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Transurethral Ejaculatory Duct Resection in Infertile Patients with Aspermia/ Hypovolemic Ejaculate and Midline Prostatic Cysts: Results of a Long-Term Retrospective Study

Aspermi/Hipovolemik Ejakülat ve Orta Hat Prostat Kistleri Olan İnfertil Hastalarda Transüretral Ejakülatör Kanal Rezeksiyonu: Uzun Dönemli Retrospektif Bir Çalışmanın Sonuçları

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Abstract

Objective: Midline prostatic cysts are extremely rare obstructive causes of male infertility. Transurethral ejaculatory duct resection (TUR-ED) is performed as a treatment modality. This study aims to evaluate the long-term outcomes of TUR-ED.
Materials and Methods: Following approval from the regional ethics committee and in compliance with the Helsinki Declaration, we retrospectively analyzed male patients who presented with infertility and underwent TUR-ED for midline prostatic cysts between January 2015 and June 2024. The patients' medical histories, semen analyses, and imaging findings were reviewed. The surgery was performed by an experienced surgeon using bipolar electrocautery. Postoperative follow-up included assessments of semen parameters, hormone levels, and complications. Statistical analyses were conducted using IBM SPSS version 2020.
Results: A total of 28 patients were included in the study. Postoperatively, a statistically significant improvement was observed in semen volume, sperm concentration, and motility. The most common complications were hemospermia (25%) and epididymitis (10.7%). The mean follow-up period was 12.3 months, and pregnancy was achieved in 42.9% of patients, with 25.0% occurring spontaneously and 17.9% via assisted reproductive techniques.
Conclusion: TUR-ED is an effective surgical treatment that improves semen parameters. Our long-term follow-up results demonstrate its positive impact on reproductive outcomes. However, due to potential complications, patients will be careful selection and close postoperative monitoring are essential.

Keywords: aspermia, ejaculatory duct cyst, male infertility, midline prostatic cyst, TUR-ED

Özet

Amaç: Orta hat prostat kistleri, erkek infertilitesinin oldukça nadir görülen obstrüktif nedenleridir. Transüretral ejakülatör kanal rezeksiyonu (TUR-ED) bir tedavi yöntemi olarak uygulanmaktadır. Bu çalışma, TUR-ED'nin uzun dönem sonuçlarını değerlendirmeyi amaçlamaktadır.
Gereçler ve Yöntemler: Bölgesel etik kurul onayı ve Helsinki Bildirgesi'ne uygun olarak, Ocak 2015 ile Haziran 2024 tarihleri arasında infertilite şikayetiyle başvuran ve orta hat prostat kistleri nedeniyle TUR-ED uygulanan erkek hastalar retrospektif olarak analiz edildi. Hastaların tıbbi öyküleri, semen analizleri ve görüntüleme bulguları incelendi. Ameliyat, bipolar elektrokoter kullanılarak deneyimli bir cerrah tarafından gerçekleştirildi. Ameliyat sonrası takipte semen parametreleri, hormon seviyeleri ve komplikasyonlar değerlendirildi. İstatistiksel analizler IBM SPSS 2020 sürümü kullanılarak yapıldı.
Bulgular: Çalışmaya toplam 28 hasta dahil edildi. Ameliyat sonrası semen hacmi, sperm konsantrasyonu ve motilitesinde istatistiksel olarak anlamlı bir iyileşme gözlendi. En sık görülen komplikasyonlar hemospermi (%25) ve epididimit (%10,7) idi. Ortalama takip süresi 12,3 ay olup, hastaların %42,9'unda gebelik elde edildi; gebelik %25,0'si kendiliğinden, %17,9'u ise yardımcı üreme teknikleriyle sağlandı.
Sonuç: TUR-ED, semen parametrelerini iyileştiren etkili bir cerrahi tedavidir. Uzun dönem takip sonuçlarımız, üreme sonuçları üzerindeki olumlu etkisini göstermektedir. Ancak, olası komplikasyonlar nedeniyle hastaların dikkatli seçilmesi ve ameliyat sonrası yakın takip şarttır.

Anahtar kelimeler: aspermi, ejakülatör kanal kisti, erkek infertilitesi, orta hat prostat kisti, TUR-ED

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Introduction

Infertility is defined as the inability to conceive despite one year of regular, unprotected intercourse and affects 4–17% of couples worldwide [1,2]. Male factors contribute to nearly half of infertility cases, with approximately 20% of infertile men exhibiting severe oligospermia or azoospermia [3,4].

