



## **Prognosis and Management of Communicating and Non-communicating Hydrocele**

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### **Authors' contributions**

*This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.*

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### **ABSTRACT**

Hydrocele can be found as a collection of fluid within the testicular tunica vaginalis. According to the etiology and pathophysiology of the disease, it can be classified into primary and secondary. Furthermore, primary hydrocele might include the closed or non-communicating, the communicating type, the congenital and or neonatal type. Many management approaches have been proposed for both the communicating and non-communicating hydrocele with different post-

operative and prognostic outcomes. In this literature review, we have discussed the current management approaches and prognosis of communicating and non-community hydrocele. Adequate diagnosis of the condition is the first step to achieve favorable management outcomes. Although the reported management outcomes are reported to be effective in the literature, the surgical approaches seem to be superior. However, many side effects might be associated with these operations. Estimates show that following varicocelectomy procedures, ipsilateral (left) hemiscrotal varicocele is the most common condition to occur, which might even develop following the procedure by several months and years (in some cases). Further investigations are still needed because the current evidence is largely based on case reports and small case series investigations. Therefore, larger studies are needed to help draw effective management protocols and enhance the outcomes and prognosis.

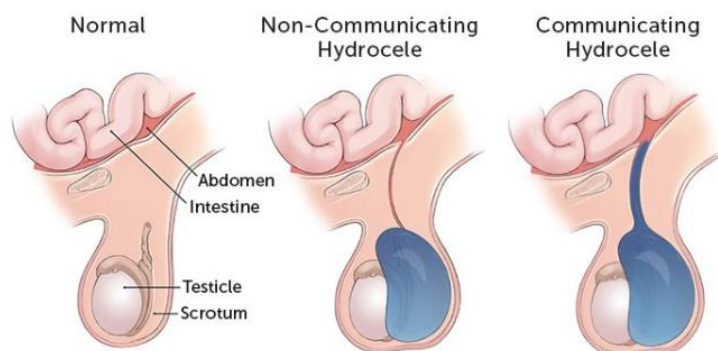
**Keywords:** Hydrocele; communicating; non-communicating; management; prognosis.

## 1. INTRODUCTION

Hydrocele can be found as a collection of fluid within the testicular tunica vaginalis. According to the etiology and pathophysiology of the disease, it can be classified into primary and secondary. Primary hydrocele might include the closed or non-communicating and the communicating types (Fig. 1), in addition to the congenital and or neonatal type [1,2]. On the other hand, congenital hydrocele usually develops secondary to other diseases. For instance, following surgical manipulation within the inguinal region (varicocelectomy), following inflammatory diseases (as epididymitis) intrascrotal tumors or trauma, systemic hyponatremia, and testicular torsion. Besides, it has also been demonstrated that parasitic infections are common causes of hydrocele within third-world countries [3].

Closed or non-communicating hydrocele usually manifests within the prepubertal age, however, the exact mechanism for such manifestations is not adequately understood. However, it has been suggested that the communication between the peritoneal cavity and the processus vaginalis

remains without symptoms until later. However, surgical findings do not support this suggestion because it has been observed that the processus vaginalis is not usually patent in this condition. A previous investigation by Koutsoumis et al. [4] biochemically analyzed the fluid from the closed hydrocele of 13 included patients and indicated that the fluid was mostly serous. Accordingly, it has been suggested that the main pathophysiology of the non-communicating hydrocele is attributable to the excessive production of fluid from the epithelial cells underlying the tunica vaginalis with no adequate reabsorption. Accordingly, the etiology is either attributable to the increased production or decreased absorption of this fluid leading to the development of a closed hydrocele [4,5]. Many management approaches have been proposed for both the communicating and non-communicating hydrocele, with different post-operative and prognostic outcomes. In this study, we aim to conduct a literature review aims to provide a proper discussion about the management and prognosis of communicating and non-communicating hydrocele.



**Fig. 1. A diagram showing the difference between the normal condition, communicating, and non-communicating hydrocele**

## **2. METHODS**

This literature review is based on an extensive literature search in Medline, Cochrane, and EMBASE databases which was performed on 7<sup>th</sup> August 2021 using the medical subject headings (MeSH) or a combination of all possible related terms [6,7]. This was followed by the manual search for papers in Google Scholar while the reference lists of the initially included papers [8,9]. Papers discussing the management and prognosis of communicating and non-communicating hydrocele were screened for relevant information, with no limitation on date, language, age of participants, or publication type.

