Data are presented as frequency (percentage). Low-risk group includes infants with UTD P1, while high-risk group includes UTD P2 and P3 combined. Outcomes compared include urinary tract infection (UTI), surgical intervention, and resolution of hydronephrosis. Outcome Measures

The primary and secondary outcome measures were predefined and assessed during the postnatal follow-up period. The primary outcomes included the occurrence of urinary tract infection (UTI) and the requirement for surgical intervention. UTI was defined as the presence of clinical symptoms supported by a positive urine culture, and the number of UTI episodes during follow-up was recorded. Surgical intervention was documented as a binary variable (yes/no), and the type of procedure performed was noted.

The secondary outcomes included the presence of jaundice, the number of hospitalizations, and the final status of hydronephrosis on follow-up imaging. Hydronephrosis outcomes were categorized as resolved (complete normalization), persistent (no significant change), or progressed (increase in severity or worsening UTD grade).

In addition, outcome measures were analyzed in relation to UTD grading (P1, P2, P3) and the presence of structural urinary tract anomalies (such as UPJO, VUR, and PUV) to identify predictors of adverse clinical outcomes.

Table 4: Clinical Outcomes of Infants with Prenatally Detected Hydronephrosis (n = 200)

Outcome	Value
UTI (Yes)	42 (21%)
UTI episodes	1.6 ± 0.8
Jaundice	38 (19%)
Surgical intervention	30 (15%)
Pyeloplasty	18 (9%)
Valve ablation	8 (4%)
Nephrectomy	2 (1%)
Others	2 (1%)
Hospitalizations (number)	1.4 ± 0.7
Hydronephrosis outcome	
Resolved	132 (66%)
Persistent	52 (26%)
Progressed	16 (8%)

Notes: Clinical outcomes include UTI, jaundice, surgical intervention, hospitalization, and hydronephrosis status during follow-up. UTI was defined by clinical features with positive urine culture, and outcomes are expressed as mean ± SD or frequency (percentage).

4. Hospitalization

The **mean number of hospitalizations** was **1.4 ± 0.7**. Higher hospitalization rates were observed in infants with structural anomalies and higher UTD grades.

5. Outcome of Hydronephrosis

The final outcome of hydronephrosis was assessed based on serial postnatal imaging findings during follow-up and categorized into three groups:

- **Resolved:** Complete normalization of renal pelvic dilatation on follow-up ultrasonography, with no residual hydronephrosis.
- **Persistent:** Presence of stable hydronephrosis without significant change in anteroposterior pelvic diameter (APD) or UTD grade over time.

Progressed: Worsening of hydronephrosis, defined as an increase in APD, escalation in UTD grade, development of renal parenchymal thinning, or deterioration in renal function requiring closer monitoring or intervention.

Table 5: Association Between Urinary Tract Dilation (UTD) Grade and Clinical Outcomes (n = 200)

Variable	P1 (n=112)	P2 (n=56)	P3 (n=32)	p-value
UTI	10 (9%)	18 (32%)	14 (44%)	<0.001
Surgery	4 (3.5%)	10 (18%)	16 (50%)	<0.001
Resolution	96 (86%)	28 (50%)	8 (25%)	<0.001

Notes: Association between UTD grade (P1–P3) and clinical outcomes was analyzed using the Chi-square test. Values are expressed as frequency (percentage), and a p-value <0.05 was considered statistically significant.

DISCUSSION

In this retrospective cohort study of infants with prenatally detected hydronephrosis, we observed that the majority of cases had a favorable clinical course, with spontaneous resolution in a significant proportion during early postnatal follow-up. However, a subset of infants experienced adverse outcomes, including urinary tract infections (UTIs), need for surgical intervention, and persistent or progressive hydronephrosis. Importantly, higher Urinary Tract Dilation (UTD) grades and the presence of structural anomalies were strongly associated with these unfavourable outcomes.[1-3]

The demographic profile of our cohort showed a clear male predominance, which is consistent with previous studies.[1,5] This may be attributed to the higher prevalence of conditions such as posterior urethral valves (PUV) and vesicoureteral reflux (VUR) in males. Most infants in our study were born at term and had normal birth weight, suggesting that prenatal hydronephrosis is often an isolated finding rather than part of a broader perinatal compromise.

Antenatally, the majority of cases were unilateral and of mild to moderate severity, in line with existing literature.[12,13] Similar observations have been reported in large cohort studies, where unilateral hydronephrosis constituted the majority and had a higher likelihood of spontaneous resolution. The mean antenatal anteroposterior pelvic diameter (APD) in our study was within the range typically associated with low- to intermediate-risk disease, further supporting the favorable outcomes observed.[7]

Postnatally, UTD P1 was the most common classification, followed by P2 and P3. This distribution is comparable to that reported by Melo et al,[3] where low-risk UTD constituted the majority of cases. In our study, higher UTD grades (P2 and P3) were significantly associated with adverse outcomes, including increased incidence of UTI and greater need for surgical intervention. These findings are consistent with previous studies, including those by Gu et al. and Braga et al,[1,2] which demonstrated that higher UTD grades are predictive of persistent disease and intervention requirement.

