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Endoüroloji Bülteni Editör Kurulu olarak, üroloji camiasının bilimsel birikimine katkı sunmaya ve yenilikçi araştırmaları akademik dünyayla buluşturmaya kararlılıkla devam ediyoruz. Temel vizyonumuz, dergimizde yer alan çalışmaların sadece ulusal değil, uluslararası platformlarda da karşılık bulmasını sağlamak ve dergimizin küresel indekslerdeki yerini her geçen gün daha da sağlamlaştırmaktır.

Yılın bu yeni sayısında, endoüroloji ve genel üroloji pratiğini yakından ilgilendiren, titizlikle seçilmiş altı özgün araştırma makalesi ve literatüre önemli bir not düşen bir olgu sunumunu sizlerle paylaşıyoruz. Bu sayıdaki içeriklerimiz, teknolojik yeniliklerden klinik validasyon çalışmalarına kadar geniş bir yelpazeyi kapsamaktadır:

Taş Hastalıkları ve Teknoloji: Üreteroskopi sonrası taşsızlık öngörüsünde De Nunzio Nomogramı'nın eksternal validasyonu ve günümüzün en güncel konularından biri olan Yapay Zekâ (ChatGPT) ile Google'ın böbrek taşları konusundaki bilgi kalitesinin karşılaştırılması, akademik heyecanımızı artıran çalışmalar arasında yer alıyor.

Klinik Pratik ve Tanı: Mesane karsinoma in situ tanısında Storz Professional Image Enhancement System gibi ileri görüntüleme teknolojilerinin etkinliği ile birinci basamakta mikroskobik hematüri yönetiminin retrospektif analizi, tanısal süreçlerimize ışık tutuyor.

Hasta Psikolojisi ve Cerrahi Teknik: Üreteral stent çekimi sürecindeki anksiyete ve depresyon sıklığının incelenmesi hastalarımızın yaşam kalitesine odaklanırken; laparoskopik girişte Veress iğnesi ile açık teknik karşılaştırması cerrahi pratiğimizdeki temel tercihlerimizi sorgulatıyor.

Olgu Sunumu: Perkütan nefrostomi kateterinin nadir görülen düğümlenme komplikasyonu ve endoskopik çözümü, klinik tecrübe paylaşımı açısından sayımızın dikkat çeken bir diğer içeriğidir.

Akademik ve klinik anlamda rehber niteliği taşıyan bu çalışmaların, siz değerli okurlarımıza ve tüm bilim dünyasına faydalı olmasını temenni ediyoruz. Dergimizin tüm içeriklerine ve güncel duyurularına www.endourolojibulteni.com adresindeki web sitemiz üzerinden erişebilirsiniz. Dijitalleşen yayıncılık dünyasında, sitemiz aracılığıyla daha geniş bir kitleye ulaşmak en büyük motivasyon kaynağımızdır.

Bu sayının hazırlanmasında emeği geçen, değerli vakitlerini ve çalışmalarını bizimle paylaşan tüm yazarlarımıza, titiz değerlendirmeleriyle bilimsel kaliteyi en üstte tutan hakemlerimize ve yayın kurulumuza teşekkürlerimi sunarım.

Üroloji bilimini hep birlikte daha ileriye taşıyacağımız yeni sayılarda buluşmak dileğiyle.

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Original Article
Özgün Araştırma

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Frequency of Anxiety and Depression in Urolithiasis Patients Undergoing Ureteral Stent Removal

Üreteral Stent Çekimi Yapılan Ürolitiyazis Hastalarında Anksiyete ve Depresyon Sıklığı

Abuzer Öztürk[1], **Hüseyin Sosa**[2], **İbrahim Karaca**[2], **İsmail Emre Ergin**[3], **Aydemir Asdemir**[2]

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ABSTRACT

Objective: Cystoscopy-guided ureteral stent removal is a standard procedure and can cause significant psychological distress in patients. In this study, we evaluated the prevalence and severity of anxiety and depression in patients with urolithiasis undergoing ureteral stent removal.

Material and Methods: This prospective observational study included 50 consecutive patients undergoing cystoscopic ureteral stent removal after endoscopic stone treatment. Anxiety and depression were assessed using Visual Analog Scale for Anxiety (VAS-A), Amsterdam Preoperative Anxiety and Information Scale (APAIS), Beck Depression Scale (BDS), and Beck Anxiety Scale (BAS).

Results: The cohort comprised 47 males and 3 females (mean age 53.2 ± 15.25 years). All patients experienced pre-procedure anxiety (VAS-A > 0, mean 3.52 ± 1.94). Mean APAIS anxiety and knowledge scores were 6.94 ± 2.44 and 4.28 ± 1.75, respectively. Patients with APAIS knowledge scores >4 demonstrated significantly higher information-seeking behavior ($p < 0.05$). Despite universal anxiety presence, BAS scores remained in the low range for all patients.

Conclusions: Universal pre-procedure anxiety occurs in patients undergoing ureteral stent removal, though severity remains generally low. Enhanced patient education and information provision may reduce psychological distress.

Keywords: anxiety, stent, ureteroscopy, quality of life

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ÖZET

Amaç: Sistoskopi rehberliğinde üreteral stent çekimi standart bir işlem olup hastalarda önemli psikolojik strese neden olabilir. Bu çalışmada, üreteral stent çekimi yapılan ürolitiyazis hastalarında anksiyete ve depresyon prevalansını ve şiddetini değerlendirdik.

Gereç ve Yöntemler: Bu prospektif gözlemsel çalışmaya endoskopik taş tedavisi sonrası sistoskopik üreteral stent çekimi yapılan 50 ardışık hasta dahil edildi. Anksiyete ve depresyon, Görsel Analog Anksiyete Skalası (VAS-A), Amsterdam Preoperatif Anksiyete ve Bilgi Skalası (APAIS), Beck Depresyon Skalası (BDS) ve Beck Anksiyete Skalası (BAS) kullanılarak değerlendirildi.

Bulgular: Kohort 47 erkek ve 3 kadından oluşuyordu (ortalama yaş 53,2 ± 15,25 yıl). Tüm hastalar (%100) işlem öncesi anksiyete yaşadı (VAS-A>0, ortalama 3,52 ± 1,94). Ortalama APAIS anksiyete ve bilgi skorları sırasıyla 6,94 ± 2,44 ve 4,28 ± 1,75 idi. APAIS bilgi skoru >4 olan hastalar anlamlı derecede yüksek bilgi arama davranışı gösterdi ($p<0,05$). Genel olarak anksiyete varlığına rağmen, BAS skorları tüm hastalarda düşük aralıkta kaldı.

Sonuç: Üreteral stent çekimi yapılan hastalarda işlem öncesi anksiyete görülmekle birlikte, şiddet genellikle düşük kalır. Geliştirilmiş hasta eğitimi ve bilgi sağlanması psikolojik stresi azaltabilir.

Anahtar Kelimeler: anksiyete, stent, üreteroskopi, yaşam kalitesi

GİRİŞ

Anksiyete (Kaygı), bireyin tanımlanmamış bir tehlike veya bilinmeyen bir tehdit nedeniyle kendini güvende hissetmediğinde ortaya çıkan korku, endişe, huzursuzluk ve sinirlilik hali olarak tanımlanmaktadır. Çalışmalar, hastaların invaziv işlemler ve cerrahi müdahaleler öncesi %60-80 gibi yüksek oranlarda anksiyete hissettiklerini göstermiştir (1). Hastaların anksiyete düzeyleri; önceki deneyimler, hastaneye yatış türü, cinsiyet, yaş ve gerçekleştirilecek cerrahi müdahale veya girişim türü dahil olmak üzere çeşitli faktörlerden etkilenir (2). Cerrahi müdahale veya invaziv girişimlerde artan anksiyete düzeyi olumsuz psikolojik ve fizyolojik sonuçlara neden olabilir. Ayrıca yaşam kalitesini, iş motivasyonunu olumsuz etkileyebilir ve ameliyat sonrası ağrıda, analjezik tüketiminde, iyileşme sürecinde ve hastanede kalış süresinde artışa neden olabilir (3).

Üriner sistem taş hastalığı yaygın bir hastalık olup gelişmiş ülkelerde görülme sıklığı %11,3 ile %14,8 arasında değişmektedir (4). Türkiye'de ise yaygınlık %14,8 olarak bildirilmiştir (5). Üriner sistem taşları tedavi edildikten 1 yıl sonra %6,12 oranında 5 yıl sonra ise %34,71 oranında tekrarlamaktadır (6). Üriner sistem taş hastalarının tedavisinde uygulanan endoskopik taş cerrahileri sonrası taş parçaları, kan pıhtıları veya ödem nedeniyle tıkanıklık riskini en aza indirmek amacıyla üreteral stentler yerleştirilmektedir (7). Üreteral stent yerleştirilen hastaların yaklaşık %80'inde hayat kalitesini bozan üriner sistem semptomları ve ağrı görülmektedir (8). Endoskopik üreter taş tedavisi sonrası üriner sisteme yerleştirilen üreteral stentler genellikle 3 hafta içerisinde alınmaktadır. Üreteral stentler, genellikle sistoskop yardımıyla retrograd yolla çıkarılır (9). Ancak, sistoskopların sertliği ve çapı nedeniyle, çoğu hasta işlem sırasında analjeziye ve bazı hastalar derin sedasyona ihtiyaç duyar (9). Ağrılı ataklarla karakterize üriner sistem taş hastalığı ile anksiyete veya depresyon arasındaki ilişki de tanımlanmıştır (10). Biz de bu çalışmamızda üreteral stent çıkarılması uygulanan hastalarda anksiyete ve depresyon sıklığını değerlendirmeyi amaçladık.

GEREÇ VE YÖNTEMLER

Çalışma Dizaynı

Bu prospektif çalışma için Sivas Cumhuriyet Üniversitesi Klinik Araştırmalar Etik Kurulu'ndan onay alınmıştır. (Karar numarası: 2024/04-22, Tarih: 18.04.2024). Tüm katılımcılardan bilgilendirilmiş onam formu alınmıştır.

