Comparison of Recurrence and Postoperative Complications Between 3 Different Techniques for Surgical Repair of Idiopathic Hydrocele

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OBJECTIVE To determine if recurrence rates and complication rates differ between 3 different techniques for treatment of idiopathic hydrocele: Jaboulay's bottleneck, hydrocelectomy, or Lord's technique.

METHODS All surgeries for idiopathic hydrocele in the health system were reviewed from 2000 to 2011. Recurrence rate, complication rate, and other surgical data were collected and analyzed.

RESULTS The 276 surgeries were performed using the following techniques: 70 (26%) Jaboulay's repair, 127 (46%) hydrocelectomy, and 79 (28%) Lord's repair. 18 (6%) hydrocele procedures required repeat surgery for recurrence, and there were no statistical differences between all techniques. Complications occurred in 32 (11.6%) of 276 surgeries and included hematoma, postoperative testalgia, and infection. Lord's repair had a significantly lower overall complication rate and rate of hematoma (P = .0016, P = .023). There was no difference between the groups with regard to infection or pain. The median volume of fluid removed with the Jaboulay's approach was 200 mL, and the volumes were 270 mL for each of the hydrocelectomy and Lord's repair, respectively. The largest volume hydrocele treated was 2.4 L and was performed with Lord's repair.

CONCLUSION Overall recurrence rate after open hydrocele surgery was 6%, and did not differ between the surgical techniques analyzed. The overall rate of complications and the rate of postoperative hematoma were lowest with Lord's repair. This data reaffirms the existing literature on hydrocele repair technique, and suggests that Lord's repair is an efficacious and safe choice in treating hydroceles. UROLOGY 125: 239–242, 2019. © 2018 Elsevier Inc.

Hydroceles are estimated to affect 1% of adult men. Primary or idiopathic hydrocele is the most common form in adults and is caused by an overabundance of fluid surrounding the testis between the parietal and visceral layers of the tunica vaginalis. This fluid accumulation is a result of decreased absorption of the fluid from the tunica vaginalis through lymphatic channels.[1,2] Most hydroceles do not require treatment, but when they are large enough to cause bothersome symptoms, a simple outpatient procedure is curative in 91%-97% of patients.[3-5]

While there are numerous corrective surgical techniques available, the 3 most common are the Jaboulay's procedure (eversion of sac followed by sewing the edges together behind testicle), hydrocelectomy (excision of sac with oversewing of edges), and Lord's procedure (drainage of hydrocele fluid with plication of the parietal layer of tunica vaginalis). Hydrocele surgery has been performed for several centuries, but the Jaboulay and Lord's technique have only been described since 1902 and 1964, respectively.[6,7] The Lord's technique differs from excisional hydrocelectomy and the Jaboulay's approach because there is minimal dissection between the layers of dartos and tunica vaginalis, with no delivery of the hydrocele sac outside of the scrotum.

Postoperative recovery after scrotal surgery can be complicated owing to the lack of supportive structures surrounding the testis and can be accompanied by complications such as hematoma, testalgia, and infection. It has also been traditionally felt that a large volume hydrocele is best treated with excision of the sac due to the redundant tissue and residual scrotal bulk caused by the plication of the Lord's procedure.[8]

Due to the high rate of cure after surgery, most studies have evaluated incidence of complications and factors which contribute to higher operative times.[4,5,9-12] However, the cure rates and follow-up for patients undergoing

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Table 1. Postoperative complication by operative technique

	Jaboulay	Hydrocelectomy	Lord's	*P* Value
Hematoma	6 (8.5%)	12 (9%)	0	.02
Pain	3 (4%)	2 (1.5%)	0	.12
Infection	3 (4%)	6 (4.5%)	0	.12
Total complications	12 (17%)	20 (15%)	0	.0016
Total procedures performed	70	127	79	

different techniques have not received much reporting. The authors' primary objective in this study is to determine if there is a difference in recurrence rates in patients undergoing Lord's procedure compared with those undergoing other techniques for hydrocele repair. The authors' secondary goal is to determine the complication rates between the groups and ascertain if there are advantages in performing one procedure over the others.

