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Original Research Article

COMPARATIVE OUTCOMES OF JABOULAY'S TECHNIQUE VS. HYDROCELECTOMY FOR SAC EXCISION USING VESSEL SEALING DEVICE IN ADULT PATIENTS WITH HYDROCELE AT A TERTIARY CARE HOSPITAL

SHAHEEN U[1], HUSSAIN S[2], SHABBIR A[2], AMJAD H[3], AKHTAR N[*4]

[1]*Department of Surgery, District Headquarters Hospital Narowal, Pakistan*
[2]*Department of Surgery, Quai E Azam Medical College Bahawalpur, Pakistan*
[3]*Department of Surgery, Tehsil Headquarters Hospital Shuja Abad, Pakistan*
[4]*Department of Surgery Nishtar Medical University Hospital Mulan, Pakistan*
**Corresponding author`s email address:* drkash123@yahoo.com

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Abstract: *Hydrocele management techniques such as Jaboulay's procedure and hydrocelectomy with sac excision using a vessel sealing device are commonly employed. However, their comparative outcomes in terms of postoperative complications and recovery remain underexplored.* ***Objective:*** *To compare the outcomes of Jaboulay's technique versus hydrocelectomy with sac excision using a vessel-sealing device in adult patients with hydroceles.* ***Methods:*** *This randomized controlled trial was conducted at a tertiary care hospital. A total of 86 patients with idiopathic hydroceles were randomly allocated into two groups. Group A (n=43) underwent hydrocelectomy with sac excision using a vessel sealing device, while Group B (n=43) underwent Jaboulay's procedure. Post-operative outcomes, including hematoma, edema, surgery duration, and hospital stay, were recorded over a 4-week follow-up period.* ***Results:*** *Among the 86 patients, 89.5% had unilateral and 10.5% had bilateral hydroceles. The mean age was 49.92 ± 6.78 years, with 66.3% over 45 years of age. Urban residents comprised 69.8% of the cohort, and 66.3% were from middle-income backgrounds. Group A had fewer cases of hematoma (2.3%) compared to Group B (7.0%), though the difference was not statistically significant (P=0.306). Edema was significantly lower in Group A (9.3%) compared to Group B (34.9%) (P=0.004). Surgery duration was comparable between the groups (P=0.674). Hospital stay was significantly shorter for Group A (1.51 ± 0.63 days) compared to Group B (1.88 ± 0.62 days) (P=0.007).* ***Conclusion:*** *Hydrocelectomy with sac excision using a vessel sealing device demonstrated superior outcomes compared to Jaboulay's technique, with significantly fewer complications, particularly edema, and a shorter hospital stay. This method offers a safe and effective alternative for managing adult hydrocele patients.*

Keywords: Hydroceles, Jaboulay's Technique, Hydrocelectomy

Introduction

Hydrocele, characterized by a fluid-filled sac surrounding the testicle, presents a common surgical challenge in adult men. Traditional treatment has primarily involved hydrocelectomy, which effectively addresses symptomatic hydroceles through the excision of the hydrocele sac. This method has demonstrated high success rates and low recurrence in adult patients, although it can involve significant postoperative discomfort and longer recovery times (1). Jaboulay's Technique, introduced in the early 20th century, remains a viable alternative for hydrocele treatment. This technique involves eversion of the hydrocele sac and over-sewing to obliterate the sac cavity, aiming to reduce the risk of recurrence. Recent studies suggest that Jaboulay's Technique, while less commonly employed today, offers comparable outcomes to conventional hydrocelectomy with potentially fewer complications (2).

