

Comparison of Surgical Approaches in Epididymal Cysts: Outcomes of Total and Partial Excision

Epididim Kistlerinde Cerrahi Yöntemlerin Karşılaştırılması: Total ve Parsiyel Eksizyon Sonuçlarımız

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ABSTRACT

OBJECTIVE: Epididymal cysts are common benign scrotal lesions that often require surgical intervention when symptomatic, enlarging, or radiologically suspicious. This study aims to compare outcomes between total and partial excision techniques.

MATERIAL and METHODS: A retrospective review of 52 patients (66 procedures) treated between 2021 and 2025 was performed. Outcomes assessed included recurrence, complications, and operative metrics. A subgroup analysis based on cyst size (giant vs. non-giant) was also conducted.

RESULTS: Although total excision showed a lower overall complication trend, the difference between groups was not statistically significant ($p=0.157$). Recurrence rates were low and comparable between groups. Although operative times were similar, median follow-up duration was significantly longer in the partial excision group ($p=0.006$). Larger cysts (≥ 10 cm) were more often treated with total excision.

CONCLUSION: Total excision demonstrated a favorable safety profile and similar recurrence rates, making it a preferred option when technically feasible. Partial excision remains a reasonable alternative in technically challenging cases with dense adhesions.

Keywords: epididymal cyst, postoperative complications, recurrence, scrotal surgery, urogenital surgical procedures

ÖZ

AMAÇ: Epididimal kistler, genellikle semptomatik hale geldiklerinde, büyüdüklerinde veya radyolojik olarak şüpheli görüldüklerinde cerrahi müdahale gerektiren yaygın benign skrotal lezyonlardır. Bu çalışmanın amacı, total ve parsiyel eksizyon tekniklerinin klinik sonuçlarını karşılaştırmaktır.

GEREÇ ve YÖNTEMLER: 2021–2025 yılları arasında 52 hastanın (toplam 66 cerrahi işlem) verileri retrospektif olarak incelendi. Değerlendirilen sonuçlar arasında nüks, komplikasyonlar ve ameliyatla ilgili parametreler yer aldı. Kist boyutuna göre (dev ≥ 10 cm ve dev olmayan) alt grup analizi de yapıldı.

BULGULAR: Total eksizyon grubunda komplikasyon oranı daha düşük bir eğilim gösterse de bu fark istatistiksel olarak anlamlı değildi ($p=0.157$). Nüks oranları her iki grupta da düşük ve benzerdi. Ameliyat süreleri açısından fark görülmezken, parsiyel eksizyon grubunda takip süresi anlamlı şekilde daha uzundu ($p=0.006$). Daha büyük kistler (≥ 10 cm) için genellikle total eksizyon yöntemi uygulandı.

SONUÇ: Total eksizyon, benzer nüks oranları ile birlikte daha güvenli bir profil sergilemiştir ve anatomik olarak mümkün olduğunda tercih edilmelidir. Ancak yoğun yapışıklıklar nedeniyle teknik zorlukların bulunduğu olgularda parsiyel eksizyon, uygun bir cerrahi alternatif olarak değerlendirilebilir.

Anahtar Kelimeler: epididimal kist, postoperatif komplikasyonlar, nüks, skrotal cerrahi, ürogenital cerrahi girişimler

INTRODUCTION

Epididymal cysts are benign intraductal lesions that arise from the efferent ducts of the epididymis and are frequently detected during routine scrotal ultrasonography, especially in the pediatric and young adult populations.^[1] Incidental detection rates have been reported in up to

30% of cases.^[2] While most cases are asymptomatic, some present with scrotal swelling, pain, or cosmetic concerns, prompting clinical evaluation. In selected cases, rapid growth or atypical imaging features may raise concerns for malignancy, leading to surgical intervention.^[3]

Surgical options include total excision, which involves the complete and meticulous removal of the cyst wall, and partial excision (or deroofing), in which the cyst is either aspirated or incompletely resected. Total excision is often considered the definitive treatment, though it may be technically demanding due to dense adhesions to surrounding structures. Conversely, partial excision is less invasive but may carry a higher risk of recurrence.^[4,5] Despite the frequency of these procedures, the literature still lacks robust comparative studies evaluating clinical outcomes such as

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recurrence, complication rates, and surgical efficiency between these approaches.^[6]

This study aims to address this gap by retrospectively analyzing a large institutional cohort of patients undergoing surgery for epididymal cysts. Specifically, it compares total and partial excision techniques in terms of recurrence, complication rates, and operative metrics, thereby offering evidence-based insights to guide optimal surgical strategy.

