

## Laparoscopic Management of Abdominoscrotal Hydrocele in Children: A Case Series

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### ABSTRACT

**Background:** Abdominoscrotal hydrocele (ASH) is an uncommon condition characterized by a fluid-filled mass with inguinoscrotal and abdominal components. There is a controversy regarding the best management.

**Objective:** This study presented a case series of five boys diagnosed with ASH, three of whom had previous inguinoscrotal surgeries. Laparoscopy was utilized in all patients. **Subjects and methods:** Patients diagnosed with ASH were treated utilizing either a laparoscopic-assisted or laparoscopic-guided technique. In the laparoscopic-assisted approach, the abdominal cyst was laparoscopically dissected and separated from the vas deferens and testicular vessels. In the laparoscopic-guided approach, laparoscopy was used to confirm the diagnosis and to guide the delivery of the abdominal component and the transfixion ligation of the proximal sac through the inguinal incision.

**Results:** A total of five patients were included with a median age at operation of 55 months (interquartile range: 12-60). Three boys had a history of prior inguinoscrotal surgeries; two for inguinal hernia repair and one for hydrocele. Additionally, one patient presented with bilateral hydrocele and no prior surgical interventions. Furthermore, one patient presented with a provisional diagnosis of right inguinal hernia alongside a left non-palpable undescended testis. Notably, no significant postoperative complications or recurrences were observed among any of the documented cases, with a mean follow-up duration of  $17.4 \pm 5.18$  months. **Conclusions:** Laparoscopy offers a notably safe and highly efficient method for management of pediatric abdominoscrotal hydrocele, especially in cases where there are instances of recurrence that need to be addressed promptly.

**Keywords:** Abdominoscrotal hydrocele, Laparoscopy, Recurrent hydrocele, Laparoscopic-assisted hydrocelectomy, Hydrocele management.

### INTRODUCTION

Abdominoscrotal hydrocele (ASH) is an uncommon condition characterized by a fluid-filled sac with inguinoscrotal and abdominal components connected by an isthmus within the inguinal canal. It comprises up to 3.1% of all pediatric hydroceles<sup>(1)</sup>.

Failure of obliteration of the processus vaginalis (PV) during development leads to two major pathological conditions namely hydrocele and indirect inguinal hernia. According to the degrees of obliteration of PV, various surgical conditions can develop including indirect inguinal hernia, communicating hydrocele, hydrocele of the cord, scrotal hydrocele, and abdominoscrotal hydrocele. Abdominoscrotal hydrocele is characterized by extension of the scrotal component of the sac to the abdominal cavity forming two intercommunicating components (inguinoscrotal and abdominal)<sup>(2-3)</sup>.

Diagnosis can be made preoperatively based on palpation of abdominal extension of the hydrocele only with compression of the scrotal component<sup>(4-5)</sup>. Ultrasonographic evaluation also can provide valuable information regarding the extension of abdominal and scrotal components, testis appearance, and other urinary tract abnormalities<sup>(6-7)</sup>. Although spontaneous resolution is reported in about 25% of patients in one study<sup>(8)</sup>, surgical intervention is still considered the rule to prevent serious reported complications such as hydronephrosis<sup>(9)</sup>, tunica vaginalis mesothelioma<sup>(10)</sup>, leg edema<sup>(11)</sup>, dysmorphic or hypoplastic testes<sup>(7,12)</sup>.

Different surgical approaches have been described for the management of ASH including open approaches

(abdominal<sup>(13)</sup>, inguinal<sup>(8)</sup>, and scrotal<sup>(7)</sup>), laparoscopic<sup>(14)</sup> and combined laparoscopic and open procedures<sup>(15)</sup>.

Although ASH is a rare form of hydrocele, it poses significant challenges in diagnosis and management. The aim of this study was to investigate the value of laparoscopy in diagnosis and management of this uncommon form of hydrocele in pediatric patients.