The advent of vessel sealing devices has revolutionized hydrocelectomy procedures by providing improved hemostasis and reducing intraoperative bleeding. These devices, which use advanced thermal technology to seal blood vessels, enhance surgical efficiency and reduce operative time. Comparative studies indicate that using vessel sealing devices in hydrocelectomy results in lower intraoperative blood loss and reduced postoperative pain, thus potentially improving recovery times (3, 4). Recent research comparing Jaboulay's Technique to hydrocelectomy with vessel sealing devices highlights several critical aspects. Hydrocelectomy with vessel sealing devices has shown superior outcomes in terms of reduced recurrence rates and faster recovery compared to traditional methods. However, Jaboulay's Technique remains an effective option, especially in settings where advanced devices may not be available (5, 6). Studies suggest that both techniques are effective in managing adult hydrocele, but the choice of method may depend on available resources, patient factors, and surgeon experience. Future research should focus on long-term outcomes, cost-effectiveness, and patient satisfaction to guide optimal treatment strategies for adult hydroceles (7, 8). This proposed study aims to provide essential data on the effectiveness of Jaboulay's Technique versus hydrocelectomy with vessel sealing devices for sac excision. To our knowledge, no prior studies have compared these procedures in Pakistan, and there is a lack of data from the Southern Punjab region. The findings will guide surgeons in selecting the technique with fewer complications, potentially improving patient outcomes,

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quality of life, and cost-effectiveness for both hospital authorities and patients.

Methodology

Randomized Controlled Trial. Department of General Surgery ward NO. 4, Nishtar Medical University/Hospital, Multan.1 yearn= 86 (43 hydrocele patients in each group), sample size has been calculated using article Ozkaya et al., 2020, CI = 95 %, Power of test = 80 %, d= 5% Non-probability purposive sampling by draw method.Adult Male population aged 18-60 years.Patients have hydroceles for a 3 months.Hydroceles are secondary to malignancy, obstruction, and patients with a history of previous lower abdominal surgery (on history and medical records).Recurrent cases.Inguinal hernia and dermatological disorders.Patients who don't give consent of participation.

Patients with hydroceles (n = 86) were recruited from Department of Surgery ward NO. 4, Nishtar Medical University/ Hospital, Multan. After obtaining formal permission and approval from the IERB of the University. Patients were recruited after obtaining formal consent and being briefed regarding the objectives of the study. After recruitment, patients with idiopathic hydroceles were randomly divided into 2 groups (Group A and group B) by draw method. Group A had 43 patients with hydroceles was managed by hydrocelectomy with excision of the sac using a vessel sealing device while group B also had 43 patients for which Jaboulay's procedure was performed by the same surgeon. These patients were followed for weeks to record the outcome of the procedure. The patients were evaluated for postoperative complications.

In group A, the sac was circumferentially excised using a bipolar vessel-sealing device (LigaSure™, Medtronic, and 710 Medtronic Parkway, Minneapolis, MN, USA). In group B, Jaboulay's technique, which comprises eversion of the tunica vaginalis and suturing of both sides in a continuous fashion using absorbable sutures, and point cauterization using electrocautery was carried out. All the data was analyzed with SPSS version 23 to calculate Mean and standard deviation for age, duration of surgery, and hospital stay. Frequencies and percentages were calculated for Edema formation (Present/Absent), residential status, hematoma formation, and Obesity (Obese/Non-obese). The chi-square test was applied to compare edema & Hematoma formation and t-test for duration of surgery and hospital stay in both groups. Effect modifiers like age, residential status, duration of hydrocele and obesity was controlled by stratification of data. Chi – square test for edema and Hematoma formation while independent sample t test for hospital stay and duration of surgery was applied at $\leq$ 0.05 level of significance.

Results

A total of 86 adult patients with hydroceles were included in this study, of which, 89.5% (n=77) were having unilateral hydroceles compared with 10.5 % (n=09) who had bilateral hydroceles.

Mean age of these hydroceles patients was 49.92 ± 6.78 years (range; 36 – 60 years) while 66.3 % (n = 57) were aged more than 45 years.

Of these 86 adult hydroceles patients, 30.2 % (n = 26) were from rural localities while 69.8 % (n=60) were residing in urban areas. Poor family background was noted in 33.7 % (n = 29) while 66.3 % (n = 57) were from middle income socioeconomic background. Thirty two (37.2%) were illiterate while 62.8 % (n=54) were literate. Mean duration of hydrocele formation was 5.24 ± 3.41 months and 61.6 % (n = 53) had duration of illness ranging from three to six months. Mean body mass index was 24.35 ± 2.17 kg/m2 while 17.4 % (n=15) were obese.