Çalışmamıza tek taraflı endoskopik üreter taşı tedavisi yapılan, cerrahi sonrası rezidü taş kalmayan ve cerrahi prosedür sonunda üreteral stent yerleştirilen 18 yaş üstü 80 yaş altı 50 hasta dahil edildi. Operasyon sonrası 3 mm ve daha küçük rezidü taş saptanması klinik olarak taşsızlık olarak kabul edildi ve stent çekilmesine karar verildi. Çift taraflı

üreteral stent yerleştirilen hastalar, operasyon sonrası rezidü taşı olan hastalar, üriner trakt cerrahisi geçirmiş hastalar, nörolojik veya psikiyatrik hastalık öyküsü olanlar ile önerilere ve takiplerine uymayan hastalar çalışma dışı bırakıldı. Ayrıca tekrarlayan taş öyküsü olan veya daha önce üreteral stent çıkarılması işlemi uygulanan hastalar çalışmaya dahil edilmedi. Ayrıntılı tıbbi ve fiziksel muayene üroloji bölümü tarafından değerlendirildi.

Hastaların genel özellikleri (yaş, cinsiyet, eğitim düzeyi, sigara, alkol kullanımı vb.) kaydedildi. Çalışmaya dahil edilen hastaların anksiyete düzeyini ölçmek için üreteral stent çekilmesi işleminden önce VAS-A (Görsel Analog Kaygı Ölçeği), Amsterdam Ameliyat Öncesi Anksiyete ve Bilgi Skoru (APAIS), Beck depresyon ve anksiyete skalalarının ölçümleri yapıldı.

Ölçüm Anketleri

Amsterdam Preoperatif Anksiyete ve Bilgi Skoru; 1996'da Hollanda'daki Moermann grubu tarafından geliştirildi. Preoperatif anksiyetenin değerlendirilmesinde kullanılan testlerden biridir. Endişe kaynağı bu testte cerrahiden duyulan, anesteziden duyulan endişe veya bilgi eksikliğinin yarattığı endişe olarak üçe ayrılmıştır. Anksiyeteyi değerlendirmek üzere bu üç kaynağa yönelik 6 ifadeyi içermektedir. Anketi objektifleştirmek üzere her ifadeye şiddete göre 5'li Likert ölçeğine dayanan sayısal değer verilmektedir; 1-5 arası değişen bu değerler; 1 = hiç, 2 = hafif, 3 = orta, 4 = şiddetli, 5 = aşırı şiddetliyi ifade etmektedir. Anestezi anksiyetesi 1 ve 2. sorulara, cerrahi anksiyete 4 ve 5. sorulara verilen puanlar ile toplam anksiyete puanı ise her ikisi toplanarak hesaplanır. Anestezi ve cerrahi ile ilgili bilgi edinme isteğini dile getiren ifadeler ise 3 ve 6. sorulardır. Anksiyete puanının 13'ün üzerinde olması ve bilgi edinme puanının 4'ün üzerinde olması anket açısından anlamlı kabul edilmektedir. En düşük puan 6, en yüksek puan ise 30'dur (11). Ülkemizde ilk defa Aykent ve arkadaşları tarafından Türkçe'ye çevrilerek kullanılmıştır (12). Bu araştırmada APAIS Cronbach alfa 0,86, alt boyutları olan anestezi ile ilgili anksiyete 0,88, cerrahi ile ilgili anksiyete 0,82 ve bilgi edinme isteği 0,68 olarak belirlendi.

Beck anksiyete skalası (BAS), Aaron T. Beck tarafından geliştirilen bir ölçektir. 21 sorudan oluşur. Uluslararası geçerliliği olan ve anksiyete düzeyini ölçmek için kullanılan bir testtir (13). Türkçe geçerlilik ve güvenilirliği Ulusoy ve arkadaşları (1998) tarafından yapılmış, Cronbach alfa 0,93 olarak bulunmuştur. Bireyin anksiyete şiddetini ölçmeyi amaçlayan 21 sorudan oluşan, 4'lü Likert tipte bir ölçektir. Her soru 0-3 arasında puanlanmaktadır. Ölçekten alınan toplam puan, 8-15 puan arası ise düşük; 16-25 puan arası ise orta, 26-63 puan arası ise yüksek düzeyde anksiyeteyi göstermektedir (14).

Beck depresyon skalası (BDS) ise, 0 ila 63 arasında değişen bir puan elde etmek için toplam 21 sorudan oluşan bir ankettir. Bilişsel (11 soru), somatik (5 soru), duygusal (2 soru), davranışları (2 soru), somatik kişilerarası belirtileri (1 soru) ölçer. Toplam puanı puanlara göre gruplara ayırdık. (0-9 = hiç/minimal depresyon, 10-18 = hafif depresyon, 19-29 = orta depresyon ve 30-63 = şiddetli depresyon). Türk toplumunda geçerlilik ve güvenilirlik çalışması Hisli tarafından test edilmiştir (15).

Görsel analog skala nicel olarak ölçülemeyen bazı değerlerin sayısal değere çevrilmesinde kullanılmaktadır. Hastalara anksiyete seviyesini değerlendirmek için VAS-A uygulandı (0 kaygı yok, 10 en yüksek kaygı seviyesi) (16).

Cerrahi Prosedür

Tüm stent çekimleri ameliyathanede dorsolitotomi pozisyonunda uygulandı. Tüm sistoskopik üreteral stent çıkarma işlemleri aynı cerrah tarafından gerçekleştirdi. İşlem sırasında 17 Fr Karl Storz rijit sistoskop ve yabancı cisim forsepsi kullanıldı. İşlemden önce üretraya %2 lidokain jel uygulandı. 5-10 dakika sonra sistoskop ile üretral yolla mesaneye girilip üreteral stent yabancı cisim forsepsi kullanılarak tam ve eksiksiz olarak çıkarıldı. Ameliyathanede elektrokardiyografi, invaziv olmayan kan basıncı takibi ve nabız oksimetre takibi yapıldı. İşlem sırasında ve işlemden sonra gündüz bakım ünitesinde vital bulgular kontrol edildi. Oksijen desatürasyonu, otonomik hareket, aritmi, enjeksiyon ağrısı ve flebit gibi komplikasyonların varlığı da incelendi.

Anestezi Tekniği

Sedasyon, kas gevşemesi olmadan 2 mg/kg propofol ile indüklendi ve 10 mg/kg/saat propofol kullanılarak sürdürüldü. İndüksiyondan sonra, anestezist bir yüz maskesi taktı ve %100 O_2 ile ventilasyona yardımcı oldu. İşlemden sonra, hasta gündüz bakım ünitesine transfer edildi ve normal zaman ve yer yönelimini ve normal aralıkta hayati belirtileri gösterdiğinde taburcu edildi.

İstatistiksel Analiz

İstatistiksel analizde SPSS (V22.0) programı kullanıldı. Sürekli değişkenler için normallik varsayımı Shapiro-Wilk testi ile değerlendirildi. Normal dağılım gösteren sürekli değişkenler ortalama ± standart sapma (%95 güven aralığı [GA]) olarak, normal dağılmayan veriler ise medyan (çeyrekler arası aralık (IQR) olarak rapor edildi. Gruplar arası karşılaştırmalarda, normal dağılım gösteren bağımsız değişkenler için bağımsız örneklem Student t-testi, eşleştirilmiş ölçümler için eşleştirilmiş t-testi kullanıldı ve sonuçlar ortalama farkı ile birlikte 95% GA verilerek sunuldu. Normal dağılım göstermeyen sürekli değişkenlerin karşılaştırılmasında Mann-Whitney U testi kullanıldı ve sonuçlar medyan farkı (95% GA, bootstrap yöntemi ile) şeklinde raporlandı. Kategorik değişkenler sayı ve yüzde (%) ile ifade edildi, gruplar arası karşılaştırmalarda Ki-kare testi veya Fisher'in kesin testi kullanıldı. APAIS bilgi puanlarının farklı gruplara göre karşılaştırılmasında tek yönlü varyans analizi (ANOVA), anlamlı farklılık saptandığında ise Tukey HSD post-hoc testi uygulandı. Normal dağılım göstermeyen bağımsız değişkenler arasındaki ilişkiler için Spearman korelasyon katsayısı (ρ) ve 95% GA hesaplandı. Ölçek geçerlik ve güvenilirlik çalışmalarında faktör analizi yapabilmek için örneklemin ölçek madde sayısının en az 5-10 katı olması önerilmektedir (17). Bu önerilere dayanarak çalışmaya 50 hasta dahil edildi. İstatistiksel anlamlılık $p < 0,05$ olarak kabul edildi.

BULGULAR

Çalışmaya 50 hasta dahil edildi. Hastalar 47 erkek ve 3 kadından oluşmaktaydı ve yaş ortalamaları 53,2 ± 15,3 (22-80 yıl) idi. Ortalama vücut kitle indeksi 28,5 ± 4,5 (19,5- 41,3) kg/m^2 idi. Hastaların medeni durumu 43 (%86) hasta evli ve 7 (%14) hasta bekardı. Katılımcıların eğitim düzeyi üniversite mezunu 12 (%24), lise mezunu 22 (%44), ilkokul mezunu 14 (%28) hasta ve eğitim düzeyi olmayan 2 (%4) hasta olarak gruplandırıldı. Çalışma durumu olarak çalışmayan 5 (%10), çalışan 25 (%50), öğrenci 2 (%4) ve emekli 18 (%36) hasta bulunmaktaydı. Katılımcıların 4'ü (%8) alkol, 23'ü (%46) ise sigara kullanmaktaydı. Hastalara ait demografik veriler Tablo 1'de gösterilmektedir.

APAIS skorlarının ortalama puanları ve standart sapması Tablo-2'de verilmiştir. Tüm hastaların ortalama puanları 11,2 ± 3,9 idi. Anestezi ve cerrahi skorlarının ortalama puanları sırasıyla 5,3 ± 2,1 ve 5,9 ± 2,4 olarak hesaplandı. APAIS puanlarının anksiyete ve bilgi bileşenleri hem anestezi hem de cerrahi için puanlara ayrılmıştır. Ortalama toplam anksiyete skoru (APAISa) ve bilgi skoru (APAISk) sırasıyla 6,9 ± 2,4 ve 4,3 ± 1,8 idi.

Hastaların Beck anksiyete ve depresyon skalalarının ortalaması sırasıyla 4,5 ± 4,8 ve 9,5 ± 9,2 olarak bulunmuştur. Beck anksiyete ölçeğine göre tüm hastalarımızda düşük düzeyde anksiyete bulunmuştur. Beck depresyon ölçeğine göre ise hastalarımızın %62'sinde minimal, %18'inde hafif, %18'inde orta ve %2'sinde şiddetli depresyon saptanmıştır. Ameliyat öncesi ortalama anksiyete (VAS-A) 3,5 ± 1,9 idi (Tablo 2). Ortalama Beck depresyon ve anksiyete puanları Şekil 1'te gösterilmiştir.

