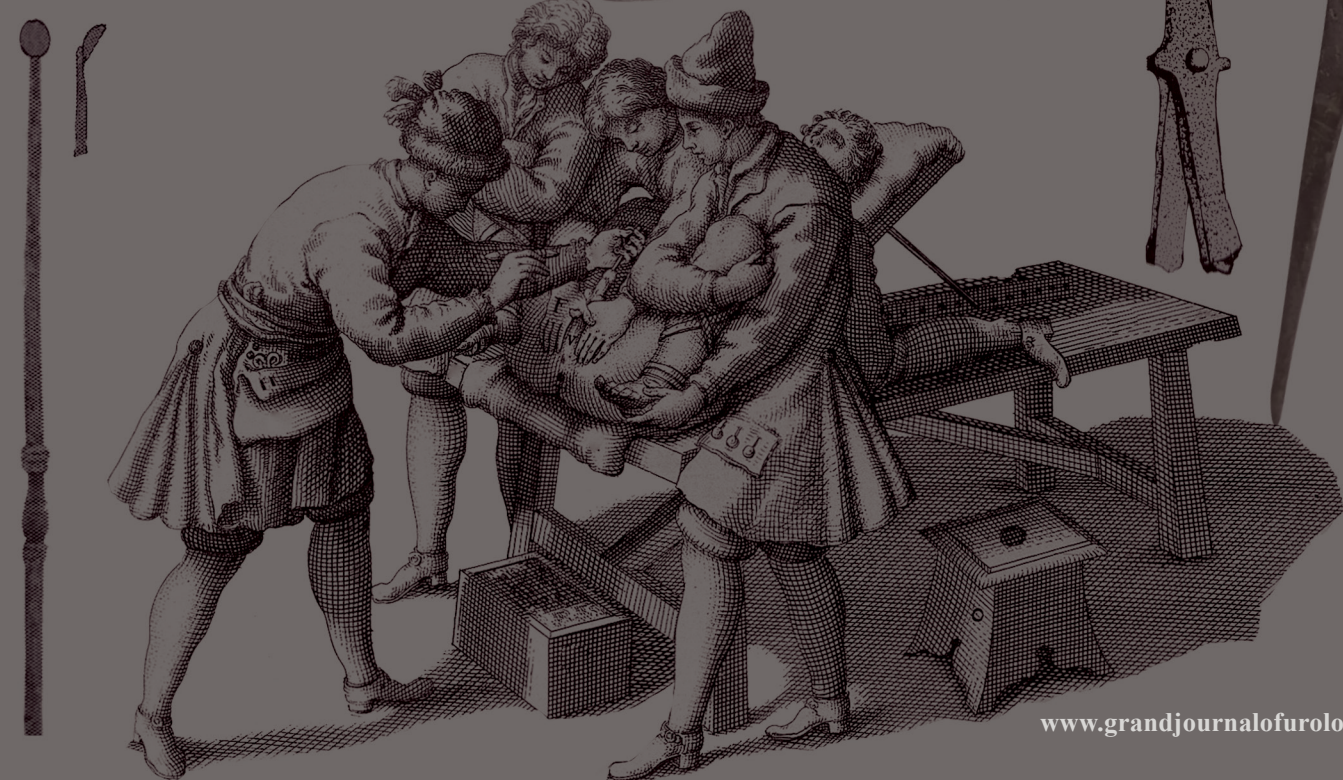


# Grand Journal of UROLOGY

May 2024

Volume: 4

Issue: 2



ISSN: 2757-7163 | May 2024 | Volume: 4 | Issue: 2

# Grand Journal of UROLOGY

Grand Journal of Urology is published three times a year  
(January, May, September)  
GJU is an open access, free and peer-reviewed journal

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The target audience of the journal includes, urology specialists, residents in urology and other specialists who are interested in the field of urology. The journal aims to publish original scientific articles, clinical research, reviews, case reports, clinical images, editorial comments, and letters to the editor that are prepared in accordance with the ethical guidelines. Mini reviews, clinical updates, surgical techniques, and a guideline of guidelines that are in the scope of the journal are considered for publication and/or invited by the editor. All manuscripts must be submitted via the online submission system at [www.grandjournalofurology.com](http://www.grandjournalofurology.com). The journal guidelines, technical information, and the required forms are available on the journal's web page.

Only articles that have not been published elsewhere or are not reviewed for publication may be submitted. Grand J Urol does not accept multiple submission and duplicate submission even though the previous one was published in a different language. The journal's publication policy is based on independent and unbiased double-blinded peer-reviewed principles. Following the online article submission, the journal's fast publishing process is an important policy, with our members of the Advisory Board and referees, peer-reviews are conducted to the highest standards and feedbacks are provided in the shortest time possible. The journal reserves the right to request any research material related to the article.

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The mission of the Grand J Urol (GJU) is to distribute urological medical data to the World as well as create a supportive and vibrant scientific platform to connect and explore ideas by publishing articles related to all fields of urology. The GJU aims to address current urological issues at both national and international levels, start debates, and exert an influence on decision-makers all over the world by integrating science in everyday life.

The Grand Journal of Urology encourages and enables academicians, researchers, and specialists to publish their valuable research in urology branch.

### Basic Publication Rules

The primary aim of the journal is to publish original articles with high scientific and ethical quality and serve as a good example of medical publications in the World.

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- Turkish (if the article is sent from Turkey) and English title of the article.
- Turkish (if the article is sent from Turkey) and English short title of the article, not exceeding 50 characters.
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- At least 2.5 cm margins must be left on all sides of each page.

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- If there is, table should be in the main text.

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The main text should contain the following sections in order:

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### Keywords

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Ethics committee approval is required in accordance with the National Ulakbim TR Index criteria for research/original article studies using patients’ data, even if they are retrospective, and this approval document should be attached when submitting the article (For more information: <https://grandjournalofurology.com/static.php?id=32>).

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## Editorial

Dear colleagues,

I am honored to share with you the second issue of 2024 (volume 4, issue 2) of the Grand Journal of Urology (Grand J Urol) with the contributions of many respected researchers and authors.

Grand Journal of Urology (GJU) aims to carry written and visual scientific urology studies to academic platforms and to make significant contributions to the science of urology. Our journal has been abstracted/indexed in Tubitak Ulakbim TR Index, DOAJ, EBSCOhost, J-Gate, Index Copernicus International, EuroPub, SciLit, ResearchGate, ScienceGate and Google Scholar international databases. As of these achievements, the Grand Journal of Urology (GJU) has taken its place among the journals indexed by national and international databases.

In this issue of our journal, there are many valuable articles under the subheadings of Andrology, Endourology, General Urology, Laparoscopic and Robotic Surgery, Pediatric Urology and Urological Oncology. I hope that these carefully prepared articles will make important contributions to valuable readers, researchers and the urology literature.

On this occasion, I would like to express my heartfelt gratitude to our authors who have contributed to our journal with their articles, to our reviewers who have meticulously evaluate the articles.

Respectfully yours

May 2024

Assoc. Prof. Ekrem GUNER, MD

Editor-in-Chief

# Can Extraperitonealization of Ileal Conduit Protect from Postoperative Bowel Complications in Patients Who Have Undergone Radical Cystectomy with the Diagnosis of Bladder Cancer?

## Mesane Kanseri Tanısıyla Radikal Sistektomi Uygulanan Hastalarda İleal Konduitin Ekstraperitonealizasyonu Postoperatif Bağırsak Komplikasyonlarından Koruyabilir mi?

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**Cite as:** Baylan B, Eren B. Can extraperitonealization of ileal conduit protect from postoperative bowel complications in patients who have undergone radical cystectomy with the diagnosis of bladder cancer? Grand J Urol 2024;4(2):35-9

**Submission date:** 20 November 2023 **Acceptance date:** 05 February 2024 **Online first:** 11 February 2024 **Publication date:** 20 May 2024

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### Abstract

**Objective:** Radical cystoprostatectomy is the most important treatment option in local control and standard surgical treatment in muscle-invasive bladder cancer, and also has serious complications that occur during the postoperative period. We have aimed to evaluate postoperative bowel complications with peritoneal closure-assisted ileal conduit extraperitonealization technique.

**Materials and Methods:** The data of 98 patients who underwent radical cystectomy and ileal conduit urinary diversion with the diagnosis of non-metastatic bladder cancer between 2015 and 2023 were retrospectively screened. The groups of patients who underwent extra-peritonealization of the ileal conduit with radical cystectomy and traditional radical cystectomy were evaluated comparatively in terms of perioperative outcomes and postoperative complications.

**Results:** Forty-five patients who underwent cystectomy with ileal conduit extraperitonealization technique and 53 patients who underwent ileal loop diversion with traditional cystectomy were evaluated comparatively. There was no statistically significant difference between the two groups in terms of demographic characteristics and duration of surgery. In the group that underwent cystectomy with extraperitonealization of the ileal conduit technique, the return of the normal gas pattern and the dwell time of the nasocacymic tube were statistically significantly shorter than the group that did not ( $p=0.017$ ,  $p=0.023$ ). The average length of hospital stay was 7.2 days in the extra-peritonealization group and 14.1 days in the group that did not undergo extraperitonealization, and this period was significantly shorter in the extraperitonealized group ( $p=0.013$ ). There were no complications requiring reoperation in the extraperitonealized group.

**Conclusion:** In radical cystectomy and ileal loop cutaneous urinary diversion, extraperitonealizing the ileal segment reduces postoperative intestinal complications.

**Keywords:** bladder cancer, cystectomy, ileal loop, extraperitonealization

### Özet

**Amaç:** Radikal sistektomi ve üriner diversiyon kas invaziv mesane kanseri için standart tedavi ve aynı zamanda ciddi komplikasyon potansiyeli olan majör cerrahidir. Peritoneal kapama yardımcı ileal loop ekstraperitonealizasyon tekniği ile yapılan cerrahi sonrası barsak komplikasyonlarının değerlendirilmesi amaçlanmıştır.

**Gereçler ve Yöntemler:** 2015-2023 yılları arasında metastatik olmayan mesane kanseri tanısı ile radikal sistektomi ve ileal loop üriner diversiyon operasyonu yapılan 98 hastanın demografik ve perioperatif verileri retrospektif olarak incelendi. Radikal sistektomi ile eş seanslı İleal loop ekstraperitonealizasyon yapılan ve geleneksel radikal sistektomi yapılan hasta grupları, perioperatif sonuçlar ve komplikasyonlar açısından karşılaştırmalı değerlendirildi.

**Bulgular:** İleal loop ekstraperitonealizasyon tekniği ile sistektomi yapılan toplam 45 hasta ve geleneksel sistektomi yapılan 53 hasta karşılaştırıldı. Demografik özellikler ve ameliyat süreleri açısından, iki grup arasında istatistiksel anlamlı farklılık görülmedi. İleal loop ekstraperitonealizasyon tekniği ile sistektomi uygulanan grupta, normal gaz paterninin geri dönüşü ve nazogastrik tüpün kalış süresi geleneksel sistektomi yapılan gruba göre istatistiksel anlamlı kısaydı ( $p=0.017$ ,  $p=0.023$ ). Ekstraperitonealizasyon yapılan grubun ortalama hastanede yatış süresi 7,2 gün, yapılmayan grupta ise 14,1 gün olarak saptandı ve ekstraperitonealizasyon yapılan grupta bu süre istatistiksel anlamlı kısaydı ( $p=0,013$ ). Ekstraperitonealizasyon yapılan grupta tekrar operasyon gerektirecek bir komplikasyon görülmedi.

**Sonuç:** Radikal sistektomi ve ileal loop kutanöz diversiyonda, ileal segmentin ekstraperitonealize edilmesi, postoperatif barsakla ilgili komplikasyonları azaltmaya yardımcı olur.

**Anahtar kelimeler:** mesane kanseri, sistektomi, ileal loop, ekstraperitonealizasyon

ORCID ID: B. Eren 0000-0002-1585-2578

## Introduction

Radical cystoprostatectomy is the most important treatment option in local control and standard surgical treatment of muscle-invasive bladder cancer [1]. In addition, radical cystoprostatectomy and urinary diversion have serious complications that occur during the postoperative period [2-4]. Intestinal complications including bowel obstruction is associated with serious mortality rates, and requires reoperation. Intestinal obstruction that may require reoperation can be seen during the early or late postoperative period [1,3].

Ten percent of the patients with urinary diversion performed using the ileal loop or gastric segment suffer from postoperative bowel obstruction that requires reoperation [5]. Mechanical ileus requiring reexploration has been reported at an incidence rate of 10.5 percent [6]. Studies have been conducted to improve early return of bowel functions with resultant decrease in bowel-related complications [7]. In a Cochrane review, the effect of prokinetic agents on intestinal complications was investigated. According to the results of the study, some drugs shortened bowel passage time by accelerating intestinal motility and also reduced the length of hospital stay [8]. Reyblat et al. investigated patients who developed neurogenic bladder after spinal cord injury and therefore underwent extraperitoneal augmentation enterocystoplasty. Compared to intraperitoneal surgery, bowel-related complications had been less frequently seen in the patient group in which extraperitoneal technique was applied [9].

Herein, we aimed to comparatively evaluate bowel complications after radical cystectomy performed using traditional cystectomy vs peritoneal closure-assisted ileal conduit extraperitonealization technique.

## Materials and Methods

Afyonkarahisar University of Health Sciences Clinical Research Ethics Committee has approved the conduction of this study with registration # 2023/153. The data of 98 patients who underwent radical cystoprostatectomy and ileal loop

urinary diversion surgery with the diagnosis of non-metastatic muscle-invasive bladder cancer between 2015 and 2023 were retrospectively analyzed. Patients were allocated to ileal conduit extraperitonealization (n=45) and traditional cystectomy and ileal loop diversion (n=53) groups. Groups were compared in terms of age, tumor characteristics, American Society of Anesthesiologists (ASA) score, body mass index (BMI). Patients with a history of abdominal surgery, radiotherapy with the indication of pelvic organ cancer, and inflammatory bowel disease were excluded from the study.

In our study, the duration of surgery, the amount of blood loss, blood transfusion rates and postoperative complications were evaluated. Postoperative surgical complications and adverse events of both groups were defined using the Clavien-Dindo complication classification.

### Surgical Technique

The peritoneal layer was incised up to the level of the common iliac artery before the dissection of lymph nodes. After the distal cutaneous and proximal ureteral anastomoses of the ileal loop segment were performed, the peritoneal layer was closed over and sutured to the ileal segment to achieve extraperitonealization.

### Statistical Analysis

Data analysis was performed using IBM SPSS Statistics ver. 25 (IBM Corporation, Armonk, NY, US) software package. The normality of the distribution of continuous variables and the assumption of homogeneity of variances were examined using the Shapiro-Wilk test and Levene's test, respectively. Descriptive statistics were presented as mean ± standard deviation or median (minimum-maximum) for continuous variables, and as the number of cases and percent values for categorical variables. Following goodness-of-fit tests, the statistical significance of intergroup differences in terms of continuous variables that did and did not comply with parametric test assumptions were evaluated by chi-square and Student's t-test vs Mann-Whitney U test, respectively.