### SUBJECTS AND METHODS

Patients' medical records were reviewed from January 2022 to June 2023 for cases diagnosed with abdominoscrotal hydrocele at Mansoura University Children's Hospital, Egypt. Patients with this pathology were included either the diagnosis was suspected preoperatively or was detected as an intraoperative surprise.

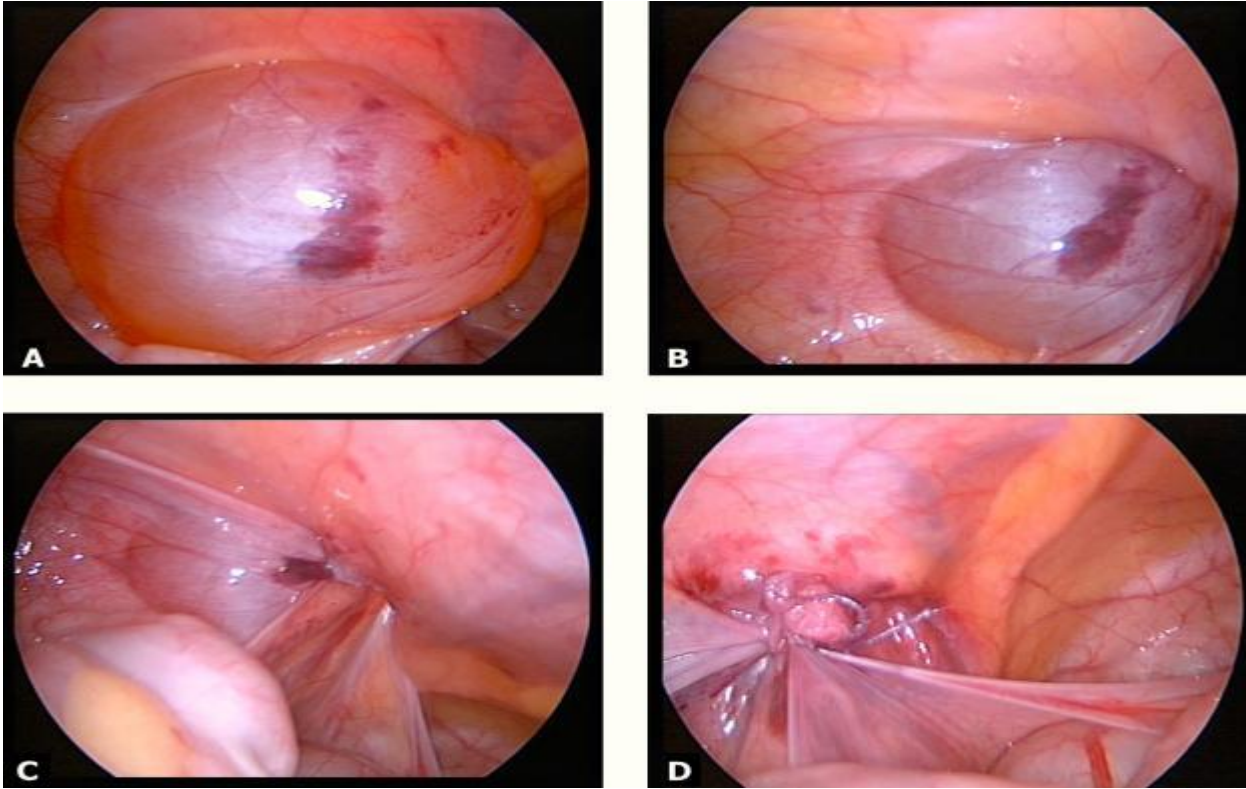
**Ethical approval:** An approval was obtained from the institutional Research Board (IRB), Faculty of Medicine, Mansoura University (code number: R23.12.2406). Before being recruited for the study, the parents of every child participant gave their informed written consent. Throughout its implementation, the study complied with the Helsinki Declaration.

Patients' data were collected including patient's presentation, previous surgical history and age at operation. Surgical details were obtained from surgical reports including operative details, complications and operative time. Postoperative data and follow up duration were also recorded.