## **3. LITERATURE REVIEW**

Adequate management of hydrocele can be achieved by proper examination to decide the most appropriate plan. It has been demonstrated that communicating hydrocele are of variable sizes, and are usually small. However, they might grow in size each day when the patient is in an upright position. The physical examination of these patients will show the presence of a tense, smooth scrotal mass with easy trans-illumination. Accordingly, this physical examination can significantly help physicians to achieve successful differential diagnosis from a tumor mass, which is usually solid, and herniation. Indirect inguinal hernia and communicating hydrocele can be accompanied in one patient [10], which is a major indicating for assessment and palpation of the whole testicular surface [11]. Ultrasound examination can also indicate the physical examination and add to its diagnosis value. It is remarkably helpful in cases when full trans-illumination cannot be fully observed or in cases when the size of the hydrocele intervenes with the thorough examination of the scrotal surface, to exclude the presence of scrotal tumors [12-15]. Moreover, although most cases with communicating hydrocele are asymptomatic, some patients might develop symptoms, and in such cases, imaging should be conducted for these patients to assess the presence of a potential underlying etiology [12,16]. In such cases, ultrasound findings might indicate the presence of an accompanying inguinal herniation [17,18]. Evidence in the literature shows that in 75% of the cases, the spontaneous resolution of the non-communicating hydrocele occurs in small infants by 2 years of age, while in older children (that are older than 1 year old), it has been observed that it resolves within 6 months

following the initial presentation [19]. In this context, it was also previously demonstrated that treatment approaches are not also required in the adult population as long as the course of the disease is symptomatic and the testicular functions are normal. On the other hand, communicating hydrocele has been reported to require management approaches, in addition to symptomatic non-communicating cases. Inguinal surgical resection, sclerotherapy, and aspiration are all management approaches that have been validated for the management of non-communicating hydroceles [20]. Well-documentation of the various management approaches, like sclerotherapy, aspiration, phenol, polidocanol, and ethanolamine oleate have been evidenced in the literature. A success rate of 58-98% has been reported for these management approaches with no adverse events or complications [21]. On the other hand, some investigations have reported that in 50% of the cases that underwent aspiration and sclerotherapy, side events and complications were observed [22-26]. In another context, a clinical trial indicated that surgical resection was more effective than aspiration and sclerotherapy. Nevertheless, it was associated with higher costs and more frequent rates of complications [27]. The surgical management of communicating hydrocele is similar to that of the indirect inguinal hernia, where correction and resections are used, and therefore, this can lead to a miscommunication with the peritoneal cavity [28]. Using catheter drainage with thrombolytic therapy and alcohol ablation has also been effectively reported in the literature for the management of complex recurring cases [29].

Furthermore, the surgical management of communicating hydrocele is to induce a significant ligation of the processus vaginalis at a level that corresponds to the internal inguinal orifice and to create a fenestration within the homolateral tunica vaginalis. It has also been demonstrated that the bottle procedure, or inducing of tunica vaginalis reversion, is not usually required in such cases [30,31]. In cases of hydrocele under pressure, reversion of the tunica might be indicated. Besides, the procedure can also be indicated in cases when the tunica is fibrosed or thickened with markers of inflammation, which can be significantly present in such cases [30,31]. It should be noted that in cases of abdominopelvic hydrocele, tense neonatal hydrocele, and closed-type hydrocele, the surgery can be done by approaching the scrotum in a trans-scrotal approach. Studies

have also recommended that tunica albuginea should be reversed, regardless of whether tunica vaginalis is excised or not, together with suturing of both tunicae within the posterior testicular surface with no induction of compression to the spermatic cord by the lord approaches [3-5,32]. This has been reported with many benefits that include obtaining favorable aesthetic outcomes, with no complications or adverse events regarding the ilioinguinal nerve, and with a significant reduction in the operation time [3-5, 32]. Hydrocele recurrence has been reported among studies in the literature, and it usually affects hydrocele that occurs within the homolateral inguinal region or following the management of an inguinal hernia. The duration for recurrence to occur has been estimated to be several months following the operation. In a previous investigation by Morecroft et al. [33], the authors reported that a total of 556 cases of males inguinal hernia or hydrocele were managed, and among these, only 8 cases (1.4%) have developed recurrence of hydrocele following the management approaches. In another investigation by Ein et al. [34], the authors also reported that they successfully managed a total of 5343 cases that suffered from inguinal hernia or hydrocele and reported that only 2 cases (0.038%) developed recurrent hydrocele following the surgical management. The estimated recurrence rates of hydrocele were higher in another investigation by Davies et al. [35], which estimated a rate of 11% in male patients that underwent surgeries for inguinal hernia (> 3 kg), or hydrocele. However, another investigation by Moss et al. [36] reported that only 2 cases (0.6%) among their 328 operated neonates developed postoperative recurrent hydrocele. This indicates that recurrence is a potential complication although it might not be common. However, it should be noted that no guidelines are currently announced for the management and intervention against such complications [37,38]. On the other hand, it has been recommended that patients should at least be evaluated and regularly checked up for at least postoperative six months. The management step might include a trans-scrotal paracentesis to adequately absorb the excess fluids using needle aspiration under local anesthesia. This approach should be considered when the patient is uncomfortable or the operation is painful, with the rapid accumulation of the aspirated fluid, or in cases of persistence of the case following the surgical management. However, this approach is contraindicated in cases of communicating hydroceles or in cases that suffer from

