

Research Article

Single Versus Double Incision in Bilateral Hydrocele - A Comparative Study

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Received: 08.07.26, Revised: 11.08.26, Accepted: 14.09.26

ABSTRACT

Background: A single-incision approach for bilateral hydrocele may reduce operative duration and postoperative discomfort compared with two separate incisions.

Methods: This comparative observational study included 86 patients with bilateral vaginal hydrocele: 43 underwent single-incision and 43 underwent double-incision hydrocelectomy. Operative duration, postoperative pain, complications, and hospital stay were compared.

Results: Mean operative duration was significantly shorter with single incision (23.49 ± 12.22 vs. 32.33 ± 15.09 minutes; $p < 0.001$). Pain scores were also lower on postoperative day 1 (2.42 ± 0.73 vs. 2.70 ± 0.51 ; $p = 0.040$) and day 2 (1.91 ± 0.78 vs. 2.51 ± 0.67 ; $p < 0.001$). Pain at discharge was comparable ($p = 0.740$). Haematoma occurred in one patient in each group, with no fever or surgical-site infection. Hospital stay was similar between the groups.

Conclusion: Single-incision bilateral hydrocelectomy reduced operative duration and early postoperative pain without increasing complications and may be preferred in appropriately selected patients.

Keywords: Bilateral Hydrocele, Hydrocelectomy, Single Incision, Postoperative Pain, Operative Duration.

INTRODUCTION

Hydrocele is defined as an abnormal accumulation of serous fluid between the parietal and visceral layers of the tunica vaginalis[1]. Acquired hydrocele is a common benign scrotal condition affecting approximately 1% of adult males, with a higher incidence among men aged over 40 years. Most acquired hydroceles are idiopathic; however, secondary hydroceles may develop due to infection, trauma, malignancy, or other underlying scrotal pathology.[2] The development of a hydrocele may be attributed to one or more mechanisms, including increased secretion of fluid by the tunica vaginalis, impaired fluid absorption, obstruction of scrotal lymphatic drainage, or persistent communication with the peritoneal cavity.[1,2] Patients may present with painless scrotal swelling, discomfort, heaviness, difficulty in walking, and interference with daily or sexual activities. Large or bilateral hydroceles may cause considerable functional and cosmetic concerns. Several treatment modalities have been described for the definitive management of hydrocele, ranging from open surgical

procedures to minimally invasive approaches such as aspiration and sclerotherapy. Commonly performed surgical techniques include Jaboulay's eversion of the sac, Sharma and Jhawar's technique, and Lord's plication.[4,5] Other reported approaches include suction evacuation and endoscopic hydrocele ablation. Nevertheless, conventional hydrocelectomy remains the standard treatment because it provides lower recurrence rates and greater long-term patient satisfaction than nonsurgical alternatives.[6,7] Despite its effectiveness, hydrocelectomy may be associated with postoperative pain, scrotal oedema, haematoma, wound infection, and prolonged recovery.[8,9] These complications may be more pronounced in patients undergoing bilateral hydrocelectomy, particularly when two separate scrotal incisions are used. Therefore, modifications aimed at reducing surgical trauma while maintaining adequate exposure and operative effectiveness may improve postoperative outcomes. In bilateral hydrocele, both sides may be approached either through two separate scrotal incisions or through a single midline or

transverse scrotal incision. The single-incision approach offers the potential advantages of reduced tissue dissection, shorter operative time, less postoperative pain and swelling, and improved cosmetic appearance. It also requires closure of only one incision and may consequently reduce the risk of wound-related morbidity.[10–12] However, evidence directly comparing single- and double-incision approaches for bilateral hydrocele remains limited. Therefore, the present study was undertaken to compare the single-incision and double-incision approaches in patients undergoing surgery for bilateral hydrocele, with particular emphasis on operative duration, postoperative pain, complications, recovery, and cosmetic outcomes.

MATERIALS AND METHODS

This comparative observational study was conducted at Navodaya Medical College Hospital and Research Centre, Raichur, over 18 months. Adult males diagnosed with bilateral vaginal hydrocele and planned for surgery were included after obtaining written informed consent.