MATERIAL and METHODS

Study Design and Patient Selection

The study was initiated after obtaining approval from the institutional ethics committee. Patients who underwent surgical excision for epididymal cysts and were followed postoperatively at our institution between July 2021 and September 2025 were included. Demographic, clinical, pathological, and follow-up data were retrieved from electronic medical records and recorded in a structured database. Patients with incomplete baseline information were excluded from general analyses, and those lacking follow-up data were omitted from time-to-event analyses. Further exclusion criteria included concomitant testicular or epididymal malignancies, incomplete medical records and inadequate postoperative follow-up. All patients underwent clinical and radiological assessment prior to surgery. The diagnosis was confirmed by scrotal USG in all cases. Selected patients with atypical features were further evaluated with computed tomography (CT) or magnetic resonance imaging (MRI) to rule out malignancy.

Definitions and Grouping

Patients were classified into two groups based on the surgical technique. Total excision was defined as complete removal of the cyst, including its entire wall with clear margins. Partial excision was performed only when dense adhesions to adjacent structures precluded safe complete dissection. For subgroup analyses, cysts were further categorized by size and morphology. The largest cyst diameter was determined based on preoperative ultrasonographic measurements. In cases with multiple cysts on the same side or in bilateral cases, the total diameter was calculated as the sum of the largest cysts. Giant cysts were defined as either a single cyst measuring ≥ 10 cm or multiple cysts with a total diameter of ≥ 10 cm on the same side.

Surgical Technique

All procedures were performed under either spinal or general anesthesia via a scrotal approach. Following incision

and exposure, the cysts were carefully dissected from the surrounding tissues. In total excision cases, the entire cyst wall was completely removed. In partial excision, aspiration followed by partial resection of the cyst wall was performed when dense adhesions to the epididymis precluded safe complete removal. Hemostasis was achieved using bipolar cautery, and the wound was closed in two layers. Surgical drains were not routinely placed. Patients were discharged on the same or the following day and were scheduled for follow-up visits at 1, 3, 6, and 12 months postoperatively.

Collected Variables

The following parameters were recorded for each procedure and categorized as demographic, preoperative, intraoperative, and postoperative variables. Demographic data included age, sex, side of involvement (right, left, or bilateral), ASA score, comorbidities, and previous surgical history. Preoperative variables included the main presenting symptom (pain, swelling, or cosmetic concern), imaging modality used (USG, CT, or MRI), and cyst diameter (in millimeters). Intraoperative data consisted of the type of anesthesia administered, surgical technique applied (total or partial excision), operative time (in minutes), and any concomitant procedures such as hydrocelectomy or TURP. Postoperative variables included complications (hematoma, infection, hydrocele formation, or cosmetic dissatisfaction), cyst recurrence (presence and time to detection in months), and total follow-up duration. Recurrence was defined as the identification of a cystic lesion larger than 5 mm in the operated area on follow-up imaging or clinical examination. The primary outcome of the study was the recurrence rate between the two surgical groups, while secondary outcomes included operative time, complication rate, and the association between cyst size (giant vs. non-giant) and recurrence.

Statistical Analysis

Descriptive statistics were presented as mean \pm standard deviation (SD) or median (interquartile range, IQR) for continuous variables, and as number and percentage (n, %) for categorical variables. The Shapiro–Wilk test was used to assess normality. For comparisons between the total and partial excision groups, the Independent Samples t-test was applied for normally distributed variables, and the Mann–Whitney U test was used for non-normally distributed variables. Categorical variables were compared using Pearson’s Chi-square test or Fisher’s Exact test, depending on expected cell counts. Subgroup analyses were conducted to evaluate the association between cyst morphology (giant vs. non-giant) and clinical outcomes, applying the same

statistical methods. A p-value <0.05 was considered statistically significant. All statistical analyses were performed using IBM Statistical Package for Social Sciences (SPSS) program version 26.0 (IBM Corp., Armonk, NY, USA).

RESULTS

Patient and Clinical Characteristics

A total of 52 patients who underwent surgical treatment for epididymal cysts included in the study. The mean patient age was 59.78±12.36 years, with no statistically significant difference between the partial and total excision groups (p=0.088). Cysts were located on the right side in 22 (42.3%) patients, on the left in 30 (57.7%) and bilateral in 14 (26.9%) patients. Giant cysts were identified in 22 (42.3%), with no significant difference in distribution between the two groups (p=0.683). Detailed demographic data are summarized in Table 1.

