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One-Year Outcomes of Hydrocele Diagnosed in Early Infancy: A Prospective Cohort Study from Khost Province, Afghanistan

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ABSTRACT

Background: Hydrocele is common in infancy and often resolves spontaneously, but evidence on its natural history during the first year of life remains limited, particularly in Afghanistan. We aimed to assess one-year outcomes among infants diagnosed with hydrocele during early infancy and examined clinical and perinatal characteristics associated with persistence.

Methods: This prospective cohort study included all eligible infants diagnosed with hydrocele at Khost Provincial Hospital, Afghanistan, between Mar 2024 and Mar 2025. Baseline demographic, perinatal, and clinical characteristics were recorded from medical records, and infants were followed until one year of age, with follow-up completed by Mar 2026. The primary outcome was spontaneous resolution or persistence at one year. Categorical and continuous variables were compared using appropriate unadjusted statistical tests.

Results: Overall, 150 male infants were included. By one year of age, 94 (62.7%) had experienced spontaneous resolution, while 56 (37.3%) had persistent hydrocele. Hydrocele type and size were significantly associated with outcome in unadjusted analyses (both $P<0.001$). All 35 infants with communicating hydroceles and all 32 with large hydroceles had persistent hydrocele at one year. In contrast, 94 of 115 infants (81.7%) with non-communicating hydroceles experienced spontaneous resolution. Age at diagnosis, gestational age, birth weight, preterm status, laterality, and associated inguinal hernia were not significantly associated with outcome.

Conclusion: Approximately two-thirds of hydroceles diagnosed during the first two months of life resolved spontaneously by one year of age. These findings provide hospital-based evidence on the early natural history of infantile hydrocele in Afghanistan and may help inform clinical assessment and follow-up.

Keywords: Hydrocele; Infant; Natural history; Spontaneous resolution; Pediatric surgery; Afghanistan

Introduction

Hydrocele is characterized by the accumulation of fluid within a serous sac, most commonly within the tunica vaginalis in males, while a rare female counterpart may occur within the canal of Nuck [1-3]. It may present as either a communicating or non-communicating hydrocele [4]. Communicating hydroceles result from a patent processus vaginalis that maintains

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communication between the peritoneal cavity and the scrotum, whereas non-communicating hydroceles occur when the processus vaginalis is partially or completely obliterated, preventing direct communication with the peritoneal cavity and allowing fluid to remain localized within the hydrocele sac [5]. Clinically, pediatric primary hydrocele is often asymptomatic and is commonly recognized when caregivers notice scrotal or inguinal swelling or asymmetry [6].

Most pediatric hydroceles resolve spontaneously during early childhood, with non-communicating hydroceles generally undergoing spontaneous reabsorption before 2 yr of age [3]. It is generally a self-limiting condition that resolves without lasting complications or adverse effects on future fertility. Its favorable natural course supports a conservative approach when appropriate, as early or unnecessary surgery may expose infants to avoidable operative and anesthetic risks and increase healthcare costs, particularly in settings with limited surgical expertise or access to specialized care [7].

A recent systematic review and meta-analysis estimated the global prevalence of hydrocele at approximately 1 per 1,000 live births among infants, although substantial variation was observed across the available studies [8]. Understanding the natural history of pediatric hydrocele, particularly the likelihood of spontaneous resolution during infancy, is important for informing clinical management. Although previous studies have described its natural history and spontaneous resolution, the overall body of published evidence remains limited, particularly regarding outcomes during the first year of life among infants diagnosed in early infancy. Evidence from low- and middle-income countries is also limited, and published data from Afghanistan on spontaneous resolution by one year of age and the clinical characteristics associated with persistence or resolution are scarce. In resource-constrained settings, locally generated evidence on the outcomes of pediatric surgical conditions may help inform clinical decision-making regarding observation, follow-up, and referral [9].

Therefore, we aimed to determine the proportion of infants diagnosed with hydrocele who experienced spontaneous resolution by one year of age. We also examined the associations of hydrocele type, size, laterality, associated inguinal hernia, and selected perinatal factors with persistence or spontaneous resolution at one year.