The causes of male infertility are classified as pre-testicular, testicular, and post-testicular [2]. Midline prostatic cysts are considered a correctable post-testicular cause of male infertility [4]. These cysts can lead to partial or complete ejaculatory duct obstruction (EDO) [5]. EDO is identified in 1–5% of men with obstructive infertility [6]. Patients typically present with azoospermia and/or aspermia [7]. Diagnosis is primarily made using transrectal ultrasonography (TRUS) or magnetic resonance imaging (MRI) [5].

Aspermia is defined as the absence of semen during ejaculation, whereas hypovolemic ejaculate refers to an ejaculate volume of less than 0.5 mL. Both conditions are among the rarest causes of male infertility [2,4]. EDOs are included among the obstructive causes of aspermia, and the primary surgical treatment for this condition is transurethral ejaculatory duct resection (TUR-ED). Although alternative approaches such as TRUS-guided cyst aspiration or laser incision have been attempted, their outcomes have not proven as effective as TUR-ED [7].

TUR-ED is a minimally invasive endoscopic procedure that reopens the obstructed ejaculatory duct, facilitating sperm passage [7]. However, limited studies have evaluated the long-term efficacy of this procedure and its impact on fertility, with most available research being case reports. In this study, we aimed to assess the long-term outcomes of TUR-ED in patients with aspermia or hypovolemic ejaculate due to midline prostatic cysts who presented to our clinic with infertility.

Material and Methods

All procedures in this study were conducted in accordance with the Helsinki Declaration and ethical standards. After obtaining approval from the regional ethics committee (Decision No: 2024/07-136), a retrospective review was performed on male patients who presented with infertility between January 2015 and June 2024. Due to the retrospective nature of this study, individual consent was not required by the ethics committee decision. The medical records, surgical notes, anesthesia records, and outpatient follow-up data of patients diagnosed with midline prostatic cysts and who underwent TUR-ED were retrospectively analyzed.

Our hospital has a well-established andrology laboratory and an active in vitro fertilization (IVF) center, providing comprehensive infertility treatment. Infertility surgery has been actively performed in our clinic for over 20 years. Before any treatment, all patients underwent a detailed medical history review, physical examination, hormone profiling, at least two semen analyses, and additional imaging studies such as scrotal ultrasound, TRUS, or MRI. Although TRUS was performed on each patient, MRI was requested for the intermediate cases to confirm the diagnosis. The surgical procedure was carried out on patients whose diagnoses were validated through semen analysis and imaging. The TUR-ED procedure was performed by a single surgeon with over 20 years of experience in infertility surgery.

Patient Selection

Patients diagnosed with primary or secondary aspermia or hypovolemic ejaculate (semen volume ≤0.5 mL) were included in the study. Hypovolemic ejaculate was defined as an ejaculate volume ≤0.5 mL, in accordance with previously published studies and WHO recommendations for the evaluation of EDO [8]. Only patients with EDO and midline prostatic cysts confirmed by TRUS and/or MRI, and who had not undergone previous surgical intervention on the ejaculatory ducts, were eligible for inclusion. Postoperative semen analysis was based on a single semen sample obtained at follow-up.

Exclusion Criteria

Patients with irregular follow-ups and/or insufficient data for the study were excluded.

Surgical Technique

Under regional or general anesthesia, following surgical site sterilization, transurethral access was achieved using a 22–24 Fr resectoscope. Upon reaching the cyst, careful bipolar electrocautery resection was performed. The bladder neck and external urethral sphincter were preserved. To prevent rectal injury, deep resection was avoided. Cauterization was minimized or omitted to prevent ejaculatory duct stenosis. A 16 Fr transurethral (TU) catheter was placed, and the procedure was concluded. TU catheters were removed 12–24 hours postoperatively, and patients were discharged. **Figure 1** illustrates the endoscopic appearance of the midline prostatic cyst, while **Figure 2** demonstrates the fully opened ejaculatory duct following cyst resection.