**Surgical technique:** Laparoscopic exploration was done in all patients using a 5-mm umbilical port with a 30° scope. After confirming the diagnosis of abdominoscrotal hydrocele.

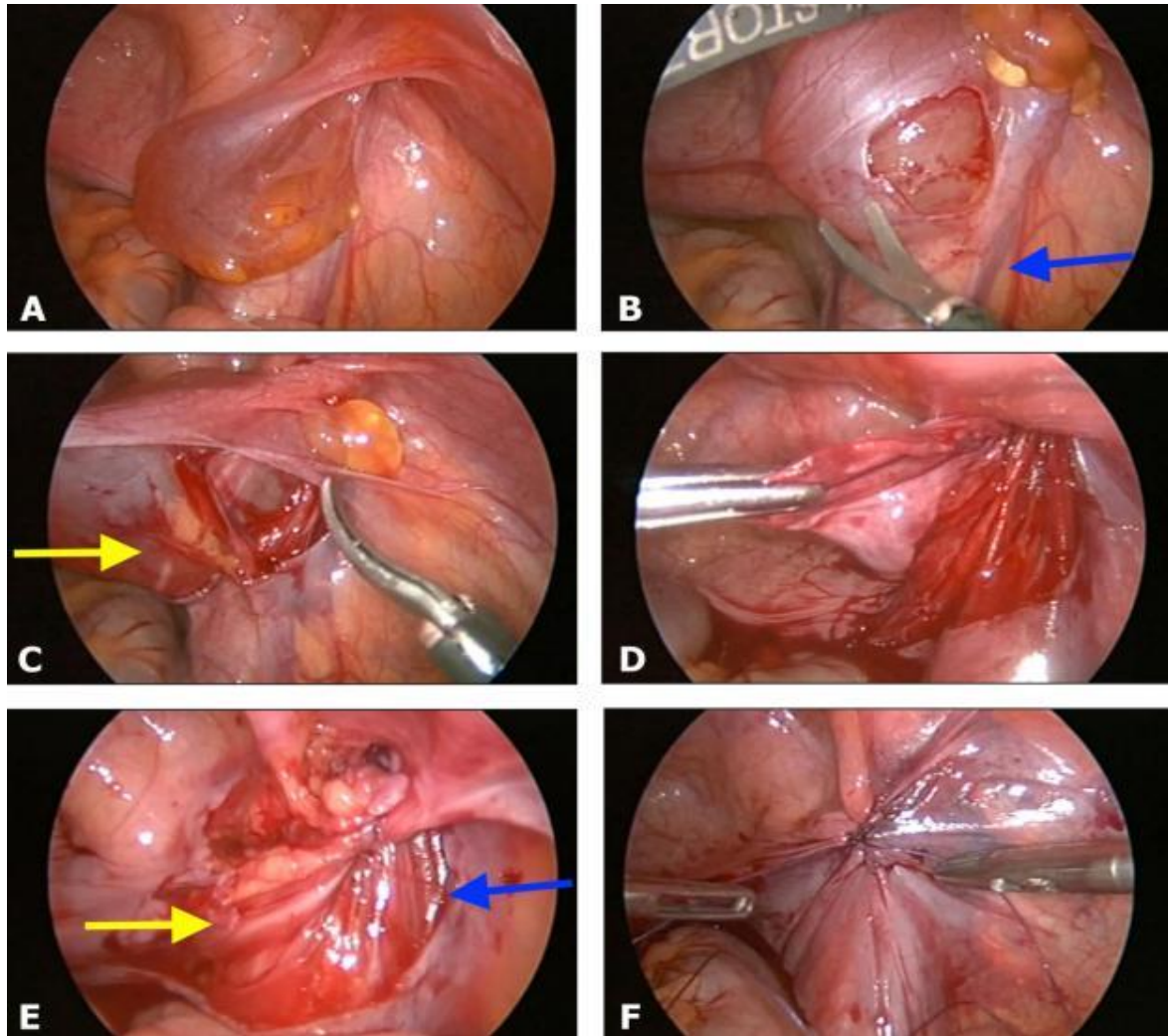
There were two possible surgical strategies:

