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RESEARCH

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Watchful waiting for communicating hydrocoele in infants

Tarek Abdelazeem Sabra[1*], Moamen Shalkamy Abdelgawaad[1], Sarah Magdy Abdelmohsen[2] and Amr Badawy[3]

Abstract

Background: One of the commonest pediatric surgeries is hydrocele. There are suggestions to wait for spontaneous resolution than to operate these cases without harmful adverse events. Herein, we evaluated the outcome of the watchfulness of these cases over 18 months.

Methods: The study included 93 infants with communicating hydrocele for the Pediatric Surgery Department, Faculty of Medicine (Assiut, Egypt). They were planned to be followed up for 18 months, and indications for intervention included hernia, increasing in size, being tense, and completion of 18 months of follow-up without improvement.

Results: The gestational age of the included patients was 38.5 ± 2.2 weeks and the age at the time of presentation was 50 (7, 495) days. Most cases were bilateral, reducible, and had an intermittent course. After 18 months of follow-up, 60.2% of the patients resolved spontaneously and 39.8% were surgically treated. Age at the time of presentation was higher among operated patients. Patients with reducibility criteria on clinical examination and lack of intermittent course had higher frequency among operated patients (89.2%).

Conclusions: It is safe to wait and not to operate on infants with hydrocele up to 18 months as long as there was no hernia. Higher age at presentation and reducibility on examination are indicators that favor the need for surgery.

Keywords: Hydrocoele, Watchfulness, Inguinal hernia

Background

Infantile hydrocele is an abnormal accumulation of fluid along the course of the vaginal process caused by inadequate obliteration of the vaginal process. Processus vaginalis is caused by the testis following the gubernaculum testis as it descends from an intra-abdominal retroperitoneal location to the scrotum. As the testis moves through the internal ring, it drags along a peritoneum diverticulum on its anteromedial surface known as "the processus vaginalis" [1].

The "canal of Nuck" is the female analog of the processus vaginalis, which follows the round ligament of the uterus that passes via the inguinal canal and continues into the labia majora. In more than 90% of full-term newborns, the layers of the processus vaginalis fuse, obliterating the peritoneal cavity's entry into the inguinal canal. Failure to obliterate can cause a range of inguinal-scrotal abnormalities, including full persistence, which can culminate in an inguinal hernia. A communicative hydrocele is defined as complete patency with a tiny aperture at the internal ring that permits only fluid flow. A hydrocele of the cord is defined as proximal and distal obliteration with a residual cyst in the center [2].

Hydrocele is a common congenital anomaly that affects 6–58% of newborn men. It is widely assumed that there is a connection with the peritoneal cavity and that the hydrocele will resolve during the first year of life. The basic cause for congenital hernia and hydrocele is thought to be the continued patency of the processus vaginalis, with the difference between them related to the caliber of the link [3].

*Correspondence: Tareksabra@aun.edu.eg

[1] Pediatric Surgery Department, Faculty of Medicine, Assiut University, 71515 Assiut, Egypt
Full list of author information is available at the end of the article

The pathophysiology of inguinal hernia (IH) and hydrocele is the same, and the surgical repair of both illnesses is similar [4].

Several techniques have been described, which can be divided into two major groups: intracorporeal techniques, which generally include dissection, ligation, and division of the sac in the same manner as the classic inguinal approach (true herniotomy), and extracorporeal percutaneous techniques, which simply ligate the patent processus vaginalis without division. Despite the fact that there is no agreement in favor of any of the approaches, there is enough evidence-based data to support minimally invasive repair as a safe and successful way if suitable training and mentoring are provided [3].

The only significant risk of seeing a communicative hydrocele is that it will proceed to an inguinal hernia, either freshly created or previously undiagnosed [5].

Herein, we are evaluating the safety of watchfulness of communicating hydrocele in comparison to surgical intervention.

Methods

Design

The design of this study is a cross-sectional study with a case–control component.

Participants

Ninety-three infants with hydrocele were eligible to be enrolled in the study, and they were recruited from the pediatric surgery outpatient clinic, Faculty of Medicine (Assiut, Egypt).