**Table 1.** Demographic features

| Characteristics                       | Ileal loop extraperitonealized group | Group without extraperitonealization | P value |
|---------------------------------------|--------------------------------------|--------------------------------------|---------|
| N                                     | 45                                   | 53                                   |         |
| Age (Mean)                            | 64,6±5,9                             | 65,4±4,1                             | 0,760   |
| Gender                                |                                      |                                      |         |
| Female (%)                            | 9 (20%)                              | 11 (20,7%)                           |         |
| Male (%)                              | 36 (80%)                             | 42 (79,3%)                           |         |
| BMI (kg/m <sup>2</sup> )              | 24,6±3,6                             | 25,2±2,8                             | 0,166   |
| Average ASA score                     | 2,3                                  | 2,6                                  | 0,276   |
| Preoperative pathological tumor stage |                                      |                                      |         |
| T1                                    | 12                                   | 15                                   |         |
| T2                                    | 33                                   | 38                                   |         |



**Table 2.** Perioperative outcomes

| Variables                             | Ileal loop extraperitonealized group (n=45) | Group without extraperitonealization (n=53) | P value      |
|---------------------------------------|---|---|--------------|
| Operation duration                    | 216 ±25,2                                   | 223±18,9                                    | 0,183        |
| Calculated blood loss                 | 290±146,7                                   | 314±123,9                                   | 0,426        |
| Complication                          | 4   | 16  |              |
| Clavien-Dindo Classification          |   |   |              |
| 1                                     | 3 (surgical site infection)                 | 4 (surgical site infection)                 |              |
| 2                                     | 1 (paralytic ileus)                         | 7 (ileus)                                   |              |
| 3                                     |   | 5 (mechanical obstruction and reoperation)  |              |
| Bowel-related complications           |   |   |              |
| Time to normal diet (days)            | 4,2±0,9                                     | 8,7±2,1                                     | <b>0,010</b> |
| Nasogastric tube removal (days)       | 1,3±0,7                                     | 5,2±1,6                                     | <b>0,023</b> |
| Time to normal stool discharge (days) | 2,6±1                                       | 6,5±2,5                                     | <b>0,017</b> |
| Length of hospital stay (days)        | 7,2±1,5                                     | 14,1±2,3                                    | <b>0,013</b> |

## Results

Patients who had undergone ileal conduit extraperitonealization technique (n:45) or traditional cystectomy and ileal loop diversion (n:53) were compared. Detailed demographic data of both groups are available in **Table 1**. Age, gender, BMI, ASA score or tumor characteristics were statistically comparable between both groups.

Both cohorts were statistically similar in terms of operation times. (216 minutes for extraperitonealization vs. 223 minutes for non-extraperitonealization group) (**Table 2**). Estimated blood loss and transfusion rates were similar between both cohorts. Postoperative bowel-related complications were observed in 7 patients in the traditional cystectomy group, and 5 patients in the group that underwent reoperation due to mechanical ileus. Extraperitonealization was associated with paralytic ileus in only one patient, and no complications requiring reoperation were observed. In the ileal conduit extraperitonealization group, the transition to normal diet was earlier than in the traditional cystectomy group. Along with gas and fecal discharge, the time to normal bowel motility was also shorter in the non-extraperitonealization group (2.6 vs. 6.5 days,  $p=0.017$ ). No delay in transition to oral diet or abdominal pain was observed in the group of patients who underwent extraperitonealization. The dwell time of nasogastric tube was significantly shorter in the extraperitonealization group ( $p=0.023$ ), and the average length of hospital stay for the extraperitonealized group was 7.2 days, significantly shorter than the non-extraperitonealization group.

## Discussion

Radical cystoprostatectomy has serious postoperative morbidity rates ranging between 20 and 64% [10-13]. Prolonged ileus and mechanical ileus, which are among the problematic postoperative and treatment resistant bowel complications seen in 20-30% of patients, [14,15]. Studies have been carried out by general surgeons to reduce the morbidity rates that develop as a result of intestinal complications.

In the metanalysis of postoperative ileus, Noble et al., demonstrated that gum chewing had reduced the duration of postoperative ileus [7]. Traut et al. found that prokinetic agents reduced rates of prolonged ileus and thus the length of hospital stay [8].

An extraperitoneal technique was described by Reyblat et al., to reduce bowel-related complications during augmentation enterocytostomy and this technique has been shown to facilitate early postoperative recovery [9]. The results of this study suggested that postoperative intestinal obstruction rates could be reduced by restructuring the pelvic floor. After removal of the bladder during radical cystectomy, a cavity is formed in the pelvis. The sigmoid colon and omentum cannot adequately fill this gap. In the empty space formed in the pelvis, the small intestine segments are compressed and cause obstruction. Preservation of the peritoneal structure can prevent the segments of the small intestine from being pinched in this area, reducing the likelihood of mechanical ileus requiring re-exploratory abdominal surgery.

Mandhani et al. reported shorter hospital stays, earlier recovery, and fewer bowel-related complications in a series of radical cystectomies performed using the technique involving

extraperitonealization of the orthotopic neobladder [16].

Dong So Park et al. described a technique in which the neobladder is extraperitonealized during radical cystectomy and orthotopic diversion. They also found that bowel-related complications were reduced using this peritoneal membrane preservation technique. They suggested that this technique is a feasible approach in selected patients and significantly reduces bowel-related complications [17].

Unlike the studies in the literature, our study investigated the effect of extraperitonealization of the ileal conduit on complication rates in patients undergoing cystoprostatectomy and ileal conduit urinary diversion. When the results of our study were examined, it was determined that the improvement in early bowel function was faster in radical cystectomies performed by extraperitonealizing the ileal loop segment compared to patients who did not undergo extraperitonealization. Refraining from the complication of mechanical ileus in the group of patients with extraperitonealized ileal loop conveys critical importance in terms of avoiding the indication of reoperation due to mechanical bowel obstruction.

## Conclusion

Although radical cystectomy and urinary diversion are the most important treatment options in non-metastatic muscle-invasive bladder cancer, it carries the potential risk for serious postoperative bowel complications. Postoperative bowel complications are reduced in patients in whom the ileal segment is extraperitonealized simultaneously with radical cystectomy and ileal loop cutaneous urinary diversion.

**Ethics Committee Approval:** The study protocol was reviewed and approved by the Afyonkarahisar University of Health Sciences Clinical Research Ethics Committee (ethics committee approval date and number: 03.03.2023/153).

**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 and internally peer-reviewed.

**Authorship Contributions:** Any contribution was not made by any individual not listed as an author. Concept – B.B., B.E.; Design – B.B.; Supervision – B.B.; Resources – B.E.; Materials – B.B., B.E.; Data Collection and/or Processing – B.B.; Analysis and/or Interpretation – B.B.; Literature Search – B.E., B.B.; Writing Manuscript – B.B., B.E.; Critical Review – B.B.

**Conflict of Interest:** The authors declare that they have no conflicts of interest.

**Financial Disclosure:** The authors state that they have not received any funding.



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# Comparison of Negative Pressure Wound Therapy and Conventional Dressing of Fournier's Gangrene

## Fournier Gangreninde Negatif Basıncılı Yara Tedavisi ile Konvansiyonel Yara Pansumanının Karşılaştırılması

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**Cite as:** Aktaş M, Dağgüllü M. Comparison of negative pressure wound therapy and conventional dressing of Fournier's gangrene. Grand J Urol 2024;4(2):40-6

**Submission date:** 01 February 2024 **Acceptance date:** 05 April 2024 **Online first:** 15 April 2024 **Publication date:** 20 May 2024

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### Abstract

**Objective:** The aim of this study is to compare two patient groups diagnosed with Fournier's Gangrene (FG) and treated with negative pressure wound therapy (NPWT) and conventional wound dressing (CWD) methods.

**Materials and Methods:** 64 patients with FG, who were followed up and treated at the Urology clinic of University Hospital between January 2011 and July 2020, were included in the study. Patients were divided into two groups: While group 1 received CWD treatment, group 2 received NPWT. Demographic characteristics, etiology, length of stay, number of debridements, additional surgeries, Fournier Gangrene Severity Index (FGSI) scores, analgesic needs, area of necrosis and amount of involvement of the patients were retrospectively analyzed.

**Results:** 37 patients in Group 1 and 27 patients in Group 2 were included in the study. All patients were male. The mean hospital stay was  $17.9 \pm 1.8$  days in Group 1, while it was  $12.7 \pm 1.1$  days in Group 2 ( $p:0.91$ ). The mean debridement numbers in Group 1 and Group 2 were  $7.1 \pm 0.8$  and  $3.7 \pm 0.3$ , respectively ( $p:0.004$ ). The mean number of daily analgesic use in Group 1 and Group 2 was  $2.4 \pm 0.12$  and  $1.44 \pm 0.08$ , respectively ( $p<0.001$ ). The mean area of necrosis was  $124 \pm 11.3$  cm<sup>2</sup> and  $147 \pm 18.1$  cm<sup>2</sup>, respectively ( $p:0.614$ ). In Group 1 and Group 2, 4 and 2 patients died, respectively ( $p:1.00$ ).

**Conclusion:** NPWT reduced the treatment burden of this disease by reducing the number of debridements and analgesic use. However, NPWT did not reduce the length of hospital stay.

**Keywords:** debridements, Fournier's gangrene, negative pressure wound therapy, analgesics, FGSI

### Özet

**Amaç:** Bu çalışmanın amacı, Fournier Gangreni (FG) tanısı alan ve negatif basınçlı yara tedavisi (NBYT) ile konvansiyonel pansuman yöntemleri (KPY) ile tedavi edilen iki hasta grubunu karşılaştırmaktır.

**Gereçler ve Yöntemler:** Ocak 2011-Temmuz 2020 tarihleri arasında Üniversite Hastanesi Üroloji kliniğinde takip ve tedavi edilen Fournier Gangreni tanılı 64 hasta çalışmaya dahil edildi. Hastalar iki gruba ayrıldı: Grup 1'e KYP tedavisi uygulanırken, Grup 2'ye NBYT uygulandı. Hastaların demografik özellikleri, etiyolojisi, yatış süresi, debridman sayıları, ek ameliyat sayısı, Fournier Gangreni Şiddet İndeksi (FGSI) skorları, analjezik ihtiyacı, nekroz alanı ve tutulum miktarı retrospektif olarak incelendi.

**Bulgular:** Grup 1'de 37, Grup 2'de ise 27 hasta çalışmaya dahil edildi. Hastaların tamamı erkekti. Ortalama hastanede kalış süresi Grup 1'de  $17,9 \pm 1,8$  gün iken Grup 2'de  $12,7 \pm 1,1$  gündü ( $p:0,91$ ). Grup 1 ve Grup 2'deki ortalama debridman sayıları sırasıyla  $7,1 \pm 0,8$  ve  $3,7 \pm 0,3$  idi ( $p:0,004$ ). Grup 1 ve Grup 2'de ortalama günlük analjezik kullanım sayısı sırasıyla  $2,4 \pm 0,12$  ve  $1,44 \pm 0,08$  idi ( $p<0,001$ ). Ortalama nekroz alanı sırasıyla  $124 \pm 11,3$  cm<sup>2</sup> ve  $147 \pm 18,1$  cm<sup>2</sup> idi ( $p:0,614$ ). Grup 1 ve Grup 2'de sırasıyla 4 ve 2 hasta öldü ( $p:1.00$ ).

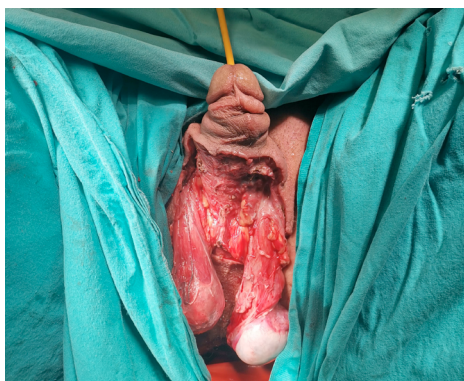
**Sonuç:** NBYT debridman sayısını ve analjezik kullanımını azaltarak bu hastalığın tedavi yükünü azalttı. Ancak NBYT hastanede kalış süresini kısaltmadı.

**Anahtar kelimeler:** debridman, Fournier gangreni, negatif basınçlı yara tedavisi, analjezikler, FGSI

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**Figure 1.** Scrotal swelling, necrosis and erythema in a patient with Fournier's Gangrene



**Figure 2.** Vital tissues after surgical debridements



**Figure 3.** Vacuum device placement after surgery

## Introduction

Fournier's gangrene (FG) was described in 1883 by the French venerologist Jean Alfred Fournier. In his series with 5 patients, he defined this disease as idiopathic fulminant gangrene involving the scrotum and penis [1]. FG usually begins with perianal or perineal pain. Scrotal swelling, local erythema of the skin and pain are the common symptoms. Also, hyperemia, pruritus, fever, nonspecific abdominal pain are other common symptoms. Cellulitis-like lesions in the early period complexify the diagnosis of the disease and cause it to be missed.

FG mostly develops in patients with comorbidities; however, it can also occur in patients without comorbidities. Hypertension, obesity (BMI>30 kg/m<sup>2</sup>), congestive heart failure, tobacco use, immunosuppressive conditions (such as acquired immunodeficiency syndrome [AIDS]), peripheral vascular diseases and alcoholism have been found to be associated with an increased risk in FG [2]. Diseases and risk factors in the etiology for FG help inoculation of microorganisms by damaging the immune system. Polymicrobial agents, as in many necrotizing soft tissue infections, cause FG. Microorganisms normally found in the perineum and genital area cause infection after a suitable environment is created. The cornerstones of FG treatment are immediate debridement of all necrotic tissues, initiation of broad-spectrum antibiotics, and patient stabilization with hemodynamic resuscitation [3]. FG is accepted as one of the urological emergencies because the rate of spread of facial necrosis can be 2-3 cm/hour. In addition, the fact that up to 21% of patients present with hypotension and septic shock increase the importance of patient stabilization before emergency surgery [4].

Broad-spectrum antibiotherapy should be started empirically as soon as FG is diagnosed, and then revised according to culture results [5]. Initial antibiotherapy should target common bacteria such as staphylococcus and streptococcal species, gram-negative bacteria, clostridium, bacteroides and pseudomonas [6]. In patients with a history of fungal infection or in immunosuppressed patients, antifungals such as amphotericin B or fluoroquinolones should be added to the treatment, considering fungal infection as the causative agent [7]. However, due to poor vascularization in fascial tissues, surgical intervention is key for an effective antibiotic therapy.

Early debridement of necrotic and dead tissue is a critical step in controlling the infection. Debridement of all dead tissues in the first operation is considered the most important factor in the patient's survival [8]. Extensive debridement and ventilation of living tissues by opening windows are recommended. Close monitoring of the wound and repeated debridements are necessary to control infection [9].

While FG can also be treated with classical dressing, vacuum-assisted closure (VAC) therapy has become popular in recent years [10]. VAC method accelerates wound healing by reducing edema and increasing blood flow. VAC system increases angiogenesis and improves tissue nutrition and formation. The main mechanism of the device is that VAC system drains dirty liquid and stagnant debris [6].

In this study, the effect of VAC therapy for the treatment of FG and the factors affecting this disease tried to be shown.