**1-Laparoscopic-guided approach (Figure 1):** After confirming the diagnosis by laparoscopy, an inguinal incision was done. The inguinoscrotal component was dissected from the spermatic cord structures up to the level of the internal ring. The fluid content was evacuated through an incision in the inguinoscrotal sac. Thereafter, with laparoscopic guidance, the abdominal component was delivered completely through the inguinal incision with the overlying peritoneum. A transfixation absorbable stitch (3/0 polyglactin) was placed at the proximal end of the sac and the sac was subtotally excised with part of the tunica vaginalis. Complete disconnection of peritoneum overlying the internal ring was confirmed by laparoscopy.



**Figure (1):** The laparoscopic-guided approach for a left-sided abdominoscrotal hydrocele, **A:** The laparoscopic appearance of the abdominal component. **B and C:** Appearance during gradual delivery of the abdominal component through the inguinal incision **D:** The final appearance after complete delivery and transfixing the sac with the overlying peritoneum.

**2- Laparoscopic-assisted approach (Figure 2):** Two working ports (3 mm or 5 mm) were inserted at the level of umbilicus one on each side. Dissection of vas deferens and testicular vessels was done separating them from the abdominal component of the hydrocele using scissors and/or monopolar hook cautery. After complete mobilization of vas and vessels, the abdominal sac was decompressed to allow its future delivery. Through an inguinal incision, dissection of the inguinoscrotal component was done separating it from the distal part of the spermatic cord. Thereafter, with laparoscopic guidance, the abdominal component was pulled and delivered through the inguinal ring. Subtotal excision of the sac with part of tunica vaginalis preserving the part that is closely related to cord structures. Laparoscopic closure of the peritoneum overlying the internal ring was done if found required according to the surgeon's preference using absorbable sutures (3/0 or 4/0 polyglactin) in a purse string manner.



**Figure (2):** The laparoscopic-assisted approach for a right-sided abdominoscrotal hydrocele, **A:** The laparoscopic appearance of the abdominal component **B:** Starting the dissection by incising the peritoneum overlying the cyst. Note the close relation of the testicular vessels (Blue arrow) **C:** Continued dissection of the cyst from the closely adherent vas deferens (yellow arrow) **D:** The completely dissected and decompressed abdominal component was pulled through the inguinal incision **E:** The appearance after complete delivery of the abdominal component. Note the intact and released vas deferens (yellow arrow) and testicular vessels (blue arrow) **F:** Final appearance after laparoscopic purse string closure of the peritoneal defect overlying the internal ring.

All patients were planned to be discharged on the same day after the procedure. The first follow-up visit was planned 1 week after discharge followed by a visit one month after then visits on 6-month-intervals.

## RESULTS

Five boys were diagnosed with abdominoscrotal hydrocele in the period from January 2022 to June 2023. The median age at presentation was 55 months (IQR 12-60) with the oldest boy aged 122 months.

**Presentation and Surgical History:**

Three patients presented with hydrocele with history of previous inguinoscrotal operations; two for inguinal hernia repair and one for hydrocele. All these operations were done through inguinal incisions. One patient presented with bilateral marked hydrocele with no previous surgical history. One patient presented with the provisional diagnosis of right inguinal hernia and left non-palpable undescended testis. The diagnosis of abdominoscrotal hydrocele was radiologically suspected in one patient based on ultrasonography done after previous inguinal hernia repair. In two patients with no previous surgical history, the diagnosis was suspected based on clinical examination under anaesthesia by positive Springing Back Ball sign (Figure 3).