Study Population

Inclusion Criteria

Male patients aged 20–80 years with bilateral vaginal hydrocele, viable testes on ultrasonography, and willingness to undergo surgery were included.

Exclusion Criteria

Patients with unilateral or bilateral giant hydrocele (>1000 mL), immunocompromised state, previous ipsilateral inguinal or scrotal surgery, suspected malignancy, significant cardiac illness, or refusal to participate were excluded.

Sample Size and Group Allocation

A total of 86 patients were included based on the anticipated difference between the two surgical approaches. Patients were allocated according to their preferred procedure after detailed counselling:

- **Study Group:** 43 patients undergoing single-incision bilateral hydrocelectomy.
- **Control Group:** 43 patients undergoing double-incision bilateral hydrocelectomy.

Preoperative Assessment

All patients underwent detailed history-taking and clinical examination. Symptoms such as scrotal swelling, pain, fever, and burning micturition were recorded. Vital parameters and

local inguinoscrotal and systemic examination findings were documented. Ultrasonography of the inguinoscrotal region was performed to confirm the diagnosis, assess testicular viability, and exclude underlying pathology. Routine investigations, including complete blood count and HIV screening, were performed.

Surgical Procedure

Following preanaesthetic evaluation, intravenous fluids and prophylactic antibiotics were administered approximately 30 minutes before incision. In the study group, both hydrocele sacs were approached through a single scrotal incision. In the control group, each hydrocele was treated through a separate scrotal incision.

Operative duration, intraoperative findings, technical difficulty, estimated blood loss, and intraoperative complications were recorded. Patients undergoing the single-incision procedure were informed about the possibility of conversion to a double incision in cases of uncontrolled bleeding, inadequate exposure, or inability to approach the contralateral hydrocele sac.

Postoperative Assessment and Follow-up

All patients received standard postoperative care. Postoperative pain, fever, scrotal oedema, haematoma, surgical-site infection, duration of hospital stay, time to suture removal, and cosmetic outcome were recorded.

Patients were followed up on postoperative days 7 and 15 and at three months. During follow-up, wound healing, postoperative complications, and recurrence of unilateral or bilateral hydrocele were assessed.

Outcome Measures

The primary outcomes were operative duration and postoperative pain. Secondary outcomes included conversion rate, intraoperative complications, postoperative fever, haematoma, surgical-site infection, hospital stay, suture-removal time, cosmetic outcome, and recurrence.

Statistical Analysis

Data were entered into Microsoft Excel and analysed using SPSS software. Continuous variables were expressed as mean $\pm$ standard deviation or median with interquartile range, depending on their distribution. Categorical variables were presented as frequencies and percentages.

Continuous variables were compared using the independent-samples *t*-test or Mann–Whitney

U test, as appropriate. Categorical variables were compared using the chi-square test or Fisher's exact test. A two-tailed p -value of <0.05 was considered statistically significant.

Ethical Considerations

The study was conducted after obtaining approval from the Institutional Ethics Committee. Written informed consent was obtained from all participants, and confidentiality was maintained throughout the study.

RESULTS

A total of 86 patients with bilateral hydrocele were included, with 43 patients each undergoing the single-incision and double-incision techniques. The age distribution was comparable between the two groups ($p=0.799$). Most participants were non-vegetarian (73.3%), and 22.1% reported a positive family history. No significant differences were observed between the groups regarding dietary habits ($p=0.808$) or family history ($p=0.795$), indicating comparable baseline characteristics (Table 1; Figure 1). The most common comorbidity was controlled diabetes mellitus, present in 14 (16.3%) patients, followed by hypertension in 10 (11.6%) and chronic obstructive pulmonary disease in 6 (7.0%). The prevalence of diabetes mellitus ($p=0.558$), hypertension ($p=0.502$), and COPD ($p=0.395$) did not differ significantly between the groups (Table 2). Medium-sized hydroceles were most common, occurring in 39 (45.3%) patients, followed by large hydroceles in 32 (37.2%) and small hydroceles in 15 (17.4%). Hydrocele-size distribution was comparable between the groups ($p=0.955$). All patients presented with bilateral scrotal swelling and reduced scrotal rugosity. Scrotal pain was reported by 35 (40.7%) patients,