Tüm yaş, medeni durum ve sigara içiciliğine göre kendi içinde karşılaştırıldı ancak istatistiksel olarak anlamlı farklılık bulunamadı (Tablo 3, 4, 5) ($p > 0,05$).

Tablo 6'ye göre, BAS ile BDS arasında istatistiksek olarak anlamlı ($p < 0,05$) ve pozitif yönde; VAS-A ile BAS arasında istatistiksek olarak anlamlı ($p < 0,05$) ve pozitif yönde ve VAS-A ile BDS arasında istatistiksek olarak anlamlı ($p < 0,05$) ve pozitif yönde korelasyon tespit edilmiştir.

Tablo 1. Hastaların demografik özellikleri

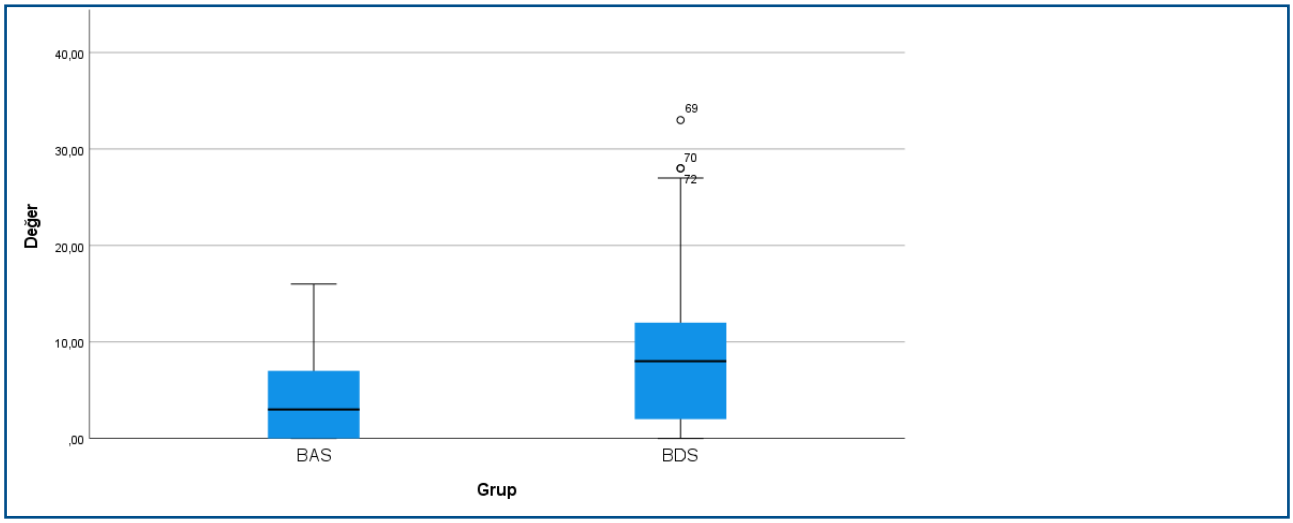
Özellik	
Yaş (yıl) (Ort ± Std ht)	53,2 ± 15,3
Cinsiyet (Erkek/Kadın)	47/3
Boy (cm) (Ort ± Std ht)	170,1 ± 6,1
Ağırlık (kg) (Ort ± Std ht)	82,6 ± 14,2
VKİ (kg/m^2) (Ort ± Std ht)	28,5 ± 4,5
Medeni durum Evli Bekar	 43 (%86) 7 (%14)
Eğitim seviyesi Yok İlköğretim Lise Üniversite	 2 (%4) 14 (%28) 22 (%44) 12 (%24)
Meslek İşsiz Çalışan Öğrenci Emekli	 5 (%10) 25 (%50) 2 (%4) 18 (%36)
Alkol Var Yok	 4 (%8) 46 (%92)
Sigara Var Yok Toplam	 23 (%46) 27 (%54) 50

Std ht: Standard hata, VKİ: Vücut Kitle İndeksi

Tablo 2. Ölçeklerin ortalama puan değerleri

	Puan	%95 Güven Aralığı
Anestezi skoru	5,3 ± 2,1	4,7 – 5,9
Cerrahi skoru	5,9 ± 2,4	5,2 – 6,6
Anksiyete skoru (APAISa)	6,9 ± 2,4	6,2 – 7,6
Bilgi skoru (APAISk)	4,3 ± 1,8	3,8 – 4,8
APAIS	11,2 ± 3,9	10,1 – 12,3
Beck Anksiyete Skalası	4,5 ± 4,8	3,1 – 5,9
Beck Depresyon Skalası	9,5 ± 9,2	6,9 – 12,1
VAS-A	3,5 ± 1,9	3,0 – 4,0

APAIS: Amsterdam Preoperatif Anksiyete ve Bilgi Skoru, VAS-A: Görsel Analog Kaygı Ölçeği



Şekil 1. Beck Anksiyete Skalası ve Beck Depresyon Skalası

BAS: Beck Anksiyete Skalası, BDS: Beck Depresyon Skalası.

Tablo 3. Yaş grupları ile ölçekler arasındaki ilişki

	50 yaş altı (n:23)	50 yaş ve üstü (n:27)	p değeri
	Medyan (IQR)	Medyan (IQR)	
Anestezi skoru	5(4)	5(4)	0,888
Cerrahi skoru	6(4)	6(2)	0,818
Anksiyete skoru (APAISa)	7(5)	7(2)	0,834
Bilgi skoru (APAISk)	5(3)	4(3)	0,488
APAIS	12(7)	11(4)	0,684
Beck Anksiyete Skalası	3(5)	3(9)	0,827
Beck Depresyon Skalası	8(8)	8(19)	0,546
VAS-A	3(2)	3(2)	0,764

APAIS: Amsterdam Preoperatif Anksiyete ve Bilgi Skoru, VAS-A: Görsel Analog Kaygı Ölçeği

**p < 0,05

Tablo 4. Medeni durum ile ölçekler arasındaki ilişki

	Bekar	Evli	
	Medyan (IQR)	Medyan (IQR)	p değeri
Anestezi skoru	3(2)	5(4)	0,076
Cerrahi skoru	3(4)	6(3)	0,164
Anksiyete skoru (APAISa)	4(3)	7(3)	0,066
Bilgi skoru (APAISk)	2(3)	5(3)	0,109
APAIS	6(7)	11(5)	0,076
Beck Anksiyete Skalası	2(6)	3(9)	0,372
Beck Depresyon Skalası	2(9)	8(13)	0,155
VAS-A	3(2)	3(2)	0,578

APAIS: Amsterdam Preoperatif Anksiyete ve Bilgi Skoru, VAS-A: Görsel Analog Kaygı Ölçeği

**p < 0,05

Tablo 5. Sigara ile ölçekler arasındaki ilişki

	Sigara		p değeri
	Yok	Var	
	Medyan (IQR)	Medyan (IQR)	
Anestezi skoru	5(3)	5(3)	0,173
Cerrahi skoru	5(3)	6(5)	0,342
Anksiyete skoru (APAISa)	6(4)	7(5)	0,225
Bilgi skoru (APAISk)	4(4)	5(4)	0,269
APAIS	11(6)	12(7)	0,172
Beck Anksiyete Skalası	4(9)	2(6)	0,798
Beck Depresyon Skalası	7(12)	9(12)	0,597
VAS-A	3(3)	3(1)	0,812

Std ht: Standard hata, APAIS: Amsterdam Preoperatif Anksiyete ve Bilgi Skoru, VAS-A: Görsel Analog Kaygı Ölçeği

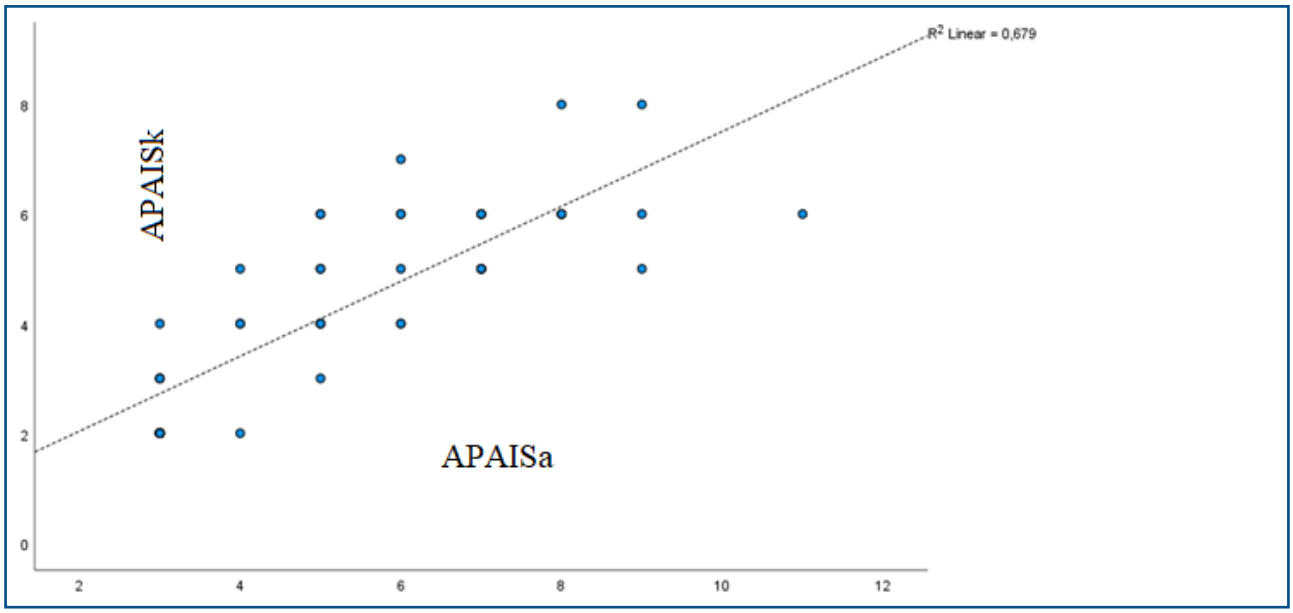
**p < 0,05

Tablo 6. BAS, BDS ve VAS-A arasındaki ikili korelasyon ilişkisi

		BAS	BDS	VAS-A
BAS	R	1,000		
	p değeri			
BDS	R	0,680**	1,000	
	p değeri	**<0,0001**		
VAS-A	R	0,462**	0,486**	1,000
	p değeri	**0,001**	**<0,0001**	