homolateral inguinal hernia. In cases when fluid aspiration does not significantly lead to a reduction in the accumulated fluids (the procedure can be repeated up to five times), surgical re-interventions can be performed to achieve better outcomes. Surgical management of such cases can then be performed via inguinal or scrotal incisions. It has been reported that the inguinal approach is more recommended than the scrotal one, according to many pediatric surgeons, because by this method, they can furtherly explore this region and adequately manage any underlying communicating hydrocele or associated inguinal hernias. Besides, recommending the inguinal approach increases if the patients were managed for the first time by the trans-scrotal approach, which increases the chances that there might be an underlying inguinal pathology, and therefore, the inguinal approach is recommended in these situations.

The postoperative outcomes are reported to be variable across the different studies based on the patients' characteristics and the type of management approach that has been done to these patients. Estimates show that following varicocelectomy procedures, ipsilateral (left) hemi-scrotal varicocele is the commonest condition to occur. It has also been reported that the condition usually develops within 2-22 months following the surgical approach. Other estimates also indicate that some patients were observed to develop these conditions within 6 years following the surgery [39,40]. The development of such complications might be attributed to the fact that some of the surgical post-follow-up periods might be short, and therefore, late complications might occur and can be easily missed. Besides, such cases are not considered a relapse from the first case because they were not present before the surgery. Estimates show that among patients that underwent varicocelectomy, around 1-40% of them will develop this condition [33,41]. A significant blockage or destruction of the lymphatic vasculature might be the main cause for developing these conditions because these structures are parallel to the internal spermatic vessels. Improvement and reversal of hydrocele have been reported to occur in 14-60% of the cases, which is attributed to either re-growing of the previously blocked lymphatic vessels or developing collateral lymphatic circulations [39, 40]. Persistence of the postoperative hydrocele for more than one year following varicocelectomy, the surgical intervention, and

management of these cases is important in these situations. The initial management procedure that is usually recommended is an aseptic aspiration of the hydrocele. The scrotal approach for hydrocelectomy should then be considered in cases when persistence or relapse occurs. Evidence shows that relapses in such cases are even more frequent than the rate of relapses that have been previously documented with other cases. This has been indicated in a case series of 6 patients by Esposito et al. [41] that underwent varicocelectomy, of whom 2 patients finally developed postoperative hydrocele with post-management relapses. In a previous review by Cimador et al. [42], the authors have classified the management approaches of adolescent hydrocele based on the underlying etiology. However, the authors concluded that the current evidence was not sufficient to draw proper conclusions about the best management modalities because most of the included studies were only case reports and small case series studies. Accordingly, further investigations must be encouraged with larger populations for further validation of the best management modality.

#### 4. CONCLUSION

Adequate diagnosis of the condition is the first step to achieve favorable management outcomes. Although the reported management outcomes are reported to be effective in the literature, the surgical approaches seem to be superior, however, many side effects might be associated with these operations. Furthermore, estimates show that following varicocelectomy procedures, ipsilateral (left) hemi-scrotal varicocele is the commonest condition to occur, which might even develop following the procedure by several months and years (in some cases). Further investigations are still needed because the current evidence is largely based on case reports and small case series investigations, and therefore, larger studies are needed to help draw effective management protocols and enhance the outcomes and prognosis.

#### CONSENT

It is not applicable.

#### ETHICAL APPROVAL

It is not applicable.

#### COMPETING INTERESTS

Authors have declared that no competing interests exist.