**Figure (3):** Examination under anaesthesia of an infant with right abdominoscrotal hydrocele and left non communicating hydrocele. **A:** Manual compression on the scrotal component while the examiner’s left hand is palpating the abdominal component. **B:** Note the partial reduction of the scrotal component. **C:** Note the re-accumulation of fluid inside the scrotal component upon release of the examiner’s right hand with gentle compression on the abdominal component by the left hand.

**Surgical strategy:** Laparoscopy was used for all patients. Diagnosis of abdominoscrotal hydrocele was confirmed in the 5 patients [4 right-sided (80%) and one left-sided (20%)]. The contralateral ring was found closed in all patients including the patient with bilateral hydrocele and the patient with non-palpable testis with blind ended vas deferens and vessels. The laparoscopic guided approach was used in only one patient (20%) with left abdominoscrotal hydrocele after previous inguinal hernia repair. The other four patients (80%) underwent a laparoscopic-assisted approach. The mean operative time for the laparoscopic-assisted approach was 110.25 ± 24.5 minutes compared to 50 minutes for the laparoscopic-guided approach. There were no intraoperative complications (Table 1).

**Table (1):** Illustrates the preoperative and the operative data of each patient

| Case No | Age (months) | Provisional Clinical diagnosis                                 | Ultra-sonography                             | Previous Surgical History  | Laparo-scopic finding   | Surgical approach      | Operative time (minutes) |
|---------|--------------|--|--|--|---|------------------------|--------------------------|
| 1       | 55           | Left hydrocele (Post Herniotomy)                               | Left abdomino-scrotal hydrocele              | Inguinal exploration for Left Inguinal Hernia)   | Left Abdominoscrotal Hydrocele  | Laparo-scopic guided   | 50                       |
| 2       | 60           | Recurrent right hydrocele                                      | Not done                                     | Inguinal exploration for Right Hydrocele<br>Right Pyeloplasty for Ureteropelvic Junction Obstruction | Right Abdominoscrotal Hydrocele   | Laparo-scopic assisted | 86                       |
| 3       | 122          | Right hydrocele (Post Herniotomy)                              | Right Communicating Hydrocele                | Inguinal exploration for Right Inguinal Hernia repair<br>Ventriculo-Peritoneal Shunt                 | Right Abdominoscrotal Hydrocele   | Laparo-scopic assisted | 95                       |
| 4       | 8            | Right Inguinal hernia and left non-palpable undescended testis | Not done                                     | None   | Right Abdominoscrotal Hydrocele and Closed left internal ring with blind ended vas deferens and vessels | Laparo-scopic assisted | 140                      |
| 5       | 12           | Bilateral huge hydrocele                                       | Bilateral Marked Non communicating Hydrocele | None   | Right Abdominoscrotal Hydrocele and left non communicating Hydrocele (managed via a scrotal incision)   | Laparo-scopic assisted | 120                      |

**Follow up:** The mean follow-up duration was  $17.4 \pm 5.18$  months. The shortest duration of follow-up of the last patient in this series was 13 months. All 5 patients suffered from moderate inguinoscrotal edema that resolved completely within 10 days. No other postoperative complications were encountered during the follow up including scrotal hematoma, testicular ascent or hypoplastic testes. No recurrences occurred during the follow up period.

## DISCUSSION

ASH was first described in 1834 by the French surgeon Dupuytren who called this entity "Hydrocele-en-bisac". The same pathology was described by Ivan K. Baitcheffand in 1903 and by Bickle in 1919 as abdominal bilocular hydrocele or abdominoscrotal hydrocele (ASH) (16-17). Diagnosis of ASH may be suspected clinically in a child with a large hydrocele that is completely reducible on examination but recurs immediately upon release of the scrotal pressure (12). This is called Springing Back Ball sign (4). This sign was found helpful to suspect the diagnosis of ASH in two patients (40%) in the present study. Moreover, a pelvic mass may be felt in a cooperative patient, while the scrotal component is being reduced with positive fluctuation test between the two swellings (5). Young infants may be initially managed expectantly as with regular infantile hydroceles, but complete resolution is uncommon (18). However, other reports recommended initial observation for uncomplicated cases with possible spontaneous resolution rate of 60% (12).