BAS: Beck Anksiyete Skalası, BDS: Beck Depresyon Skalası, VAS-A: Görsel Analog Kaygı Ölçeği

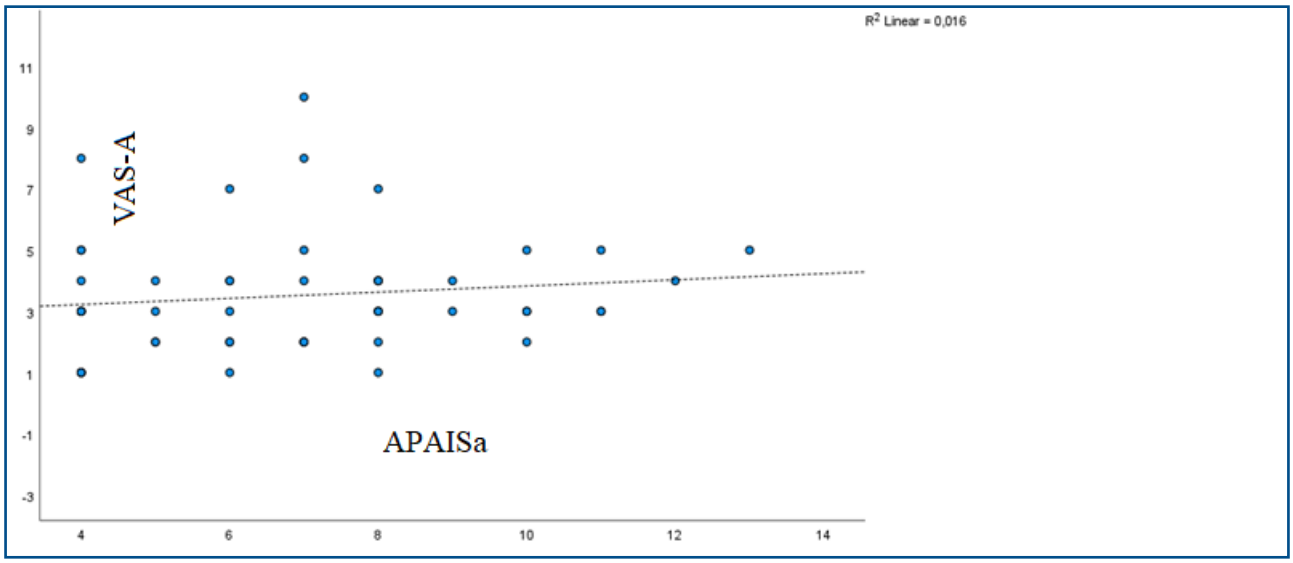
**p < 0,05



Şekil 2. APAISa ve APAISk arasındaki korelasyon

APAISa: Amsterdam Preoperatif Anksiyete ve Bilgi Skoru-Anksiyete, APAISk: Amsterdam Preoperatif Anksiyete ve Bilgi Skoru-Bilgi

Anksiyete düzeyi (APAISa) ve bilgi gereksinimi (APAISk) arasında pozitif ve istatistiksel olarak anlamlı korelasyon bulunmuştur (Şekil 2) ($p < 0,05$). VAS-A ve APAISa arasında istatistiksel olarak anlamlı korelasyon bulunamadı (Şekil 3) ($p = 0,180$).



Şekil 3. APAISa ile VAS-A arasındaki korelasyon

TARTIŞMA

Üreteroskop eşliğinde endoskopik üreter taş tedavisi, üreter taşlarını tedavi etmek için kullanılan en yaygın cerrahi tedavi yöntemidir (18). Vakaların çoğunda üreteral stent yerleştirilmesi endoskopik tedaviyi takip eder (19). Üreteral stentin sistoskop eşliğinde retrograd yolla çıkarılması ağrılı bir işlem olmakla birlikte işlem ile ilişkili anksiyete ve depresyon belirsizdir. Çalışmamız, üreteral stent çıkarımı yapılan hastalarda anksiyetenin evrensel olduğunu, hastaların %100' ünde bir miktar işlem öncesi anksiyete yaşandığını göstermektedir. Ancak anksiyete düzeyi genellikle düşük-orta düzeyde kalmış, 10 puanlık skalada ortalama VAS-A skorları 3,52 ± 1,94 olmuştur. Önemli olan, anksiyete yaygın olmasına rağmen depresyon oranlarının minimal olması, hastaların %80'inde belirgin depresif semptom göstermemesidir.

İşlem öncesi anksiyete bulgumuz, invaziv ürolojik işlemler geçiren hastalarda yüksek anksiyete oranları (%25-80) bildiren önceki çalışmalarla uyumludur (20). Kim ve ark. Koreli hastalarda stent çıkarımında benzer anksiyete düzeyleri bildirmiş, ortalama ağrı ve anksiyete skorları 3,4 ± 2,1 olarak rapor etmiştir (21). Ancak çalışmamız %100 anksiyete prevalansı göstermesi açısından benzersizdir, bu durum kültürel faktörleri veya hasta populasyonumuzda artmış farkındalığı yansıtıyor olabilir.

Çalışmamızda, işlem öncesi anksiyetenin değerlendirilmesinde APAIS skorlama sistemini kullandık. APAISa skoru 6,94 ± 2,44 iken APAISk skoru 4,28 ± 1,75 olarak hesaplandı. İşlem öncesi APAISa skoru ile APAISk skoru arasında pozitif bir korelasyon olduğu gösterildi. APAISk skorunun 4'ün üzerinde olması ölçek açısından anlamlı kabul edilmektedir. Sonuçlarımız, stent çıkarımı yapılan hastalarda rutin işlem öncesi anksiyete değerlendirmesi ve yönetiminin standart bakımın bir parçası olması gerektiğini göstermektedir. İşlem öncesi rutin anksiyete taraması, VAS-A skoru >6 olan hastalar için anksiyolitik premedikasyon açısından değerlendirilmesi, müzikoterapi uygulanması veya multimedya araçları ile yapılacak görsel eğitimlerin hastaların bilgi eksiklerini giderebileceğini düşünmekteyiz (22).

Endoskopik üreter taş tedavisi sonrasında üreteral stent yerleştirilen hastalarda stent çıkarılması işlemine bağlı ortaya çıkan anksiyete ve depresyon değerlerini değerlendirdiğimiz bu çalışmada, hastaların işlem öncesi anksiyete oranları

%100 (VAS-A > 0) olarak saptadık. Beck anksiyete ölçeğine göre tüm hastalarımızda düşük düzeyde anksiyete bulduk. Yapılan korelasyon analizlerinde VAS-A ve BDS arasında istatistiksel olarak anlamlı korelasyon gözlenirken anksiyete düzeyi (APAISa ve VAS-A) arasında istatistiksel olarak anlamlı korelasyon bulunamadı. Bunun ölçek farklılıklarına veya Türkçe geçerlilik ve güvenilirlik ile ilişkili olduğunu düşünmekteyiz.

Üriner sistem taş hastalığı olan bireylerde genel popülasyona göre daha yüksek derecede depresyon olduğu gösterilmiştir (23). Lien ve arkadaşları üriner sistem taş hastalığı ile 10 yıl takip edilen hastaların üriner sistem taş hastalığı olmayan hastalara göre %50 oranında daha fazla anksiyete ve %26 oranında daha fazla depresyon riski gösterdiğini bulmuşlardır (24). Taş hastalığının tekrarlayıcı özellikte olması ve kronikleşme durumuna sahip olması yaşam kalitesini olumsuz etkileyerek depresyon ve anksiyeteyi artırabilir. Bu yüzden tekrarlayan taş hastalığı olan hastaları veya daha önce üreteral stent çıkarılması işlemini deneyimleyen hastaları çalışma dışı bıraktık. Bu dışlama kriteri ile sadece üreteral stent çıkarılması işlemine bağlı olarak oluşan anksiyete ve depresyonu saptamaya çalıştık.

Çalışmamızda bazı kısıtlılıklar mevcuttu. Birincisi, tek merkezli çalışma olması nedeniyle, çalışmanın sonuçları tüm hastalara genellenebilirliği sınırlayabilir. İkincisi, küçük örneklem büyüklüğü (n = 50) ve ağırlıklı erkek populasyonu (%94) olması istatistiksel gücü kısıtlayabilir. Üçüncü olarak anksiyete sadece işlem öncesi değerlendirildi; longitudinal değerlendirme zaman içindeki anksiyete paternlerine dair bilgi sağlayabilirdi. Dördüncüsü, anksiyeteyi azaltmaya yönelik potansiyel müdahaleleri araştırmadık. Son olarak, Türk populasyonuna özgü kültürel faktörler anksiyete ifadesi ve raporlanmasını etkileyebilir.

SONUÇ

Ürologlar üreteral stent çıkarılmasına daha fazla özen göstermelidir. Üreteral stent çıkarılması anksiyete ve depresyonla önemli ölçüde ilişkili olup hastalara işlem hakkında daha detaylı bilgi verilerek anksiyetelerinin azaltılması hedeflenmelidir.

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Original Article
Özgün Araştırma

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Urological Evaluation Processes of Patients with Microscopic Hematuria Identified in Primary Healthcare Services: A Retrospective Analysis

Birinci Basamak Sağlık Hizmetlerinde Mikroskobik Hematüri Saptanan Hastaların Ürolojik Değerlendirme Süreçleri: Retrospektif Analiz

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ABSTRACT

Objective: This study aimed to investigate the diagnostic evaluation pathways, referral rates for advanced testing, final diagnoses, and follow-up outcomes of patients with microscopic hematuria (MH) identified through routine urinalysis in primary care settings.

Materials and Methods: In this retrospective cross-sectional study, clinical data were reviewed for 73 patients who presented to primary healthcare centers between 2022 and 2023 and had ≥3 red blood cells per high-power field (RBC/HPF) on urinalysis. Data included demographic characteristics, medical history, laboratory findings, imaging studies, specialist consultations, and treatment outcomes.

Results: The mean age of participants was 39.6 ± 14.3 years, with 63% being female. MH was classified as benign in 80.8% of cases. Urolithiasis accounted for 13.7%, while glomerular pathology and malignancy were each identified in 2.7% of patients. A follow-up-only approach was adopted in 60.3% of cases. During follow-up, hematuria resolved spontaneously in 84.9% of patients. The presence of malignancy was more common among high-risk individuals, particularly older adults and smokers.

