Techniques — Mini-incision and plication (MIP) cure hydrocele: A minimally invasive surgical variation

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Abstract

In this single-surgeon case series of 92 men, we present the mini-incision and plication (MIP) cure hydrocele technique for the treatment of idiopathic hydrocele. This minimally invasive, open surgical variant achieves the desired eversion and plication with minimal hydrocele manipulation, providing excellent results independent of hydrocele size, with fewer complications and a recurrence rate of <1%.

Introduction

Idiopathic hydroceles are the most common cause of chronic scrotal swelling, affecting 1% of adult men.[1] Although benign, larger idiopathic hydroceles can become symptomatic and affect quality of life.[2] Adult hydrocele is an accumulation of fluid between the two layers of the tunica vaginalis due to an imbalance of the secretory and resorptive activity of the visceral and parietal layers of the tunica vaginalis, respectively.[3] Open surgical intervention is usually curative and various techniques have been described.[4] The Jaboulay (1902) approach of sac delivery, eversion, and plication remains the standard;[5,6] however, this approach is associated with significant morbidity and a reported recurrence rate of 5%.[4,5,7]

Minimally invasive approaches, including sclerotherapy and tunica vaginalis fenestration, have fewer complication rates but limited efficacy, with unacceptable recurrence rates requiring multiple treatment.[8,9]

We present the mini-incision and plication (MIP) cure hydrocele technique, a minimally invasive surgical variant for the primary treatment of idiopathic hydrocele. Compared to published literature, this technique is associated with fewer complications, can be used independent of hydrocele size, and has a recurrence rate of 1%.

Methods

Patient data

We conducted a retrospective, single-surgeon audit on 92 patients that underwent MIP at three hospitals in Sydney, Australia, between January 2013 and December 2020. Written consent for sharing intraoperative images for research purposes was obtained from the patient during the preoperative consultation.

All patients had routine postoperative followup at six weeks and three months. Recurrence was defined to be any visible or palpable fluid collection that appeared and persisted within three months after surgery.

Equipment and materials

The following equipment was used: 15-blade scalpel, monopolar electrocautery blade, Yankauer suction, 2-0 Vicryl on a taper needle, 3-0 Vicryl on a taper needle, 4-0 Monocryl on cutting needle, and a dressing and scrotal support undergarment.

This procedure can be performed under general or spinal anesthesia in supine position. Sequential calf compression devices are applied for venous-thromboembolism prophylaxis, and intravenous perioperative antibiotic prophylaxis is administered on induction, as per the American Urological Association (AUA) guidelines.[10]

Operative technique

1. Place the scrotum on stretch. Using the scalpel, make a 2–3cm incision along the midline raphe. Using electrocautery, dissect down but not into the anterior hydrocele wall (Figure 1).

2. Make a stab incision on the anterior hydrocele wall (avoiding the testis) and drain the fluid with a Yankauer-sucker (Figure 2).
3. Apply two hemostat clips on either edge of the incised hydrocele wall (Figure 3).
4. Lifting the hemostats, use electrocautery to incise the hydrocele sac rostrally until the anterior wall of the hydrocele is fully incised. The incision may be extended into the inguinal region as far as practically possible, retracting the scrotal skin with cats paw retractors (Figure 4).
5. Perform the same manoeuvre caudally, incising the hydrocele sac to just before the epididymal tail (Figure 5).
6. Deliver the testicle out of the wound and the hydrocele sac will evert (Figure 6).
7. Plicate the everted free edges of the hydrocele ***posterior*** to the epididymal tail with a tight hemostatic running 2-0 Vicryl suture on a tapered needle. Continue the plication proximally to the spermatic cord base (snug but not too tight) (Figures 7A, 7B).
8. Always create a medial dartos pouch and reposition the testis within the scrotum (Figures 8A, 8B, 8C).
9. Apply local anesthetic and close the scrotum in layers (3-0 Vicryl on tapered needle for dartos and 4-0 Monocryl on cutting needle to skin) (Figure 9).
10. Apply dressing and scrotal support.

Figure 3. Two hemostat clips applied to either edge of the incised hydrocele wall for control and manipulation of the hydrocele sac.

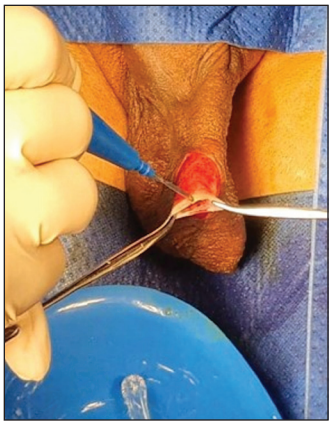

Figure 4. Electrocautery division of the anterior hydrocele sac rostrally.