Inclusion criteria

Inclusion criteria are all infants younger than 18 months old who were diagnosed as a case of communicating hydrocele in the duration between January 2015 and June 2020.

Sample size

All children who were diagnosed as communicating hydrocele were included, and only 93 children continued a follow-up till the end of the study. Those 93 children were enrolled.

Methods

Data were collected from the patient sheet or their caregivers, and it included gestational age, age at the time of the presentation, and laterality. Hydrocele was diagnosed clinically by the presence of painless scrotal swelling rendering the testes impalpable with positive transillumination and fluctuation. During the ultrasonography examination, hydrocele appears as an anechoic or echolucent area surrounding the testis. Intermittent hydrocele usually reduces when lying flat due to the drainage of hydrocele fluid into the peritoneum. Communication, for most patients, was defined by a history of daily change in size recognized by parents with near-total temporary resolution noted on occasion. Diagnosis of the communication in 43 was made after the physician reduction of all fluid during the physical examination. The resolution was marked by the absence of any swelling on history and examination.

All patients were followed up for maximum age of 18 months. The intervention was indicated if persistence for more than 18 months old or occurrence of complications such as inguinal hernia. All patients were asked to seek medical advice in case of the presence of complications and were followed up by telephone and close follow-up.

Technique of surgical repair

An inguinal approach is required for the open method of inguinal hernia repair (adopted for all our study population). An inguinal incision 3–4-cm long is done on the side ipsilateral to the symptomatic inguinal hernia. The hernia sac is separated from the surrounding cord tissues, which include the cremasteric muscle, vas deferens, and testicular arteries or round ligaments. The proximal separated sac is ligatured, and the distal sac is split. There is no evidence in the literature to support the use of absorbable sutures over the non-absorbable suture. Historically, contralateral patency of the processus vaginalis was not examined during the open repair of a unilateral inguinal hernia.

Hydrocele therapy needs the same surgical method as open inguinal herniotomy. A scrotal method may be used in older children. In the event of a communicating hydrocele, an inguinal incision is done, the PVD is ligated and sectioned, and the distal fluid is attempted to be drained if it has not already been emptied. To discharge any leftover fluid, an incision distally, down to the scrotal tunica vaginalis, is typically required [6].

Grouping

Patients were divided into 2 groups according to response to watchfulness: group I included patients who showed complete resolution and group II included patients who were operated. Both groups were compared regarding baseline characteristics and hydrocele characters to evaluate the causes of non-response to watchfulness.

Administrative design

Approval was obtained from the institutional review board (IRB) NO: 17300769 in the Faculty of Medicine, Assiut University, and informed consent was obtained from patients' parents or caregivers.

Statistical analysis

All data were tabulated in SPSS sheet version 21. Qualitative data was presented as number and percentage, while quantitative parametric data (normally distributed) was presented as mean and standard deviation and quantitative non-parametric data (abnormally distributed) was presented as median (minimum, maximum). The following statistical tests will be used: chi-square test, to compare categorical data; Student's *t* test, to compare normally distributed quantitative data between 2 groups; and Mann–Whitney test, to compare abnormally distributed quantitative data between 2 groups. *P* value < 0.05 was considered statistically significant.

Results

The study included 93 infants with communicating hydrocele, and they were delivered at 38.5 ± 2.2 gestational weeks. Age at the time of presentation ranged from 7 to 495 days with a median of 50 days. The number of infants who were diagnosed based on reducibility was 43 (46.2%). About 53.8% (50 infants) had an intermittent course. The lesions were bilateral in 65 infants (69.9%), right in 19 infants, and left in 9 infants (Table 1).

All infants were planned to be followed up without surgical intervention for 18 months old.