Surgical Outcomes and Complications

The mean operative time was longer in the total excision group compared to the partial excision group (69.13±21.88 min vs. 63.48±21.04 min), although the difference was not statistically significant (p=0.309). Median follow-up duration was significantly longer in the partial excision group (4[2.5–12] vs. 2 [1–5] months, p=0.006).

Postoperative complications were observed in six patients (11.5%), being more frequent in the partial excision group (17.2% vs. 4.3%), although this difference did not reach statistical significance (p=0.157). The most common complications were recurrence in 2 patients (3.8%) and cosmetic dissatisfaction or scarring in 2 patients (3.8%), followed by hematoma in 1 patient (1.9%) and wound infection in 1 patient (1.9%). All complications were minor and managed conservatively, with no patients requiring reoperation. Detailed comparisons of operative outcomes and complication profiles between the two groups are presented in Table 2.

Table 1. Demographic and clinical characteristics of total and partial excision groups

Variable	Partial Excision (n = 29)	Total Excision (n = 23)	p-value
Age (years)	60.68 ± 12.79	57.17 ± 13.79	0.088
Presenting Symptom			< 0.001
	Pain	5 (17.20%)	6 (26.10%)
	Swelling	19 (65.60%)	16 (69.60%)
	Cosmetic	5 (17.20%)	1 (4.30%)
Comorbidity			0.589
	None	18 (62.10%)	15 (65.20%)
	DM	3 (10.30%)	4 (17.40%)
	HT	4 (13.80%)	2 (8.70%)
	CHF/CAD	1 (3.50%)	0 (0.00%)
	BPH	3 (10.30%)	2 (8.70%)
Side			0.556
	Right	10 (34.40%)	11 (47.80%)
	Left	11 (38.00%)	6 (26.10%)
	Bilateral	8 (27.60%)	6 (26.10%)
Cyst Diameter (mm)	55.72 (40.00-70.00)	70.00 (40.00-85.00)	0.114
Surgical Indication			0.742
	Pain	4 (13.80%)	6 (26.10%)
	Cosmetic	25 (86.20%)	15 (65.21%)
	Tumor Suspicion	0 (0.00%)	2 (8.70%)
ASA Score			0.683
	ASA 1	6 (20.70%)	3 (13.00%)
	ASA 2	18 (62.10%)	17 (74.00%)
	ASA 3	5 (17.20%)	3 (13.00%)

Data are presented as mean ± standard deviation (SD), median (interquartile range), or number and percentage (n, %) as appropriate; statistically significant values are indicated in bold; DM: diabetes mellitus; HT: hypertension; CHF: congestive heart failure; CAD: coronary artery disease; BPH: benign prostatic hyperplasia; ASA: American Society of Anesthesiologists.

Table 2. Comparison of surgical outcomes and complications between partial and total excision groups

Variable	Partial excision (n = 29)	Total excision (n = 23)	p-value
Operative time (min)	63.48 ± 21.04	69.13 ± 21.88	0.309
Follow-up duration (months)	4 (2.5–12)	2 (1–5)	0.006
Any complication	5 (17.2%)	1 (4.3%)	0.157
Recurrence	2 (6.9%)	0 (0.0%)	
Cosmetic dissatisfaction / scar	2 (6.9%)	0 (0.0%)	
Hematoma / bleeding	1 (3.4%)	0 (0.0%)	
Wound infection	0 (0.0%)	1 (4.3%)	

Data are presented as mean ± standard deviation (SD), median (interquartile range), or number and percentage (n, %) as appropriate; statistically significant values are indicated in bold (p < 0.05).

Table 3. Post-hoc pairwise comparisons of cyst size and follow-up duration between four subgroups defined by cyst diameter and surgical technique

Group comparison	Cyst diameter (mm)	Follow-up duration (months)
1 vs 2 (Giant + Total vs Giant + Partial)	0.021	0.070
1 vs 3 (Giant + Total vs Non-Giant + Total)	0.001	0.618
1 vs 4 (Giant + Total vs Non-Giant + Partial)	0.001	0.103
2 vs 3 (Giant + Partial vs Non-Giant + Total)	0.323	0.033
2 vs 4 (Giant + Partial vs Non-Giant + Partial)	0.228	0.539
3 vs 4 (Non-Giant + Total vs Non-Giant + Partial)	0.973	0.036

Data are presented as p-values obtained from post-hoc pairwise analyses using the Mann-Whitney U test following a significant Kruskal-Wallis test; statistically significant values are indicated in bold (p < 0.05).