Results

Ninety-two men underwent MIP for symptomatic hydrocele over a seven-year period (Tables 1, 2). Bilateral procedures were performed in 11/92 (12%) of patients; 77/92 (83%) had idiopathic hydroceles of variable size, 39/92 (42%) >100 cc, and 18/92 (20%) were >250 cc. Eighty-six of 92 (93%) had day-only procedures and those kept overnight were following spinal analgesia. The most commonest complication was transient post-surgical edema (20/92, ~22%). Four of 92 (~4.3%) had small hematoma that did not require take back to the theatre. Only one of 92 (1%) patients had a hydrocele recurrence requiring a modified-Jaboulay redo procedure three years after initial surgery. One of 92 (1%) developed scrotal cellulitis four months following surgery and one (1%) developed chronic testicular pain (Table 3).

Discussion

Complications arising from surgery are inevitable and it is essential we continue refining our techniques to reduce surgery-associated morbidity, particularly when operating on benign diseases. Traditional open cure hydrocele approaches can be categorized in groups based on the characteristics: delivery, dissection, excision, eversion, and plication of the hydrocele sac (Table 4).

Figure 1. A 2–3 cm incision along the scrotal midline raphe.

Figure 2. A Stab incision made on the anterior hydrocele wall to allow drainage of the hydrocele fluid.

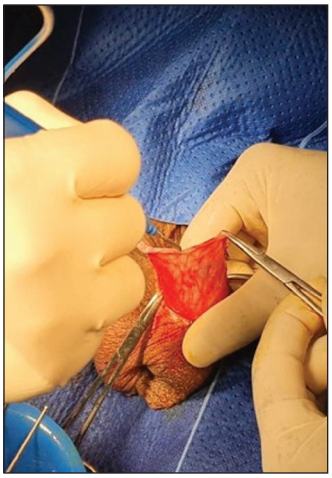

Figure 5. Electrocautery division of the anterior hydrocele sac caudally.

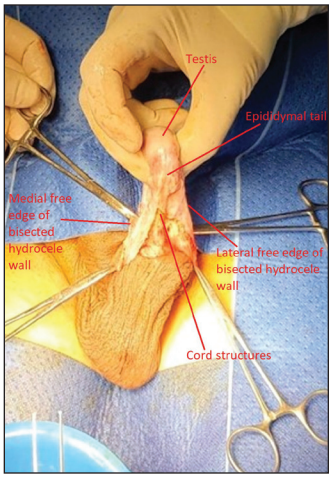

Figure 6. Deliver the testicle out of the wound.

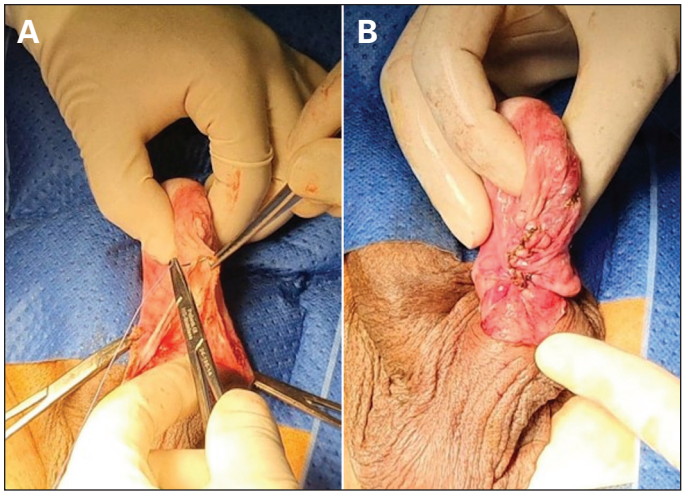

Figure 7. Plication of the everted free edges of the hydrocele posterior to the epididymal tail.

There appears to be unanimity among the groups that eversion and plication of the hydrocele sac are essential manoeuvres to achieving a successful cure but contrasting views on the extent of sac dissection, delivery, and excision one should undertake. Extensive dissection and excision

Table 1. Summary of patient characteristics (n=92)

Patient demographic		Past medical history	
Age		Smoking	
Mean	55	None/unknown	66
Min	87	Active	24
Max	16	Ex-smoker	2
Range	71		
Epidemiology		Diabetes mellitus	
Idiopathic	75	Type 2	15
Previous surgery	13	Type 1	1
Trauma	1	Unknown	76
Epididymo-orchitis	3		
Previous hydrocele treatment		Anticoagulant	
Nil	84	NOAC	3
Previous aspirate	6	Warfarin	3
Previous cure (internal)	1	No/unknown	86
Previous cure (external)	1		
Weight		Antiplatelet	
Unknown	72	Aspirin or Clopidogrel	23
Obese (BMI >30)	17	Dual antiplatelet (Aspirin & clopidogrel)	7
Morbid (BMI >40)	3	No/unknown	62
Followup		Comorbidities	
3-month	68	Less than 2	48
6-month	10	2 or more	28
12-month	14	IHD/AMI/CABG	12
		CVA	4

AMI: acute myocardial infarction; BMI: body mass index; CABG: coronary artery bypass graft; CVA: cerebrovascular accident; IHD: ischemic heart disease ; NOAC: novel oral anticoagulants.