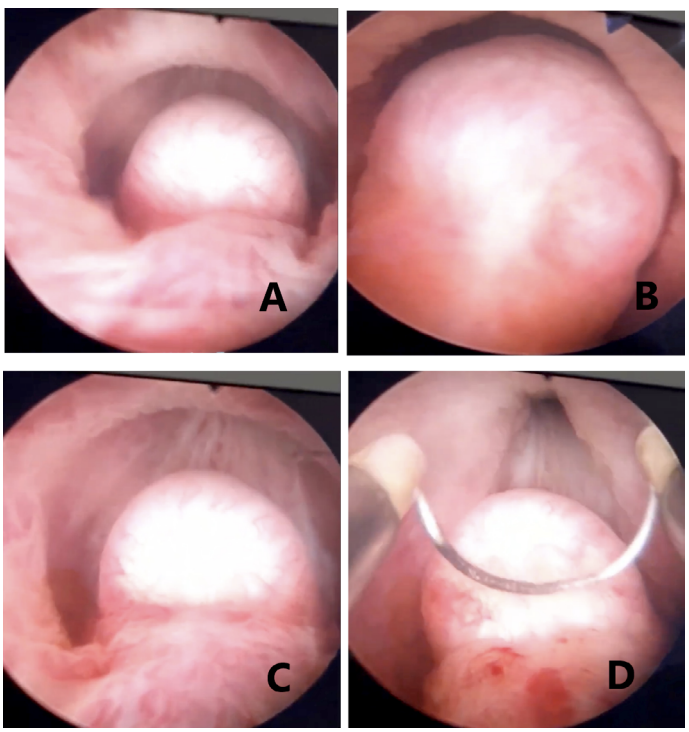

Figure 1. A, B, C, D: Endoscopic appearance of prostate midline cysts; the cysts completely block the ejaculatory ducts and cause obstruction in the urethral lumen.

Follow-up Protocol

Patients were evaluated postoperatively at 1, 3, 6, and 12 months, followed by annual follow-ups. During these visits, semen analyses, ejaculate volume, complications, cyst recurrence, and spontaneous pregnancy outcomes were assessed. Hormone profiles, smoking, and alcohol consumption were also recorded. Patients were referred for assisted reproductive techniques when necessary. Semen and hormonal analyses were conducted according to World Health Organization (WHO) criteria.

Statistical Analysis

Data were analyzed using IBM SPSS version 2020. Categorical variables were presented as frequencies and percentages, while continuous variables were expressed as mean and standard deviation. The distribution of continuous variables was assessed using the Kolmogorov-Smirnov test. For normally distributed parameters, preoperative and postoperative differences were compared using the paired samples t-test. Non-normally distributed data were analyzed using the Wilcoxon test. A p-value <0.05 was considered statistically significant.

Results

A total of 28 patients were included in the study. The mean age of the patients was 30.4 ± 4.9 years. The median cyst diameter was 1.0 [1.0;1.6] cm. The mean operative time was 13.8 ± 4.2 minutes.

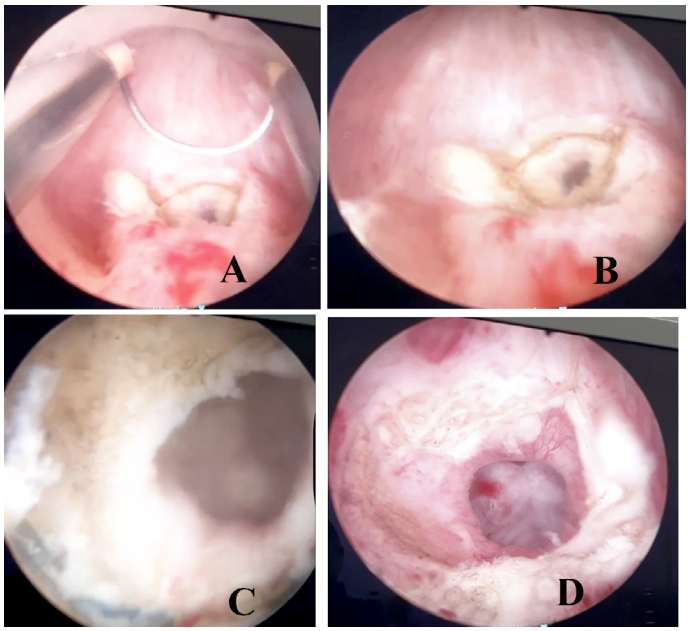

Figure 2. A, B, C, D: After TUR-ED, the ejaculatory ducts and urethra are seen to be fully opened.