Ultrasonography is a commonly used diagnostic tool for ASH. An experienced radiologist can detect the two intercommunicating components of ASH. However, it may not be always sufficient for establishing the proper diagnosis by detecting the confluence between the abdominal and the scrotal components (11). Among three patients underwent preoperative ultrasonography in our series, the correct diagnosis was made in only one patient (33.3%), while one patient was misdiagnosed as non-communicating hydrocele and the last patients was incorrectly described as a classic communicating hydrocele. As a result of this diagnostic dilemma, we believe that laparoscopy is the best diagnostic tool for abdominoscrotal hydrocele rather than its significant role in management.

Furthermore, laparoscopy is considered a priceless tool to detect the underlying pathology in cases of recurrent hydroceles. Given that recurrent hydroceles are thought to occur on top of missed or recurrent abdominal component or communication, laparoscopy is believed to be the preferred approach for all recurrent hydroceles including abdominoscrotal ones. In the light of our findings of having three patients who underwent previous inguinoscrotal surgeries for hernias or hydroceles. We believe that the correct diagnosis was missed during the previous surgery and consequently, recurrence occurred due to the residual abdominal component. This comes in agreement with **Luks et al.**

(19) who reported that missing the abdominoscrotal communication can lead to what is thought to be recurrent scrotal hydrocele. They also reported that some abdominal components may be unnoticed during conventional open surgery. However, one study reported that complete excision of the abdominal sac does not affect the recurrence rate compared to a standard Jaboulay procedure (20).

Different surgical approaches were described for treatment of ASH including open (inguinal, scrotal and abdominal) and laparoscopic ones (6, 20-23). We tended to use laparoscopy in all cases suspected to have ASH with two possible approaches. After confirming the diagnosis by laparoscopy, according to the surgeon's preference, he had the choice to proceed directly for inguinal incision (laparoscopic guided approach) or to dissect the abdominal compartment first by laparoscopy before proceeding to the inguinal part of the procedure (laparoscopic-assisted approach). The same laparoscopic-assisted approach was used by **Abel et al.** (21). However, they opted to marsupialize the hydrocele from the abdomen before proceeding to the inguinal incision. In contrast, for easier dissection, we deferred the evacuation of the fluid until the complete dissection of the abdominal compartment was done. We only decompressed the hydrocele before delivering the abdominal component through the inguinal incision. The laparoscopic-guided approach was reported by **Martin et al.** (24) in a series of eight patients with satisfactory outcomes. Despite the longer operative time needed for the laparoscopic-assisted approach, it allows the surgeon to perfectly dissect the abdominal compartment from vas deferens and testicular vessels. Yet, this meticulous dissection required advanced laparoscopic skills in order not to injure these important structures. We would like to emphasize that the intraperitoneal fluid filled sac that is associated with some hydroceles is a different entity from ASH. In these cases, there is no adherence between the abdominal sac and vas and vessels. However, the extraperitoneal location (retroperitoneal or properitoneal) of the abdominal component of ASH with no peritoneal communication is a consistent part of the pathology (17, 25). In accordance with **Cuervo et al.** (3), the retroperitoneal location was found in all our patients.

In concordance with previous reports (22, 26), we found that both techniques can provide satisfactory outcomes with no recurrences as long as the abdominal component is excised completely.

## CONCLUSION

Laparoscopy has a great value in diagnosis and management of abdominoscrotal hydroceles particularly because many patients are not diagnosed preoperatively. Missing the correct diagnosis may lead to excision of the inguinoscrotal component only through an inguinal incision and consequently, hydrocele recurrence. We recommend laparoscopy as the best approach for management of recurrent pediatric

hydroceles, especially when an abdominal component or communication are suspected.

**Conflict of interest:** None.

**Financial disclosures:** None.

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