Seventy-eight infants completed the 18-month duration. Out of them, 56 patients had spontaneous resolution and 22 patients needed surgical intervention due to an increase (1 infant) or persistence size (19 infants) and 2 patients were operated on due to reappearance of hydrocele after primary spontaneous resolution. The total number of infants who were treated surgically was 37 patients. Out of them, 15 infants were operated on before the completion of the 18 months due to being associated with a hernia (2 infants), increased in size (4 infants), being tense hydrocele (6 infants), and 3 infants with the persistence of size (Table 2). Kaplan-Meyer curve was constructed to illustrate the time to each event (event vs. censored) of all included children (Fig. 1).

Table 1 Baseline characteristics of the patients and clinical characteristics

	Total cohort *n* = 93 infants
Gestational age (weeks) mean ± SD	38.5 ± 2.2
Age at presentation (days) median (min, max)	50 (7, 540)
Reducibility on examination no. (%)	43 (46.2%)
Intermittent course no. (%)	50 (53.8%)
Laterality no. (%)	
Bilateral	65 (69.9%)
Right	19 (20.4%)
Left	9 (9.7%)

Table 2 Outcome of 18 months of watchfulness and surgery

	Total cohort, *n* = 93 infants
Spontaneous resolution no. (%)	56 (60.2%)
Need for surgery no. (%)	37 (39.8%)
Indication for surgery no. (%)	
Persistence of size	22/37 (59.5%)
Increased in size	5/37 (10.8%)
Become tense	6/37 (13.5%)
Associated hernia	2/37 (5.4%)
Appearance after resolution	2/37 (5.4%)
Age at surgery (months) mean ± SD	15.74 ± 5.38
Age at resolution (months) mean ± SD	8.4 ± 3.5

Infants who were treated surgically were compared to infants with a spontaneous resolution to examine the risk factors for non-response to watchfulness. Both groups were comparable regarding gestational age. While the median age at the time of presentation was higher among infants who were referred to surgery ($p = 0.009$). There was a statistically significant difference between both groups regarding the method of diagnosis as infants who needed surgery were diagnosed based on reducibility (89.2%) while the majority of patients with spontaneous resolution were diagnosed based on a history of intermittent swelling ($p < 0.001$). Percent of infants with the intermittent course was higher among infants with spontaneous resolution than the surgery group with a statistically significant difference ($p < 0.001$). Both groups were comparable regarding laterality (Table 3).

Children were divided into 2 groups according to the disease course: 50 children had an intermittent course and 43 were reducible. Out of 50 children with an intermittent course, 46 had spontaneous resolution and surgery was required for 4 children. Out of 43 children with a non-intermittent course, 10 had spontaneous resolution and surgery was required for 33 children (Fig. 2). There was a statistically significant difference regarding time to surgery between both groups ($p = 0.026$) (Fig. 3).

Discussion

One of the commonest pediatric operations is hydrocele repair. Little is known and few literature had been published about hydroceles in pediatric patients [5, 7, 8]. Although surgeons have established an agreement on the conservative treatment of hydroceles in infants under the age of 1 year, the management of hydroceles in older children is still debatable. Although some authors