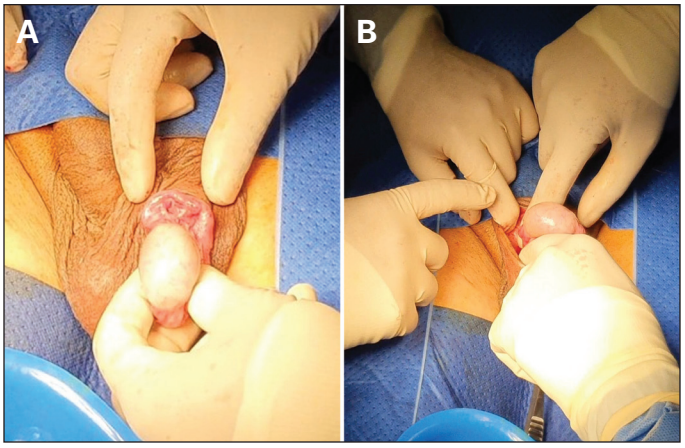

Figure 8. Create a medial dartos pouch using finger dissection.

in the frequently used Jaboulay is associated with higher complication rates, with postoperative edema in 91% of patients, hematoma in 22%, and wound infection rates of 14%.[7] A more recent study also reported increased complications with the use of Jaboulay compared to other techniques but superior cure rates.[8]

The MIP approach achieves eversion and plication with minimal hydrocele manipulation, providing excellent success rates independent of hydrocele size, a recurrence rate of <1%, and fewer complications compared to the traditional Jaboulay approach. Without the use of drains and due to the small incision, MIP was found to be more time-efficient and, anecdotally, easier for our residents to learn. Unfortunately, no formal data was collected to measure these parameters.

We acknowledge the limitations of this single-surgeon series. External validation, reproduction, and long-term followup are still required. Given the well-established operative interventions for idiopathic hydrocele, there is scarcity of new data comparing well-established techniques, particularly in redo procedures. Prospective comparative

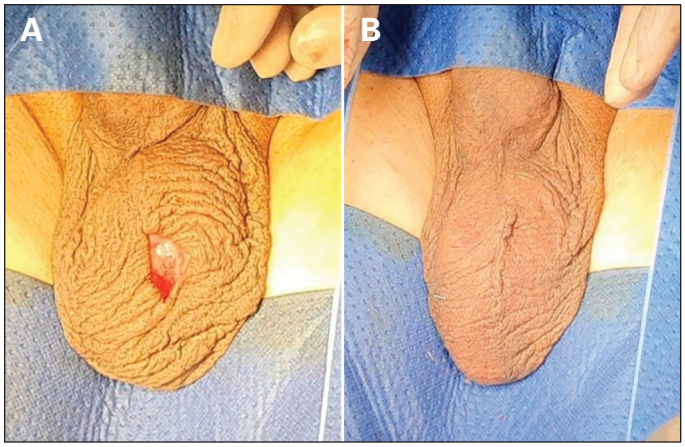

Figure 9. Application of local anesthetic followed by layered closure of the scrotum.

Table 2. Summary of hydrocele and surgical characteristics

Hydrocele factors		Surgical factors	
Side		Anaesthetic	
Bilateral	11	General	88
Left	30	Spinal	4
Right	51	Local	0
Hydrocele size		Length of stay	
Small (0–50 cc)	2	Day only	86
Moderate (50–100 cc)	33	Overnight	5
Large (100–250 cc)	39	>48hrs	1
Very large (>250 cc)	18	Drains	
Range	50–1200 cc	Nil	92

trials against Jaboulay and Lord would be useful to determine superiority before mainstream adoption. Future prospective trials could assess other metrics, such as postoperative pain, quality of life, operative time, and learning curve.

Conclusions

Elegance in its simplicity, this MIP technique achieves eversion and plication with minimal hydrocele manipulation, providing excellent success rates independent of hydrocele size, a recurrence rate of <1%, and fewer complications. Prospective comparative trials comparing MIP to the popular Jaboulay and Lord would be useful to determine superiority before mainstream adoption.

Competing interests: The authors do not report any competing personal or financial interests related to this work.

This paper has been peer-reviewed.

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Table 3. Summary of postoperative complications

Immediate day 0		Intermediate day 1–90		Long-term >day 90	
Nil	91	Nil	58	Wound cellulitis	1
Pain	1	Mild swelling	20	Chronic testicular pain	1
		Haematoma	4	Recurrence	1
		Hyperesthesia	2	Stitch granuloma	1

Table 4. Summary of open surgical approaches

		Characteristics				
Group	Technique	Delivery	Dissection	Excision	Eversion	Plication
I	Radical	√	√	√	No	No
II	Jaboulay	√	√	No	√	√
	Winkelmann	√	√	√	√	√
	Von Bergmann	√	√	√	√	√
III	Andrews (Bottle)	No	Minimal	No	√	No
IV	Lord	No	No	No	Minimal	√
	Solomon	No	No	No	Minimal	√
	Wilkinson	No	No	No	No	No
Novel	MIP	No	Minimal	No	√	√

MIP: mini-incision and plication.