## Materials and Methods

Ethical approval for this study was obtained from Dicle University Medical Faculty Ethics Committee (Approval Number: 318, date: 03.09.2020). 64 FG patients who were followed up and treated between January 2011 and July 2020 in the Urology clinic of the University Hospital were included in the study. CWD was applied to 37 patients in Group 1 and NPWT was applied to 27 patients in Group 2. Informed consent was taken from all patients. All patients included in the study were male. FG was diagnosed with pain, edema, purulent discharge, necrosis and crepitation on palpation in physical examination after anamnesis was taken from the patient (**Figure 1**) (scrotal swelling, necrosis and erythema in a patient with FG). As soon as diagnosis was made, fluid resuscitation and antibiotherapy were started. The patient was then taken to emergency operation; and the first debridement was performed, which was performed to necrotic tissues until vital and normal bleeding tissues were seen (**Figure 2**) (vital tissues after surgical debridement). Depending on the vitality, the testicles were either preserved or orchiectomy was performed. Foley catheter was inserted to all patients. In patients with penile or urethra involvement, urinary diversion was performed by inserting a cystostomy catheter. A colostomy was performed in patients in whom the anal sphincter was involved or stool contamination could occur

**Table 1.** Number of patients and comorbidities by groups

| Characteristics                       | Total      | Group 1    | Group 2    | P value |
|---------------------------------------|------------|------------|------------|---------|
| Number of patients                    | 64         | 37         | 27         |         |
| Age                                   | 52 ± 2.1   | 53.5 ± 2.6 | 50.2 ± 3.4 | .434    |
| Diabetes mellitus                     | 23 (35.9%) | 13 (35.1%) | 10 (37%)   | .876    |
| Cardiac problems                      | 7 (10.9%)  | 4 (10.8%)  | 3 (11.1%)  | 1.00    |
| Malignity                             | 10 (15.6%) | 3 (8.1%)   | 7 (25.9%)  | .81     |
| Chronic obstructive pulmonary disease | 3 (4.7%)   | 2 (5.4%)   | 1 (3.7%)   | 1.00    |
| Infection after surgery               | 4 (6.3%)   | 1 (2.7%)   | 3 (11.1%)  | .302    |
| Chronic kidney disease                | 5 (7.8%)   | 2 (5.4%)   | 3 (11.1%)  | .642    |
| Wegener Granulomatosis                | 1 (1.6%)   | 1 (2.7%)   | 0          | 1.00    |
| Paraplegia                            | 1 (1.6%)   | 1 (2.7%)   | 0          | 1.00    |

**Table 2.** Distribution of patients by etiology

| Origin         | Total (n=64) | Group 1 (n=37) | Group 2 (n=27) | P value |
|----------------|--------------|----------------|----------------|---------|
| Urogenital     | 37 (57.8%)   | 21 (56.8%)     | 16 (59.3%)     | .841    |
| Anorectal      | 16 (25%)     | 7 (18.9%)      | 9 (33.3%)      | .188    |
| Skin infection | 4 (6.3%)     | 3 (8.7%)       | 1 (3.7%)       | .632    |
| Idiopathic     | 7 (10.9%)    | 6 (16.2%)      | 1 (3.7%)       | .223    |

in the debrided area. A fecal management set was applied to the patients who did not undergo colostomy procedure, and who were thought to have stool contamination. In Group 1, mesh dressing prepared with rifamycin SV (sodium salt hydrate); and nitrofurazone pomade was applied 2 or 3 times per day. Epidural anesthesia or narcotic analgesics were used during the dressing. Before starting the dressing, the wound site was washed with hydrogen peroxide and isotonic. Debridement was performed in the operating room under spinal anesthesia, once every 2 or 3 days, depending on the degree of necrosis. Debridement was performed more frequently in cases where the degree of necrosis increased. In Group 2, the VAC device was applied in a sealed way after the first debridements. The pressure value was brought to the subatmospheric mean value of 100-125 mmHg (**Figure 3**) (vacuum device placement after surgery). The VAC system was renewed in the operating room every 2 or 3 days. Tissues were irrigated with rifamycin SV (sodium salt hydrate) before the VAC device was mounted. All VAC device changes were performed in the operating room under spinal anesthesia. Debridements were performed until viable granulation tissue was seen in both group. The wound site was closed primarily in patients with the wound lips reaching each other. In case of extensive tissue loss after aggressive debridement, the plastic surgery department was consulted for free flap transportation. Patients who were planned for reconstruction were transferred to the plastic surgery department. All patient's age and comorbidities, etiologies by origin, additional surgeries such as orchiectomy, penectomy, colostomy and cystostomy, mortality status, length of hospital stay, number of debridements, average analgesic use, Fournier's Gangrene Severity Index (FGSI)

scores, area of necrosis involved, and amount of necrosis areas in cm<sup>2</sup> were recorded.

### Statistical Analysis

In the comparison of two independent groups, t test was used to see if the results were in a normal distribution and Mann Whitney U test was used to find out if it did not. Chi-square or fisher's exact tests were used for the analysis of qualitative data. Quantitative data was expressed as mean ± std values in the tables. Categorical data were written as n (frequency) and percentages (%). The data was analyzed at 95% confidence level and the P value was considered significant when it was less than 0.05.

### Results

All patients included in the study were male and their mean age was 53.5 ± 2.6 in group 1 and 50.2 ± 3.4 in group 2 (p>0.05). Diabetes mellitus was the most common comorbid disease in both groups (**Table 1**).

FG is basically divided into 3 groups according to its etiology. The group of patients whose etiology cannot be found is called idiopathic. In our study, in group 1, 21 (56.8%) patients had urogenital origin, 7 (18.8%) patients had anorectal origin, 3 (8.7%) patients had skin infection and 6 (16.2%) patients were idiopathic. In group 2, 16 (59.3%) patients had urogenital origin, 9 (33.3%) patients had anorectal origin, 1 (3.7%) patient had skin infection and 1 (3.7%) patient was idiopathic. There was no statistical difference between the groups according to their etiology (p>0.05) (**Table 2**).

**Table 3.** Patient characteristics and additional surgeries

| Characteristics                    | Total      | Group 1    | Group 2     | P value         |
|------------------------------------|------------|------------|-------------|-----------------|
| Number of patients                 | 64         | 37         | 27          |                 |
| Mean hospitalization               | 15.7 ± 1.2 | 17.9 ± 1.8 | 12.7 ± 1.1  | .91             |
| Mean debridements number           | 5.7 ± 0.5  | 7.1 ± 0.8  | 3.7 ± 0.3   | <b>.004</b>     |
| Mean daily analgesic use           | 2 ± 0.1    | 2.4 ± 0.12 | 1.44 ± 0.08 | <b>&lt;.001</b> |
| Area of necrosis(cm <sup>2</sup> ) | 134 ± 10   | 124 ± 11.3 | 147 ± 18.1  | .614            |
| Number of orchiectomy              | 16 (25%)   | 8 (21.6%)  | 8 (29.6%)   | .465            |
| Number of colostomy                | 9 (14.1%)  | 4 (10.8%)  | 5 (18.5%)   | .475            |
| Number of cystostomy               | 2 (3.1%)   | 0          | 2 (7.4%)    | .174            |
| Number of penectomy                | 1 (1.6%)   | 1 (2.7%)   | 0           | 1               |
| Type of wound closure              |            |            |             |                 |
| Primary                            | 30 (51.7%) | 14 (42.4%) | 16 (64%)    | .103            |
| Reconstructive                     | 28 (48.3%) | 19 (57.6%) | 9 (36%)     |                 |
| FGSI                               | 4.3 ± 0.4  | 4.6 ± 0.5  | 3.8 ± 0.6   | .227            |
| Mortality                          | 6 (9.4%)   | 4 (10.8%)  | 2 (7.4%)    | 1               |

**Table 4.** Distribution according to the areas of necrosis involved

| Area of necrosis involved | Group 1 (n=37) | Group 2 (n=27) | P value |
|---------------------------|----------------|----------------|---------|
| Scrotum                   | 37 (100%)      | 27 (100%)      | 1.00    |
| Inguinal                  | 17 (45.9%)     | 13 (48.1%)     | .862    |
| Perineum                  | 20 (54.1%)     | 13 (48.1%)     | .641    |
| Abdomen                   | 3 (8.1%)       | 4 (14.8%)      | .443    |
| Penis                     | 2 (5.4%)       | 4 (14.8%)      | .231    |
| Thigh                     | 2 (5.4%)       | 5 (18.5%)      | .122    |

**Table 5.** Mortality and FGSI scores

| Variables        | Survivor (n=58) | Nonsurvivor (n=6) | P value          |
|------------------|-----------------|-------------------|------------------|
| FGSI (mean ± SD) | 3.4 ± 0.3       | 12.5 ± 1          | <b>&lt;0.001</b> |

The mean hospital stay was 17.9 ± 1.8 and 12.7 ± 1.1 days, for group 1 and group 2, respectively (p:0.91). The mean debridement numbers were 7.1 ± 0.8 and 3.7 ± 0.3, respectively (p:0.004). The mean number of daily analgesic use was 2.4 ± 0.12 and 1.44 ± 0.08, respectively (p<0.001). The mean area of necrosis was 124 ± 11.3 cm<sup>2</sup> and 147 ± 18.1 cm<sup>2</sup>, respectively (p:0.614). In group 1, orchiectomy was performed on 8 patients, 3 patients bilaterally and 5 patients unilaterally. In Group 2, a total of 8 patients underwent unilateral orchiectomy (p: 0.465). In addition, colostomy was performed on 4 patients in group 1, penectomy on 1 patient, colostomy on 5 patients in group 2, and cystostomy on 2 patients (p> 0.05). The wounds of 14 patients in group 1 and 16 patients in group 2 were closed primarily. The wounds of 19 patients from group 1 and 9 patients from group 2 were closed after reconstruction by the plastic surgery department (p:0.103). The mean FGSI scores in group 1 and 2 were 4.6 ± 0.5 and 3.8 ± 0.6, respectively

(p:0.227). In group 1 and 2, 4 and 2 patients died, respectively (p:1.00) (**Table 3**).

All patients included in the study had scrotal involvement. Inguinal region involvement was 17 (45.9%) and 13 (48.1%) in group 1 and 2, respectively (p:0.862). Perineal involvement was 20 (54.1%) and 13 (48.1%) in group 1 and 2, respectively (p:0.641). Abdominal spread was 3 (8.1%) and 4 (14.8%) in group 1 and 2, respectively (p:0.443). Penile involvement was 2 (5.4%) and 4 (14.8%) in group 1 and 2, respectively. In group 1 and 2, spread to the thigh region was 2 (5.4%) and 5 (18.5%), respectively (**Table 4**).

A total of 6 patients who participated in the study are deceased. The mean FGSI score of the surviving patients, whom we mentioned in Table 5 as survivor, was 3.4 ± 0.3. The mean FGSI score of the patients who deceased, whom we defined as non-survivors, was 12.5 ± 1. A statistical difference was found between them (p<0.001) (**Table 5**).

## Discussion

Despite all advances and early interventions in the medical world, FG is still a disease with high mortality. FG mortality rates range from 3% to 45%. In Eke et al.'s 1726 disease series, this rate was found to be 16%. In our study, this rate was found to be 9.3%. Severe sepsis, coagulopathy, acute renal failure, diabetic ketoacidosis, and multiple organ failure were the causes of death. Less than 1/4 of FG cases are currently considered idiopathic. The most common causes are known as gastrointestinal tract with 30-50%, genitourinary tract with 20-40% and cutaneous causes with 20% [11]. In our study, urogenital causes were 57.8%, anorectal causes 25% and cutaneous causes 6.3% in etiology. The rate of idiopathic patients was 10.9%. In our study, the majority of patients with urogenital causes was due to the fact that we are a urology clinic.

NPWT was described by Argenta and Morykwas in 1997 [8]. Then it was used for the first time in FG treatment by Weinfeld et al [12]. This technique transforms an open wound into a temporarily closed and controllable environment. In laboratory and clinical studies, it has been shown that the use of a VAC device increases blood flow and creates a suitable environment for wound healing [13]. There are different opinions about whether NPWT shortens the hospitalization time in patients with FG. In their study, Assenza et al., reported that NPWT treatment shortens the hospitalization time and leads to an early reconstructive surgery [14]. In a study by Czymek et al., it was found that NPWT prolongs the length of stay compared to the CWD method [15]. However, in the study of Yanaral et al., no difference was found between CWD and NPWT applied groups in terms of hospitalization length [16].

In our study, there was a decrease in the number of debridements and daily average analgesic use in NPWT applied group compared to CWD group. With a decrease in the use of analgesics, the number of complications associated with the use of these drugs also decreased. The scarcity of analgesic use indicates that patients' comfort has increased and their pain has also decreased. In addition, this comfort causes NPWT to be preferred not only by patients but also by physicians. As the number of debridements decreases, the physician spends less time and the patients complain less about pain. These factors are some of the reasons why most physicians prefer NPWT. In a study conducted by Ozturk et al., it was shown that 92% of physicians prefer NPWT in the treatment and management of FG [17]. It is seen that the high mortality rate has decreased with improvement in health services, better definition of the treatment algorithm of the disease and technological advances. In our study, mortality rates were 10.8% with 4 patients and 7.4% with 2 patients in CWD group and NPWT group, respectively. The total number of patients, who deceased, is 6 and this rate is 9.4%. Considering that FG disease progresses with high mortality, our result was lower than the literature [18]. We attribute this to the fact that our hospital is centrally located therefore easily accessible, and that we work with a serious team approach, which does not delay the urgent surgery of these patients.

Urinary and fecal diversion are essential in the management of FG disease. For FG, which often involves the scrotum and perineum, contamination of the wound with urine or feces will delay wound healing. Urethral catheterization and cystostomy

catheter are among the options for urinary diversion. Although it has been stated by a small number of researchers that cystostomy can be applied to all patients, and urethral catheterization is often sufficient [19]. In Ghnam's series of 74 patients published in 2008, all patients except one with urethral injury received a urethral catheter and it was sufficient for urinary diversion [20]. In our series of 64 patients, a single cystostomy catheter was applied to 2 patients, which is compatible with the literature. Although cystostomy catheter application is a minimally invasive procedure, it is still a surgical procedure that may have complications. In our opinion, a cystostomy catheter is not required for all patients; a cystostomy catheter is required only in cases of necrosis involving the penis and urethra. The issue of fecal diversion is controversial in the treatment management of FG. Some researchers recommend routine fecal diversion to reduce wound contamination and speed healing [21]. Diversion colostomy is recommended in cases of anal sphincter involvement, in order to eliminate fecal incontinence and fecal contamination risk of the wound. In the study conducted by Chen et al., it was shown that primary diversion colostomy reduces the risk of mortality compared to secondary colostomy [22]. However, this issue raises doubts because it is not correlated with the place where the disease first reached. In a retrospective study by Korkut et al., the mortality rate was 7% in the group that did not require a stoma, while it was 38% in the group that required a stoma [23]. In another study by Kızılay et al., the necessity of peroperative colostomy was reported as a risk factor that increases mortality in multivariate analysis. In this research article, it is stated that colostomy application is a result rather than a cause in showing mortality, and that this alone is an important factor showing the prevalence and severity of the disease [24]. As an alternative to diversion colostomy, a fecal management system has been described. This method protects the wound from fecal contamination, such as a colostomy [25]. In the study conducted by Estrada et al., it was stated that the fecal management system is an effective method for fecal diversion and is an alternative to colostomy [26]. With this device, stoma-related complications are eliminated, it also provides better psychological recovery for the patient and is more economical. Fecal management system contraindications; rectal neoplasm, penetrating rectal injuries and fistulas. In our study, protective colostomy was performed on a total of 9 patients, 4 patients in CWD group and 5 patients in NPWT group. Fecal management system was applied to patients with extensive perineal involvement. A colostomy was performed in 2 of the 6 patients who deceased.

Although it is stated that the blood supply of the testicles originates from the retroperitoneum and therefore will be preserved in FG, it is a known fact that it goes to necrosis, especially in late cases. In a study by Morua et al., orchiectomy was performed in 18% of patients [27]. In our study, orchiectomy was performed on a total of 16 patients (25%), 3 of whom were bilateral. In our study, we attribute this high rate to the higher rate of urogenital causes in etiology. Bilateral orchiectomy and penectomy were performed on a patient diagnosed with prostate cancer in CWD group. This is the only patient for whom we performed penectomy. Unfortunately, this patient died on the first postoperative day.

FGSI scoring system was developed in 1995 by Laor et al. In this scoring, when the cut-off value is taken as 9, it is stated that the mortality probability is 75% for the values above it, and



probability of survival is 78% for the values below 9 [28]. In a study by Corcoran et al., a statistically significant difference was found between the average FGSI score of the living and the average FGSI score of the deceased as 5.3 and 10.9, respectively [29]. In a recent study by Kutsal et al., it was shown that NPWT causes significant decrease in 1st week's FGSI mean score. But mortality assessment wasn't evaluated in their study [30]. We evaluated FGSI scores during the first day of patients' hospitalization. In our study, the higher score in FGSI was correlated with the increased risk of mortality.

Another important issue concerning with NPWT is cost. The seemingly expensive VAC device is at par with the CWD method as it reduces the number of debridements and the need for analgesics. It has been stated by some researchers in the literature that NPWT is not more expensive yet even cheaper than CWD method [31].