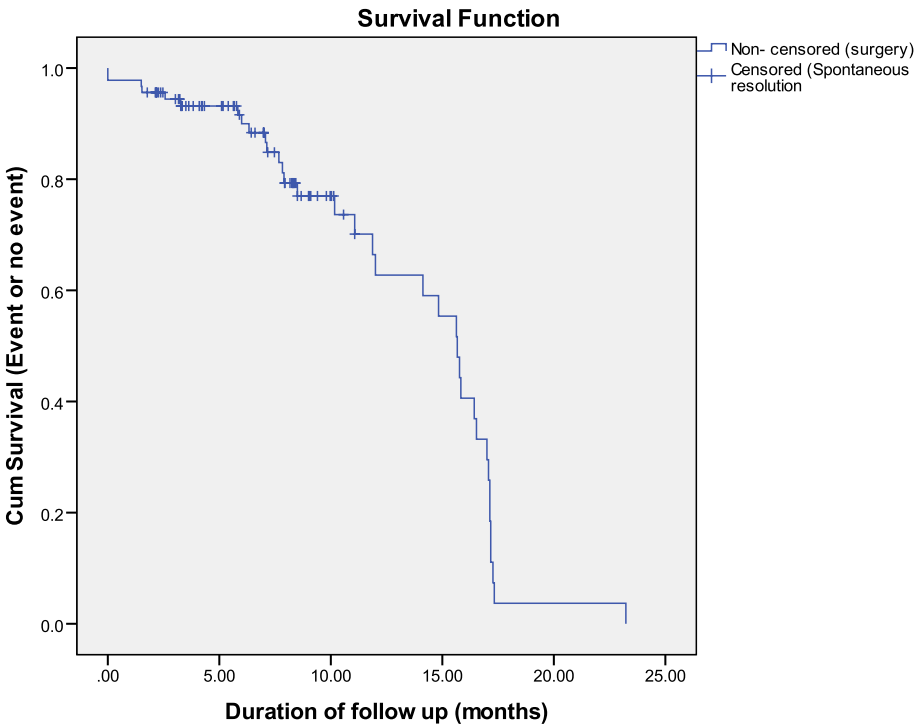

Fig. 1 Kaplan-Meyer curve for all patients illustrating time to event (surgery) and no event (spontaneous resolution) in the total cohort

Table 3 Risk factors for non-response to watchfulness

	Resolution *N* = 56	Need for surgery *N* = 37	Test of significance	*P* value
Gestational age (weeks) mean ± SD	38.58 ± 2.26	38.38 ± 2.1	$t = -0.387$*	0.7
Age at presentation (days) median (min, max)	45.5 (7, 495)	71 (20, 450)	$U = 705$#	***0.009***
Reducibility on examination no. (%)	10 (17.86%)	33 (89.2%)	$X^2 = 45.6^{\$}$	***< 0.001***
Intermittent course no. (%)	46 (82.14%)	4 (10.8%)	$X^2 = 45.6^{\$}$	***< 0.001***
Laterality no. (%)				
Bilateral	40 (71.4%)	25 (67.6%)	$X^2 = 0.16^{\$}$	0.69
Right	11 (19.6%)	8 (21.6%)	$X^2 = 0.05$	0.8
Left	5 (8.9%)	4 (10.8%)	$X^{2=}$ 0.09	0.67

* Student's *t* test; #Mann–Whitney test; $Chi-square test; Level of significance < 0.05