Methods

Study design and setting

This prospective observational study was conducted at Khost Provincial Hospital in Khost Province, Afghanistan. Infants diagnosed with hydrocele between Mar 2024 and Mar 2025 were enrolled and followed until they reached one year of age, with follow-up completed by Mar 2026.

Khost Province is located in southeastern Afghanistan and shares borders with Paktia and Paktika provinces and Pakistan. Khost Provincial Hospital, located in the provincial capital, is a major healthcare facility providing medical and surgical services to the population of Khost Province and surrounding areas.

Study population and sampling

All eligible infants diagnosed with hydrocele during the recruitment period were consecutively enrolled in the study. Infants were eligible if they were born at the hospital, had a clinical diagnosis of unilateral or bilateral hydrocele at birth or during the early neonatal period, and had the baseline information required for assessment of the study variables and follow-up outcomes.

Infants with major congenital or surgical abnormalities of the scrotum or testes that could interfere with hydrocele assessment, testicular torsion, severe infection, or another acute scrotal condition were considered ineligible. All 150 infants diagnosed with hydrocele during

the recruitment period were enrolled and included in the final analysis.

Data collection and variables

Study data were collected prospectively using a structured data collection form and information from hospital birth registers, clinical examinations, and follow-up assessments. The variables included age at diagnosis, gestational age, birth weight, hydrocele type, laterality, hydrocele size, associated inguinal hernia, and other relevant demographic and clinical characteristics.

Hydrocele type was classified as communicating or non-communicating, and laterality was recorded as right-sided, left-sided, or bilateral. Hydrocele size was categorized as small, medium, or large based on the clinical assessment documented by the examining physician at Khost Provincial Hospital. Gestational age and birth weight were recorded as continuous variables and additionally categorized where clinically appropriate. Preterm status was determined from the recorded gestational age.

Infants were followed from diagnosis until one year of age through outpatient visits and telephone contact with parents or caregivers. Spontaneous resolution was defined as disappearance of the hydrocele without surgery, while persistence was defined as its continued presence at one year of age.

Statistical analysis

Data were checked for completeness, consistency, and coding errors before analysis. Statistical analyses were performed using IBM SPSS Statistics, version 27 (IBM Corp., Armonk, NY, USA). Categorical variables were summarized as frequencies and percentages. Continuous variables were summarized using means and standard deviations (SDs) when appropriate, or medians and interquartile ranges (Q1–Q3) when distributions were skewed. Minimum and maximum values were also reported to describe the observed ranges.

The primary objective was to determine the proportion of infants whose hydrocele resolved spontaneously by one year of age. Baseline characteristics were summarized for the overall study population and according to one-year outcome (spontaneous resolution or persistence). Categorical variables were compared using Pearson's chi-square test or Fisher's exact test, as appropriate. Continuous variables were compared using the Mann–Whitney U test. All tests were two-sided, and a *P*-value of less than 0.05 was considered statistically significant.

Complete separation in some categorical variables prevented reliable estimation using standard logistic regression. Therefore, analyses were limited to descriptive statistics and unadjusted comparisons, and potential confounding could not be addressed.

Ethical considerations

Ethical approval for this study was obtained from Ghalib University. Permission to conduct the study at Khost Provincial Hospital was obtained from the responsible hospital authorities. Appropriate measures were taken to protect participant confidentiality and privacy throughout data collection, analysis, and reporting. Individual patient identifiers were not included in the study dataset or manuscript.

Results

Overall, 150 cases of hydrocele were identified among 3,240 live births, yielding a proportion of 4.6%. All infants diagnosed with hydrocele were male, and the diagnosis was established within the first two months of life in every case. The median age at diagnosis was 28 d (range, 1–59 d), while the median gestational age was 37 wk (range, 34–40 wk). Based on gestational age, 69 infants (46.0%) were classified as preterm. The median birth weight was 3,150 g (range, 2,211–3,898 g), and 19 infants (12.7%) had low birth weight. Regarding residence, 82 infants (54.7%) came from districts outside Khost city, while 68 (45.3%) resided in the provincial capital (Table 1).