The shortcomings of our study are that it is retrospective, and that no cost analysis was performed. Despite all its advantages, NPWT should not be used in all cases such as malignant tissues, exposed vessels, nerves, organs and anastomoses, untreated osteomyelitis, non-enteric or unexplained fistulas. In addition, it should not be used in cases with high bleeding risk and in cases where infective tissues are not fully debrided [32]. It is imperative to treat the right patient with the right indication to avoid unnecessary complications.

## Conclusion

FG, which was a feared disease in the past, has become a manageable disease with the advances in medicine today. Early diagnosis of the disease, immediate surgical intervention and initiation of broad-spectrum antibiotics are critical. NPWT, which has started to be used relatively recently in FG, is becoming an integral part of the treatment as it both increases patient comfort and facilitates the work of physicians and healthcare team. NPWT appears to be safe and effective in many ways. NPWT reduces the number of debridements and analgesic use, but does not reduce the length of hospital stay. Prospective, randomized studies with larger groups are needed for a better understanding of NPWT.

**Ethics Committee Approval:** Ethical approval for this study was obtained from Dicle University Hospital Medical Faculty Ethics Committee (Approval Number: 318, date: 03.09.2020).

**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.A, M.D.; Design – M.A, M.D.; Supervision – M.A, M.D.; Resources – M.A, M.D.; Materials – M.A, M.D.; Data Collection and/or Processing – M.A, M.D.; Analysis and/or Interpretation – M.A, M.D.; Literature Search – M.A, M.D.; Writing Manuscript – M.A, M.D.; Critical Review – M.A, M.D.

**Conflict of Interest:** The authors declare that they have no conflicts of interest.

**Financial Disclosure:** The authors state that they have not received any funding.

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# Evaluation of Pyeloplasty Results in Pediatric Patients with Glomerular Filtration Rates Below 15 ml/min

## Glomerüler Filtrasyon Hızı 15 ml/dk'nın Altında Olan Pediyatrik Hastalarda Piyeloplasti Sonuçlarının Değerlendirilmesi

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**Cite as:** Baturu M, Öztürk M, Şen H, Durna G, Bayrak Ö. Evaluation of pyeloplasty results in pediatric patients with glomerular filtration rate below 15 ml/min. Grand J Urol 2024;4(2):47-52

**Submission date:** 07 February 2024 **Acceptance date:** 12 April 2024 **Online first:** 19 April 2024 **Publication date:** 20 May 2024

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### Abstract

**Objective:** To identify crucial factors influencing surgical success, specifically focusing on the role of differential renal function (DRF), in children with ureteropelvic junction obstruction (UPJO) and glomerular filtration rates (GFR) at or below 15 ml/min.

**Materials and Methods:** Pyeloplasty results of 45 pediatric patients whose GFRs at or below 15 ml/min were analyzed retrospectively. Patients' demographic characteristics, anteroposterior diameters (APDs) of their renal pelvises, renal parenchymal thickness (PT), preoperative and postoperative DRFs and GFRs were recorded. The effects of the renal pelvis APD/PT ratio, the ratio between renal pelvis APD, and ultrasonographically measured preoperative length of the long axis of the kidney (LAK), and preoperative DRF values on the procedural success rates were evaluated.

**Results:** Twenty-nine patients met the inclusion criteria. The mean age of the patients was 48.79 (5-180) months. The mean preoperative GFR (13.44±1.52 ml/min) and DRF (28.69%±9.32) values increased up to 23.35±10.52 ml/min and 35.71%±15.04 at postoperative 6th- and 24.35±10.8 ml/min and up to 35.27%±14.57 at postoperative 12th-months, respectively (p<0.001, p<0.001). A preoperative DRF greater than 18 % was identified as a factor affecting procedural success of the surgery (p=0.006).

**Conclusion:** Contrary to what has been advocated in other studies, pyeloplasty should be preferred in patients with decreased renal functions having a GFR of 15 ml/min or lower, and DRF below cut-off value of 18 percent.

**Keywords:** pyeloplasty, ureteropelvic junction obstruction, poor renal function, differential renal function

### Özet

**Amaç:** Üreteropelvik bileşke obstrüksiyonu (UPJO) olan ve glomerüler filtrasyon hızları (GFR) 15 ml/dakika veya altında olan çocuklarda, özellikle diferansiyel böbrek fonksiyonunun (DRF) rolüne odaklanarak, cerrahi başarıyı etkileyen önemli faktörleri belirlemek.

**Gereçler ve Yöntemler:** GFR 15 ml/dk altında piyeloplasti uygulanan 45 çocuk hasta retrospektif olarak incelendi. Hastaların demografik özellikleri, renal pelvis ön-arka çapı (APD), renal parankim kalınlığı (PT), preoperatif ve postoperatif DRF ve GFR'leri kaydedildi. Renal pelvis APD/PT oranı, renal pelvis APD/US (ultrason böbrek uzun aksı) oranı ve preoperatif DRF düzeylerinin işlemin başarısı üzerindeki etkileri değerlendirildi.

**Bulgular:** Yirmi dokuz hasta dahil edilme kriterlerini karşıladı. Ortalama yaş 48.79 ay (5-180 ay) idi. Ortalama GFR ve DRF değerleri ameliyat öncesi dönemde 13.44±1.52 ml/dk ve %28.69±9.32 iken ameliyat sonrası 6. ayda sırasıyla 23.35±10.52 ml/dk ve %35.71±15.04'e ve ameliyat sonrası 12. ayda 24.35±10.8 ml/dk ve %35.27±14.57'ye yükseldi (p<0.001, p<0.001).

**Sonuç:** Ameliyat öncesi DRF'nin 18'den büyük olması ameliyat başarısını etkileyen bir faktör olarak belirlendi (p=0.006).

**Anahtar kelimeler:** piyeloplasti, üreteropelvik bileşke darlığı, düşük renal fonksiyon, diferansiyel böbrek fonksiyonu

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## Introduction

Ureteropelvic junction obstruction (UPJO) is a common condition resulting in hydronephrosis in adult and pediatric patients [1]. UPJO may cause urinary tract infections and pain and to lead to a decline in renal functions. In the presence of critically reduced renal function, use of particularly the Anderson-Hynes pyeloplasty technique, is recommended as the optimal treatment approach [2–4].

The progression of hydronephrosis in cases with delayed diagnosis can lead to degeneration of the renal parenchyma. While the optimal treatment approach for patients with reduced renal function (10%-25%) is still a matter of debate, nephrectomy may be recommended if adequate improvement in renal functions with alternative treatment methods can not be achieved [5,6].

The magnitude of postoperative improvement in differential renal function (DRF) is strictly correlated with the baseline DRF, renal cortical thickness, anteroposterior diameter (APD) of the renal pelvis, pelvis-to-cortex ratio, and calyx-to-parenchyma ratio [7]. The present study evaluates the outcomes of pyeloplasty and the factors [renal pelvis APD, parenchymal thickness (PT), APD/PT, DRF] affecting surgical outcomes in patients with a preoperative GFR of  $\leq 15$  ml/min.

## Material and Methods

### Study Participants

The study was approved by the Local Ethics Committee of Gaziantep University (decision date and number: 2023/04). The data of 45 pediatric patients who underwent pyeloplasty between 2015 and 2022 due to a GFR of  $\leq 15$  ml/min on technetium-99m diethylenetriaminepentaacetic acid (Tc99m DTPA) scintigraphy, secondary to UPJO, were retrospectively reviewed. The patients whose one-year follow-up data were available were included in the study. Patients who had undergone endopyelotomy, pyeloplasty, renal surgery, nephrostomy, double-J stenting (DJ) and those with secondary UPJO, vesicoureteral reflux, posterior urethral valve, chronic renal failure, and bilateral UPJO were excluded from the study.

Pyeloplasty procedures were decided upon based on the joint decision of a Pediatric Urologist and a Pediatric Nephrologist. The study included patients with a GFR of  $\leq 15$  ml/min on follow-up as detected by Tc99m DTPA, more than 10% loss of DRF (DRF $<40\%$ ) as seen on Tc99m DMSA, hydronephrosis with an APD of over 30 mm as identified by US, and signs of obstruction with a peak clearance time ( $t_{1/2}$ ) lasting more than 20 min on Tc99m DTPA. Open pyeloplasty procedures were performed by a single surgeon (Dr. HS) using the Anderson-Hynes pyeloplasty technique as appropriate for patients meeting all inclusion criteria. All patients received a DJ stent and drainage catheter perioperatively. The drainage catheter was removed two days later, and DJ stent at postoperative one month.

### Outcomes and Follow-up

The patients' age, laterality of UPJO, renal pelvis APD, renal parenchymal thickness, and preoperative and postoperative DRFs, and GFRs were recorded. In addition, the patients were followed up with DMSA, DTPA, and US

examinations performed at 6th and 12th months, and the effects of preoperatively estimated ratios between the anteroposterior diameter of the renal pelvis, and parenchymal thickness of the kidney (PT), and between the APD of the renal pelvis and the length of the long axis of the kidney, and DRF on outcomes were analyzed. The grade of hydronephrosis was determined using the staging system developed by the Society of Fetal Urology (SFU).

The success of the pyeloplasty procedure was defined as a  $t_{1/2}$  less than 20 min after pyeloplasty, a regression in hydronephrosis even if  $t_{1/2}$  was not less than 20 min, and a lack of change or increase in DRF.

### Statistical Analysis

A Shapiro-Wilks test was used to examine whether or not the data were normally distributed. Continuous variables with and without normal distribution were analyzed using a paired samples t-test, and Wilcoxon test, respectively. Analysis of variance (ANOVA) or Friedman test was used to analyze repeated measurements, depending on the fitness of the variables to normal distribution. The relationship between categorical variables was analyzed with a chi-square test and Fisher's Exact test, where appropriate, depending on the fitness of the variables to a normal distribution. Spearman rank correlation coefficients were used to assess the relation between numerical variables with non-normal distribution. A receiver operating characteristic (ROC) curve analysis was used to identify the cut-off points for numerical variables. IBM SPSS Statistics for Windows software (Version 22.0. Armonk, NY: IBM Corp.) was used for the statistical analysis, and a p-value of less than 0.05 was considered statistically significant.

## Results

Among 45 pediatric patients, the data of 29 patients with accessible records and who met the study inclusion criteria were included in the analysis. Patients with a history of DJ stent placement and nephrostomy (n:12), VUR (n:1), and missing 6th- and 12th-month follow-up data were excluded from the study. The mean age of the patients was 48.79 (5–180) months. The study population consisted of 16 (55.17%) male, and 13 (44.83%) female patients. The UPJO was located on the left side in 17 (58.6%) and on the right side in 12 (41.37%) patients. While 13 (44.8%) patients had experienced a urinary tract infection at least once in their life. Urinary tract infections were detected in 8 (42.1%) male and in 5 (38.4%) female patients. Three out of five patients (27.25%) with a failed pyeloplasty had urinary tract infection more than once. Preoperatively, 19 (66%) patients had grade 3, and 10 (34%) had grade 4 hydronephrosis (**Table 1**).

The mean DRF values of the patients were  $28.69\% \pm 9.32$  (11–47) in the preoperative period,  $35.71\% \pm 15.04$  (5–55) at the postoperative 6th and  $35.27\% \pm 14.57$  at postoperative 12th-months ( $p=0.014$ ,  $p=0.012$ , respectively). A significant increase was noted in the postoperative DRF values compared to their preoperative values ( $p=0.004$ ) (**Table 2**). During the one-year postoperative period, a decline in DRF values was experienced by five (17.24%), and an increase by 22 patients (75.86%), while DRF values did not change in two (6.8%) patients.

Similarly, the mean GFR was  $13.44 \pm 1.52$  ml/min in the preoperative period and increased up to  $23.35 \pm 10.52$  ml/min at

postoperative 6th and up to 24.35±10.8 ml/min at postoperative 12th-months (p=0.05 and p<0.001, respectively), while any significant difference was not detected between postoperative 6th and 12th months in terms of GFR values (p=0.974). Furthermore, the mean preoperative renal parenchymal thickness (PT) was 4.86±0.23 mm and increased up to 7.66±0.33 mm at postoperative 6th and up to 10±0.34 mm at postoperative 12th months (p<0.001, p<0.001, respectively) There was also significant difference between postoperative 6th and 12th months in terms of PT values (p=0.008) (Table 2).

Preoperatively 19 (65.51%) patients had grade 3, and 10 (35.49%) patients had grade 4 hydronephrosis. In addition, the degree of hydronephrosis decreased at the 6th and 12th-month control visits performed after pyeloplasty (p<0.001) (Table 2). All patients in the failed pyeloplasty group were asymptomatic and required no additional intervention throughout the follow-up.

In the analysis of the factors affecting the success of the pyeloplasty procedures, the cut-off value for the renal pelvis APD/PT ratio was calculated as 5.5 with a sensitivity of 87.5% and a specificity of 80%, and the cut-off value for the ratio between APD of the renal pelvis and the length of the long axis of the kidney ratio was calculated as 0.37 with a sensitivity of 79.2% and a specificity of 80%. The ratio of renal pelvis APD/PT and the ratio between anteroposterior diameter of the renal pelvis, and the length of the long axis of the kidney had no effect on the procedural success of the surgery performed (p=0.2, p=0.22). Preoperative DRF was identified as a factor affecting the success of the procedure, with a ROC curve analysis revealing a cut-off value of 18% with a sensitivity of 95.8% and a specificity of 20% (p=0.006) (Figure 1) (Table 3).

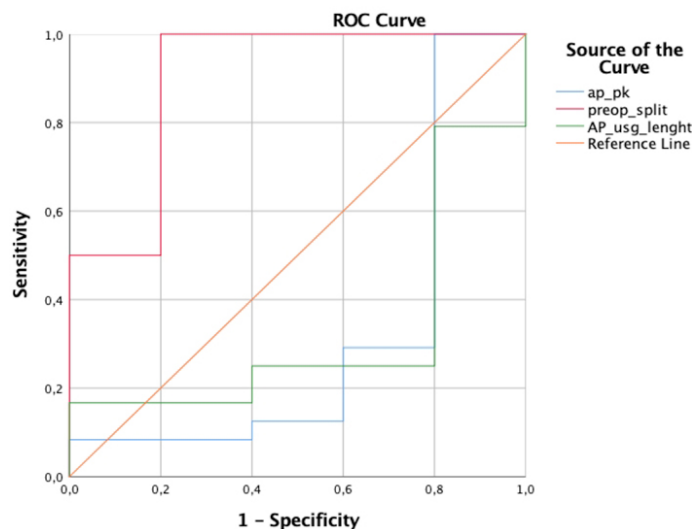
### Discussion

Pyeloplasty is an elective treatment for patients with UPJO, and the best outcomes are achieved with the Anderson-Hynes technique with reported success rates as high as 90–95% [8,9]. In the present study, a relatively lower surgical success rate (82.7%) was noted, which was attributed to the fact that patients with decreased renal function had also undergone this surgical procedure.

