Participants were neonates born in the obstetrics department of our hospital between November 2018 and September 2020. After obtaining institutional review board approval, we retrospectively reviewed the ultrasonographic findings and progress of the participants. All patients underwent fetal ultrasonography screening for various organs at 28–30 weeks of gestation. Patients unable to undergo follow-up after birth due to home birth or absenteeism, or patients with unclear prenatal diagnosis of hydronephrosis were excluded. The urinary system of the neonates was examined using abdominal ultrasonography for 28 days after birth. Patients with unstable respiratory and circulatory dynamics at birth were prioritized for treatment, and ultrasonographic screening was performed only after stabilization. Prior to screening, participants were well-hydrated in the neonatal room and under general care. Hydration was confirmed by checking sufficient bladder urine volume. Screening ultrasonography was performed on a flat table in the neonatal room to maintain a supine position on the table to facilitate an accurate diagnosis. Screening ultrasonography was performed using a Xario 200 (Canon Medical Systems, Tochigi, Japan) with a resolution of 0.2–1.0 mm, making detailed scanning possible. The sonographer had more than 10 years of experience with abdominal ultrasonography in newborns and children. The Society for Fetal Urology (SFU) classification was used as a semi-quantitative parameter for urinary tract (UT) dilatation, and the anterior-posterior renal pelvic diameter (APRPD), which is currently the most widely accepted parameter for defining a sonographically evident renal pelvis, [5] was used as the quantitative parameter. In this study, we examined the following items for PHN and AHN as a reference:

1) number of participants and total number of affected kidneys

2) left-right differences in hydronephrosis

3) male-female ratio

4) incidence of urinary tract infections (UTIs) that occurred during the observation period

5) number of vesicoureteral reflux (VUR) detections, and

6) time course of SFU grade and APRPD. JMP® (version 14.0; SAS Institute Japan, Tokyo, Japan) was used for the statistical analysis. Continuous data with a normal distribution are described using median and interquartile range. Comparison of the APRPD between PHN and AHN at birth and at 1, 6, and 12–24 months of age was performed using the t-test. Statistical significance was set at $P < 0.05$ (Table 1).

Results

Patient characteristics

The total number of births in our obstetrics department during the study period was 1,271, of which 264 were found to have PHNs. Twenty patients were excluded from this study, including 10 home births, 9 absentees who were unavailable at the time of the study, and 1 unclear prenatal diagnosis of hydronephrosis. Thus, of the 1251 included patients, the total number of PHN patients was 244 and the total number of AHN patients was 9. Among the 244 AHN patients, 317 kidneys were assessed (136 left kidneys, 35 right kidneys, and 73 bilateral). Overall, 146 and 98 patients were male and female, respectively. UTIs were observed in four patients (1.6%) during follow-up. Voiding cystourethrography (VCUG) was performed in patients with UTI, and VUR was observed in two patients. Nine male patients with AHN were included. Fourteen kidneys were studied in these patients (four left, five bilateral). None of the right kidneys were included in this group. UTI incidence was not observed in AHN cases.

Time course of SFU grade and APRPD

The SFU grade and median APRPD (mAPD) for each grade of PHN are summarized for each observation period at birth, 1 month after birth, 6 months after birth, 12 months after birth, and 24 months after birth (Table 2).

The most frequently detected SFU grade of PHN at birth was grade 1 (99.3%), and only two kidneys had an SFU grade of 2. Of the 317