while itching was reported by 15 (17.4%). Neither scrotal pain ($p=0.510$) nor itching ($p=0.776$) differed significantly between the groups (Table 3; Figure 2). The mean operative duration was significantly shorter in the single-incision group than in the double-incision group (23.49 ± 12.22 versus 32.33 ± 15.09 minutes; $p<0.001$). However, the distribution across the predefined operative-duration categories was comparable between the groups ($p=0.962$). A drain was placed in all patients (Table 4). On postoperative day 1, the distribution of verbal rating scale (VRS) pain scores differed significantly between the groups ($p<0.001$), with VRS 3 being more frequent in the double-incision group than in the single-incision group (88.4% versus 55.8%). The mean VRS score was also significantly lower in the single-incision group (2.42 ± 0.73 versus 2.70 ± 0.51 ; $p=0.040$). On postoperative day 2, the categorical distribution of pain scores was not significantly different ($p=0.190$); however, the mean VRS score remained significantly lower in the single-incision group (1.91 ± 0.78 versus 2.51 ± 0.67 ; $p<0.001$). At discharge, neither the categorical distribution ($p=0.138$) nor the mean VRS score (1.12 ± 0.32 versus 1.14 ± 0.35 ; $p=0.740$) differed significantly between the groups (Table 5).

Postoperative complications were uncommon. Haematoma developed in one patient (2.3%) in each group, with no significant between-group difference ($p=1.000$). No patient developed postoperative fever or surgical-site infection, and 84 (97.7%) patients had no postoperative complications. Most patients were discharged on postoperative day 4 (44.2%), followed by day 3 (25.6%), day 5 (22.1%), and day 6 or later (8.1%). The postoperative day of discharge was comparable between the groups ($p=0.825$) (Table 6; Figure 3).

Table 1. Baseline Characteristics of the Study Participants

Characteristic	Single incision (n=43)	Double incision (n=43)	Total (N=86)	p-value	Statistical test
Age group, years				0.799	Chi-square test
21–30	6 (14.0)	4 (9.3)	10 (11.6)		
31–40	8 (18.6)	6 (14.0)	14 (16.3)		
41–50	8 (18.6)	12 (27.9)	20 (23.3)		
51–60	8 (18.6)	8 (18.6)	16 (18.6)		
61–70	9 (20.9)	11 (25.6)	20 (23.3)		
71–80	4 (9.3)	2 (4.7)	6 (7.0)		
Dietary habit				0.808	Chi-square test
Vegetarian	12 (27.9)	11 (25.6)	23 (26.7)		

Non-vegetarian	31 (72.1)	32 (74.4)	63 (73.3)		
Positive family history	9 (20.9)	10 (23.3)	19 (22.1)	0.795	Chi-square test