**Table 1.** Demographic data of the patients

| Mean age (month) (min- max)      |         | 48.79 (5-180) |
|----------------------------------|---------|---------------|
| Gender (n, %)                    | male    | 16 (55.17)    |
|                                  | female  | 13 (44.8)     |
| Laterality (n, %)                | right   | 12 (41.37)    |
|                                  | left    | 17 (58.6)     |
| Urinary tract infections, (n, %) |         | 13 (44.8)     |
| Success rate (n, %)              |         | 24/29 (82.75) |
| Hydronephrosis degree (n, %)     |         |               |
|                                  | grade 3 | 19 (66)       |
|                                  | grade 4 | 10 (34)       |

min: minimum; max: maximum; n: number of the patients



**Figure 1.** ROC curve of risk factors

**Table 2.** Preoperative and postoperative data about renal functions

|                                    | Preoperative | Postoperative 6. month | Postoperative 12. month | P      |
|------------------------------------|--------------|------------------------|-------------------------|--------|
| GFR ± SD (ml/min)                  | 13.44±1.52   | 23.35±10.52            | 24.35±10.8              | <0.001 |
| DRF ± SD (%)                       | 28.69±9.32   | 35.71±15.04            | 35.27±14.57             | 0.004  |
| Parenchymal thickness ± SD (mm)    | 4.86±0.23    | 7.66±0.33              | 10 ±0.34                | <0.001 |
| Renal Pelvis AP diameter ± SD (mm) | 37.13±7.79   | 14.74±6.75             | 13.89±1.28              | <0.001 |
| HN Grade 1                         | 0            | 1                      | 14                      | <0.001 |
| Grade 2                            | 0            | 13                     | 10                      |        |
| Grade 3                            | 19           | 15                     | 5                       |        |
| Grade 4                            | 10           | 0                      | 0                       |        |

GFR: glomerular filtration rate; mm: milimeter; SD: standart deviation; DRF: differantial renal function; AP: anteroposterior; HN: hydronephrosis

**Table 3.** ROC curve parameters of risk factors

| Risk factor              | AUC (95%)        | Cut off value | P     | Sensitivity (%) | Specificity (%) |
|--------------------------|------------------|---------------|-------|-----------------|-----------------|
| DRF                      | 0.9 (0.71-1)     | 18            | 0.006 | 91.7            | 80              |
| Renal pelvis AP/PT ratio | 0.4. (0.19-0.6)  | 4,52          | 0.52  | 50              | 60              |
| AP/US length ratio       | 0.39 (0.12-0.65) | 0,4           | 0.45  | 54.2            | 40              |

AUC: area under roc curve; AP: antero-posterior diameter; PT: parenchymal thickness; DRF: differential renal function; US: ultrasonography

Although nephrectomy is the preferred approach in adult patients with a GFR lower than 15 ml/min, pyeloplasty was preferred as an organ-sparing surgery in pediatric patients with poor renal function [10,11]. Addressing this issue, the present study examines the treatment outcomes of pediatric patients with a GFR of  $\leq 15$  ml/min and the factors affecting the surgical success rates.

The use of US in conjunction with DTPA is considered to be the optimal diagnostic approach for the patients with UPJO. In their study, Karnak et al. reported lack of any relationship between the grade of preoperative hydronephrosis and renal function and that DRF may have been preserved despite the presence of a high grade hydronephrosis [12]. In addition, various studies have reported an up to 81% improvement in hydronephrosis in the early post-pyeloplasty period ranging between 3–6 months [13]. However, no relationship has been reported between the resolution of hydronephrosis and improvement in renal functions [13–15]. The present study also noted significant resolution in hydronephrosis ( $p < 0.001$ ).

Chipde et al. divided their patients into three groups to evaluate the factors affecting the success of pyeloplasty as those with  $< 5\%$  or  $> 5\%$  improvement in DRF and  $> 5\%$  deterioration in DRF. The authors compared the renal pelvis APD, PT, and pelvis-to-cortex ratios of the groups. They found PT to be significantly higher and the pelvis-to-cortex ratio to be lower in the patients with more than 5% improvement DRF compared to the other groups. In contrast, no significant difference was noted between the other two groups in terms of these parameters. APD and PT were thus identified as two factors affecting the success of pyeloplasty [16]. In a study of patients aged 0–1 years with UPJO accompanied by grade 3–4 hydronephrosis, Jiang et al. observed no significant difference between the preoperative and postoperative PT and APD values but noted a significant improvement in DRF [17]. The present study evaluating the effects of renal pelvis APD and the renal pelvis APD-to-PT ratio on treatment success could not detect any significant effect of these parameters on the success of pyeloplasty.

There is a lack of consensus regarding the impact of baseline DRF in patients with a UPJO accompanied by a decrease in renal functions on surgical success rates [13]. In studies that used a DRF of 10–30% as an indication of reduced kidney function, more remarkable postoperative improvement was achieved as the baseline DRF increased [8,13,18]. In the present study, when a GFR of less than 15 ml/min on DTPA was used as a reference, improvement in postoperative DRF values was noted. A cut-off value for DRF to predict the surgical success has not been cited in the literature. A cut-off value of 18% for DRF was determined so as to evaluate the factors effective on

postoperative improvement in GFR. The present study differs from other studies cited in the literature in that it proposed a cut-off value based on the success rate of the treatment rather than specifying a cut-off value at the beginning of the study.

Although nephrectomy is recommended in some publications for patients with a differential renal function of less than 10%, Aziz et al. reported an increase in DRF after pyeloplasty in patients with a baseline DRF of less than 10%, and they advised against nephrectomy in such patients [6]. Nishi et al. advocated pyeloplasty as an effective therapy in patients with a DRF greater than 20% and suggested that as an organ-sparing treatment method pyeloplasty should be preferred over nephrectomy [19]. The authors also reported nephrectomy to be an option in patients with decreased DRF accompanied by hypertension [20]. In the present study, we observed increases in the GFR and DRF values of patients with a baseline GFR of less than 15 ml/min and noted an improvement in the renal functions of 24 (82.75%) patients. Although the results of our study suggest a cut-off value for those with worsened DRFs, pyeloplasty should be prioritized in those with a DRF greater than 18.

The main limitations of the present study are small number of research patients, retrospective design of the study, and the inadequacy of available data on renal functions more than one year after surgery.

## Conclusion

A significant improvement in GFR and DRF was observed on diuretic scintigraphy obtained after pyeloplasty in patients with a GFR of less than 15 ml/min. The parameters identified as factors affecting surgical success rates in previous studies, including preoperative PT, renal pelvis APD, and renal pelvis APD/PT ratio, had no effect on the procedural success rates in the current study. Contrary to the reports of the previous studies, a threshold of 18 for DRF was determined for patients with a GFR of  $\leq 15$  ml/min demonstrating decreased renal function. Therefore, as an organ-sparing procedure, pyeloplasty should be preferred in this group of patients. The results of the present study should be supported by prospective studies with longer follow-up periods performed on greater number of patients.

**Ethics Committee Approval:** Ethics committee approval was received for this study from the ethics committee of Gaziantep University (decision date: 18.01.2023 and no: 2023/04) and was performed following the ethical standards as laid down in the 1964 Declaration of Helsinki and its later amendments. **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.B., M.Ö.; Design – M.B., M.Ö.; Supervision – M.B., Ö.B.; Resources – H.Ş., G.D.; Materials – H.Ş., G.D.; Data Collection and/or Processing – H.Ş., G.D.; Analysis and/or Interpretation – M.B., M.Ö.; Literature Search – H.Ş., G.D.; Writing Manuscript – M.B., M.Ö.; Critical Review – M.B., Ö.B.

**Conflict of Interest:** The authors declare that they have no conflicts of interest.

**Financial Disclosure:** The authors state that they have not received any funding.

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# Is Periprostatic Nerve Block Innocent on Erectile Functions in Prostate Biopsy? Randomized, Controlled, Prospective Observational Study

## Prostat Biyopsisinde Periprostatik Sinir Bloğu Eretil Fonksiyonlar Açısından Zararsız mıdır? Randomize, Kontrollü, Prospektif Gözlemsel Çalışma

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**Cite as:** Özercan AY, Güzel Ö, Coşer Ş, Tatlıcı K, Atan A, Tuncel A. Is periprostatic nerve block innocent on erectile functions in prostate biopsy? Randomized, controlled, prospective observational study. Grand J Urol 2024;4(2):53-8

**Submission date:** 16 April 2024 **Acceptance date:** 04 May 2024 **Online first:** 10 May 2024 **Publication date:** 20 May 2024

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### Abstract

**Objective:** Our aim was to determine the effects of periprostatic nerve block and intrarectal local anesthesia techniques applied during the prostate biopsy and accompanied by transrectal ultrasonography on the erectile function.

**Materials and Methods:** A total of 86 patients who underwent prostate biopsy between January 2020 and September 2021 were included in the study as two study groups. Forty patients (Group-1) received 10 mL intrarectal lidocaine gel 2%, and 46 patients (Group-2) underwent periprostatic nerve block with 10 ml lidocaine HCL 1%. We recorded demographic data (age, height, weight), PSA values before the biopsy procedure, prostate volumes, visual analogue scores (VAS), and post-procedure complications. Erectile function and changes over time was investigated with IIEF-5 questionnaire at the time of biopsy and 1, 3 and 6 months after the biopsy. Significance was set at  $p < 0.05$ .

**Results:** The mean age was  $61.08 \pm 6.05$  years, and mean BMI, biopsy duration were  $27.35 \pm 3.7$  kg/cm<sup>2</sup>,  $11.84 \pm 2.32$  minutes respectively. PSA values, prostate volumes, and mean IPSS were  $8.19 \pm 3.82$  ng/ml,  $56.8 \pm 23.8$  cc, and  $10.5 \pm 4.28$ , respectively, without any significant differences between the groups. No difference was found between two groups when mean IIEF-5 scores over time were compared with changes in erectile function ( $p = 0.907$ ). In-group comparisons of changes over time also yielded insignificant results in both groups (Group-1:  $\chi^2(4) = 2.22$ ,  $p = 0.529$ , Group-2:  $\chi^2(4) = 6.61$ ,  $p = 0.086$ ).

**Conclusion:** Periprostatic nerve block does not affect erectile function negatively six months after the biopsy. Its initial negative effect on erectile function in the first month is temporary. Therefore, we concluded that periprostatic nerve block can be safely used during transrectal ultrasound-guided prostate biopsy in terms of erectile function.

**Keywords:** periprostatic nerve block, intrarectal local anesthesia, prostate, biopsy, erectile function

### Özet

**Amaç:** Transrektal ultrasonografi eşliğinde yapılan prostat biyopsisi sırasında uygulanan periprostatik sinir bloğu ve intrarektal lokal anestezi tekniklerinin, erektil fonksiyonlar üzerine etkilerini değerlendirmektir.

**Gereçler ve Yöntemler:** Ocak 2020 ile Eylül 2021 tarihleri arasında prostat biyopsisi uygulanan toplam 86 hasta, iki çalışma grubu olarak çalışmaya dahil edildi. Kırk hastaya (Grup-1) 10 mL lidokain jel %2 intrarektal olarak uygulandı, 46 hastaya (Grup-2) 10 ml lidokain HCL %1 ile periprostatik sinir bloğu yapıldı. Demografik veriler (yaş, boy, kilo), biyopsi öncesi PSA değerleri, prostat hacimleri, görsel analog skorlar (VAS) ve biyopsi sonrası komplikasyonlar kaydedildi. Eretil fonksiyon ve erektil fonksiyonun zaman içerisindeki değişimi, biyopsi anında ve biyopsiden 1, 3 ve 6 ay sonra IIEF-5 anketi ile araştırıldı. Anlamlılık düzeyi  $p < 0.05$  olarak belirlendi.

**Bulgular:** Ortalama yaş  $61.08 \pm 6.05$  yıl, ortalama BMI, biyopsi süresi sırasıyla  $27.35 \pm 3.7$  kg/cm<sup>2</sup>,  $11.84 \pm 2.32$  dakikaydı. PSA değerleri, prostat hacimleri ve ortalama IPSS sırasıyla  $8.19 \pm 3.82$  ng/ml,  $56.8 \pm 23.8$  cc ve  $10.5 \pm 4.28$  idi ve gruplar arasında anlamlı farklılık bulunmadı. İki grup arasında zamanla ortalama IIEF-5 puanları karşılaştırıldığında erektil fonksiyondaki değişikliklerde fark bulunmadı ( $p = 0.907$ ). Zamanla erektil fonksiyondaki değişikliklerin grup içinde karşılaştırmalarında, her iki grupta da anlamsız sonuçlar elde edildi (Grup-1:  $\chi^2(4) = 2.22$ ,  $p = 0.529$ , Grup-2:  $\chi^2(4) = 6.61$ ,  $p = 0.086$ ).

**Sonuç:** Periprostatik sinir bloğu, biyopsiden altı ay sonraki erektil fonksiyonu olumsuz etkilememektedir. İlk aydaki erektil fonksiyondaki olumsuz etkisi geçicidir. Dolayısıyla, transrektal ultrason eşliğinde prostat biyopsisi sırasında periprostatik sinir bloğun erektil fonksiyonlar açısından güvenli kullanılabileceğini düşünmekteyiz.

**Anahtar kelimeler:** periprostatik sinir bloğu, intrarektal lokal anestezi, prostat, biyopsi, erektil fonksiyon

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## Introduction

Transrectal ultrasonography-guided (TRUSG) prostate biopsy is frequently performed in outpatient settings due to its ease, lack of need for hospitalization, and low rate of severe complications. However, recent studies and clinical experience have shown that patients experience discomfort and pain during the procedure, contrary to earlier beliefs that the procedure was painless without local anesthesia [1]. Periprostatic nerve block (PPNB) was first described by Soloway and Obek in 2000 [2], and since then has become a widely agreed method for pain relief during TRUSG prostate biopsy.

PPNB has currently been recommended as the standard anesthesia technique for TRUSG prostate biopsy by American Urological Association (AUA) and the European Association of Urology (EAU) [3,4]. However, other techniques including intrarectal local anesthesia (IRLA) with lidocaine gel, intravenous sedation and general anesthesia may also be employed, depending on patient preference, medical history, and the clinical decision of the physician.

Although TRUSG prostate biopsy is generally considered safe, it may lead to complications such as bleeding, infection, urinary retention, pain and lower urinary tract symptoms. Moreover, it has been claimed that it may impair erectile function [5-8]. Various studies have demonstrated that the effect on erectile function is short-lived and transient. In fact, our previous study indicated impairment of erectile function up to six months after biopsy [9]. Another study with a follow up period of three months suggested that the effect on erectile function might be related to inflammation caused by the biopsy procedure itself [10]. However, it is not clear whether the impairment of erectile function is due to the anesthesia technique used during the biopsy or the inflammation caused by the biopsy procedure.

Herein, we aimed to compare the IRLA and PPNB, two anesthetic methods administered for prostate biopsy, on erectile function following the procedure.

## Materials and Methods

This study was performed in Ankara City Hospital Urology Clinic after obtaining approval of Ankara City Hospital No. 1 Ethics Committee on 03.10.2019, with the reference number E1/026/2019, and Turkish Medicines and Medical Devices Agency on 16.01.2020, with the reference number 66175679-514.05.01-E.12529.

The study included 114 patients who underwent TRUSG prostate biopsy due to suspected prostate cancer (PCa) in the Urology Clinic of Ankara City Hospital between January 2020 and September 2021. Twenty-eight patients were excluded due to urethral catheterization for urinary retention after biopsy, undergoing genitourinary procedures within six months of biopsy or inability to contact with during the follow up period or unwillingness to continue participating in the study.

This clinical trial was planned as a randomized, controlled, prospective, observational study. The patients were randomized into two groups with the sealed envelope method: Group 1 (n=40) received 10 mL intrarectal lidocaine gel 2%, and Group 2 (n=46) was injected with 5 mL lidocaine HCl 2% (10 ml in total) to each side along the vascular nerve bundles, posterolateral to

the prostate. The duration of PPNB was recorded, and prostate biopsy was performed 10 minutes after the block.

We also noted PSA levels, International Prostate Symptom Score (IPSS) scores, body mass index (BMI), concomitant systemic disorders related to erectile dysfunction (ED), and medications that could potentially affect erectile function. Transrectal ultrasonography and prostate biopsy were performed by the same Urology specialist using a Hitachi® EUB-400 ultrasonography device, a 7.5 MHz biplane transrectal probe (Hitachi, Tokyo, Japan), and an 18G 25 cm biopsy needle (Geotek®, Geotek Medical, Ankara, Turkey). All patients received antibiotic prophylaxis (ciprofloxacin 1x500 mg) starting the day before the biopsy and continuing for five days after the biopsy. The ellipsoid formula was employed to calculate the prostate volumes, 12 core prostate biopsies were obtained from the patients, and they were observed for early complications for two hours after the biopsy.