MATERIALS AND METHODS

A retrospective chart review was performed for the time period between January 2000 and May 2011. The CPT codes for hydrocelectomy (55040, 55041, 55060) were extracted from surgeries performed at 3 clinical sites within the healthcare network. Inclusion criteria included hydroceles treated by open trans-scrotal approach and attendance to a follow-up visit. Exclusion criteria included prior ipsilateral scrotal surgery, active infection, or prior pelvic radiation. Concomitant procedures for other pathologies such as spermatocele or epididymectomy were not excluded from this analysis. Each chart had the following data points extracted: technique, complication, drain placement, volume of hydrocele, and recurrence of hydrocele. Complications were defined as hematoma, infection, or reoperation for pain. Hematoma was counted as a complication if it required intervention, and recurrences were counted if they required additional procedures. The follow-up time was calculated as the time between their surgery and last visit in our department for any reason. The entire follow-up period was evaluated for complications rather than a specified time after surgery so as to not miss recurrences. Due to its retrospective design follow-up was not standardized between surgeons and was dependent on their preferences. Lord's repair was performed as described elsewhere.[6] A Pearson chi-square test (or Fisher's exact test when low cell counts were present) was used to assess associations between repair type and categorical variables of interest. A Kruskal-Wallis test was used to assess differences in continuous variables of interest between the 3 types of repair. A *P* value of less than .05 indicated statistical significance.

RESULTS

There were 276 hydrocele surgeries performed that met inclusion criteria. Surgeries were performed by 23 different surgeons, and 20 (7%) of these surgeries were bilateral. The bilateral surgeries were treated as 1 case, and each testis was not analyzed independently. The techniques used were 1 of the 3 described above: Jaboulay's procedure, hydrocelectomy, or Lord's. There were 70 (26%) surgeries that utilized Jaboulay's procedure, 127 (46%) that used classic hydrocelectomy, and 79 (28%) that used Lord's repair. Nine different surgeons performed a Jaboulay, 18 performed hydrocelectomy, and 9 performed Lord's repair. Only 7 surgeons utilized only 1 technique in the entire group, and the majority of the surgeons used different techniques depending on clinical presentation. The median (range) ages were 57 (18-89), 62 (12-89), and 57 (23-87), respectively, and were not statistically different. Median (range) follow-up after surgery was 9.7 (0-102) months for the Jaboulay patients, 25.2 (0-182) months for hydrocelectomy, and 26.1 (0-171) months for Lord's. A significant difference was detected between these groups (Kruskal-Wallis test, $P = .03$).

There was an overall recurrence of 18 (6%) hydroceles requiring operations, with 7 in the Jaboulay's group, 5 in the hydrocelectomy, and 6 in the Lord's groups. Differences in recurrence failed to meet statistical significance (chi-square test, $P = .23$).

Analysis revealed complications in 32 (11.6%) patients. The result of the data regarding complications is outlined in Table 1. Hematoma was the most common complication overall, followed by infection and postoperative pain. There were no complications in the patients who had Lord's procedure for treatment of hydrocele. A significant difference was detected between groups for hematoma formation and overall complications.

A drain was placed in 21 Jaboulay's patients, 62 hydrocelectomy patients, and 6 Lord's repair patients. There was no correlation between drain placement and complication rate.

The volume of fluid evacuated during hydrocelectomy for each surgical technique was not statistically different. The median (range) volume of fluid removed with the Jaboulay's approach was 200 mL (20-2200 mL), and the volume was 270 mL (20-1650 mL) and 270 mL (50-2400 mL) for the hydrocelectomy and Lord's approach respectively. The largest volume hydrocele operated on was 2.4 L and was treated with a Lord's repair.

DISCUSSION

Surgery for hydrocele is one of the oldest surgical techniques in medicine, and as such various techniques have been described. The description and terminology have become somewhat confusing over the years in the literature, but modern surgical techniques fall into 3 main categories: eversion of the sac behind the testis, excision of the sac, and extrusion of the testis with plication of the tunica.[9] When performing a Jaboulay or an excisional procedure, the hydrocele sac must be delivered out from the scrotal incision; this dissection of the dartos is thought to contribute to the higher rate of hematoma after these procedures.[6]

Meyer in his analysis of NSQIP data identified the primary source of bleeding in scrotal surgery is either the dartos fascia or the cut edge of the hydrocele sac; even with

meticulous hemostasis, formation of hematoma is not uncommon. The authors' data reinforce other literature on the subject of demonstrating lower rates of hematoma after the Lord's technique.[3-5,10,11,13,14]

Previous authors have indicated that the Lord's procedure should not be utilized for larger volume or chronic hydroceles because the larger tunica vaginalis does not suit itself to plication and reintroduction into the scrotum.[8] In our experience, there is no increased difficulty in performing the Lord's procedure on larger volume hydroceles. In fact, a higher percentage of Lord's procedure patients had volumes greater than 500 mL, and the largest hydrocele treated (2.4 L) had a Lord's repair.