Conclusion: Microscopic hematuria is most often benign but may signal serious underlying conditions in high-risk patients. Nurses in primary care play a vital role in the early identification and triage of such patients by interpreting urinalysis findings using a risk-based approach and ensuring timely specialist referrals.

Keywords: hematuria, nursing, oncology, primary healthcare, urology

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ÖZET

Amaç: Bu araştırma birinci basamak sağlık hizmetlerinde rutin tam idrar tahlili sırasında mikroskobik hematüri (MH) saptanan bireylerin tanısal değerlendirme süreçlerini, ileri tetkiklere yönlendirme oranlarını, son tanılarını ve izlem sonuçlarını değerlendirmek amacıyla yapılmıştır.

Yöntem: Bu retrospektif kesitsel çalışmada, 2022–2023 yılları arasında birinci basamak sağlık hizmetine başvuran ve tam idrar tahlilinde ≥3 RBC/HPF saptanan toplam 73 bireyin klinik verileri incelendi. Demografik özellikler, tıbbi öykü, laboratuvar bulguları, yapılan görüntüleme ve konsültasyonlar ile tanı ve tedavi süreçleri değerlendirildi.

Bulgular: Katılımcıların yaş ortalaması 39,6 ± 14,3 yıl olup %63'ü kadın idi. MH olgularının %80,8'i benign olarak değerlendirildi. Taş hastalığı %13,7, glomerüler nedenler ve malignite ise %2,7 oranında saptandı. Hastaların %60,3'ü yalnızca izlem ile takip edildi. İzlemde hematürinin %84,9'unda geçici olduğu gözlendi. Riskli bireylerde (ileri yaş, sigara kullanımı) malignite görülme olasılığı daha yüksekti.

Sonuç: Mikroskobik hematüri genellikle benign nedenlere bağlı olmakla birlikte, özellikle risk grubundaki bireylerde ciddi patolojilerle ilişkili olabilir. Birinci basamak sağlık hizmetlerinde görev yapan hemşirelerin TİT sonuçlarını risk temelli şekilde değerlendirmesi ve gerekli yönlendirmeleri yapması, erken tanı açısından kritik öneme sahiptir.

Anahtar kelimeler: Birinci Basamak Sağlık Hizmetleri, Hemşirelik**,** Hematüri, Üroloji, Onkoloji

INTRODUCTION

Microscopic hematuria (MH) is a clinical finding that is often asymptomatic and typically detected incidentally during routine urinalysis. It is defined as the presence of three or more red blood cells per high-power field (HPF) on microscopic examination (1). The significance of MH lies in its broad etiological spectrum, ranging from benign causes to serious malignant neoplasms (2). According to the updated clinical guidelines of the American Urological Association (AUA), individuals with microscopic hematuria should undergo further diagnostic evaluation once transient and benign causes such as menstruation, urinary tract infections, urolithiasis, or recent strenuous exercise have been ruled out (1). However, in primary care settings, MH is often overlooked, or diagnostic algorithms are not followed, which may lead to delayed diagnosis of malignancies (3,4).

The evaluation of MH in female patients may be more complex compared to males. Factors such as menstrual contamination, vaginal atrophy, urethritis, or cystitis may result in false-positive findings and complicate the diagnostic process (5). Especially in postmenopausal women, careful assessment is essential to differentiate between true and false positives (6). The prevalence of microscopic hematuria in the general population varies between 2% and 31%, depending on age, gender, and associated risk factors (7). In older adults, the presence of MH is associated with a higher risk of urinary tract malignancies (8). Conversely, in younger individuals, urolithiasis and glomerular pathologies are more commonly identified (9). The diagnostic process typically involves urine cytology, imaging modalities (such as ultrasonography, computed tomography, or cystoscopy), and nephrology or urology consultations when necessary (10). However, adherence to these diagnostic pathways in primary care remains low. Some studies report that only 30–40% of individuals diagnosed with MH are referred for further evaluation (11). Primary care nurses and family physicians play a pivotal role in the timely identification and appropriate referral of patients with MH (12). Their awareness in interpreting urinalysis results is especially critical for the early detection of malignancies, thereby contributing significantly to public health. The extent to which diagnostic algorithms are followed, the adequacy of imaging and consultation procedures, and the final diagnoses all serve as key indicators of healthcare system efficiency (4,6). Moreover, cost-effective screening strategies for MH have been the subject of recent debate. It has been reported that early imaging in older individuals and those with a history of smoking can facilitate the early diagnosis of bladder and kidney cancers, offering long-term economic benefits to the healthcare system (12,13). In recent years, the use of clinical decision support systems (CDSS) integrated with electronic health records has aimed to standardize the evaluation of MH. The broader application of such digital tools in primary care may reduce unnecessary testing and enable timely diagnosis for high-risk patients (14).

This study aims to retrospectively examine the diagnostic evaluation processes of individuals diagnosed with microscopic hematuria through routine urinalysis in primary care settings. The findings are expected to highlight

the clinical risk associated with MH and the potential adverse outcomes of neglecting this condition. Furthermore, based on the results, it is anticipated that the referral behaviors of primary care professionals will be reassessed and supported with appropriate diagnostic algorithms. The study seeks to raise awareness among primary care personnel by emphasizing the clinical implications of microscopic hematuria and the importance of its proper management. This research was conducted to retrospectively analyze the urological evaluation processes of patients diagnosed with microscopic hematuria in primary healthcare services. It is believed that the study will contribute to the literature and serve as a foundation for future research. A significant proportion of individuals identified with microscopic hematuria during routine health screenings in primary care are found to have pathological findings following further diagnostic evaluation.

MATERIALS AND METHODS

This retrospective and cross-sectional study was conducted in a district-level primary healthcare setting. The study population consisted of individuals who presented to primary healthcare centers in a district with a population of approximately 10,000, located in eastern Turkey, between January 2022 and December 2023. A total of 73 individuals were identified as having microscopic hematuria (MH). In accordance with contemporary guideline definitions, microscopic hematuria was defined as the presence of ≥3 red blood cells per high-power field (RBC/HPF) on microscopic urinalysis. Persistent microscopic hematuria was defined as ≥3 RBC/HPF on at least two separate microscopic examinations performed 3–6 months apart. In the present cohort, repeated urinalyses were generally performed during secondary care urology assessments; therefore, persistence was confirmed at the level of specialist evaluation rather than in primary care follow-up. These individuals comprised the study sample.

Data were obtained from family health centers, the national e-Nabız health information system, and relevant hospital information management systems. Anonymized data were transferred to a pre-designed data collection form. The variables collected were classified as follows:

- **Demographic data:** Age, sex, body mass index (BMI), smoking history
- **Medical history:** Hypertension, diabetes mellitus, history of radiotherapy/chemotherapy, family history of kidney disease
- **Urinalysis findings:** RBC/HPF, proteinuria, leukocyturia
- **Diagnostic evaluations:** Ultrasonography (USG), computed tomography (CT), magnetic resonance imaging (MRI), cystoscopy, cytology
- **Clinical outcomes:** Final diagnosis, time to diagnosis, treatment type, follow-up status, outcome

Data Analysis

The data were analyzed using IBM SPSS Statistics software (version 25.0). Descriptive statistics were presented as mean ± standard deviation (SD) for continuous variables and as frequency and percentage for categorical variables.

Ethical Compliance

This study was conducted by the ethical principles outlined in the Declaration of Helsinki. The study protocol was reviewed and approved by the Scientific Research and Publication Ethics Committee of Muş Alparslan University (Approval Date and Number: 08.05.2025/-193286 Decision number: 63/32). All data were retrospectively obtained from institutional records and were anonymized prior to analysis; therefore, no additional written informed consent was required according to the ethics committee decision.

RESULTS

The mean age of the 73 patients included in the study was 39.6 ± 14.3 years (range: 17 to 74). Regarding gender distribution, 63% of the participants were female (n = 46) and 37% were male (n = 27).

Among the patients diagnosed with microscopic hematuria, 80.8% (n = 59) were found to have benign etiologies. The most frequently identified pathological causes were urolithiasis (13.7%, n = 10), glomerular causes (2.7%, n = 2), and malignancy (2.7%, n = 2) (Table 1).

All patients in the cohort were referred from primary care to a urology outpatient clinic for further evaluation. A bedside renal and bladder ultrasonography was performed by the attending urologist in all cases. Additional imaging was obtained based on clinical suspicion: six patients underwent non-contrast abdominal computed tomography (CT), and two patients underwent contrast-enhanced abdominal CT. Two individuals were referred to nephrology due to suspected glomerular pathology. Among patients with recurrent or persistent microscopic hematuria, cystoscopic evaluation under local anesthesia was performed in several cases. Recurrent hematuria was ultimately attributed to urothelial malignancy in two patients, cystoscopic findings were normal in the remaining recurrent cases. Two patients (2.7%) were diagnosed with urothelial malignancy. One patient, an active smoker over the age of 50 years, had a T1 high-grade papillary bladder tumor, while the second patient, a 42-year-old smoker, had a 1 cm Ta papillary bladder tumor. In both cases, the diagnosis was established by cystoscopic evaluation and transurethral resection of bladder tumor (TURBT).

A follow-up approach was recommended for 60.3% (n = 44) of the patients, while 23.3% received medical treatment, 8.2% underwent surgical intervention, and lifestyle modification was advised for 8.2% (Table 2). During the follow-up period, microscopic hematuria was observed to be transient in 84.9% (n = 62) of patients. In the remaining 15.1% (n = 11), hematuria persisted (Table 3).

Both patients diagnosed with malignancy were over the age of 50 and active smokers. In patients with glomerular causes, proteinuria and the presence of red blood cell casts were notable findings. Among those diagnosed with urolithiasis, the majority (70%) were male patients with a history of smoking. However, despite initial ultrasonographic evaluation, many patients classified as having benign microscopic hematuria did not undergo further advanced diagnostic investigations, such as contrast-enhanced computed tomography or cystoscopic examination.