Pain and discomfort levels were determined with visual analogue scale (VAS) at six different time points: during local anesthesia procedure (VAS 1), during insertion and movement of the USG probe in the rectum (VAS 2), during biopsy needle penetration into the prostate and biopsy (VAS 3), 30 minutes after biopsy (VAS 4), 2 hours after biopsy (VAS 5), and the first day following the biopsy (VAS 6).

The 5-item International Index of Erectile Function (IIEF-5) questionnaire was employed on the day of the prostate biopsy to determine the baseline erectile functions of the patients. The IIEF-5 consists of five questions that evaluate erectile function, each scored between 1 and 5. The total IIEF-5 score ranges from 5 to 25 points, with interpretations as follows: 5-7 points indicate “severe” erectile dysfunction (ED), 8-11 points indicate “moderate” ED, 12-16 points indicate “mild-moderate” ED, 17-21 points indicate “mild” ED, and 22-25 points indicate “no ED”.

During the follow-up period, IIEF-5 scores were documented during the outpatient clinic visits at months 1, 3, and 6, after the prostate biopsy. If the patients did not present at the outpatient clinic within the specified timeframes, we made effort to contact them using their provided contact information.

Histopathological reports of the prostate biopsy were recorded carefully. We also documented any complications within 15 days of the biopsy (early complications) and the ones that appeared during the 6-month follow-up period (late complications).

### Statistical Analysis

We performed the statistical analysis with Statistical Package for Social Sciences (SPSS) Version 20.0 (SPSS Inc., Chicago, IL, USA). The confidence interval was determined as 95% for all analyses.

Kolmogorov-Smirnov test was used to determine normality of distribution of quantitative data. It was observed that the quantitative data, with the exception of age, did not conform to a normal distribution. Consequently, we compared two study groups with Student’s t-test for age, and with Mann-Whitney U test for other quantitative data.

We used Friedman test to determine the significance of changes in IIEF-5 scores before and after prostate biopsy since the data did not follow a normal distribution. Chi-square test was employed to analyze qualitative variables. P<0.05 was considered as statistically significant in all analyses.

**Table 1.** Baseline clinical characteristics of groups

| Variables                 | Group 1 (n=40)    | Group 2 (n=46)   | P value |
|---------------------------|-------------------|------------------|---------|
| Age (years)               | 59.85±6.68 (60.5) | 62.15±5.29 (62)  | 0.078   |
| BMI (kg/cm <sup>2</sup> ) | 27.7±4.3 (26.4)   | 27.02±3.1 (26.3) | 0.775   |
| Biopsy time (minutes)     | 11.75±1.82 (12)   | 11.91±2.7 (12)   | 0.947   |
| PSA (ng/ml)               | 7.79±3.27 (6.55)  | 8.56±4.26 (7.55) | 0.544   |
| Prostate volume (ml)      | 57.4±21.9 (55.5)  | 56.4±25.6 (48)   | 0.530   |
| IPSS                      | 10.4±3.85 (10.5)  | 10.6±4.67 (9.5)  | 0.771   |

BMI: body mass index; PSA: prostate specific antigen; Data presented as mean ± standard deviation with median values in parenthesis

**Table 2.** Comparison of VAS results between groups

| VAS Scores | Group 1 (n=40) | Group 2 (n=46) | P value       |
|------------|----------------|----------------|---------------|
| VAS-1      | 1.05±0.99 (1)  | 2.9±1.37 (3)   | <b>0.000*</b> |
| VAS-2      | 2.6±1.06 (2)   | 3±1.56 (3)     | <b>0.223</b>  |
| VAS-3      | 4.5±1.45 (4)   | 1.54±1.19 (1)  | <b>0.000*</b> |
| VAS-4      | 2.47±1.2 (2.5) | 1.24±0.92 (1)  | <b>0.000*</b> |
| VAS-5      | 1.78±0.97 (2)  | 1.17±0.88 (1)  | <b>0.002*</b> |
| VAS-6      | 1.2±0.79 (1)   | 0.85±0.87 (1)  | <b>0.030*</b> |

VAS: visual analogue scale; \* Statistical Significant for Mann Whitney U Test; Data presented as mean ± standard deviation with median values in parenthesis

**Table 3.** IIEF-5 averages and comparisons of groups over time

| Time of IIEF-5 | Group-1 (n=40)    | Group-2 (n=46)  | P value* |
|----------------|-------------------|-----------------|----------|
| Biopsy day     | 21±3.97 (22)      | 20.8±4.32 (22)  | 0.909    |
| 1st Month      | 20.1±4.65 (21)    | 20.2±5.06 (22)  | 0.838    |
| 3rd Month      | 20.05±5.36 (22.5) | 21.04±4.75 (23) | 0.511    |
| 6th Month      | 20.57±4.86 (22)   | 20.93±5.14 (23) | 0.637    |
| P value**      | 0.529             | 0.086           |          |

IIEF-5: 5-item international sexual function index; Data presented as mean ± standard deviation with median values in parenthesis;

\* Comparison of averages between groups at the time with Mann Whitney U Test; \*\*Comparison of changes within group over time with Friedman Test

## Results

The mean age of 86 patients who participated in and completed the follow-up period was 61.08±6.05 years. The mean BMI was 27.35±3.7 kg/cm<sup>2</sup>. The mean biopsy time was 11.84±2.32 minutes. The mean PSA, prostate volume, and IPSS of the patients were 8.2±3.82 ng/ml, 56.8±23.8 cc, and 10.5±4.28, respectively.

Two study groups were similar for mean age, BMI, biopsy time, number of cores, PSA value, prostate volumes, and IPSS (**Table 1**). Two groups were also similar for prevalence of comorbidities such as hypertension and diabetes mellitus, which are associated with ED (pHT=0.26, pDM=0.27).

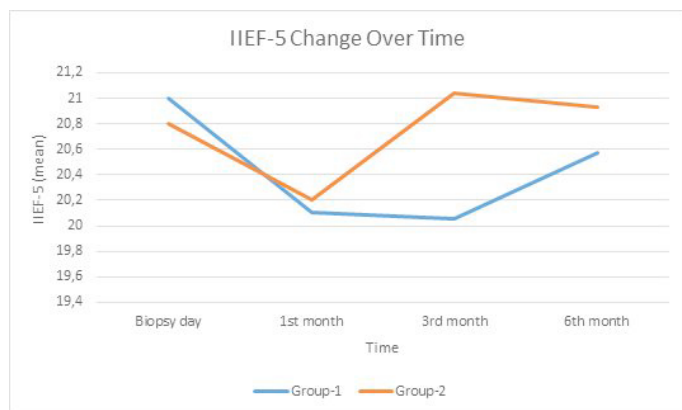
The mean VAS-1 score were significantly smaller in Group 1, however VAS-2 scores were not significantly different when two groups were compared (p=0.223). VAS 3, VAS-4, VAS-5 and VAS-6 scores were significantly higher in the IRLA group (**Table 2**).

Baseline IIEF-5 scores, on the day of prostate biopsy, were not significantly different in two study groups (p=0.909) indicating no difference between two groups for erectile functions. Two groups were compared for any change in erectile function after the biopsy procedure. The mean IIEF-5 scores 1 month after the biopsy were smaller than the mean score on the day of biopsy and 6 months after biopsy in both groups (**Table 3**), however, the differences were not statistically significant in either group (Group-1:  $\chi^2(4)=2.22$ , p=0.529, Group-2:  $\chi^2(4)=6.61$ , p=0.086).

The mean IIEF-5 scores changed over time in both groups, however it was determined that the changes in IIEF-5 scores did not cause significant differences between two groups (**Figure 1**).

A total of four patients experienced complications which were classified as grade 2 or lower according to the Clavien-Dindo complication classification system. Two groups were similar early and late complication rates (p=0.595 for both).

After histopathological results, the rate of the patients with



**Figure 1.** Graphic of IIEF-5 Changes Over Time

Gleason 3+3 prostate adenocarcinoma to the patients with benign prostatic hyperplasia was determined as 29.03% and 27.8% in groups 1 and 2, respectively ( $p>0.05$ ).

## Discussion

Prostate biopsy is the primary method to obtain a histopathological diagnosis in case of suspected PCa. Although mostly considered safe, it is together with potential complications. ED is a rare complication of prostate biopsy besides more frequent ones including bleeding, infection and difficult urination [3,4]. ED has been defined as failure to have an adequate penile tumescence for a satisfactory sexual performance and/or inability to maintain it throughout the sexual intercourse [11]. It may have neurogenic, psychogenic, vasculogenic, anatomical, hormonal, or drug-related causes [12]. According to Zisman et al. [5] ED resulting from prostate biopsy may arise due to direct damage to neurovascular structures or may be due to secondary trauma, for example neural compression resulting from hematoma or edema. We hypothesized that possible nerve injury and inflammation due to periprostatic nerve block could disturb erectile function. Therefore, we planned this study to investigate whether the anesthesia method had any effect on erectile function in the patients who had TRUSG prostate biopsy.

The risk of ED after prostate biopsy is usually low, but the procedure may lead to temporary or, in rare cases, permanent ED. In our study published in 2008 [9] that included 97 patients who underwent TRUSG prostate biopsy with periprostatic nerve block, the mean IIEF-5 score was 19.1 before the biopsy, it decreased to 17.1 after one month and to 16.8 after 6 months, supporting our hypothesis. That study also demonstrated decreased sexual function in the female partners of the patients within a 6-month period after biopsy. In another study, Kamali et al. [13] excluded patients who underwent radical prostatectomy for malignancy and those who had hormone therapy and radiotherapy after biopsy, and similarly reported a significant decrease in IIEF-5 scores 1, 3, and 6 months after biopsy compared to the pre-biopsy scores, however interestingly prostate biopsies were performed under general anesthesia in that study. Klein et al. [8] followed up the patients for three

months and compared erectile functions in the ones who had and did not have PPNB. The authors indicated that the number of cores, age or local anesthesia did not have any long-term effects on erectile function. That study reported a significant difference in the mean baseline IIEF-5 scores between the groups that had and did not have PPNB. The authors observed lower baseline IIEF-5 scores in the patients who did not have PPNB, and IIEF-5 scores decreased more in this group. In another study, Sönmez et al., [14] aimed to minimize pain without affecting erectile function negatively during transrectal prostate biopsy, and they demonstrated that the group that had PPNB had lower mean VAS scores both during and after the procedure compared to the IRLA group. Additionally, when examining changes in erectile function over a one-month period, the authors observed decreased IIEF-5 scores in the IRLA group, however scores increased in the PPNB group although the difference was not statistically insignificant. In 2006, Stravodimos et al. [15] included 62 patients who had either IRLA or PPNB into their study. The study compared the IIEF scores between two groups at the time of information for the need of a prostate biopsy, during the prostate biopsy, and 10 and 20 days after the biopsy. In that study, although the number of patients with ED increased 10 days after the biopsy, it was reported that ED recovered within 20 days after biopsy. The authors also reported that the variations in the numbers of patients with ED paralleled each other between two anesthesia methods. A meta-analysis by Mehta et al. [16] evaluated erectile functions after prostate biopsy and the pre-biopsy IIEF-5 score was regarded as the baseline value. That meta-analysis reviewed three studies which compared baseline IIEF-5 scores with the scores two weeks later, 22 studies which compared baseline scores with the ones 4 weeks later, 18 studies which compared baseline scores with the ones three months later, and 10 studies which compared baseline scores with the ones six months later. The authors concluded that there was a significant impairment in erectile functions within 4 weeks after the biopsy, however comparison with the results of the 3rd and 6th months revealed that the impairment was temporary. In the current study, we compared sexually active patients at the time and after transrectal prostate biopsy based on the anesthesia method applied. In our study, the patients who were on the medications that could affect erectile function were excluded, and we observed a similar distribution of comorbidities that could affect erectile function in two study groups. We also compared the anesthesia methods for pain perception at six time points using VAS. We found significantly lower VAS scores during and after the biopsy in the group that underwent PPNB. On the biopsy day, IIEF-5 scores were similar between two study groups in our study. During the 1-month follow-up period, we noted similar declines in erectile function in both groups. We observed an increase in IIEF-5 scores compared to the 1st month scores in both groups 6 months after biopsy.

It cannot be denied that the suspicion of prostate cancer itself may have a significantly effect on sexual function. Stravodimos et al. [15] demonstrated that some patients who did not have ED developed it after they were informed about the need for biopsy. Helfant et al. [17] studied 85 patients and found that those with a positive prostate biopsy for cancer experienced a greater loss of sexual function compared to the ones without cancer. Although the higher mean age in the group with prostate cancer poses a

limitation to that study, it was argued that the impairment of sexual function observed in the cancer group following the biopsy, using the same method, was attributed to psychogenic factors. In our study, two study groups included similar numbers of patients with biopsy-proven prostate cancer (Gleason Score 6). Furthermore, a possible reason for the increase in IIEF-5 scores 3 and 6 months after biopsy compared to baseline scores in the PPNB group may be attributed to the benign result of the prostate biopsy. However, the lack of pre- and post-biopsy assessments to determine the overall psychogenic profile and the level of anxiety is a limiting factor in our study.

Small number of patients included in our study is also considered as a limitation. Furthermore, the efficacy of IRLA, which is applied based on the absorption capacity of the rectal mucosa and has shown to exert comparable pain-relieving effects to PPNB in some studies [18], continues to be a subject of debate. We believe that the novelty of our study design constitutes its primary strength.

## Conclusion

Our data clearly demonstrated that PPNB (Periprostatic Nerve Block) offers a significant advantage over IRLA (Intrarectal Local Anesthesia) in alleviating pain during prostate biopsy procedures. Furthermore, our results indicate that any negative effect on erectile function resulting from the periprostatic nerve block is temporary, and erectile function returns to the pre-biopsy levels within 3 months. It is critical to note that initial ED is temporary. Consequently, we concluded that PPNB may be safely used in transrectal ultrasound-guided prostate biopsy procedures.

**Ethics Committee Approval:** This study was performed in Ankara City Hospital Urology Clinic after obtaining approval of Ankara City Hospital No. 1 Ethics Committee on 03.10.2019, with the reference number E1/026/2019, and Turkish Medicines and Medical Devices Agency on 16.01.2020, with the reference number 66175679-514.05.01-E.12529.

**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:** Internally and externally peer-reviewed.

**Authorship Contributions:** Any contribution was not made by any individual not listed as an author. All authors read and approved the final version of the manuscript. Concept – A.Y.Ö., Ö.G.; Design – A.Y.Ö., Ö.G.; Supervision – A.A., A.T.; Resources – S.C., K.T.; Materials – S.C., K.T.; Data Collection and/or Processing – S.C., K.T.; Analysis and/or Interpretation – S.C., K.T.; Literature Search – S.C., K.T.; Writing Manuscript – A.Y.Ö., Ö.G.; Critical Review – A.A., A.T.

**Conflict of Interest:** The authors report there are no competing interests to declare.

**Financial Disclosure:** The authors received no financial support for the research, authorship and/or publication of this article.

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# First Successful Endoscopic Removal of a Pen from the Male Urinary Bladder

## Erkek Mesanesinden İlk Başarılı Endoskopik Kalem Çıkarma Operasyonu

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**Cite as:** Sharma S, Prakash JVS, Natarajan V. First successful endoscopic removal of a pen from the male urinary bladder. Grand J Urol 2024;4(2):59-62

**Submission date:** 18 January 2024 **Acceptance date:** 28 February 2024 **Online first:** 04 March 2024 **Publication date:** 20 May 2024

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### Abstract

Self-inflicted foreign bodies in the urinary bladder are very rarely reported. Insertion of a wide variety of objects into bladder due to autoerotic stimulation, psychiatric disturbances, and senility etc. have been reported in the medical literature. This case report discusses an exceptional incident where a young male patient self-inserted a ball-point pen into his urinary bladder via the urethra. Notably, the pen negotiated the curvatures of the urethra without causing significant lower urinary tract injury. The report underscores the challenges and successful endoscopic removal of the pen, marking the first documented instance of such an extraction in a male patient.