As stated in Dr. Lord's original article, the operation is much easier to perform than to describe. Figure 1 shows the critical maneuvers in performing the Lord's hydrocele repair.

It has been felt that a complete hydrocelectomy yields the lowest rate of recurrence.[8] The authors' study did not demonstrate a benefit in recurrence rate between 1 surgical approach over another, and the rates of recurrence are similar to those reported elsewhere.[9] Urologists over the years have sought to find the best balance between successful treatment of hydrocele and minimization of complications. In this endeavor, even more minimally invasive options than the Lord's procedure have been employed. These are typically needle drainage with sclerotherapy or a variation on the Lord's approach where a small window is created in the tunica vaginalis,[15,16] which allows the fluid to drain into the dartos but does not require delivery of the testicle outside the tunica. These techniques have shown lower rates of complications but an unacceptable rate of recurrence.[15-17] Based on these findings, it appears that the Lord's procedure is the least invasive option that retains the high cure rate that traditional excisional surgery offers.

In Dr. Lord's original description, no drain was left in the scrotum at the conclusion of the case; however, there are instances where this is done in this data. There were 6 drains left in the Lord's patients, and the presence of a drain did not influence the rate of complication in any of the surgical groups. Due to the retrospective nature of the study, the reason behind drain placement for some patients was unclear, and unfortunately no conclusions can be made from these data.

To the authors' knowledge, these data represent the largest single institution comparison of operative technique and their associated outcomes for surgical treatment of idiopathic hydrocele. The surgeries were performed by many different surgeons with the majority contributing to different surgical technique groups. We feel that this heterogeneity of surgeons between the groups improves the study and lessens the influence of individual surgeon skill on the outcomes. Limitations of the study include its nonrandomized retrospective nature, and the shorter follow-up length in the