Of these 86 patients with hydroceles, hematoma was noted in 4.7 % (n=04), in group A hematoma was noted in 7.0 % (n = 3) compared with 2.3 % (n=01) in group B. (P = 0.306). Edema formation was noted to be 22.1 % (n = 19), in group A, edema formation was noted in 9.3 % (n = 04) compared with 34.9 % (n = 15) in group B (P = 0.004). All these findings are shown in the Table No. 1.

Mean duration of surgery in group A was 48.98 ± 4.44 minutes while in group B mean duration of surgery was 49.40 ± 4.75 minutes (P = 0.674).

Mean duration of hospital stay was 1.51 ± 0.63 days in group A versus 1.88 ± 0.62 days in group B (P=0.007). (Table No. 2)

Hematoma formation, edema, mean duration of surgery and hospital stay were stratified with regards to type of hydrocele, age, residential status, socioeconomic status, literacy, duration of hydrocele formation and obesity. (Table No. 3 & 4).

Table: 1 Character wise distribution of study cases (n = 86)

Character	GROUP A		GROUP B	
	Frequency	Percentage	Frequency	Percentage
• Unilateral n=77	40	93%	37	86%
• Bilateral n=09	03	7.0%	06	414.0%
Age Groups				
• Up to 45 years n=29	15	34.9%	14	32.6%
• More than 45 Years n=57	28	65.1%	29	67%
Residential status				
• Ruler n=26	12	27.9%	14	32.6%
• Urban n= 60	31	72.1%	29	67.4%

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Obesity • Yes n=15 • NO n= 71	 09 34	 20.9% 79.1%	 06 37	 14% 86%
Complications of surgery Hematoma • Yes n= 04 • NO n= 82 Edema • Yes n= 19 • No n= 67	 01 42 04 39	 2.9% 97.7% 9.3% 90.7%	 03 40 15 28	 7.0% 93% P value=0.609 34.9% 65.1% P value=0.004

Table 2: Distribution of mean Hospital stay and duration of surgery (n=86)

Out come	Group A		Group B		P Value
	Mean	SD	Mean	SD	
Duration of surgery (minutes)	48.98	4.44	49.40	4.75	0.678
Duration of hospital stay (Days)	1.51	0.631	1.88	0.625	0.007

Table: 3 Stratifctions of Patients with Hydrocele Having Edema (N=86)

TYPE	Edema	GROUPS		P-VALUE
		A	B	
EDEMA Unilateral (n=77) Bilateral (n=09)	 YES n=17 NO n=60 YES n =02 NO n=07	 04 36 00 03	 13 24 02 04	 0.008 0.257
AGE 1. Up to 45 years n =29 2. More than 45 years n=57	 YES n=07 NO n=22 YES n=12 NO n= 45	 01 14 03 25	 06 08 09 20	 0.023 0.058
Residential Status • Rural n= 26 • Urban n= 60	 YES n=05 NO n=21 YES n=14 NO n= 27	 00 12 04 27	 05 09 10 19	 0.021 0.048
Socioeconomic Status Poor n=29 Middle Income n=57	 YES n=12 NO n=17 YES n=07 NO n=50	 03 10 01 29	 09 07 06 21	 0.071 0.030
Duration of Disease Up to 6 months n=53 More than 6 months n=33	 YES n=12 NO n=41 YES n=07 NO n=26	 02 24 02 15	 10 17 05 11	 0.011 0.171

Table: 4 Stratifctions of Patients with Hydrocele with Mean Duration of Hospital Stay (N=86)

TYPE	GROUP	Mean Hospital Stay (Days)		P-VALUE
		Mean	SD	
EDEMA Unilateral (n=77) Bilateral (n=09)	 A n=40 B n=37 A n =03 B n=06	 1.53 1.86 1.33 2.00	 0.64 0.67 0.57 0.01	 0.026 0.018