Table 1. Etiological Classification and Diagnostic Distribution in Cases of Microscopic Hematuria

Diagnosis	Number of Patients (n)	Percentage (%)
Benign	59	80.8
Urolithiasis	10	13.7
Glomerular cause	2	2.7
Malignancy	2	2.7

Table 2. Treatment Approaches in Patients Diagnosed with Microscopic Hematuria

Type of Treatment	Number of Patients (n)	Percentage (%)
Follow-up	44	60.3
Medical treatment	17	23.3
Surgical intervention	6	8.2
Lifestyle modification	6	8.2

Table 3. Hematuria Status During Follow-Up in Patients with Microscopic Hematuria

Follow-Up Status	Number of Patients (n)	Percentage (%)
Transient	62	84.9
Persistent	11	15.1

DISCUSSION

This study aimed to evaluate the diagnostic processes, referral patterns, final diagnoses, and follow-up outcomes of individuals in primary care settings who were incidentally diagnosed with MH during routine urinalysis. The findings provide important insights into how MH is approached in primary healthcare and highlight areas in which adherence to guideline-based evaluation can be strengthened.

In our study, 80.8% of patients diagnosed with MH were ultimately found to have benign causes, consistent with existing literature. According to updated American Urological Association (AUA) guidelines, the incidence of malignancy among patients with MH ranges between 2% and 5%. (15). Our malignancy rate of 2.7% parallels previously reported data from StatPearls and AAFP summaries (16,17).

Both malignancy cases in our cohort were active smokers, and one was over 50 years of age. This pattern aligns with current evidence demonstrating that age, male sex, smoking history, and hematuria persistence substantially increase the likelihood of detecting clinically significant pathology. According to the updated AUA/SUFU guideline, individuals who are older, smoke, or present with persistent MH fall into intermediate- or high-risk groups and therefore warrant a more comprehensive evaluation, including cystoscopy and appropriate upper-tract imaging (16, 17,18,19).

In patients with glomerular hematuria, the presence of proteinuria and red blood cell casts supported a nephrological etiology. These findings reinforce the need to consider glomerular diseases in the differential diagnosis of MH and are consistent with clinical recommendations emphasizing nephrology referral when hematuria coexists with proteinuria (15).

Among patients diagnosed with MH due to urolithiasis, male predominance and smoking history were more common, which is consistent with epidemiologic characteristics of stone disease, although smoking itself is not considered a direct lithogenic factor. Instead, microscopic bleeding in these individuals is likely related to mechanical or inflammatory irritation of the urothelium by calculi rather than systemic risk factors (20).

A notable observation was that 60.3% of patients were managed with follow-up advice alone, and many did not undergo further diagnostic evaluation. Although previous studies have reported low referral rates for patients with microscopic hematuria in primary care settings, all individuals in the present cohort were referred to urology clinics. This finding reflects local referral practices but does not necessarily indicate full adherence to guideline-recommended risk-based diagnostic algorithms, as advanced evaluations were selectively performed (21). This challenge may reflect both limited clinician familiarity with MH algorithms and the absence of standardized workflows in primary care.

Analysis of demographic and clinical risk factors in our cohort revealed trends consistent with the broader literature. Patients with non-benign etiologies—including urolithiasis, glomerular pathology, and malignancy—tended to be older and more frequently smokers compared with those with benign causes. All malignant cases clustered within recognized risk categories, and among seven patients with persistent MH, two were males over 50 years, four were active smokers, and two had biopsy-confirmed glomerulonephritis. Although the small sample size limits formal statistical analysis, these patterns support risk-stratified evaluation approaches recommended in contemporary guidelines.

In primary care settings, the initial evaluation and clinical decision-making regarding MH are performed by physicians, while nurses contribute by ensuring accurate urine collection, detecting documentation gaps, and reinforcing follow-up instructions. Increasing MH awareness among both physicians and nurses, as well as integrating standardized protocols or clinical decision-support tools, may enhance coordination of care, reduce unnecessary testing, and help prevent missed diagnoses (22,23).

From a urological perspective, our findings underscore the importance of strict adherence to contemporary risk-based algorithms. The AUA/SUFU guideline stratifies patients according to age, sex, smoking history, and hematuria

persistence and recommends tailored evaluation combining cystoscopy and upper-tract imaging. Most patients in our cohort with non-benign outcomes would have been categorized as intermediate- or high-risk, suggesting that systematic application of these criteria in primary care could facilitate earlier referral and improve diagnostic timeliness.

Recent large-scale cohort studies and guideline amendments further emphasize the low but non-negligible prevalence of genitourinary malignancy among patients with MH, particularly in older adults and smokers (13,23). These data collectively highlight the value of structured, risk-based MH evaluation pathways.

This study has several limitations. It was conducted at a single center with a relatively small sample size, and some clinical data were incomplete due to the retrospective study design. Additionally, the absence of uniform follow-up and further diagnostic testing in all patients means that a small number of underlying conditions may not have been fully identified.

CONCLUSION

This study demonstrates that although microscopic hematuria detected in routine urinalysis is often benign, it may serve as an indicator of serious underlying conditions in certain cases. In particular, malignancy should be considered in high-risk individuals, such as older adults, smokers, and those with persistent hematuria, and cases should be evaluated within a structured algorithm rather than being dismissed. Accordingly, in-service training programs should be organized to improve the knowledge and awareness of primary healthcare providers—especially nurses and family physicians—regarding MH management. Furthermore, implementation of risk-based assessment protocols, integration of electronic decision support systems, and enhancement of interdisciplinary communication are recommended.

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Original Article
Özgün Araştırma

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Can the De Nunzio Nomogram Reliably Predict Stone-Free Rates After Semirigid Ureteroscopy? A Retrospective External Validation Study

De Nunzio Nomogramı, Semirigid Üreteroskopi Sonrası Taşsızlık Oranlarını Güvenilir Şekilde Öngörebilir mi? Retrospektif Bir Eksternal Validasyon Çalışması

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ABSTRACT

Objective: To externally validate the De Nunzio nomogram for predicting stone-free outcomes after semirigid ureteroscopic lithotripsy (ULT) in patients with ureteral stones.

Materials and Methods: This retrospective study included 385 patients who underwent semirigid ULT for ureteral stones between December 2021 and October 2024. Demographic, clinical, and radiological data were collected. The De Nunzio nomogram score was calculated for each patient. Stone-free status was defined as the complete absence of residual fragments on imaging within 4–6 weeks postoperatively. Predictive performance of the nomogram was assessed using ROC curve analysis and decision curve analysis (DCA).

Results: The overall stone-free rate was 85.7%. There were no significant differences between the stone-free and non-stone-free groups regarding age, gender, or stone density. However, patients in the stone-free group more frequently had single stones, lower median stone length, and lower De Nunzio scores. Stones were more commonly located in the middle and distal ureter, while pyuria and hydronephrosis were less frequently observed in this group. The nomogram demonstrated high discriminative performance with an AUC of 0.866. DCA showed a net clinical benefit across a wide range of threshold probabilities.

Conclusions: The De Nunzio nomogram is a valid and clinically useful tool for predicting stone-free outcomes following semirigid ULT. Its implementation may enhance preoperative risk stratification and support individualized treatment planning in patients with ureteral stones.

Keywords: de Nunzio score, nomogram validation, semirigid ureteroscopy, stone-free rate, , ureteral stones, urolithiasis

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ÖZET

Amaç: De Nunzio nomogramının, üreter taşı bulunan hastalarda semirigid üreteroskopik litotripsi (ULT) sonrası taşsızlık sonuçlarını öngörme gücünün eksternal validasyonunu yapmak.

Gereç ve Yöntem: Bu retrospektif çalışmaya, Aralık 2021 ile Ekim 2024 tarihleri arasında üreter taşı nedeniyle semirigid ULT uygulanan 385 hasta dahil edildi. Demografik, klinik ve radyolojik veriler toplandı. Her hasta için De Nunzio nomogram skoru hesaplandı. Taşsızlık durumu, ameliyat sonrası 4–6 hafta içinde görüntülemede rezidü taş olmaması olarak tanımlandı. Nomogramın prediktif performansı ROC eğrisi analizi ve karar eğrisi analizi (DCA) ile değerlendirildi.

Bulgular: Genel taşsızlık oranı %85,7 idi. Taşsız ve rezidü kalan gruplar arasında yaş, cinsiyet veya taş dansitesi açısından anlamlı fark yoktu. Taşsız gruptaki hastalarda tek taş olma sıklığı daha fazlaydı. Ayrıca median taş uzunluğu ve De Nunzio skorları daha düşüktü. Taşlar daha çok mid ve distal üreterde lokalizeydi; piyüri ve hidronefroz bu grupta daha az sıklıkla izlendi. Nomogram, 0,866'lık AUC değeri ile yüksek ayırt edici performans gösterdi. DCA, geniş bir eşik olasılık aralığında nomogramın net klinik fayda sunduğunu ortaya koydu.

Sonuç: De Nunzio nomogramı, semirigid ULT sonrası taşsızlık sonuçlarını öngörmede geçerli ve klinik olarak faydalı bir araçtır. Bu nomogramın kullanımı, preoperatif risk sınıflandırmasını geliştirebilir ve üreter taşı olan hastalarda bireyselleştirilmiş tedavi planlamasını destekleyebilir.

Anahtar Kelimeler: de Nunzio skoru, nomogram doğrulama, semirigid üreteroskopi, taşsızlık oranı, üreter taşları, ürolitiyazis

INTRODUCTION

Urolithiasis is a common and increasing global health problem, with an estimated 106 million new cases reported in 2021, with a higher incidence observed in men compared to women (1). Among its subtypes, ureterolithiasis is also notably prevalent, with lifetime risk estimates suggesting that nearly one in eleven adults in the United States may be affected (2). In clinical practice, the mainstay of treatment for ureteral stones includes minimally invasive approaches such as extracorporeal shock wave lithotripsy (ESWL) and ureteroscopy (URS), with the choice of modality largely determined by stone size, location, composition, and patient-related factors. URS has emerged as a primary treatment modality for ureteral stones due to its high stone-free rates (SFR), often exceeding 90%, particularly when Holmium: YAG laser lithotripsy is used with high-energy settings (3).

Ureteroscopic lithotripsy (ULT) is widely regarded as a safe procedure for the treatment of ureteral stones. However, despite its favorable safety profile, certain complications may still occur, albeit infrequently. Reported complications include mucosal injury, ureteral perforation, stone migration, urinary tract infection, ureteral stricture, and, in rare cases, ureteral avulsion (4).