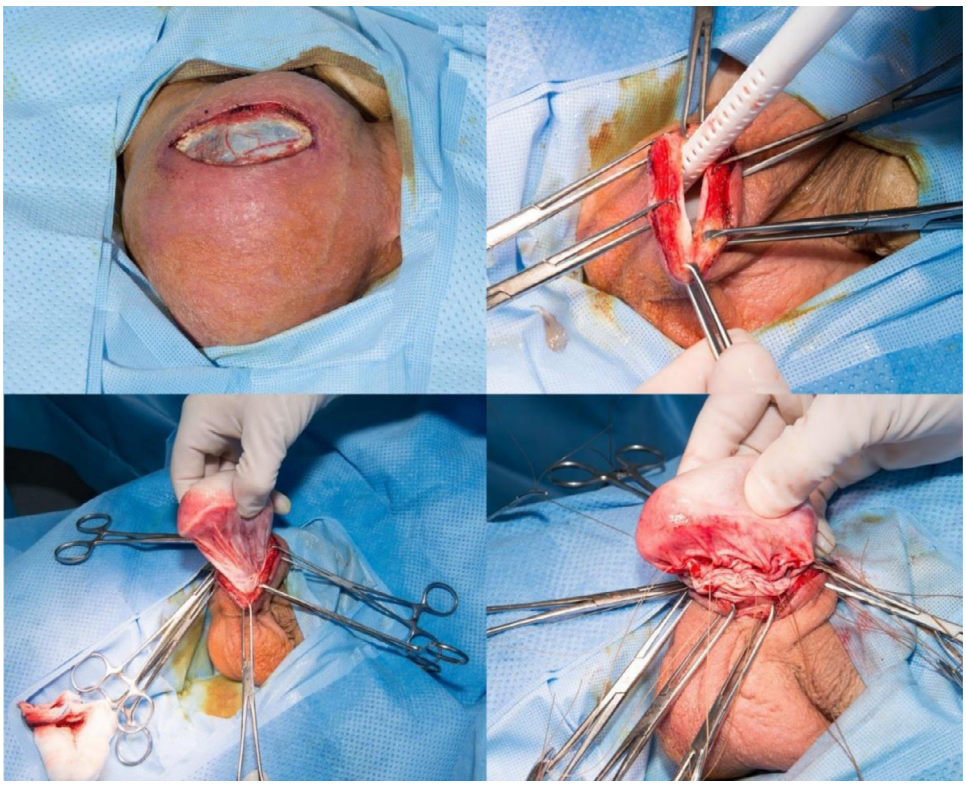

Figure 1. (**a**) Incision and dissection carried down to shiny tunica without delivery of hydrocele sac. (**b**) Placement of 6-8 Allis clamps and incision and drainage of hydrocele sac. (**c**) Delivery of testicle out of the wound and inversion of the tunica vaginalis. (**d**) Plicating stitches of 0 chromic placed at 1 cm intervals circumferentially. (Color version available online.)

Jaboulay's group. In addition, we are not able to know the reasons that each surgeon chose their particular operative technique, and it is possible that these factors influence the outcomes measured.

CONCLUSION

The Lord's procedure is an excellent treatment option for idiopathic hydrocele. Recurrence rates are low and equivalent to traditional excisional and Jaboulay's bottleneck procedures with a significantly lower rate of hematoma and overall complication. In addition, no drain is required, and we utilize this technique on hydroceles of any size.

References

1. Özdilek Ş. The pathogenesis of idiopathic hydrocele and a simple operative technique. *J Urol*. 1957;77:282–284.
2. Rinker JR, Allen L. A lymphatic defect in hydrocele. *Am Surg*. 1951;17:681–686.
3. Miroglu C, Tokuc R, Saporta L. Comparison of an extrusion procedure and eversion procedures in the treatment of hydrocele. *Int Urol Nephrol*. 1994;26:673–679.
4. Swartz MA, Morgan TM, Krieger JN. Complications of scrotal surgery for benign conditions. *Urology*. 2007;69:616–619.
5. Ku JH, Kim ME, Lee NK, Park YH. The excisional, plication and internal drainage techniques: a comparison of the results for idiopathic hydrocele. *BJU Int*. 2001;87:82–84.
6. Lord PH. A bloodless operation for the radical cure of idiopathic hydrocele. *Br J Surg*. 1964;51:914–916.
7. Jaboulay M. *Chirurgie des centres nerveux des viscères et des membres*.2Lyon/Paris: Storck; 1902:192.
8. Goldstein M. Surgical management of male infertility and other scrotal disorders. In: Retik A, Vaughan ED, Jr., Wein A, et al., eds. *Campbell's Urology*. Vol 2, 8th ed. Philadelphia: Saunders; 2002:1579–1580.
9. Rodriguez WC, Rodriguez DD, Fortuno RF. The operative treatment of hydrocele: a comparison of 4 basic techniques. *J Urol*. 1981;125:804–805.
10. Kiddoo DA, Wollin TA, Mador DR. A population based assessment of complications following outpatient hydrocelectomy and spermatocelectomy. *J Urol*. 2004;171:746–748.
11. Albrecht W, Holtl W, Aharinejad S. Lord's procedure—the best operation for hydrocele? *Br J Urol*. 1991;68:187–189.
12. Löppenberg B., Cheng P.J., Speed J.M., et al. The Effect of resident involvement on surgical outcomes for common urologic procedures: a case study of uni- and bilateral hydrocele repair. Urology.94:70-76.
13. Rohondia OP, Kowli SS. Everted plication—a modified technique in hydrocoele surgery. *J Postgrad Med*. 1993;39:77–78.
14. Dahl DS, Singh M, O'Conor VJ Jr, Sokol JK, Bulkley GJ. Lord's operation for hydrocele compared with conventional techniques. *Arch Surg*. 1972;104:40–41.
15. Nigam VK. Window operation: new technique for hydrocele. *Urology*. 1984;24:481–482.
16. Jahnson S, Johansson JE. Results of window operation for primary hydrocele. *Urology*. 1993;41:27–28.
17. Shakiba B, Heidari K, Jamali A, Afshar K. Aspiration and sclerotherapy versus hydrocoelectomy for treating hydrocoeles. *Cochrane Database Syst Rev* 2014; Cd009735.