Preoperative semen parameters were recorded as follows: mean semen volume of 0.2 ± 0.2 mL, sperm concentration of 2.1 ± 4.7 million/mL, and progressive motility of 3.0 ± 7.0%. Postoperatively, a statistically significant improvement was observed, with mean semen volume increasing to 0.8 ± 0.3 mL,

Table 1. Demographic, clinical, perioperative, and postoperative data of patients

Parameter			
Patient number, n	28	-	-
Mean age ± SD (years)	30.4 ± 4.9	-	-
Median cyst diameter (IQR, cm)	1.0 [1.0; 1.6]	-	-
Mean operation time ± SD (min.)	13.8 ± 4.2	-	-
Mean follow-up time ± SD (month)	12.3 ± 3.2	-	-
Pregnancy number, n (%)	12 (42.9)	-	-
Spontaneous	7 (25.0)	-	-
With assisted reproductive techniques	5 (17.9)	-	-
Postoperative complications, n (%)	-	-	-
None	18 (64.3)	-	-
Hemospermia	7 (25.0)	-	-
Epididymitis	3 (10.7)	-	-
Recurrence	0 (0.0)	-	-
Urethral Stricture	0 (0.0)	-	-
Other	0 (0.0)	-	-
Parameter	**Preoperative**	**Postoperative**	**P-value**
Mean semen volume ± SD, ml	0.2 ± 0.2	0.8 ± 0.3	<0.001[a]
Mean sperm concentration ± SD, million/ml	2.1 ± 4.7	7.2 ± 6.5	<0.001[a]
Mean progressive motility ± SD, percentage	3.0 ± 7.0	12.5 ± 11.9	<0.001[a]
Mean total testosterone ± SD, ng/ml	421.1 ± 90.4	420.4 ± 87.2	0.897[a]
Median FSH (IQR), IU/L	3.0 [2.0; 4.0]	3.0 [2.1; 4.2]	0.964[b]

a Paired samples t-test; b Wilcoxon test

sperm concentration to 7.2 ± 6.5 million/mL, and progressive motility to 12.5 ± 11.9% ($p<0.05$). While 75% of the patients (n=21) were azoospermic in the preoperative period, only 21.42% (n=6) remained azoospermic postoperatively (**Table 1**).

Mean testosterone levels and median FSH levels remained within normal ranges preoperatively and postoperatively, showing no significant difference between the two periods ($p>0.05$) (**Table 1**).

During postoperative follow-up, hemospermia was observed in 7 patients (25%) and epididymitis in 3 patients (10.7%). Epididymitis was successfully treated with antibiotic therapy, while hemospermia resolved spontaneously without intervention. No cases of incontinence, rectal injury, cyst recurrence, urethral or ejaculatory duct stricture, or retrograde ejaculation were reported.

The mean follow-up period was 12.3 ± 3.2 months. Pregnancy was achieved in 42.9% of patients, with 25.0% occurring spontaneously and 17.9% via assisted reproductive techniques. A history of smoking was noted in 46.4% (n=13) of patients, while alcohol consumption was reported in 3 patients (10.7%). The demographic, preoperative, and postoperative data of the patients are presented in **Table 1**.

Discussion

TUR-ED is recognized as an effective and safe surgical approach for the treatment of EDO [7-10]. In the literature, partial studies and case reports evaluating TUR-ED outcomes have demonstrated improvements in spontaneous pregnancy rates and conception via assisted reproductive techniques [11,12]. Reports indicate that sperm passage is restored in approximately 60–70% of patients following TUR-ED, with spontaneous pregnancy rates ranging from 12% to 30% [4,9,12-14]. Additionally, studies have shown an increased likelihood of conception with intrauterine insemination (IUI) [15]. One study reported a pregnancy rate of 41.6%, with 25% of patients achieving spontaneous pregnancy [16]. Similarly, in our study, significant improvements were observed in semen parameters and ejaculate volume, with pregnancy achieved in 42.9% of patients, with 25.0% occurring spontaneously and 17.9% via assisted reproductive techniques.