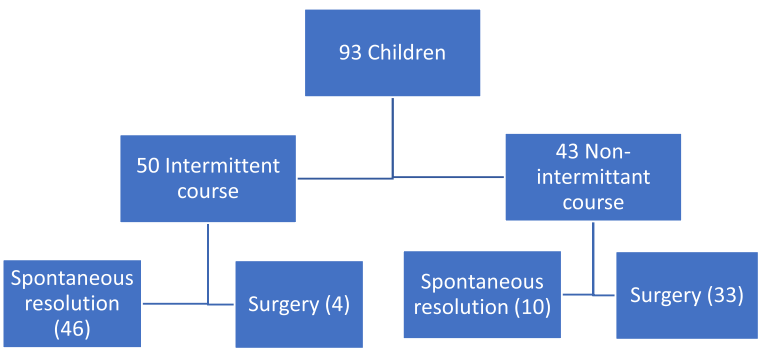

Fig. 2 Flow chart of children according to the course intermittency

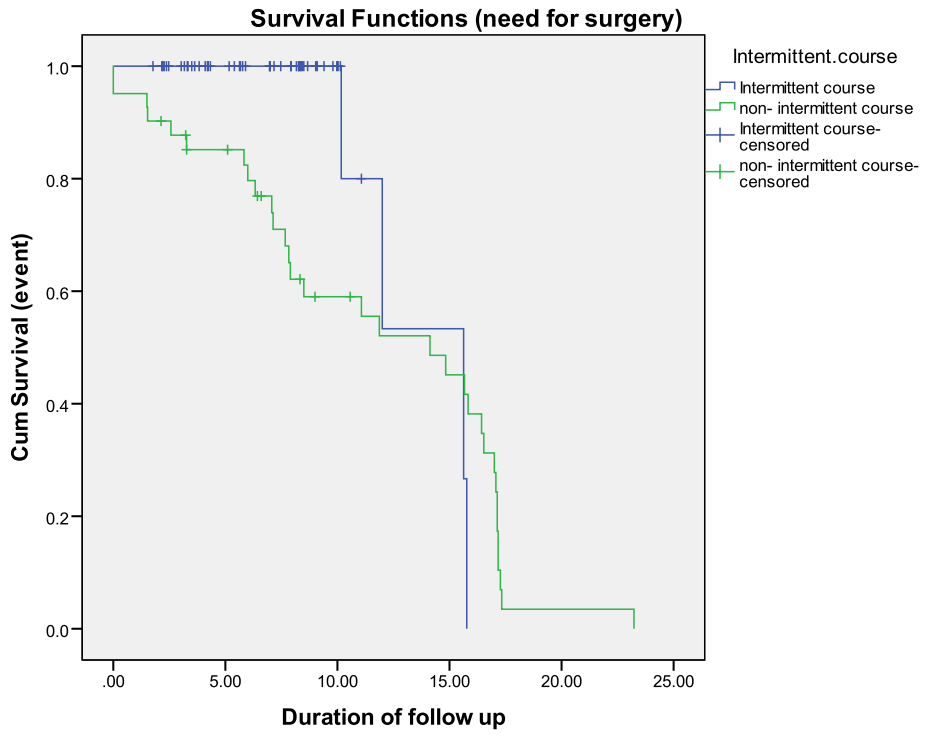

Fig. 3 Log rank analysis between cases with and without intermittent course regarding time to surgery showed a statistically significant difference ($p = 0.026$)

recommended surgery for patients above the age of 1 year, recent studies recommended older age criteria or a period of observation [9]. Herein, we evaluated the outcome of 93 infants with communicating hydrocele then a comparison between spontaneous resolution cases and cases that were operated on was conducted to determine risk factors associated with non-response to watchfulness management.

Most of the included infants were full term. Prematurity and small for gestational age infants are associated with the persistence of processus vaginalis [10]. Osifo et al. reported a higher incidence of hydrocele among premature babies [5]. The median age at presentation in the current study was 50 (7, 540) days. Older age was reported by Christensen et al., who stated first presenting at more than 1 year of age (median, 3 years; range, 1–18 years) [7]. Most of our patients had bilateral lesions. This is against what was reported by Nagi et al. [8].

Based on the previous studies, we planned to follow up with our patients without intervention till the age of 18 months without surgical intervention. Koski et al. recently reported a rate of spontaneous resolution of communicative hydrocele in 174 boys under the age of 18 months who were electively followed up on without surgery for a mean of 11 months (range, 0–110 months) [11]. Also, Hall et al. included 2878 infants in their meta-analysis and they were followed up for an average of 18 months [2]. In most cases, the premise of watchfulness is based on the patent processus vaginalis, which will spontaneously shut after 1 to 2 years [12]. Indications for surgical intervention in the current study included increasing in size, being tense, and the presence of an inguinal hernia. Some authors advocated the same indications for surgical intervention [8, 13–15].

Hydroceles have a tendency for spontaneous resolution [16]. The majority of newborns do not require surgical treatment within the first 12–24 months of life. If there is a suspicion of an underlying testicular disease or a concurrent inguinal hernia, surgery should be performed in the early months. If a scrotal hydrocele continues after the age of 2 years, it may be a reason for inguinal surgical correction, as the hydrocele is frequently accompanied by an inguinal hernia [17].

The spontaneous resolution was reported in 56 patients (60.2%) in the current study while surgery was required for 37 infants (39.8%). Naji et al. reported a similar resolution rate (62%) [8]. In Osifo et al., during follow-up, a higher percentage (83.4%) of cases (136 hydrocele cases) resolved spontaneously while only 27 (16.6%) persisted and were operated and no cases showed resolution after 18 months [5]. In Yavuz et al., 27% of the included infants were operated [18]. On the other hand,

Christensen et al. reported that 97% of the communicating hydrocele in their study were operated and only 3% resolved spontaneously. The average time to resolution was 5.6 months with a median of 3 months and a range of up to 24 months. Also, Midrio et al. reported a low rate of spontaneous resolution (27% only) [19].