Although ULT generally yields high SFR, it remains important to identify patients who are at risk of treatment failure or who may require repeat intervention, so that they can be appropriately counseled in advance. Therefore, it is crucial to develop nomograms that are both easy to implement in clinical practice and have strong predictive performance. Until recently, such predictive tools were lacking for ULT, but in the past few years, three notable studies have addressed this gap. The first nomogram in this field was introduced by Imamura et al. in 2013 to predict stone-free status following transurethral ureterolithotripsy (5). This model was externally validated in 2019 by De Nunzio et al., confirming its predictive accuracy (6). Subsequently, in 2021, De Nunzio and colleagues developed their nomogram based on a Southern European cohort undergoing semirigid ULT [7]. Most recently, another nomogram was introduced in 2023 based on a Chinese cohort, marking the latest contribution to this evolving area of research (8).

Notably, the most recent two nomograms have not yet undergone external validation. Conducting such validation studies is essential to assess their generalizability and predictive accuracy across different clinical settings. In this

context, evaluating all three nomograms within the same patient population would provide valuable insights and could significantly contribute to their integration into routine clinical practice.

In light of these considerations, the present study aimed to externally validate the nomogram proposed by De Nunzio et al. for predicting stone-free status following semirigid ULT. By testing its performance in an independent patient cohort, this study seeks to contribute to the growing body of evidence regarding the clinical applicability and reliability of predictive tools in endourology.

MATERIALS AND METHODS

This retrospective observational study was conducted at a tertiary referral center and included 385 patients who underwent semirigid ULT for ureteral stones between December 2021 and October 2024. Ethical approval was obtained from the University of Health Sciences, Başakşehir Çam and Sakura City Hospital (KAEK/21.05.2025.165, Date: 2025-05-21). The study was conducted by the ethical standards of the institutional research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards. The requirement for informed consent was waived by the ethics committee due to the retrospective design of the study and the use of anonymized patient data. All procedures were performed using a standardized technique by experienced endourologists. Patients with incomplete clinical data, anatomical abnormalities of the urinary tract, active urinary tract infection, pregnancy, or age under 18 years were excluded from the study.

Demographic and clinical parameters, including age, gender, stone location (distal, midureteral, proximal, or ureteropelvic junction), stone length, number of stones, presence of pyuria, degree of hydronephrosis, and stone density, were recorded for all patients. All stone-related measurements, including size, location, and density, were obtained from preoperative non-contrast computed tomography (CT) scans. Stone length was defined as the maximum diameter of the stone measured on axial or reconstructed images. Pyuria was considered present when the urine sediment contained ≥5 white blood cells per high-power field, or when the urine dipstick test yielded a positive result for leukocyte esterase and/or nitrite. Data were obtained retrospectively from medical records and operative reports. Body mass index (BMI) was calculated by dividing weight (kg) by the square of height (m^2). Stone volume was estimated using the ellipsoid formula: volume (mm^3) = $\pi \times$ length $\times$ width $\times$ depth / 6 [9]. For each patient, a total score was calculated based on the scoring system described in the De Nunzio nomogram (Figure 1), in order to evaluate its association with stone-free outcomes.

Surgical Technique

All procedures were performed under either general or spinal anesthesia, with the patient placed in the lithotomy position. A safety guidewire was inserted into the ureter under cystoscopic guidance. Ureteral access was achieved using a semirigid ureteroscope (6/7.5 Fr Ultrathin model, Richard Wolf GmbH, Knittlingen, Germany). Stone fragmentation was performed using a Holmium: YAG laser (Sphinx Jr., LISA Laser, Omniguide Company, Germany) with a 273-µm laser fiber. The dusting technique was used in all cases, with laser settings ranging from 0.5 to 0.8 Joules in energy and 15 to 20 Hertz in frequency. At the end of the procedure, the surgeon decided whether to place a double-J stent. Stents were typically removed 2 to 4 weeks postoperatively.

Outcomes:

Treatment outcomes were assessed 4 to 6 weeks after the procedure using non-contrast CT imaging. Patients were considered stone-free only if no residual fragments were visible on the scan. In cases where residual stone fragments were identified, patients were scheduled for an additional intervention such as repeat ureteroscopy, retrograde intrarenal surgery, ESWL, or mini-PCNL to achieve complete stone clearance.

Statistical Analysis

All statistical analyses were performed using IBM SPSS Statistics for Windows, version 27.0 (IBM Corp., Armonk, NY, USA), except where otherwise stated. The normality of continuous variables was assessed using the Shapiro–Wilk test. Normally distributed continuous variables were presented as mean ± standard deviation, while non-normally distributed continuous variables were presented as median (interquartile range). Categorical variables were presented as frequency (percentage). Continuous variables were compared between stone-free and non-stone-free groups using the Mann–Whitney U test for non-normally distributed data and the independent-samples t-test for normally distributed data. Categorical variables were compared using the chi-square test. Receiver operating characteristic (ROC) curve analysis was used to evaluate the discriminative ability of the De Nunzio score, and the area under the curve (AUC) was calculated. The optimal cut-off value was determined by maximizing the Youden Index. Sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV) were calculated at the optimal threshold. Decision curve analysis (DCA) was performed in Python (version 3.11) to assess the clinical utility of the nomogram-derived predicted probabilities, based on the methodology described by Vickers and Elkin. A two-sided p-value <0.05 was considered statistically significant.

RESULTS

A total of 385 patients were included in the study, with a median age of 45 years (IQR: 42–50), and 76.9% (n = 296) were male. Of these, 330 (85.7%) were stone-free after the procedure. There were no significant differences between the groups in terms of age, gender, or stone density. However, patients who were not stone-free had significantly greater stone length, higher De Nunzio scores, higher stone number, and higher rates of proximal ureter/UPJ stone location and pyuria (all $p < 0.001$), as well as hydronephrosis ($p = 0.018$). All demographic, preoperative, intraoperative, and postoperative characteristics of the patients are summarized in the Table.

ROC curve analysis was performed to assess the predictive performance of the De Nunzio score for stone-free status. The AUC was 0.866. The optimal cut-off value, determined by the Youden Index, was 9.0. At this threshold, sensitivity was 91.8%, specificity was 70.9%, PPV was 95.0%, and NPV was 59.1%. The ROC curve for this analysis is presented in Figure 2. DCA demonstrated a net clinical benefit for the use of the nomogram-derived predicted probabilities across a threshold probability range of approximately 15% to 65% (Figure 3).

DISCUSSION

In patients diagnosed with ureteral stones, the primary goal is to achieve complete stone clearance using minimally invasive techniques that offer high SFR with low morbidity. To determine the optimal surgical approach for each patient, several factors must be considered individually, including stone characteristics (such as location, laterality, size, burden, and density), patient-specific conditions (such as comorbidities or anatomical anomalies), the surgeon's experience with the procedure, and the availability of surgical equipment. Advances in the imaging quality and miniaturization of semirigid ureteroscopes, along with continuous improvements in laser technology, have contributed to making these procedures safer and more comfortable for both patients and surgeons (10).

In the management of urolithiasis, there is a clear need for clinically practical and validated scoring systems or nomograms with strong predictive performance. However, the number of studies addressing this need remains limited. Such predictive tools play a key role in patient counseling and in guiding individualized treatment decisions. Factors such as stone location, degree of hydronephrosis, larger stone size (11), stone impaction (12), number of stones, and stone density (13) have all been shown to influence stone-free outcomes following semirigid URS independently. Consequently, nomograms incorporating these parameters are increasingly being used in the field of urolithiasis, but further external validation in diverse patient populations is still warranted.

Table 1. Baseline characteristics of patients according to stone-free status.

	Overall	Stone-Free (n=330)	Not Stone-Free (n=55)	p-value
Age (years)	47 (IQR: 44–52)	45 (IQR: 41–50)	47 (IQR: 44–51)	0.715
Gender				
Female	142	124	18	0.548
Male	243	206	37	
Stone Length (mm)	10 (IQR: 8–13)	16 (IQR: 13–23)	11 (IQR: 8–16)	< 0.001
Stone Density (HU)	875.5 ± 244.8	924.3 ± 300.2	884.4 ± 254.1	0.187
De Nunzio Score	16.6 (IQR: 14.0–22.0)	7.9 (IQR: 3.0–11.0)	15.6 (IQR: 10.0–20.0)	< 0.001
De Nunzio Group				
1	173	127	46	
2	58	51	7	< 0.001
3	108	106	2	
4	46	46	0	
Number of Stones				
1	315	289	26	
2	56	37	19	
3	8	4	4	< 0.001
4	4	0	4	
6	2	0	2	
Stone Location				
Distal Ureter	221	204	17	
Middle Ureter	84	76	8	< 0.001
Proximal Ureter	47	30	17	
UPJ	33	20	13	
Pyuria				
Yes	319	289	30	< 0.001
No	66	41	25	
Hydronephrosis				
Yes	221	181	40	0.018
No	164	149	15	

Abbreviations: mm: milimeter, HU: hounsfield unit, UPJ: ureteropelvic junction.

Age, stone length, stone density, and De Nunzio score were compared using the Mann–Whitney U test.

Gender, number of stone, stone location, hydronephrosis, pyuria, and De Nunzio groups were compared using the chi-square test.

HU values were compared using the independent-samples t-test

The green curve represents the net benefit of using the nomogram-derived predicted probabilities to guide clinical decisions across a range of threshold probabilities. The blue and brown curves indicate the strategies of treating all or treating none, respectively.

In parallel with URS, predictive nomograms for other treatment modalities have also emerged. Among them, a recent 2024 study introduced a logistic regression–based nomogram to predict stone-free success after ESWL, reporting robust predictive accuracy and suggesting its potential use for patient selection and counseling (14). In the context of PCNL, although no nomograms have specifically targeted proximal ureter or ureteropelvic junction stones, research efforts continue in this field. For example, recent studies have explored predictive models for postoperative bleeding and residual stones following upper tract PCNL [15]. Moreover, nomogram-based prediction of stone-free outcomes and complications after ESWL and PCNL has gained traction, reflecting a broader trend toward personalized endourology. Importantly, the development of nomograms specific to URS in recent years not only underscores this shift but also highlights the growing emphasis on individualized treatment planning in endourologic stone management.