Several studies have reported improvements in semen parameters following TUR-ED, with success rates ranging from 63% to 83% [9,14,17,18]. Other studies have demonstrated a 90% increase in semen volume and up to a 50% improvement in sperm count [19,20]. In our study, preoperatively, the mean semen volume was 0.2 ± 0.2 mL, sperm concentration 2.1 ± 4.7 million/mL, and progressive motility 3.0 ± 7.0%. Postoperative values significantly improved to 0.8 ± 0.3 mL, 7.2 ± 6.5 million/mL, and 12.5 ± 11.9%, respectively ($p<0.05$). Azoospermia was present in 75% (n=21) of patients before surgery, but only 21.4% (n=6) remained azoospermic afterward. Our long-term follow-up results confirm the effectiveness of TUR-ED, particularly in increasing ejaculate volume and facilitating sperm passage. However, semen parameters did not improve in some patients. Although factors that may significantly affect spermatogenesis—such as a solitary testis, prior use of anabolic steroids or testosterone, cystic fibrosis, a history of testicular malignancy, or other embryological abnormalities—could be among the underlying genitourinary causes, such data were not accessible through the patients' medical records [1]. While this raises the possibility of epididymal reflux and/or testicular damage due to prolonged obstruction, other potential causes should also be considered.

Studies have demonstrated that in patients with obstructive azoospermia or aspermia, testicular function remains intact, as evidenced by normal levels of FSH and total testosterone [1,21]. In our study, both preoperative and postoperative measurements of FSH and total testosterone were found to be within normal ranges.

The reported complications of TUR-ED include urinary reflux into the ejaculatory ducts and seminal vesicles, epididymo-orchitis, hematuria, acute urinary retention, retrograde ejaculation, and incontinence [7]. Studies have reported postoperative complication rates ranging from 4% to 26% [7,20-24]. Some reports also indicate that secondary ejaculatory duct stenosis may develop after TUR-ED, with azoospermia occurring in up to 27% of cases, necessitating repeat TUR-ED [6,24,25]. In our study, postoperative complications included hemospermia in 25% and epididymitis in 10.7% of patients. No other complications, such as incontinence, rectal injury, cyst recurrence, urethral or ejaculatory duct stricture, or retrograde ejaculation, were observed.

If sperm are detected in the preoperative semen analysis, cryopreservation is recommended to safeguard against the risk of postoperative azoospermia [7]. In our study, cryopreservation was recommended for patients in whom sperm were detected in the preoperative semen analysis, to be used if necessary in subsequent assisted reproductive techniques and as a precaution against the risk of postoperative azoospermia.

Given the scarcity of studies assessing the long-term outcomes, adverse effects, and fertility implications of TUR-ED, we believe our findings provide meaningful contributions to the existing literature.

Our study has several limitations. The retrospective design and relatively small sample size may limit the generalizability of the results. Additionally, the lack of a control group and potential selection bias should be considered when interpreting the findings. Future prospective, multicenter studies with larger cohorts and longer follow-up periods are warranted to confirm and expand upon these results. Another limitation of this study is that all procedures were performed by a single surgeon, which may limit the generalizability of the results and represent a potential source of operator-related bias.

Conclusion

TUR-ED is an effective surgical technique for improving semen parameters in patients with midline prostatic cysts. Our long-term follow-up results indicate that TUR-ED positively contributes to fertility outcomes while maintaining a low complication rate. However, careful patient selection and long-term postoperative monitoring are essential to optimize outcomes.

Ethics Committee Approval: This study was approved by the Erzurum Medical Faculty Local Ethics Committee (approval number: BAEK 2024/07-136)

Informed Consent: An informed consent was obtained from all the patients.
Publication: The results of the study were not published in full or in part in form of abstracts.
Peer-review: Externally peer-reviewed.
Authorship Contributions: Any contribution was not made by any individual not listed as an author. Concept – M.S.A., A.E.C.; Design – M.S.A., F.B., V.K., Ş.O.D.; Supervision – M.S.A., A.U., A.E.C., İ.Ö.; Resources – F.B., H.K., İ.K.; Materials – M.S.A., İ.K., Ş.O.D., İ.Ö.; Data Collection and/or Processing – M.S.A., A.U., H.K., V.K.; Analysis and/or Interpretation – H.K.; Literature Search – M.S.A., A.U., A.E.C.; Writing Manuscript – M.S.A., F.B., İ.K., Ş.O.D.; Critical Review – M.S.A., Ş.O.D., İ.Ö.
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