**Keywords:** pen, foreign body, bladder, endoscopic extraction

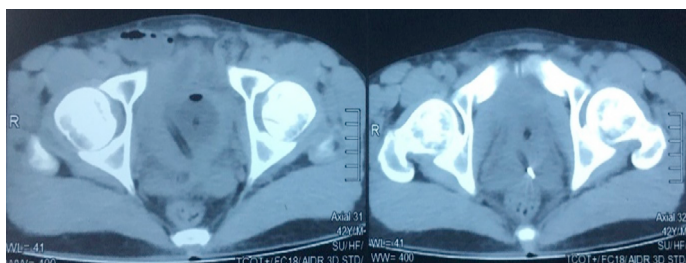
### Özet

İdrar kesesine kendi kendine yabancı cisim sokulması çok nadir olarak bildirilmiştir. Otoerotik stimülasyon, psikiyatrik rahatsızlıklar ve yaşlılık gibi nedenlerle mesaneye çok çeşitli cisimlerin sokulması tıbbi literatürde bildirilmiştir. Bu vaka raporunda, genç bir erkek hastanın üretra yoluyla idrar kesesine tükenmez kalem kendi kendine soktuğu istisnai bir olay tartışılmaktadır. Özellikle, kalem üretranın eğriliklerini önemli bir alt üriner sistem yaralanmasına neden olmadan aşmıştır. Rapor, erkek bir hastada bu tür bir çıkarma işleminin belgelenmiş ilk örneğini işaret ederek, kalemin endoskopik olarak çıkarılmasının zorluklarını ve başarısını vurgulamaktadır.

**Anahtar kelimeler:** kalem, yabancı cisim, mesane, endoskopik ekstraksiyon



**Figure 1.** X-ray of the pelvis depicting the metal portion of a linear foreign body within the bladder region



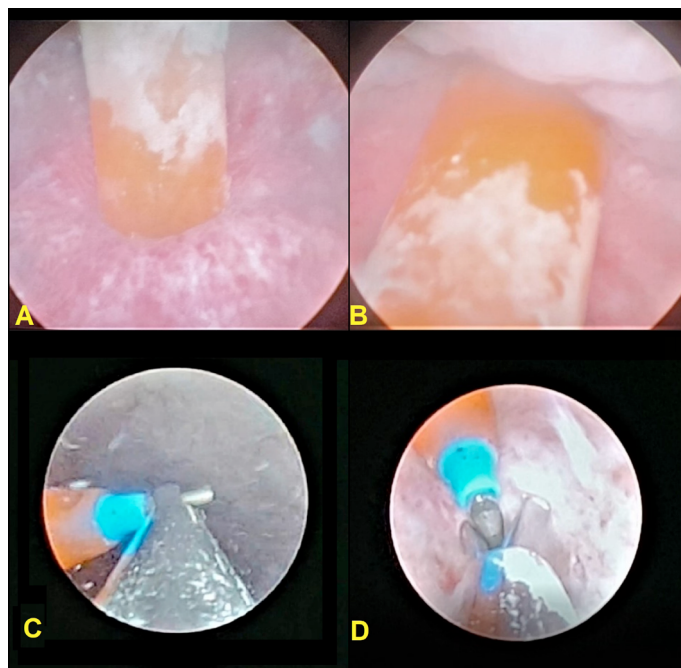
**Figure 2.** CT-KUB confirming the presence of the foreign body in the bladder without any signs of bladder perforation

## Introduction

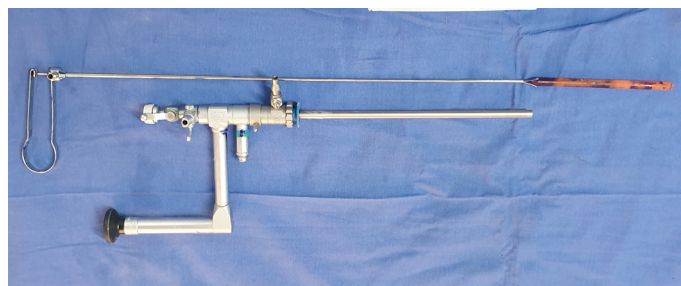
The presence of self-inflicted foreign bodies in the urinary bladder is an uncommon phenomenon, with objects typically small in size and associated with factors like sexual gratification, psychiatric disorders, or advanced age [1]. In literature, there have been reports of long foreign bodies such as pens, pencils, telephone cable, beading awl and thermometer that have been found in the bladder [2-7]. This case presents the unique instance of a self-inserted ball-point pen in a male patient's bladder, successfully removed through endoscopic methods using a nephroscope cystoscopy.

## Case

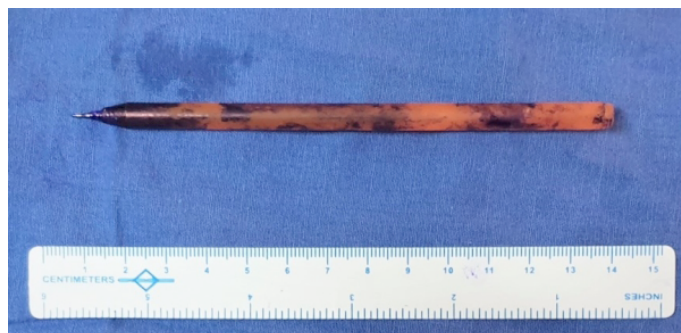
A 34-year-old migrant laborer experienced dysuria, terminal hematuria, and suprapubic pain following self-insertion of a ball-point pen into the urinary bladder during masturbation. Radiological examinations confirmed the intravesical location of the pen [Figure 1,2]. Under regional anesthesia, we performed cystoscopy with a 20 F 30-degree telescope which revealed intact anterior and posterior urethra, with minor mucosal injuries in the posterior urethra. The freely moving pen in the bladder and its impingement on the bladder wall were noted [Figure 3]. Initial cystoscopic extraction attempts to grab its freely dangling distal



**Figure 3.** Cystoscopic observation displaying both ends of the foreign body within the bladder (A, B); Successful extraction of the pen through endoscopy using a nephroscope and tri-prongs grasper (C, D)



**Figure 4.** Armamentarium used for the extraction; 22 F rigid nephroscope and tri-prongs grasper, alongside the successfully removed foreign body



**Figure 5.** Extracted pen from the bladder measuring 13 cm in length



end with a conventional cold-cup grasper failed due to the wide diameter of the pen. A three-prong grasper was delivered through the work channel of a 22 F rigid nephroscope introduced through urethra and the pen was extracted successfully highlighting the need for adaptive techniques in endoscopic procedures [Figure 4,5]. Despite the challenges such as the sharp tip, wide diameter and slippery surface of the pen, the three-prong grasper enabled successful extraction without significant mucosal injuries. The procedure was completed in less than 40 minutes, emphasizing the importance of precise maneuvering in overcoming such challenges.

## Discussion

The insertion of foreign bodies into the urinary bladder, termed as “self-inflicted urethral foreign body insertion,” is a rare but documented phenomenon. While successful extraction of foreign bodies from the female urinary bladder has been documented [6], extracting them from the male urinary bladder presents distinct anatomical and technical challenges [4,5]. Previous reports have described cases of bladder perforation, migration of foreign bodies into the abdominal cavity, and the need for open surgical interventions in these patients [7-10]. Therefore, the successful endoscopic extraction presented in this case adds valuable insights to the existing body of literature and reinforces the feasibility of minimally invasive approaches in managing such cases. The successful transurethral removal of a pen from inside the male urinary bladder using endoscopic methods marks a significant milestone in urological practice. This case underscores the importance of employing adaptive techniques and specialized equipment, such as rigid nephroscopes and three-prong graspers, in addressing unique challenges posed by long and rigid foreign bodies. The ability to negotiate through the urethral curvatures and extract the pen without causing significant mucosal injuries highlights the expertise and skill required in endourological procedures. Nevertheless, urologists should be prepared to switch to open surgical procedures if endoscopic extraction is unsuccessful, in the absence of appropriate endoscopic equipment or they have insufficient surgical expertise in endoscopic techniques [11,12].

## Conclusion

In conclusion, the successful endoscopic extraction of a ball-point pen from inside the male urinary bladder highlights the efficacy of minimally invasive approaches in managing complex cases of self-inflicted foreign bodies. This case demonstrates that long foreign objects can be effectively removed endoscopically, provided that appropriate endoscopic instruments, and equipment are readily available.

**Ethics Committee Approval:** N / A.

**Informed Consent:** An informed consent was obtained from the patient.

**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 – S.S., J.V.S P., V. N.; Design – S.S., J.V.S P., V. N.; Supervision – S.S., J.V.S P., V. N.; Resources – S. S., J.V.S P., V. N.; Materials – S. S., J.V.S P., V. N.; Data Collection and/or Processing – S. S., J.V.S P., V. N.; Analysis and/or Interpretation – S. S., J.V.S P., V. N.; Literature Search – S.S., J.V.S P., V. N.; Writing Manuscript – S. S., J.V.S P., V. N.; Critical Review – S. S., J.V.S P., V. N.

**Conflict of Interest:** The author declares that there was no conflict of interest.

**Financial Disclosure:** The author declares that this study received no financial support.

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# Isolated Renal Involvement Requiring Surgical Treatment in Systemic Cat Scratch Disease

## Sistemik Kedi Tırmağı Hastalığında Cerrahi Tedavi Gerektiren İzole Böbrek Tutulumu

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**Cite as:** Kozubaev B, Demirdöğen ŞO, Aksakallı T, Budak A, Hilal Y, Şener E, Yapanoğlu T. Isolated renal involvement requiring surgical treatment in systemic cat scratch disease. Grand J Urol 2024;4(2):63-6

**Submission date:** 18 December 2023 **Acceptance date:** 08 March 2024 **Online first:** 11 March 2024 **Publication date:** 20 May 2024

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### Abstract

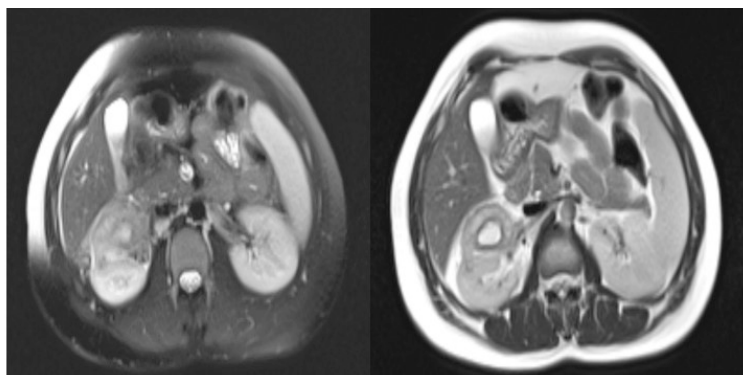
Cat scratch disease (CSD) is a self-limiting infectious disease that develops after a cat bite or scratch, caused by the Gram-negative bacillus *Bartonella henselae*. The disease is generally characterized by fever and regional granulomatous lymphadenopathy, but in 5-10% of cases it can occur as a systemic disease and lead to various diseases. A 31 year old healthy woman applied to the internal medicine clinic with right side pain. He was referred to the urology clinic after the urinary system USG revealed a 4x3cm cystic mass in the right kidney. There was no finding in the patient's history other than a cat bite 3 months ago. Radiological evaluations showed RCC suspicion in the right kidney with the classification of Bosniak type 3 cyst. Upon being reported as a medical condition, the patient underwent laparoscopic partial nephrectomy. Multiple abscesses in the liver and spleen, and microabscesses in both kidneys, accompanied by systemic inflammatory symptoms, have previously been reported in systemic CSD. However, as far as we know, this is the first case of *Bartonella henselae* in the literature showing isolated single kidney involvement of this size without showing systemic inflammatory symptoms.

**Keywords:** *Bartonella henselae*, cat scratch disease, renal abscess, partial nephrectomy

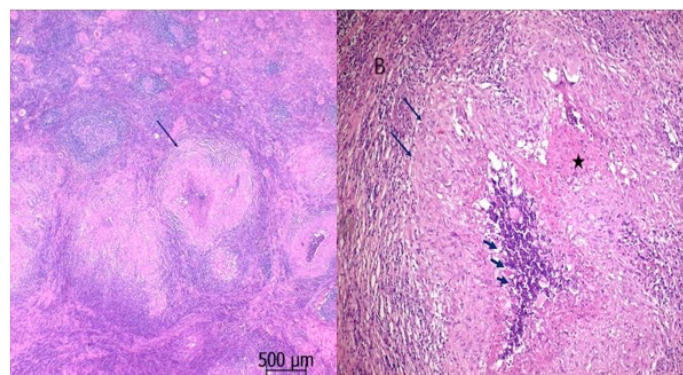
### Özet

Kedi tırmağı hastalığı (KTH), Gram-negatif basil *Bartonella henselae*'nin neden olduğu, bir kedi ısırığı veya tırmağı sonrasında gelişen, kendi kendini sınırlayan bulaşıcı bir hastalıktır. Hastalık genel olarak ateş ve bölgesel granülatöz lenfadenopati ile karakterize olmakla birlikte %5-10 oranında sistemik bir hastalık olarak ortaya çıkıp çeşitli hastalıklara yol açabilmektedir. 31 yaşında sağlıklı kadın hasta, sağ yan ağrısı şikayetiyle dahiliye polikliniğine başvurdu. Üriner sistem USG'sinde sağ böbrekte 4x3 cm'lik kistik kitle saptanması üzerine üroloji kliniğine yönlendirildi. Hastanın özgeçmişinde 3 ay önceki kedi ısırığı dışında bulgu yoktu. Radyolojik değerlendirmelerde sağ böbrekte Bosniak tip 3 kist sınıflaması ile renal hücreli karsinom (RHK) şüphesi olduğu görüldü. Sağlık durumunun bildirilmesi üzerine hastaya laparoskopik parsiyel nefrektomi uygulandı. Sistemik KTH'de sistemik inflamatuvar semptomların eşlik ettiği karaciğer ve dalakta çoklu apseler ve her iki böbrekte mikroabseler daha önce bildirilmişti. Ancak bildiğimiz kadarıyla bu vaka literatürde sistemik inflamatuvar semptomlar göstermeden bu büyüklükte izole böbrek tutulumu gösteren ilk *Bartonella henselae* vakasıdır.

**Anahtar kelimeler:** *Bartonella henselae*, kedi tırmağı hastalığı, böbrek apsesi, parsiyel nefrektomi



**Figure 1.** Abdominal MRI shows a 47x37 mm mass in the middle pole of the left kidney and several lymphadenopathies in the paracaval region, the largest of which is 15x10 mm in size



**Figure 2.** In the histopathological evaluation of the lesion, there were star-shaped necrotizing granuloma structures with neutrophils in the middle (forming microabscess formation), but no neoplastic formation was observed. No staining was observed with Ehrlich-Ziehl-Neelsen applied histochemically A: Star-shaped granuloma structures are observed (arrows) (H&E x40), B: Granuloma structures surrounded by epithelioid histiocytes (long arrows) with necrosis (asterisk) and neutrophils (short arrows) in the middle are observed at higher magnification (H&E x400)

## Introduction

Cat scratch disease (CSD) is a self-limiting infectious disease that develops after a cat bite or scratch, caused by the Gram-negative bacillus *Bartonella henselae* [1]. It is seen in children, young adults, patients with compromised immune systems, and rarely in the elderly [2]. The disease is generally characterized by fever and regional granulomatous lymphadenopathy, but it can occur as a systemic disease in 5-10% of cases and lead to various diseases [3]. In systemic CSD, all systemic organs, especially the liver and spleen, can be affected along with long-term fever [4].