Table 1: Demographic, perinatal, and clinical characteristics of infants with hydrocele (N=150)

Characteristic	*Category / Statistic*	*n (%) or Mean ± SD*
Location	Other districts	82 (54.7)
	Capital city	68 (45.3)
Age at diagnosis (days)	Mean ± SD	29.17 ± 16.92
	Median (range)	28 (1–59)
Gestational age (weeks)	Mean ± SD	36.83 ± 2.01
	Median (range)	37 (34–40)
Preterm status	Term	81 (54.0)
	Preterm	69 (46.0)
Birth weight (g)	Mean ± SD	3127.80 ± 471.96
	Median (range)	3150 (2211–3898)
Birth weight category	Low birth weight	19 (12.7)
	Normal birth weight	131 (87.3)
Clinical presentation	Painless scrotal swelling with mild heaviness	150 (100.0)
Transillumination test	Positive (translucent)	150 (100.0)
Hydrocele type	Non-communicating	115 (76.7)
	Communicating	35 (23.3)
Laterality	Right	87 (58.0)
	Left	53 (35.3)
	Bilateral	10 (6.7)
Hydrocele size	Small	70 (46.7)
	Medium	48 (32.0)
	Large	32 (21.3)
Associated hernia	No	127 (84.7)
	Yes	23 (15.3)
One-year outcome	Spontaneous resolution	94 (62.7)
	Persistent hydrocele at 1 year	56 (37.3)

Note: Preterm birth was defined as gestational age <37 completed weeks. Low birth weight was defined as birth weight <2500 g

Clinically, all infants presented with painless scrotal swelling and had positive transillumination. Non-communicating hydrocele was the predominant type, accounting for 115 cases (76.7%), while 35 (23.3%) had communicating hydrocele. The right side was most frequently affected (87, 58.0%), followed by the left side (53, 35.3%), with bilateral involvement observed in 10 infants (6.7%). Regarding size, 70 (46.7%) hydroceles were classified as small, 48 (32.0%) as medium and 32 (21.3%) as large. An associated inguinal hernia was identified in 23 infants (15.3%).

By the age of one-year, spontaneous resolution had occurred in 94 infants (62.7%), whereas hydrocele persisted in 56 (37.3%). Comparison of baseline and clinical characteristics according to one-year outcome showed no statistically significant differences in most demographic and perinatal characteristics (Table 2). However, hydrocele type was significantly associated with outcome (P<0.001). All 35 infants with communicating hydrocele had persistent hydrocele at one year, whereas spontaneous resolution occurred in 94 of 115 infants (81.7%) with non-communicating hydrocele. Hydrocele size was also significantly associated with one-year outcome (P<0.001). All 32 infants with large hydroceles had persistent hydrocele at one year, compared with 14 of 70 infants (20.0%) with small hydroceles and 10 of 48 (20.8%) with medium-sized hydroceles.

Table 2: Comparison of demographic and clinical characteristics according to hydrocele outcome at 1-year follow-up (N = 150)

Characteristic	*Persistent hydrocele (n = 56)*	*Spontaneous resolution (n = 94)*	*Test statistic*	*P-value*
Location			$\chi^2 = 1.501$	0.220
Other districts	27 (32.9)	55 (67.1)		
Capital city	29 (42.6)	39 (57.4)		
Age at diagnosis, days	25.50 (11.00–43.75)	29.50 (17.00–44.00)	U = 2908.0	0.262
Gestational age, weeks	36.00 (34.00–38.75)	37.00 (35.75–39.00)	U = 2951.5	0.218
Preterm status			$\chi^2 = 1.204$	0.272
Term	27 (33.3)	54 (66.7)		
Preterm	29 (42.0)	40 (58.0)		
Birth weight, g	3240.50 (2692.25–3614.50)	3126.50 (2801.75–3453.75)	U = 2396.0	0.403
Birth weight category			$\chi^2 = 0.002$	0.962
Low birth weight	7 (36.8)	12 (63.2)		
Normal birth weight	49 (37.4)	82 (62.6)		
Hydrocele type			Fisher's exact	<0.001
Non-communicating	21 (18.3)	94 (81.7)		
Communicating	35 (100.0)	0 (0.0)		
Laterality			$\chi^2 = 2.225$	0.329
Right	31 (35.6)	56 (64.4)		
Left	23 (43.4)	30 (56.6)		
Bilateral	2 (20.0)	8 (80.0)		
Hydrocele size			Fisher's exact	<0.001
Small	14 (20.0)	56 (80.0)		
Medium	10 (20.8)	38 (79.2)		
Large	32 (100.0)	0 (0.0)		
Associated hernia			$\chi^2 = 0.076$	0.783
No	48 (37.8)	79 (62.2)		
Yes	8 (34.8)	15 (65.2)		