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AGE				
1. Up to 45 years	A n=15	1.20	0.41	0.147
n =29	B n=14	1.50	0.65	
2. More than 45	A n=28	1.68	0.67	0.018
years n=57	B n= 29	2.07	0.53	
Residential Status				
• Rural n= 26	A n=12	1.83	0.71	0.741
	B n=14	1.93	0.73	
• Urban n= 60	A n=31	1.93	0.55	0.002
	B n= 29	1.86	0.58	
Socioeconomic Status				
Poor n=29	A n=13	1.38	0.65	0.011
	B n=16	2.06	0.68	
Middle Income n=57	A n=30	1.57	0.62	0.193
	B n=27	1.78	0.57	
Duration of Disease				
Up to 6 months	A n=26	1.54	0.70	0.129
n=53	B n=27	1.85	0.77	
More than 6 months	A n=17	1.47	0.51	0.003
n=33	B n=16	1.94	0.25	

Discussion

Jaboulay's technique and hydrocelectomy with excision of the sac using a vessel sealing device are both surgical techniques targeted to treat hydroceles in adult patients. In Jaboulay's technique; an incision is made in the scrotum to drain the fluid from the hydrocele sac and then edges of sac are everted and sutured together so that re-accumulation of fluid is prevented. It is a well-established surgical technique which has been employed for last many years. On the other hand; hydrocelectomy with Sac Excision using a Vessel Sealing Device involves making a small incision in the scrotum. Fluid is drained and then sac excision is done using a vessel sealing device that utilizes energy for sealing blood vessels and tissues. In this technique, not only fluid is drained but sac is also completely removed which is associated with significant reduction of likelihood of recurrence. Both these techniques are highly efficacious in the treatment of hydroceles. However, hydrocelectomy with sac excision method offers less proportion of recurrence, as the procedure involves removal of sac entirely. Complications such as surgical site infections, blood loss and recurrence have been reported in both these techniques and likelihood of complications varies depending upon various underlying factors and expertise of surgical team (9, 10)

A total of 86 adult patients with hydroceles were included in this study, of which, 89.5% (n=77) were having unilateral hydroceles compared with 10.5 % (n=09) who had bilateral hydroceles. A study from Texas, USA has also reported 93 % unilateral hydroceles versus 7 % bilateral hydroceles, similar to our results. (Tsai et al., 2019). A Nigerian study has also documented 80 % unilateral hydroceles versus 20 % bilateral hydroceles, similar to our results (11).

Mean age of these hydroceles patients were 49.92 ± 6.78 years (range; 36 – 60 years) while 66.3 % (n = 57) were aged more than 45 years. A study conducted in Nawabshah has also reported 45 years mean age in adult hydrocele patients, similar to our results (12). A study conducted in Jamshoro has also reported 43.68 ± 12.34 years mean age in adult patients with hydroceles, similar to our results 13. Ghumro et al conducted a study on 80 patients and reported 47 years mean age of the hydrocele patients, similar to our results 14. Rub et al from Israel has reported similar results (15). A study from Turkey has also reported 57.2 ± 11.56 years mean age of the adult patients with hydroceles, similar to our results (16). A study from Texas, USA has also reported 57 years median of the hydroceles patients, similar to our results 17. An Egyptian study has reported quite low mean age with 37 ± 11.4 years in hydrocele patients, similar to our results 18. A multi – national study conducted in Major European countries has reported similar results (19). A Nigerian study has also documented the findings which are similar to our results (11). These studies results shows that European population has higher mean age of patients having Hydrocele.

Of these 86 adult hydroceles patients, 30.2 % (n = 26) were from rural localities while 69.8 % (n=60) were residing in urban areas. Poor family background was noted in 33.7 % (n = 29) while 66.3 % (n = 57) were from middle income socioeconomic background. Thirty two (37.2%) were illiterate while 62.8 % (n=54) were literate. Mean body mass index was 24.35 ± 2.17 kg/m2 while 17.4 % (n=15) were obese. Mean duration of hydrocele formation was 5.24 ± 3.41 months and 61.6 % (n = 53) had duration of illness ranging from three to six months. A study conducted in Jamshoro has also reported majority of adult patients with hydroceles had disease duration from less than 6 months, similar to our results (13).