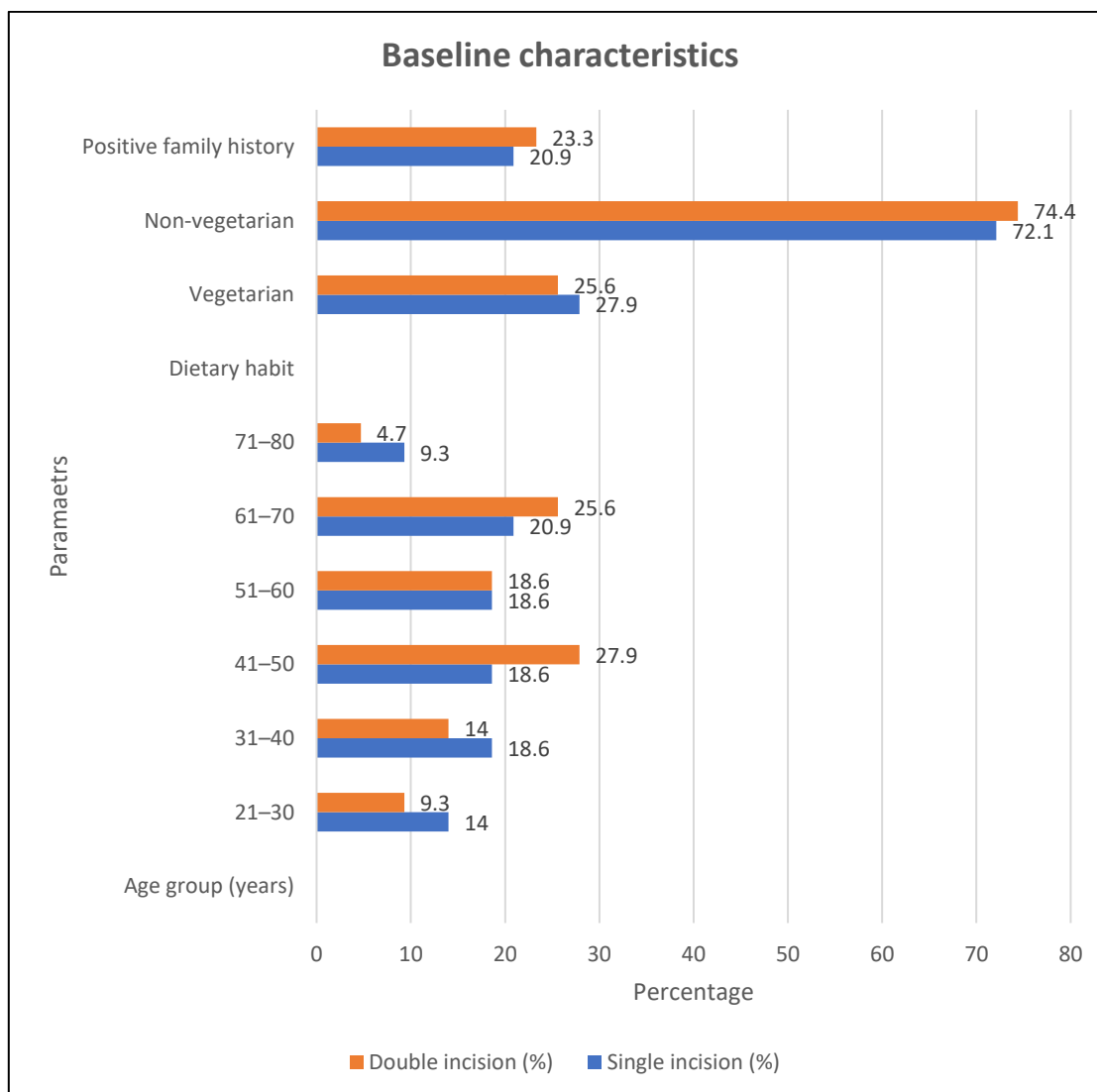


Figure 1. Baseline Characteristics of the Study Participants

Table 2. Comparison Of Comorbidities Between the Groups

Comorbidity	Single incision (n=43)	Double incision (n=43)	Total (N=86)	p-value	Statistical test
Controlled diabetes mellitus	8 (18.6)	6 (14.0)	14 (16.3)	0.558	Chi-square test
Hypertension	6 (14.0)	4 (9.3)	10 (11.6)	0.502	Chi-square test
COPD	4 (9.3)	2 (4.7)	6 (7.0)	0.395	Fisher's exact test

Table 3. Comparison Of Clinical Characteristics Between the Groups

Clinical characteristic	Single incision (n=43)	Double incision (n=43)	Total (N=86)	p-value	Statistical test
Hydrocele size					
Small	8 (18.6)	7 (16.3)	15 (17.4)	0.955	Chi-square test
Medium	19 (44.2)	20 (46.5)	39 (45.3)		

Large	16 (37.2)	16 (37.2)	32 (37.2)		
Bilateral scrotal swelling	43 (100)	43 (100)	86 (100)	—	-
Scrotal pain	19 (44.2)	16 (37.2)	35 (40.7)	0.510	Chi-square test
Itching	8 (18.6)	7 (16.3)	15 (17.4)	0.776	Chi-square test
Reduced scrotal rugosity	43 (100)	43 (100)	86 (100)	—	-