Values are presented as n (%) or median (interquartile range), as appropriate. Percentages for categorical variables are calculated within each category row. *P*-values are from chi-square or Fisher's exact tests for categorical variables and the Mann–Whitney U test for continuous variables, as appropriate

No statistically significant differences were observed between infants with resolved and persistent hydrocele in terms of age at diagnosis, gestational age, or birth weight. Similarly, no statistically significant associations were found between one-year outcome and place of residence, preterm status, birth-weight category, hydrocele laterality, or associated inguinal hernia.

Discussion

In this prospective observational study, 150 male infants diagnosed with hydrocele during the first two months of life were followed until one year of age. Spontaneous resolution occurred in 94 infants (62.7%), while hydrocele persisted in 56 (37.3%). Hydrocele type and size were significantly associated with one-year

outcome in unadjusted analyses, whereas the demographic and perinatal characteristics examined were not significantly associated with resolution or persistence.

The finding showed that 62.7% of infants experienced spontaneous resolution by one year of age supports the generally favorable natural history of infantile hydrocele, although more than one-third of the cohort had persistent hydrocele at the end of follow-up. This finding is consistent with a study of 121 infants followed during the first 12 months of life, in which 63% achieved complete spontaneous resolution [10]. The authors attributed this favorable course to ongoing obliteration of the processus vaginalis and recommended regular follow-up to monitor resolution. Similarly, a study of neonates with congenital hydrocele in Nigeria reported spontaneous resolution in 129 of 163 cases (79.1%) within the first year, with seven additional cases resolving between 13 and 18 months [11]. Differences in resolution proportions across studies may reflect variation in patient characteristics, clinical assessment, study setting, and follow-up procedures. Nevertheless, these findings collectively support the potential for spontaneous resolution during infancy.

The association between hydrocele type and one-year outcome warrants particular consideration. In the present cohort, all 35 infants with communicating hydroceles had persistent hydrocele at one year, whereas spontaneous resolution occurred in 94 of 115 infants (81.7%) with non-communicating hydroceles. In contrast, the Nigerian study found no statistically significant difference in spontaneous resolution between communicating and non-communicating hydroceles [11]. Koski et al. reported spontaneous resolution without surgery in approximately two-thirds of infants with clinically communicating hydroceles followed to a defined outcome [12]. Taken together, these findings suggest that communicating hydroceles may resolve spontaneously in some infants, although the observed outcomes vary across studies. The findings reported by Koski et al. support the possibility of continued observation before elective surgery in appropriately selected patients. However, the present study cannot determine whether the communicating hydroceles that persisted at one year would subsequently resolve.

Hydrocele size was also strongly associated with one-year outcome. None of the infants with large hydroceles experienced spontaneous resolution by one year, compared with approximately 80% of those with small or medium-sized hydroceles. The hydrocele size may be associated with the likelihood of persistence during infancy. However, the size categories were based on clinical assessments documented in the medical records, and the criteria used to distinguish small, medium, and large hydroceles could not be further clarified from the available documentation. This limits the reproducibility of the classification and warrants caution when interpreting the observed association. Further prospective studies using standardized criteria for hydrocele size are needed to determine whether this relationship can be consistently demonstrated.

No statistically significant associations were observed between one-year outcome and age at diagnosis, gestational age, birth weight, preterm status, birth-weight category, laterality, or associated inguinal hernia. Although hydrocele type and size demonstrated stronger observed associations with outcome in this cohort, these findings should not be interpreted as evidence that anatomical characteristics are independently associated with persistence or resolution. The analyses were unadjusted, and the absence of statistical significance for the other characteristics does not establish that they have no relationship with the natural history of hydrocele. Furthermore, the relatively small numbers of infants in some subgroups may have limited the ability to detect modest associations.