Subgroup Analysis Based on Cyst Characteristics and Surgical Approach

Clinicopathological characteristics and follow-up duration were compared across four subgroups defined by cyst size and surgical method: Group 1 (giant cyst + total excision), Group 2 (giant cyst + partial excision), Group 3 (non-giant cyst + total excision), and Group 4 (non-giant cyst + partial excision). Statistically significant differences were observed in both cyst diameter (p=0.003) and follow-up duration (p=0.046). Cyst diameter was greatest in Group 1, whereas follow-up duration was longer in Groups 2 and 4 compared to Groups 1 and 3. Detailed p-values from the pairwise comparisons are presented in Table 3.

DISCUSSION

To our knowledge, this study represents one of the largest single-center series comparing total and partial excision techniques for epididymal cysts in adult patients. While both approaches were effective in resolving symptoms, differences were noted in operative and follow-up outcomes rather than in complication rates. Partial excision, often employed in cases with dense adhesions or challenging dissection planes, was not associated with a statistically higher complication rate but tended to show a higher incidence of

minor events such as hematoma and cosmetic dissatisfaction. In contrast, total excision, though potentially more technically demanding, demonstrated a similar overall safety profile and comparable recurrence rates, suggesting it may be a more definitive approach in appropriately selected patients.^[7-9] These findings contribute meaningful comparative data to a field where such evidence remains limited, as most prior studies have focused on single techniques without direct outcome comparisons.^[10,11]

Previous research on epididymal cyst surgery has predominantly emphasized descriptive outcomes or individualized management strategies. For instance, Hori et al. examined the long-term outcomes of epididymectomy for chronic pain but did not differentiate between surgical techniques or evaluate recurrence specifically in the context of cyst management.^[7] A more recent clinical series by Hassan et al. described the presentation and resolution of symptomatic epididymal cysts but lacked a detailed comparison of surgical modalities.^[8] Our study adds to this knowledge by integrating both clinical outcomes and surgical metrics, highlighting operative efficiency, follow-up characteristics, and overall safety.

Although partial excision showed a slightly shorter operative time, the difference did not reach statistical

significance. This aligns with previous reports on benign scrotal surgeries, where less invasive techniques may reduce operative burden without significantly increasing postoperative complications.^[9] Additionally, while recurrence rates were low in both groups, a nonsignificant trend toward higher recurrence in partial excision cases emphasizes the importance of achieving complete cyst wall removal whenever technically feasible.^[12]

Microsurgical approaches have also gained popularity for managing epididymal cysts, particularly in fertility-conscious populations. Hou et al. demonstrated that microsurgical cystectomy preserved sperm parameters and was associated with minimal complications.^[10] However, such methods may not be widely applicable in all surgical settings and require specialized expertise and equipment.

Our study also highlighted challenges in defining and monitoring recurrence. The lack of standardized follow-up protocols and imaging criteria has been noted in previous literature, contributing to heterogeneity in reported recurrence rates.^[13] Furthermore, while symptomatic relief and cosmetic outcomes often drive surgical decision-making, the lack of validated patient-reported outcome measures limits objective evaluation of patient satisfaction across techniques. In our cohort, recurrence was rare and detected only during short-term follow-up, emphasizing the need for longer and standardized postoperative surveillance. A recent prospective study by Bal et al. showed the feasibility of using local anesthesia in scrotal surgeries while capturing patient tolerability and outcomes an approach that may help standardize future assessments.^[14]

Several limitations must be acknowledged. First, as a retrospective single-center study, selection bias may have influenced the choice of surgical technique. In particular, partial excision was often selected for technically challenging cases with dense adhesions or proximity to critical structures, which may have contributed to the observed trends in operative and postoperative outcomes. Second, the follow-up duration was relatively short in some cases, particularly in the total excision group, potentially leading to underestimation of late recurrences. Third, complications such as cosmetic dissatisfaction were recorded based on clinical notes rather than standardized scales. Lastly, the relatively modest sample size may limit the generalizability of our findings, though it remains one of the more robust datasets in this specific surgical context.

CONCLUSION

Total and partial excision are both effective in treating epididymal cysts. Total excision demonstrated a

lower overall complication trend without an increase in recurrence and may be preferred when technically feasible. Partial excision remains a valuable option in technically challenging or adhered cases but may carry a slightly higher risk of minor complications. Longer-term, standardized prospective studies are needed to better guide optimal surgical decision-making.

Ethics Committee Approval

The study was approved by Uşak University Faculty of Medicine Ethics Committee. (date and number of approval: 09/10/2025/837-837-16).

Peer-review

Externally peer-reviewed.

Conflict of Interest

No conflict of interest was declared by the authors.

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