There is no gold standard method for the diagnosis of the disease. However, diagnostic criteria have been proposed by Margileth as follows: history of contact with cats; negative Mantoux, interferon gamma releasing assay tests, or serologies for other agents that may cause abscesses; *B. henselae* observed by positive polymerase chain reaction (PCR) test and imaging in spleen and liver lesions; enzyme immunoassay (EIA) or immunofluorescence (IFA) positive with a 4-fold increase in titer between the acute phase and convalescence or a single titer  $\geq 1:64$ ; Histopathological examination showing granulomatous inflammation suggestive of systemic CSD. The presence of at least 3 of these 5 criteria confirms systemic CSD [5].

Because cat scratch disease is often a self-limiting disease, initiation of antibiotic therapy is controversial. However, in prolonged cases of the disease and systemic cat scratch disease, single or combination antibiotic agents such as gentamicin, trimethoprim/sulfamethoxazole, rifampicin, ciprofloxacin, azithromycin tetracycline are used [3]. It has also been reported that surgical treatment is required for abscesses of internal organs [6].

In this case report, we aimed to emphasize the importance of detailed patient history and a multidisciplinary approach in the diagnosis and treatment of patients despite advanced imaging methods in patients with suspected renal cancer.

## Case

A previously healthy 31-year-old Turkish woman applied to the internal medicine clinic with right side pain. The patient was referred to the urology clinic after a urinary system USG revealed a 4x3cm cystic mass in the right kidney. The patient was admitted to the urology service and laboratory tests and radiological imaging methods were requested. The patient had no active complaints other than nonspecific, dull, intermittent, and not very severe right side pain that had been present for approximately 2 months. The physical examination was normal. No abnormalities were observed in hemogram and blood biochemistry. The patient had a history of being bitten by a cat approximately 3 months ago. Apart from this, there was no history of trauma, chronic disease or regular use of medication in his family history. Urinalysis revealed leukocyte count as 118 and erythrocyte count as 20.

The mass was evaluated using contrast-enhanced cross-sectional imaging methods. In the magnetic resonance imaging (MRI) sections taken, a mass lesion image of 47x37 mm in size, exophytic extension, with a cystic component in the center, restricting diffusion, containing heterogeneous contrast in the postcontrast series, and extending towards the lower pole of the kidney was observed in the middle zone of the right kidney (Bosniak type 3) (Figure 1). Several lymph nodes, the largest of which was 15x10 mm in size, were observed in the paracaval distance in the medial neighborhood of the right kidney. No pathology was detected in any other intra-abdominal organs on MRI.

According to the results of the evaluations, we planned a laparoscopic partial nephrectomy for the patient. Under general anesthesia, in the right lumbar position, the mass was incised and excised all around, including some intact kidney tissue. The removed pathology material was sent to histology (Figure 2). In the postoperative period, blood values and vital signs remained

normal and no surgery-related complications developed. The transurethral catheter was removed on postoperative day 1, and the drain in the lodge was removed on day 2.

In the histopathological evaluation of the lesion, star-shaped necrotizing granuloma structures containing neutrophils in the center and causing microabscess formation were observed. However, no signs of neoplastic formation were detected. No positive result was obtained on Ehrlich-Ziehl-Neelsen staining, so systemic CSD was first considered.

Based on the pathology results, the patient was evaluated for Cat Scratch disease. It was determined that his cat had bitten him 3 months before he was admitted to the hospital. Considering that the patient might have cat-scratch disease, an infectious diseases clinic consultation was requested to exclude other diseases that could cause granulomatous abscess in the kidney. In the laboratory tests of the evaluations made by the infectious diseases clinic, CRP-13.25 mg/l and sedimentation rate-40 mm/h were observed, and other laboratory tests were within normal reference ranges. The purified protein derivative test (PPD) and PCR test were evaluated as negative and no additional treatment recommendations were made.

A diagnosis of systemic CSD was made based on the fact that other causes of abscess were negative, the pathology result including the features of CSD, and the cat contact history met 3 of the criteria recommended by Margileth.

## Discussion

With the widespread use of imaging methods, the frequency of detection of renal masses has increased. Kidney masses can be seen as malignant or benign. Approximately 85-90% of malignant renal masses are renal cell carcinoma (RCC) [7]. RCC accounts for 2-3% of all malignant diseases in adults [8]. Surgery is the only curative treatment option for localized RCC [9]. There are some studies in the literature reporting that cystic renal mass pathology results are associated with infective pathologies. There are studies reporting that renal involvement of parasitic infections such as hydatid cyst may be confused with RCC and that treatment is planned with a preliminary diagnosis of RCC [10]. Again, some authors have reported that laparoscopic surgery can be applied in rare infectious cystic masses [11].

Radiological imaging of our patient was reported as Bosniak type 3 cyst. Bosniak type 3 renal cysts have a 50% malignant potential and are recommended to be managed just like RCC [9]. In this study, we performed laparoscopic partial nephrectomy in accordance with the European Association of Urology (EAU) guidelines on the patient who we thought had malignant potential and was reported as Bosniak type 3 cyst in imaging methods. No neoplastic formation was observed in the histological evaluation of the partial nephrectomy material sent. Systemic cat scratch disease was primarily considered due to necrosis and suppuration observed in the granuloma structures observed. Diagnosis was confirmed according to

Margileth criteria. When performing the etiological evaluation of masses detected in the kidney, it should be kept in mind that even if there is radiological suspicion of malignancy, infectious factors may be confused with the picture, as seen in our case. While taking the patient's anamnesis, it is necessary to include the history that may create an infectious predisposition within the scope of evaluation. In case of a positive infectious history, a multidisciplinary approach and joint evaluation with the infectious disease clinic will be important in clarifying the case.

## Conclusions

According to our literature knowledge, our case is the first case of cat scratch disease in which a mass was presented in the kidney and a partial nephrectomy was performed. While evaluating renal masses, considering infectious etiologies, although rare, in the differential diagnosis will contribute to the management process of the patient.

**Ethics Committee Approval:** N / A.

**Informed Consent:** An informed consent was obtained from the patient.

**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 – B.K., S.O.D., T.Y.; Design – B.K., S.O.D., T.Y.; Supervision – B.K., S.O.D., T.Y.; Resources – B.K., S.O.D., T.Y.; Materials – B.K., S.O.D., T.Y.; Data Collection and/or Processing – E.S.,Y.H.; Analysis and/or Interpretation – E.S.,Y.H.; Literature Search – B.K., S.O.D., T.Y.; Writing Manuscript – B.K., S.O.D., T.Y.; Critical Review – E.S.,Y.H.

**Conflict of Interest:** The author declares that there was no conflict of interest.

**Financial Disclosure:** The authors have declared that they did not receive any financial support for the realization of this study.

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# Importance of Genital Examination: The Case of Overlooked Testicular Torsion

## Genital Muayenenin Önemi: Gözden Kaçan Testis Torsiyonu Olgusu

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**Cite as:** Yalçın K, Köllükçü E, Fırat F. Importance of genital examination: The case of overlooked testicular torsion. Grand J Urol 2024;4(2):67-9

**Submission date:** 28 February 2024 **Acceptance date:** 04 May 2024 **Online first:** 09 May 2024 **Publication date:** 20 May 2024

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### Abstract

Testicular torsion is one of the most important pathologies among the genitourinary emergencies. Orchiectomy may be necessary in delayed cases. Our 2-year-old patient was hospitalized in an external center for 3 days due to abdominal and groin pain, nausea and vomiting. After discharge, he was brought to our clinic because of swelling and redness of the left scrotum which was noticed by his family. Abdominal examination was unremarkable except tenderness in the groin, swelling and hyperemia of the left scrotum, and painful and edematous left testicle on palpation. Pulsating color filling and blood flow were not observed during color Doppler US of the testicle. The patient was taken to emergency surgery with a preliminary diagnosis of the torsion of the left testicle. The patient underwent left orchiectomy because of intraoperative detection of a black necrotized testicle due to referral to our urology clinic after a delay of more than 72 hours following the onset of the incident. For a male patient applying with a stomach ache, testicular torsion should be considered as differential diagnosis and a complete physical examination, including the genital area, should be performed.

**Keywords:** testicular torsion, abdominal examination, child

### Özet

Testis torsiyonu genitoüriner aciller arasında en önemli patolojilerden biridir. Gecikmiş olgularda orşiektomi gerekli olabilir. İki yaşındaki olgumuz karın ve kasık ağrısı, bulantı ve kusma nedeniyle 3 gün dış merkezde yatarak tedavi görmüş. Taburcu olduktan sonra ailesi tarafından fark edilen sol skrotumda şişlik ve kızarıklık nedeniyle kliniğimize getirildi. Karın muayenesinde kasıklarda hassasiyet, sol skrotumda şişlik ve hiperemi ve palpasyonda ağrılı ve ödemli sol testis dışında özellik yoktu. Testisin renkli Doppler US'sinde pulsasyonlu renkli dolmuş ve kan akımı gözlenmedi. Hasta sol testis torsiyonu ön tanısı ile acil ameliyata alındı. Olayın başlangıcından 72 saatten fazla bir süre geçtikten sonra üroloji kliniğimize sevk edilmesi nedeniyle intraoperatif olarak siyah nekrotize testis tespit edilmesi nedeniyle hastaya sol orşiektomi uygulandı. Karın ağrısı ile başvuran bir erkek hastada ayırıcı tanı olarak testis torsiyonu düşünülmeli ve genital bölge de dahil olmak üzere tam bir fizik muayene yapılmalıdır.

**Anahtar kelimeler:** testis torsiyonu, karın muayenesi, çocuk

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**Figure 1.** Intraoperative view of testicular torsion



**Figure 2.** Torsioned testicle with orchietomy

## Introduction

Stomach ache does not usually require surgical intervention, and it may be felt secondary to disorders associated with extra-abdominal organs [1,2]. Testicular torsion is an emergency situation that causes severe scrotal pain [1]. Torsion of the spermatic cord is a rare disease often seen in adolescent males. It is seen in 1/4000 of the male population under the age of 25, but this rate is estimated to be below the actual frequency of testicular torsion. While sudden scrotal pain concludes classical clinical manifestations of the spermatic cord torsion, pain may be less severe and the set up may be slower in some of the children. In addition to scrotal pain, increase in scrotal volume, scrotal rash, pain in the lower quadrant of the abdomen, nausea and vomiting may accompany the clinical picture [3].

In this study we present a 2-year-old case with abdominal pain that was treated as an inpatient at an external center but after his discharge his parents noticed swelling and rash of the left scrotum. Then he was operated with preliminary diagnosis of testicular torsion and his severely impaired testis was removed. Presentation of this case conveys importance in that it emphasizes the significance of a full physical examination including the genital area in patients manifesting with stomach ache.

## Case

The patient treated as an inpatient at an external center with a stomach ache, nausea and vomiting 3 days before his application to our clinic was brought to our clinic upon his parents' noticed swelling and rash in the left scrotum. Abdominal examination of this 2-year-old male patient with no history of trauma was unremarkable except for mild tenderness felt on the groin. His left scrotum was swollen and hyperemic and the left testicle was painful and edematous on palpation. Emergency color Doppler ultrasonography revealed absence of left testicular blood flow. Then the patient was urgently operated. A black necrotized testicular tissue was detected during the surgical procedure (**Figure 1**) and the patient underwent orchietomy upon more than 72 hours after the incident (**Figure 2**). Intact right testicle wasm fixated to the scrotum. Images were used in the case report after signed permission from the patient's family was obtained.

## Discussion

Historically, hemiscrotal or testicle pain have been the most common symptom of testicular torsion. However in our study, testicular torsion emerging with a stomach ache without scrotal pain is remarkable in a way that it looks alike some of the intra-abdominal diseases such as appendicitis, gastroenteritis, peritonit but can be distinguished from them based on examination findings of genital area and scrotal color Doppler US. Since these patients are frequently evaluated by the doctors who have little knowledge about the specific symptoms of the testicular torsion, and rarely examine external genitalia often delaying the diagnosis.

Although etiology of the stomach ache in men with testicular torsion has still not known well, the probable causes of stomach ache in cases with testicular torsion can be listed as follows: (a) Anterior aspect of the scrotum are innervated by branches coming from L1, and posterior aspect by nerves stemming from S2 and S3. Besides that, the testicle is innervated by branches derived from spinal segments of T10 and T11 and the testicular pain can spread to abdominal organs commonly innervated by nerves coming from adjacent segments of the spine; (b) Intact, healthy testicles have a rich neural network, however probably some congenital testicular abnormalities in patients with testicular torsion may induce stomach ache; (c) The twisted spermatic cord evokes peritoneal response, and pushes it upward provoking stomach ache; (d) Stretched cremaster muscle pulls and stimulates the peritoneum [4].

Many researchers have focused on atypical clinical manifestations of the testicular torsion in children and adolescents. Anderson et al. [5] stated that 134 of 597 patients applied with a stomach ache that preceded and sometimes felt more severely than scrotal pain, and 29 of these patients applied only with stomach ache. While Mellick et al. [6] reported a 6-year-old boy who applied with an isolated stomach ache, Pogorelić et al. [4] stated in their study that 17 of the 84 patients with testicular torsion applied with a stomach ache, Mäkelä et al. [7] stated that 7 of the 100 patients with testicular torsion suffered from stomach ache. Gaither et al. [8] found out that 16 patients applied only with a stomach ache after analyzing malpractice cases of testicular torsion among court appeals from 1985 to 2015. Our case underwent inpatient treatment due to stomach ache, nausea



and vomiting persisting for 3 days and the diagnosis of testicular torsion is delayed.

The diagnosis of testicular torsion can be priorly done with physical examination. The examination of the external genitalia can mostly reveal the presence of scrotal swelling and erythema, testicles sensitive to palpation and loss of cremasteric reflex. Santos et al. [9] suggested compulsory genital examination of the boys presenting with stomach ache.

Color Doppler US is routinely used to assess testicular blood flow. Indeed, color Doppler US can properly, and non-invasively demonstrate arterial blood flow and venous drainage in the center of the testicle. Mellick et al. [6] stated that color Doppler US is a reliable method to validate the diagnosis of testicular torsion.

Testicular torsion can cause severe testicular ischemia. When testicular torsion occurred, priorly venous blood flow is blocked, then testicular and epididymal edema become manifest. If this blockage is not eliminated on time, the existing swelling continues to grow impairing blood flow to the testicular arteries. Fabiani et al. [10] believed that the time lapsed between the onset of symptoms and exploratory surgery represented the only prognostic factor for testicular viability. Testicular viability is negatively correlated with ischemia time. It is believed that the best time frame for successful testicular recovery is a time interval of less than 6 hours between the incident and surgical intervention [6]. If the torsion is managed within 6, 6-12 or 12-24 hours after onset of symptoms, 90-100%, 20-50%, and only 10% of the affected testicles can be saved, respectively. [4,6,7,11]. In our study the ischemia time was over 72 hours. When we compared the duration of ischemia with the published reports mentioned above, our results were consistent with the previous literature findings.

## Conclusion

In a male patient applying with a stomach ache, testicular torsion should be considered as differential diagnosis and a complete physical examination, including the genital area, should be performed. A simple genital examination may provide early diagnosis, treatment and prevent organ loss.

**Ethics Committee Approval:** N / A.

**Informed Consent:** An informed consent was obtained from the patient.

**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 – K.Y., E.K., F.F.; Design – K.Y., E.K., F.F., V. N.; Supervision – K.Y., E.K., F.F.; Resources – K.Y., E.K., F.F.; Materials – K.Y., E.K., F.F.; Data Collection and/or Processing – K.Y., E.K., F.F.; Analysis and/or Interpretation – K.Y., E.K., F.F.; Literature Search – K.Y., E.K., F.F.; Writing Manuscript – K.Y., E.K., F.F.; Critical Review – K.Y., E.K., F.F.

**Conflict of Interest:** The author declares that there was no conflict of interest.

**Financial Disclosure:** The author declares that this study received no financial support.

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