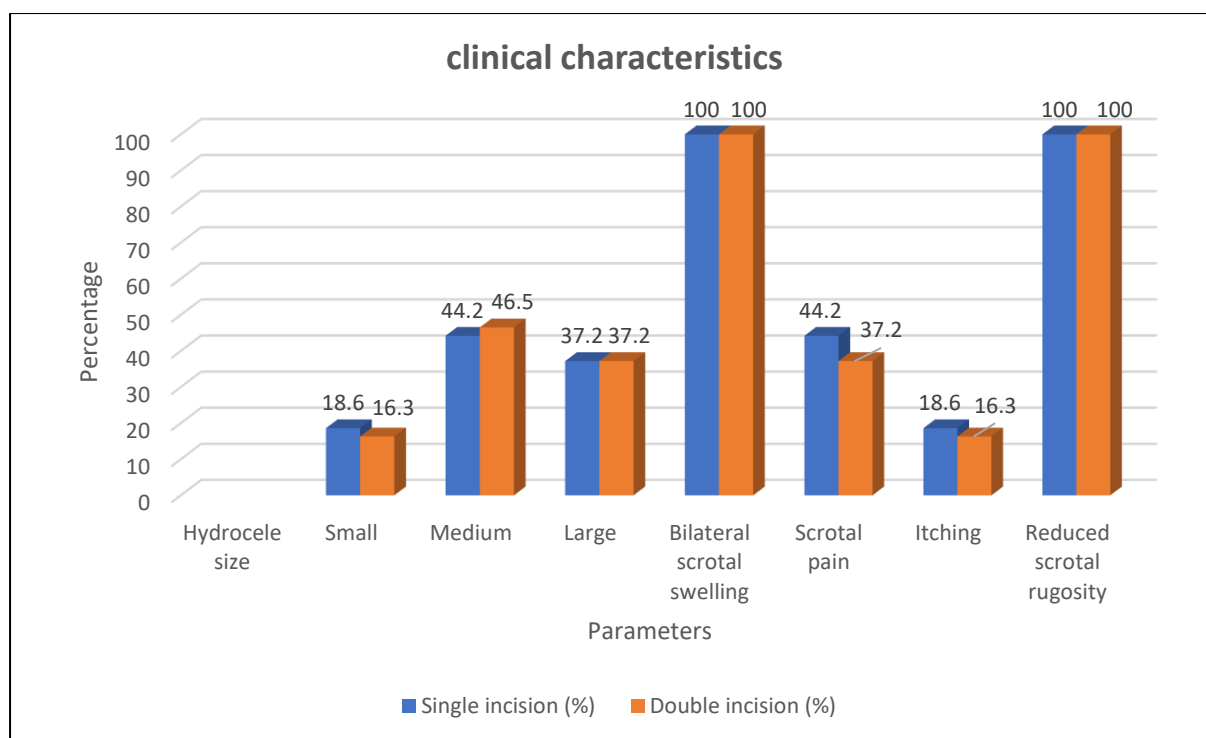


Figure 2. Comparison Of Clinical Characteristics Between the Groups

Table 4. Comparison Of Operative Characteristics Between the Groups

Operative characteristic	Single incision (n=43)	Double incision (n=43)	p-value	Statistical test
Operative duration, minutes, mean $\pm$ SD	23.49 $\pm$ 12.22	32.33 $\pm$ 15.09	<0.001	Independent-samples t-test
Operative-duration category			0.962	Chi-square test
≤ 20 minutes	6 (14.0)	7 (16.3)		
21–30 minutes	23 (53.5)	22 (51.2)		
31–40 minutes	11 (25.6)	10 (23.3)		
>40 minutes	3 (7.0)	4 (9.3)		
Drain placement	43 (100)	43 (100)	—	-

Table 5. Comparison Of Postoperative Pain Between the Groups

Assessment time	Pain assessment	Single incision (n=43)	Double incision (n=43)	p-value	Statistical test
Postoperative day 1	VRS 2	19 (44.2)	5 (11.6)		
	VRS 3	24 (55.8)	38 (88.4)	<0.001	Chi-square test