#### REFERENCES

1. Gadelkareem RA. Abdominoscrotal hydrocele: A systematic review and proposed clinical grading. *African Journal of Urology*. 2018;24(2):83-92.
2. Ahmad T, Ullah S, Ullah N, Nabi G. A Mini Review on Hydrocele: The Most Common Scrotal Problem. *Social and Basic Sciences Research Review*. 2014;2: 571-5.
3. DeVries CR. The role of the urologist in the treatment and elimination of lymphatic filariasis worldwide. *BJU International*. 2002;89 Suppl 1:37-43.
4. Koutsoumis G, Patoulis I, Kaselas C. Primary new-onset hydroceles presenting in late childhood and pre-adolescent patients resemble the adult type hydrocele pathology. *Journal of Pediatric Surgery*. 2014;49(11):1656-8.
5. Wilson JM, Aaronson DS, Schrader R, Baskin LS. Hydrocele in the pediatric patient: inguinal or scrotal approach? *The Journal of urology*. 2008;180(4 Suppl): 1724-7; Discussion 7-8.
6. Ghozy S, Tran L, Naveed S, Quynh TTH, Helmy Zayan A, Waqas A, et al. Association of breastfeeding status with risk of autism spectrum disorder: A systematic review, dose-response analysis and meta-analysis. *Asian J Psychiatr*. 2020;48:101916.
7. Mahmoud AR, Dahy A, Dibas M, Abbas AS, Ghozy S, El-Qushayri AE. Association between sarcoidosis and cardiovascular comorbidity: A systematic review and meta-analysis. *Heart Lung*. 2020;49(5): 512-7.
8. Ghozy S, Nam NH, Radwan I, Karimzadeh S, Tieu TM, Hashan MR, et al. Therapeutic efficacy of hepatitis B virus vaccine in treatment of chronic HBV infections: A systematic review and meta-analysis. *Rev Med Virol*. 2020;30(3):e2089.
9. Hashan MR, Ghozy S, El-Qushayri AE, Pial RH, Hossain MA, Al Kibria GM. Association of dengue disease severity and blood group: A systematic review and meta-analysis. *Rev Med Virol*. 2021;31(1): 1-9.