Of these 86 patients with hydroceles, hematoma was noted in 4.7 % (n=04), in group A hematoma was noted in 2.3% % (n = 1) compared with 7 % (n=03) in group B. (P = 0.306). A study conducted in Nawabshah has also reported 5 % hematoma in adult hydrocele patients, similar to our results (12). Ghumro et al conducted a study on 80 patients and reported 5% hematoma formation with Jaboulay's procedure for the hydrocele patients, similar to our results (14).

Edema formation was noted to be 22.1 % (n = 19) of total patients. In group A, edema formation was noted in 9.3 % (n = 04) compared with 34.9 % (n = 15) in group B (P = 0.004). A study conducted in Jamshoro has also reported 24 % edema with hydrocelectomy in adult patients with hydroceles, similar to our results (13). Another Indian study

has documented lower incidences of postoperative hematoma, pain and edema formation in adult patients with hydroceles undergoing hydrocelectomy with an excision of sac using vessel sealing device, similar to that of our results (20). A study from Texas, USA has also reported hydrocelectomy had significantly less complications as compared with Jaboulay's procedure, similar to our results (17). An Egyptian study has also reported quite 12.8 % versus 37 % complication rate in hydrocele patients undergoing hydrocelectomy versus Jaboulay's technique, similar to our results (18). A study conducted in Turkey has also reported postoperative edema in 31.7 % in Jaboulay's technique versus 6% in hydrocelectomy with an excision of sac using vessel sealing device, similar to our results (16). Mean duration of surgery in group A was 48.98 ± 4.44 minutes while in group B mean duration of surgery was 49.40 ± 4.75 minutes (P = 0.674). Rub et al from Israel has reported similar results as significant short duration of surgery i.e. 31.87 versus 37.4 minutes (P = 0.003), respectively (15). Although duration of surgery was shorter in group A in our study; however this difference was not significant as reported by Rub (15). A study conducted in Turkey has also reported mean duration of surgery was 47.83 ± 7.4 minutes versus 47.05 ± 7.01 minutes, respectively which is similar to our results (16). An Egyptian study has also reported similar results in hydrocele patients undergoing hydrocelectomy with Ligasure versus Jaboulay's technique (18).

Mean duration of hospital stay was 1.51 ± 0.63 days in group A versus 1.88 ± 0.62 days in group B (P=0.007). Rub et al from Israel has also reported similar results as significant short duration of hospitalization i.e. 1.18 versus 1.53 days (P = 0.038), respectively (15). A study conducted in Turkey has also reported mean duration of hospital stay was 1.66 versus 1.29 day, respectively, similar to our results 16. An Egyptian study has also reported mean duration of return to work was significantly shorter in hydrocele patients undergoing hydrocelectomy versus Jaboulay's technique, similar to our results (15).

Conclusion

Our study results support hydrocelectomy with an excision of sac using vessel sealing device in adult patients with hydroceles as compared with Jaboulay's technique. Hydrocelectomy with an excision of sac using vessel sealing device was found to be safe, reliable and effective in adult patients with hydroceles. Post – operative complications such as edema formation and mean duration of post-operative hospital stay was significantly less in hydrocelectomy with an excision of sac using vessel sealing device group in adult patients with hydroceles.

Declarations

Data Availability statement
All data generated or analyzed during the study are included in the manuscript.

Ethics approval and consent to participate
Approved by the department Concerned. (IRBEC-DHQH-99872/23)

Consent for publication
Approved

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Conflict of interest

The authors declared absence of conflict of interest.

Author Contribution

UZMA SHAHEEN (Consultant Surgeon)
Coordination of collaborative efforts.
Study Design, Review of Literature.
SHAHID HUSSAIN (Associate Professor)
Conception of Study, Development of Research Methodology Design, Study Design,, Review of manuscript, final approval of manuscript.
Conception of Study, Final approval of manuscript.
ASIYA SHABBIR (Associate Professor)
Manuscript revisions, critical input.
Coordination of collaborative efforts.
HUMAYUN AMJAD (Medical Officer)
Data acquisition, analysis.
Manuscript drafting.
NAVEED AKHTAR (HOD Surgery)
Data entry and Data analysis, drafting article.
Data acquisition, analysis.
Coordination of collaborative efforts.

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