	Mean VRS $\pm$ SD	2.42 $\pm$ 0.73	2.70 $\pm$ 0.51	0.040	Independent-samples t-test
Postoperative day 2	VRS 1	21 (48.8)	15 (34.9)		
	VRS 2	22 (51.2)	28 (65.1)	0.190	Chi-square test
	Mean VRS $\pm$ SD	1.91 $\pm$ 0.78	2.51 $\pm$ 0.67	<0.001	Independent-samples t-test
At discharge	VRS 1	35 (81.4)	29 (67.4)		
	VRS 2	8 (18.6)	14 (32.6)	0.138	Chi-square test
	Mean VRS $\pm$ SD	1.12 $\pm$ 0.32	1.14 $\pm$ 0.35	0.740	Independent-samples t-test

Table 6. Comparison Of Postoperative Complications and Hospital Stay

Outcome	Single incision (n=43)	Double incision (n=43)	Total (N=86)	p-value	Statistical test
Haematoma	1 (2.3)	1 (2.3)	2 (2.3)	1.000	Fisher's exact test
Postoperative fever	0	0	0	—	-
Surgical-site infection	0	0	0	—	-
No postoperative complication	42 (97.7)	42 (97.7)	84 (97.7)	1.000	Fisher's exact test
Postoperative day of discharge				0.825	Chi-square test
Day 3	12 (27.9)	10 (23.3)	22 (25.6)		
Day 4	20 (46.5)	18 (41.9)	38 (44.2)		
Day 5	8 (18.6)	11 (25.6)	19 (22.1)		
Day 6 or later	3 (7.0)	4 (9.3)	7 (8.1)		

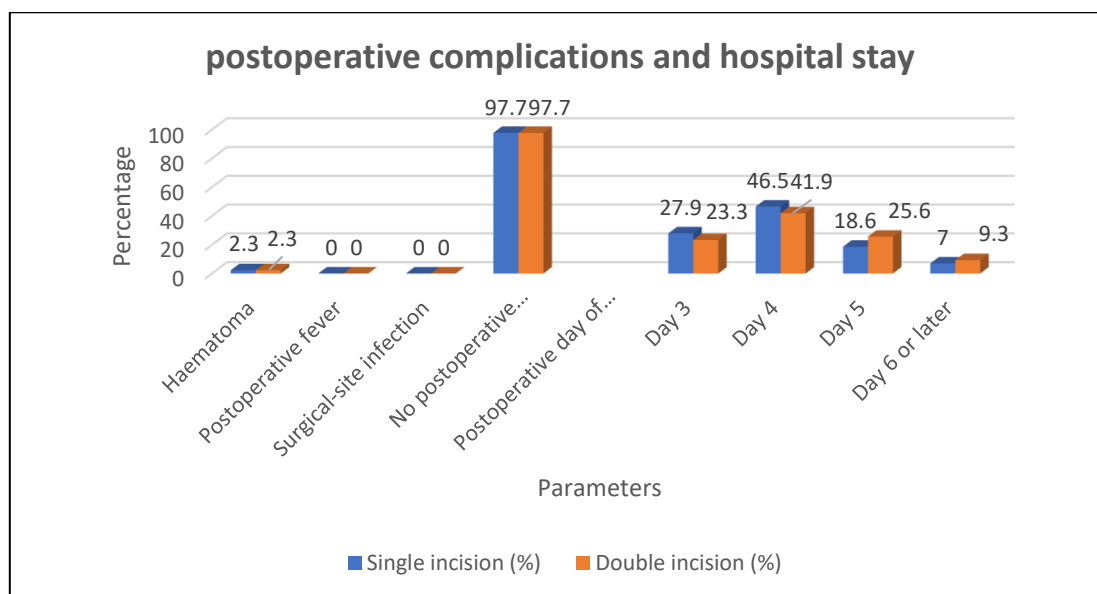


Figure 3. Comparison Of Postoperative Complications and Hospital Stay

DISCUSSION

Hydrocelectomy is a commonly performed general surgical procedure. In bilateral hydrocele, surgery may be undertaken through a single scrotal incision or two separate incisions. The present study compared these approaches in 86 patients, with 43 patients in

each group. The single-incision technique was associated with shorter operative duration and less early postoperative pain, while hospital stay and complication rates were comparable. The largest proportions of patients belonged to the 41–50-year and 61–70-year age groups, each accounting for 23.3% of the

study population. In contrast, Chaudhuri et al.[13] reported the highest frequency among patients aged 26–35 years. This variation may be related to differences in population characteristics, referral patterns, and healthcare-seeking behaviour. All patients presented with bilateral scrotal swelling, while 35 (40.7%) reported pain and 15 (17.4%) reported itching. Chaudhuri et al.[13] observed painless swelling in 68%, pain with swelling in 28%, and isolated pain in 4% of patients. Medium-sized hydroceles were the most common in the present study (45.3%), followed by large hydroceles (37.2%). Hydrocele size and comorbidities were similarly distributed between the two groups.