This study had several limitations. First, its single-center design may limit the generalizability

of the findings to other settings. Second, complete separation in some categorical variables limited the assessment of adjusted associations. Consequently, the findings are based on unadjusted comparisons, and potential confounding could not be adequately addressed. Third, the criteria used to classify hydrocele size as small, medium, or large could not be clarified from the available documentation, limiting reproducibility. Finally, follow-up ended at one year of age, preventing assessment of whether persistent hydroceles subsequently resolved or required surgery. Further prospective studies using standardized clinical classifications and longer follow-up are needed.

Despite these limitations, the study has several strengths. All 150 eligible infants identified during the recruitment period were included, avoiding exclusions among the identified eligible cases. The prospective design enabled the assessment of outcomes through one year of age, while the study examined several relevant clinical characteristics, including hydrocele type, size, laterality, and associated inguinal hernia. Importantly, the study provides locally relevant evidence on the early natural history of infantile hydrocele in Khost Province, Afghanistan, where published data remain limited. These findings contribute to the regional evidence base and may help inform further research and clinical evaluation of infantile hydrocele in similar settings.

Conclusion

In this prospective hospital-based cohort of infants diagnosed with hydrocele during the first two months of life, spontaneous resolution by one year occurred in approximately two-thirds of cases. Hydrocele type and size were significantly associated with one-year outcomes, with all observed communicating and large hydroceles persisting at one year. These findings highlighted the importance of careful clinical assessment when planning observation and follow-up during infancy. However, the results should be interpreted cautiously given the single-center setting and the inability to adequately account for potential confounding in the unadjusted analyses. Further prospective multicenter studies using standardized definitions of hydrocele type and size and longer follow-up are needed to better characterize the natural history of infantile hydrocele in Afghanistan and similar resource-constrained settings.

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Conflict of interest

The authors declare that there is no conflict of interests.

References

1. Hoang VT, Van HAT, Hoang TH, Nguyen TTT, Trinh CT. A Review of Classification, Diagnosis, and Management of Hydrocele. J Ultrasound Med. 2024;43(3):599-607.
2. Co C, Wijerathne S, Dacaynos L, Malik S, Loh C, Lee S, et al. Hydrocele of the canal of nuck: a case series and literature review. Hernia. 2026;30(1):244.

3. Fourie N, Banieghbal B. Pediatric hydrocele: A comprehensive review. Clin Surg 2017; 2. 2017;1448.
4. Patoulias I, Koutsogiannis E, Panopoulos I, Michou P, Feidantsis T, Patoulias D. Hydrocele in pediatric population. Acta Medica. 2020;63(2):57-62.
5. Hoang VT, Van HAT, Hoang TH. Updated classification system for primary hydrocele. Abdom Radiol(NY). 2023;48(1):387-9.
6. Jiang M, Pan H, Wei C, Zeng Z, Yang J, Li S, et al. Factors affecting the spontaneous resolution of pediatric primary hydrocele: a cohort study of children aged 0–12 years and development of a clinical prediction model. BMC Pediatr. 2026;26(1):583.
7. Razzaque A, Islam T, Rahman AM, Poly NN. Congenital Hydrocele: Prevalence and Outcome Among Male Children. Pacific J Med Res. 2025;2(4):182-91.
8. Salari N, Beiromvand M, Abdollahi R, Hemmatabadi FK, Daneshkhah A, Ghaderi A, et al. Global prevalence of hydrocele in infants and children: a systematic review and meta-analysis. BMC Pediatr. 2025;25(1):128.
9. Chen X, Luo X, Deng J. Digital health to strengthen pediatric surgical referral and follow-up in Low-resource settings: progress, gaps, and future directions. Front Surg. 2026;13:1835282.
10. Naji H, Ingolfsson I, Isacson D, Svensson JF. Decision making in the management of hydroceles in infants and children. Eur J Pediatr. 2012;171(5):807-10.
11. Osifo O, Osaigbovo E. Congenital hydrocele: prevalence and outcome among male children who underwent neonatal circumcision in Benin City, Nigeria. J Pediatr Urol. 2008;4(3):178-82.
12. Koski ME, Makari JH, Adams MC, Thomas JC, Clark PE, Pope IV JC, et al. Infant communicating hydroceles—do they need immediate repair or might some clinically resolve? J Pediatr Surg. 2010;45(3):590-3.