10. Chiang HC, Chen PH, Chen YL, Yan MY, Chen CC, Lin J, et al. Inguinal hernia repair outcomes that utilized the modified Kugel patch without the optional onlay patch: a case series of 163 consecutive patients. *Hernia: The Journal of Hernias and Abdominal Wall Surgery*. 2015;19(3): 437-42.
11. Wampler SM, Llanes M. Common scrotal and testicular problems. *Primary Care*. 2010;37(3):613-26, x.
12. Rebik K, Wagner JM, Middleton W. Scrotal Ultrasound. *Radiologic Clinics of North America*. 2019;57(3):635-48.
13. Schwarze V, Marschner C, Rübenthaler J, Negrão de Figueiredo G, Clevert DA. Overview of ultrasound applications for assessing scrotal disorders. *Journal of Ultrasound in Medicine: Official Journal of the American Institute of Ultrasound in Medicine*. 2020;39(6):1047-56.
14. Schul MW, Keating MA. The acute pediatric scrotum. *The Journal of Emergency Medicine*. 1993;11(5):565-77.
15. Sakellaris GS, Charissis GC. Acute epididymitis in Greek children: a 3-year retrospective study. *European Journal of Pediatrics*. 2008;167(7):765-9.
16. Nour S, MacKinnon AE. Acute scrotal swelling in children. *Journal of the Royal College of Surgeons of Edinburgh*. 1991; 36(6):392-4.
17. Liaqat N, Latif T, Khan FA, Iqbal A, Nayyar SI, Dar SH. Enteric duplication in children: A case series. *African Journal of Paediatric Surgery: AJPS*. 2014;11(3):211-4.
18. Lewis AG, Bukowski TP, Jarvis PD, Wacksman J, Sheldon CA. Evaluation of acute scrotum in the emergency department. *Journal of Pediatric Surgery*. 1995;30(2):277-81; Discussion 81-2.
19. Christensen T, Cartwright PC, Devries C, Snow BW. New onset of hydroceles in boys over 1 year of age. *International Journal of Urology: Official Journal of the Japanese Urological Association*. 2006; 13(11):1425-7.
20. Tammela TL, Hellström PA, Mattila SI, Ottelin PJ, Malinen LJ, Mäkäpäinen HP. Ethanolamine oleate sclerotherapy for hydroceles and spermatoceles: a survey of 158 patients with ultrasound followup. *The Journal of Urology*. 1992;147(6): 1551-3.
21. Daehlin L, Tønder B, Kapstad L. Comparison of polidocanol and tetracycline in the sclerotherapy of testicular hydrocele and epididymal cyst. *British Journal of Urology*. 1997;80(3):468-71.
22. Levine LA, DeWolf WC. Aspiration and tetracycline sclerotherapy of hydroceles. *The Journal of Urology*. 1988;139(5):959-60.
23. Rencken RK, Bornman MS, Reif S, Olivier I. Sclerotherapy for hydroceles. *The Journal of Urology*. 1990;143(5):940-3.
24. Miskowiak J, Christensen AB. Treatment of hydrocele testis by injection of tetracycline. *European Urology*. 1988;14(6):440-1.
25. Agrawal MS, Yadav H, Upadhyay A, Jaiman R, Singhal J, Singh AK. Sclerotherapy for hydrocele revisited: a prospective randomised study. *The Indian Journal of Surgery*. 2009;71(1):23-8.
26. Shan CJ, Lucon AM, Pagani R, Srougi M. Sclerotherapy of hydroceles and spermatoceles with alcohol: results and effects on the semen analysis. *International Braz J urol: Official Journal of the Brazilian Society of Urology*. 2011; 37(3):307-12; Discussion 12-33.
27. Beiko DT, Kim D, Morales A. Aspiration and sclerotherapy versus hydrocelectomy for treatment of hydroceles. *Urology*. 2003; 61(4):708-12.
28. Cavusoglu YH, Karaman A, Karaman I, Erdogan D, Aslan MK, Varlikli O, et al. Acute scrotum -- etiology and management. *Indian Journal of Pediatrics*. 2005;72(3):201-3.
29. Metcalfe MJ, Spouge RJ, Spouge DJ, Hoag CC. The use of TPA in combination with alcohol in the treatment of the recurrent complex hydrocele. *Canadian Urological Association journal = Journal de l'Association des Urologues du Canada*. 2014;8(5-6):E445-8.
30. Snyder CL. chapter 51 - Inguinal hernias and hydroceles. In: Holcomb GW, Murphy JP, Ostlie DJ, editors. *Ashcraft's Pediatric Surgery (Fifth Edition)*. Philadelphia: W.B. Saunders. 2010;669-75.
31. Andrews EW. XI. The "Bottle Operation" Method for the Radical Cure of Hydrocele. *Annals of Surgery*. 1907;46(6):915-8.
32. Belman AB. Abdominoscrotal hydrocele in infancy: a review and presentation of the scrotal approach for correction. *The Journal of Urology*. 2001;165(1):225-7.
33. Morecroft JA, Stringer MD, Higgins M, Holmes SJ, Capps SN. Follow-up after inguinal herniotomy or surgery for hydrocele in boys. *The British Journal of Surgery*. 1993;80(12):1613-4.

34. Ein SH, Njere I, Ein A. Six thousand three hundred sixty-one pediatric inguinal hernias: A 35-year review. *Journal of Pediatric Surgery*. 2006;41(5):980-6.
35. Davies BW, Fraser N, Najmaldin AS, Squire BR, Crabbe DC, Stringer MD. A prospective study of neonatal inguinal herniotomy: the problem of the postoperative hydrocele. *Pediatric Surgery International*. 2003;19(1-2):68-70.
36. Moss RL, Hatch EI, Jr. Inguinal hernia repair in early infancy. *American Journal of Surgery*. 1991;161(5):596-9.
37. Ibrahim M. Congenital hernias and hydrocele: Importance of age. *African Journal of Paediatric Surgery: AJPS*. 2016; 13(1):54-5.
38. Parks K, Leung L. Recurrent hydrocele. *J Family Med Prim Care*. 2013;2(1):109-10.
39. Chang YT, Lee JY, Wang JY, Chiou CS, Chang CC. Hydrocele of the spermatic cord in infants and children: Its particular characteristics. *Urology*. 2010;76(1):82-6.
40. Kapur P, Caty MG, Glick PL. Pediatric hernias and hydroceles. *Pediatric Clinics of North America*. 1998;45(4):773-89.
41. Shalaby R, Ismail M, Gouda S, Yehya AA, Gamaan I, Ibrahim R, et al. Laparoscopic management of recurrent inguinal hernia in childhood. *Journal of Pediatric Surgery*. 2015;50(11):1903-8.
42. Cimador M, Castagnetti M, De Grazia E. Management of hydrocele in adolescent patients. *Nature Reviews Urology*. 2010; 7(7):379-85.

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