The mean operative duration was significantly shorter in the single-incision group than in the double-incision group (23.49 ± 12.22 versus 32.33 ± 15.09 minutes; $p < 0.001$). Talwade and Bali[1] also reported a significant reduction in operative duration with the single-incision approach. This may be explained by reduced dissection and the need to create and close only one surgical wound. Ho[14] reported that limited dissection with direct visualization through a small incision facilitated treatment of even large hydroceles with minimal complications and faster recovery. Similarly, Korkes et al.[15] reported high success rates, few complications, and an early return to routine activities following modified hydrocelectomy. These observations support the use of less invasive surgical approaches whenever adequate exposure can be achieved.

Postoperative pain was significantly lower in the single-incision group on day 1 (2.42 ± 0.73 versus 2.70 ± 0.51 ; $p = 0.040$) and day 2 (1.91 ± 0.78 versus 2.51 ± 0.67 ; $p < 0.001$). At discharge, however, pain scores were comparable (1.12 ± 0.32 versus 1.14 ± 0.35 ; $p = 0.740$). Talwade and Bali[1] similarly reported better postoperative pain, wound healing, scrotal oedema, haematoma, infection, and suture-removal outcomes with the single-incision technique. Soualili et al.[16] also emphasized that interscrotal access reduces tissue dissection and improves patient comfort. Postoperative complications were uncommon. Haematoma occurred in one patient (2.3%) in each group, while no postoperative fever or surgical-site infection was recorded. Chaudhuri et al.[13] reported a comparable haematoma rate of 2%. Oh et al.[17] reported haematoma and infection rates of 0.6% and 1.9%, respectively, following the scrotal approach. These findings indicate that

both approaches have favourable safety profiles. Oh et al.[17] also found that the scrotal approach was associated with shorter operative duration and hospital stay than the inguinal approach in paediatric patients. Lasheen[18] reported that the inguinal approach in adults had low morbidity and facilitated the management of associated inguinal lesions. However, in uncomplicated bilateral vaginal hydrocele without inguinal pathology, a single scrotal incision may provide adequate access while avoiding additional dissection. Khaniya et al.[10] found that although hydrocelectomy had more immediate complications than aspiration and sclerotherapy, it provided greater treatment success and patient satisfaction. This supports hydrocelectomy as the definitive treatment for symptomatic hydrocele. Tsai et al.[19] reported a recurrence rate of approximately 6% following open hydrocele surgery, without significant differences among the operative techniques. In the present study, recurrence was uncommon and comparable between the groups during the available follow-up.

Most patients were discharged on postoperative day 4, and the discharge pattern did not differ significantly between the groups ($p = 0.825$). Thus, the reduction in operative duration and early postoperative pain with the single-incision technique did not translate into a significantly shorter hospital stay, possibly because discharge was influenced by institutional protocols and drain management. The present findings add to the limited evidence comparing single- and double-incision bilateral hydrocelectomy. However, the observational design, allocation according to patient preference, single-centre setting, modest sample size, and short follow-up should be considered while interpreting the results. Larger randomized studies with long-term assessment of recurrence, cosmetic satisfaction, analgesic consumption, and return to routine activity are warranted.

CONCLUSION

Single-incision bilateral hydrocelectomy was associated with significantly shorter operative duration and lower pain during the first two postoperative days. Both approaches had comparable complication rates, pain at discharge, and hospital stay. Therefore, the single-incision technique is a safe and efficient alternative for appropriately selected patients with bilateral vaginal hydrocele.

Limitations

This was a single-centre observational study with a relatively small sample, and allocation according to patient preference may have

introduced selection bias. The limited follow-up prevented a detailed assessment of long-term recurrence, cosmetic satisfaction, and quality of life.

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