The mean age for spontaneous resolution was 8.4 ± 3.5 months in the current study. Koski et al. reported that the median age at which resolution occurred was 11 months, and the range was up to 60 months (i.e., 5 years), suggesting that, in some boys, the resolution does occur beyond 2 years of age [11].

It is true that the data of Osifo and Osaigbovo show no improvement in resolution between 18 and 24 months of age, although it is worth noting that they did not follow boys beyond the age of two to record additional resolution [8]. Midrio et al. suggested that the rate of resolution is higher before the age of 4 years compared with after [19].

Only 2 patients (5.4%) in the current study were operated on due to hernia in comparison to 10 (11.2%) infants in a study by YAVUZ [18], and the rest of the patients were operated on due to persistence or increase in size. Koksi et al. reported hernia as an absolute indication for intervention [11]. Lau et al. reported hernia, increase in the size, and being tense as indications for surgical intervention [12]. Among the non-resolvers, there was a progressive increase in size among 4 patients (10.8%) while the rest had preserved size. A higher percentage showed a progressive increase in size (50%) as an indication for intervention in Osifo et al. [5]. Naji et al. reported testicular torsion in 1 patient as an additional indication for surgery [8].

In this study, the mean age of surgery was 15.74 ± 5.38 months and operated patients had higher age at the time of presentation in comparison to patients with spontaneous resolution. Hall et al. reported that the peak incidence of surgery for hydrocele was during the third year of life (24–36 months of age) [2]. Also, Midrio et al. reported the age of presentation as a predictor for spontaneous resolution [19]. Naji et al. reported the mean age of the patients operated upon for hydrocele was 3.5 years [8]. Contrary to our study, Koski et al. did not find the effect of the age at presentation on the need for intervention [11].

An intermittent course of the hydrocele was associated with spontaneous resolution while reducibility increased the need for intervention in the current study which can be explained by a wider defect in the latter. This comes in hand with Kapur et al. and Nguyen et al. [1, 4].

In the current study, laterality did not affect spontaneous resolution and there was no statistically significant difference between both groups regarding laterality. Most of the operated patients had bilateral disease, and this percentage is much higher than what was reported by Osifo et al. as bilateral lesions presented in only 4 cases (14.8%) out of the operated patients [5]. Similarly, Naji et al. did not consider bilateralism as a predictor for resolution or need for operation [8]. Contrary to the current study, Yavuz et al. stated that surgery was required in unilateral cases especially the right-side presence than in bilateral cases with a statistically significant difference. He also reported size as an additional risk factor [18].

The study had some limitations as lack of randomization, and we did not study some paternal and maternal risk factors of hydrocele which may affect spontaneous resolution.

In conclusion, there is good evidence that hydrocele in infants could be resolved spontaneously before the age of 18 months with a rare incidence of hernia and risks for non-resolution include higher age of presentation, reducibility on examination, and lack of intermittent course.

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Authors' contributions
Tarek Abdelazeem Sabra contributed to the data analysis, drafted the work, approved the version to be published, and revised the work critically. Moamen Shalkamy Abdelgawaad contributed to the interpretation of the data, design of the work, and revised the manuscript. Sarah Magdy Abdelmohsen approved the version to be published and analysis of the data, and shared in writing the manuscript. Amr Badawy approved the version to be published and contributed to the data interpretation and data analysis. The authors read and approved the final manuscript.

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Availability of data and materials
The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate
Approval was obtained from the institutional review board (IRB) NO: 17300769 in the Faculty of Medicine.

Consent for publication
Not applicable.

Competing interests
The authors declare that they have no competing interests.

Author details
[1]Pediatric Surgery Department, Faculty of Medicine, Assiut University, 71515 Assiut, Egypt. [2]Pediatric Surgery Unit, Faculty of Medicine, Aswan University, Alexandria, Egypt. [3]Faculty of Medicine, Alexandria University, Alexandria, Egypt.

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