Structural urinary tract anomalies were identified in 64 infants (32%), with ureteropelvic junction obstruction being the most common (30 cases, 15%), followed by vesicoureteral reflux (22 cases, 11%) and posterior urethral valves (8 cases, 4%). infants, with ureteropelvic junction obstruction (UPJO) being the most common, followed by vesicoureteral reflux (VUR) and less commonly posterior urethral valves (PUV). The presence of these anomalies was a strong predictor of poor outcomes, particularly the need for surgery and recurrent infections. This aligns with established evidence indicating that anatomical abnormalities significantly influence disease progression and prognosis.[4,5,6]

The Urinary tract infection was observed in 42 infants (21%), with a higher proportion in those with advanced UTD grades, increasing from 10 cases (9%) in UTD P1 to 14 cases (44%) in UTD P3. particularly among infants with higher UTD grades and structural anomalies. UTIs are a well-recognized complication of hydronephrosis and may contribute to renal scarring if not promptly managed.[5,15] Our findings reinforce the importance of close monitoring and early intervention in high-risk groups.

Surgical intervention was required in 30 infants (15%), with a markedly higher proportion in severe cases, rising from 4 cases (3.5%) in UTD P1 to 16 cases (50%) in UTD P3. of cases, predominantly in those with high-grade hydronephrosis and obstructive uropathies. The rate of surgical management observed in our study is comparable to previously published data.[4,8] Early identification of infants likely to require surgery is crucial to prevent long-term renal damage, and our results highlight the role of UTD grading in this regard.

Regarding outcomes, the majority of infants demonstrated complete resolution of hydronephrosis, especially those with low-grade disease (UTD P1). This finding is consistent with prior studies reporting high resolution rates in mild hydronephrosis.[2,9] However, persistence and progression were more commonly observed in higher grades, emphasizing the need for risk stratification.

The UTD classification system proved to be a valuable tool in predicting clinical outcomes in our study. Its ability to stratify patients into risk categories facilitates individualized follow-up protocols and reduces unnecessary investigations in low-risk cases while ensuring timely intervention in high-risk infants.[3,11]

CONCLUSION

Prenatally detected hydronephrosis is a common condition with a predominantly favorable outcome, with spontaneous resolution observed in the majority of infants. However, a subset of patients, particularly those with higher UTD grades (P2–P3) and associated structural urinary tract anomalies are at increased risk of adverse outcomes such as urinary tract infections and the need for surgical intervention The UTD classification system serves as a valuable tool for risk stratification, enabling clinicians to identify high-risk infants early and tailor follow-up and management accordingly. A risk-based approach can help optimize resource utilization, avoid unnecessary interventions in low-risk cases, and ensure timely treatment in those requiring intervention.

Early diagnosis, appropriate postnatal evaluation, and structured follow-up are essential to prevent complications and preserve renal function in infants with prenatal hydronephrosis.

Limitations

This study has certain limitations. Being a retrospective, single-center study, the findings may have limited generalizability. The reliance on medical records may have led to incomplete or missing data and potential information bias. Additionally, the study focused on early postnatal outcomes, and long-term renal outcomes could not be assessed. Variability in imaging interpretation and follow-up duration may also have influenced the results.

Clinical Implications

The findings of this study highlight that most infants with prenatally detected hydronephrosis can be managed conservatively, particularly those with low-risk UTD grades. The use of the UTD classification system enables effective risk stratification, allowing clinicians to identify infants who require closer monitoring and early intervention. A structured, risk-based follow-up approach can help reduce unnecessary investigations in low-risk cases while ensuring timely diagnosis and management in high-risk infants, thereby preventing potential renal damage and improving clinical outcomes.

Conflict of Interest

The authors declare that there is no conflict of interest.

Funding

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

Ethical Approval and Consent

The study was approved by the Institutional Ethics Committee (IEC) of Swamy Vivekanandha Medical College Hospital & Research Institute. The committee reviewed and discussed the research proposal titled "Clinical Profile and Early Postnatal Outcomes of Infants with Prenatally Detected Hydronephrosis: A Retrospective Cohort Study" and granted approval (File Ref. No.: **EC/NEW/INST/2024/TN/0529**).

As this study was based on retrospective analysis of hospital records with no direct patient interaction, and patient confidentiality was strictly maintained, informed consent was waived.

Author Contributions

All authors contributed to the conception, design, data collection, analysis, and writing of the manuscript. All authors reviewed and approved the final version.

Declaration of Generative AI and AI-assisted Technologies in the Writing Process

During the preparation of this work, the authors used ChatGPT to perform grammatical revision of the manuscript. After using this tool, all authors reviewed and edited the content as needed and take full responsibility for the content of the published article.

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