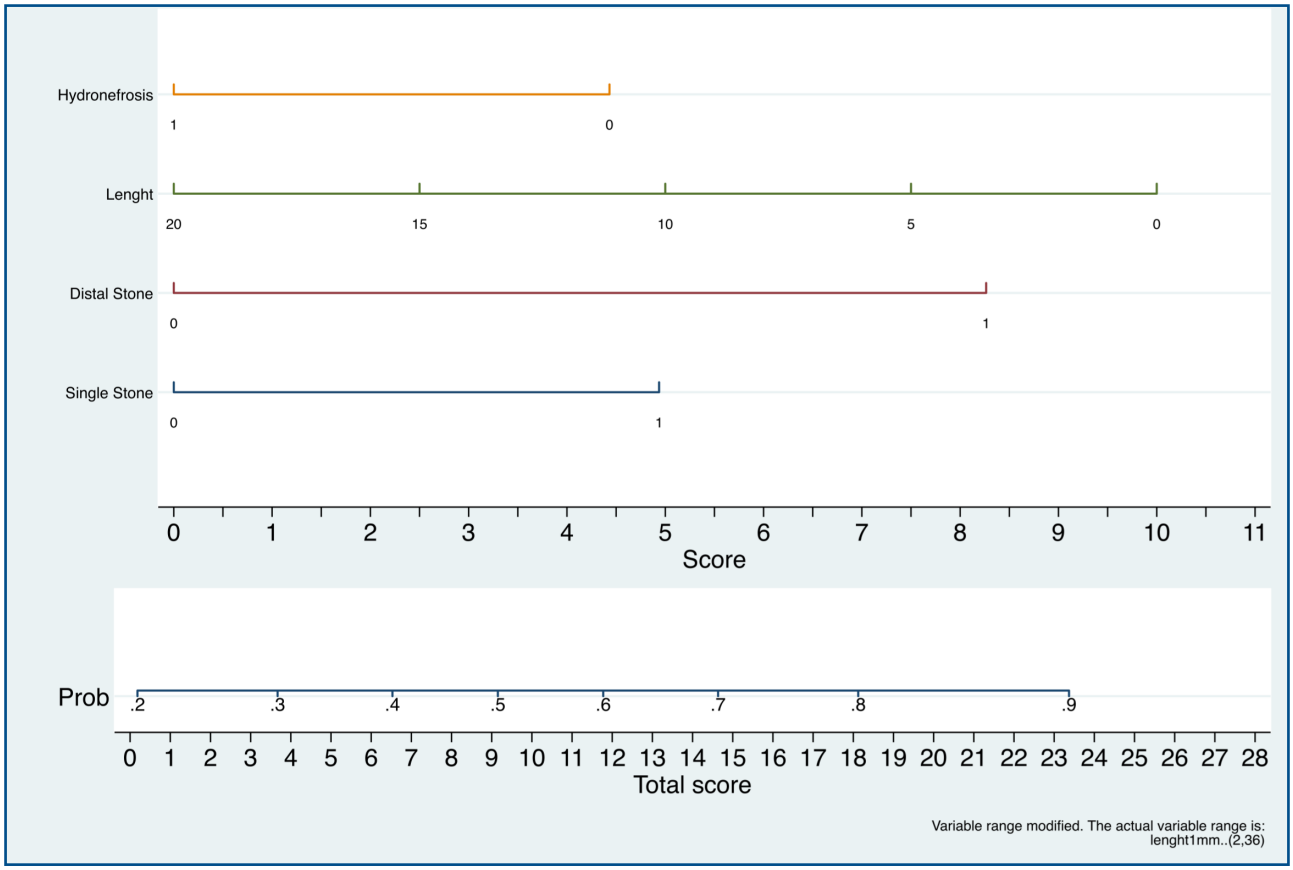


Figure 1. De Nunzio nomogram

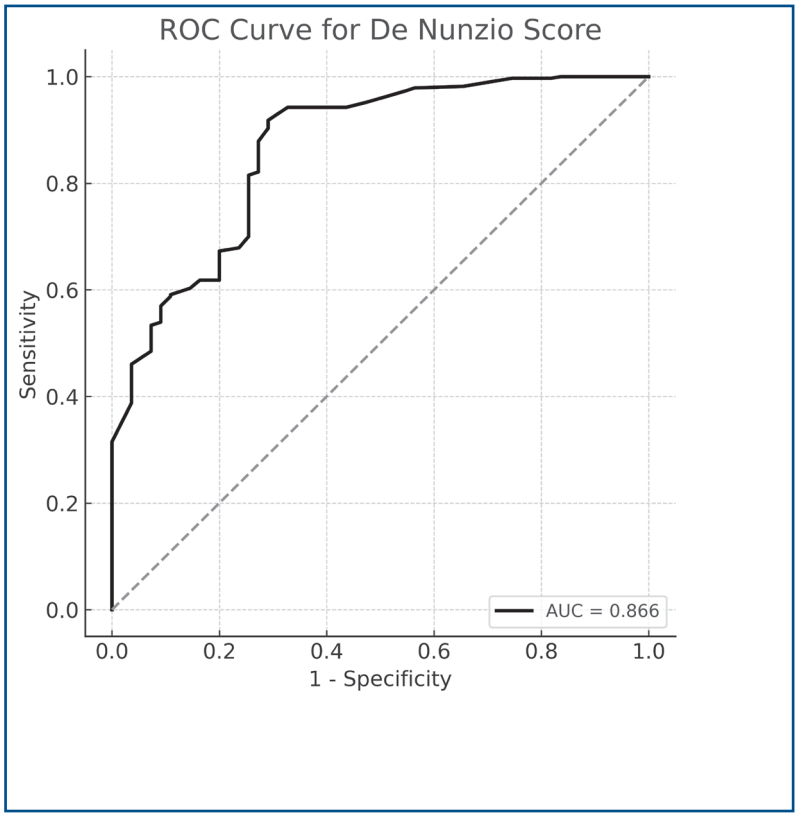


Figure 2. Receiver operating characteristic (ROC) curve for the De Nunzio score in predicting stone-free status.

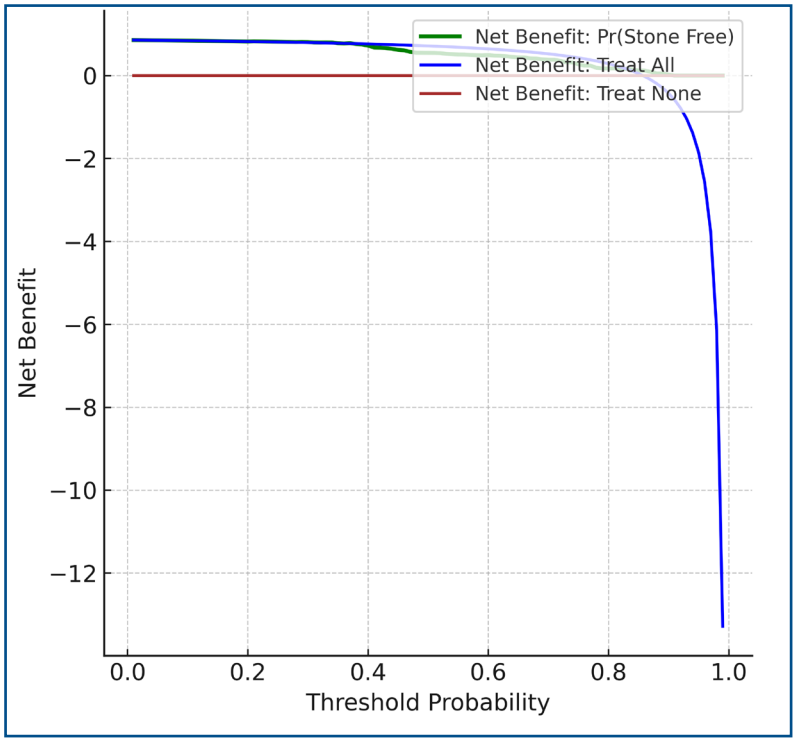


Figure 3. Decision curve analysis of the externally validated nomogram based on the De Nunzio score.

In this context, our study aimed to externally validate the De Nunzio nomogram, which was specifically developed to predict stone-free outcomes following semirigid ULT. To the best of our knowledge, this is the first study to validate the nomogram in an independent patient cohort externally. By applying the original scoring system to a contemporary real-world population, we assessed its discriminative performance and clinical applicability. Our findings, based on comprehensive statistical analyses including ROC curve and DCA, confirm the model's strong predictive accuracy and highlight its potential role in supporting individualized treatment decisions in endourologic stone surgery.

The AUC value obtained in our study (0.866) was notably higher than that reported in the original De Nunzio study (0.746). Several cohort-related factors may explain this difference. In our population, the median stone length was greater, and the distribution of stone locations was more concentrated in the distal ureter, which is typically associated with higher SFR [16]. In addition, our cohort included a wider range of De Nunzio scores, with a higher proportion of patients clustered at both the lower and upper ends of the scale. This may have enhanced the nomogram's capacity to discriminate between outcomes. Furthermore, key predictive variables such as pyuria and hydronephrosis showed stronger associations with stone-free status in our dataset, which likely contributed to the improved discriminative performance. These differences, taken together, may explain the higher AUC observed in our external validation.

The SFR observed in our cohort was 85.7%, which is consistent with previous large-scale studies evaluating semirigid ULT. In the original De Nunzio study, the reported SFR was 81.5%, while Imamura et al. and other contemporary series have documented rates ranging from 80% to 90%, depending on stone characteristics and surgical techniques (17,18). The increased SFR observed in our cohort relative to those reported by De Nunzio and Imamura may be attributable to the predominance of distal ureteral stones and a higher incidence of solitary calculi, both of which are well-established predictors of successful ULT (19–21). A recent nomogram-based study also reported a similar SFR of 84.9% (8), further supporting the generalizability of our findings. Therefore, our findings support the reliability of semirigid URS as an effective modality for ureteral stone management and confirm the external applicability of the De Nunzio nomogram across different patient populations.

The evaluation of a prediction model's performance should incorporate multiple dimensions, including discrimination, calibration, clinical utility, as well as internal and external validation, to ensure its reliability and applicability across diverse clinical settings (22). Numerous predictive models have been developed for urological cancers, and research in this area continues to expand with the publication of new studies (23–25). However, the development of reliable nomograms for ureterolithiasis presents several challenges, including the lack of consensus on the definition of residual fragments, variability in postoperative evaluation timing and imaging methods, ongoing debates regarding the optimal surgical approach (rigid vs. flexible ureteroscopy), differences in equipment used (laser alone vs. laser plus basket retrieval), and the presence or absence of a preoperative ureteral stent (26). The Imamura nomogram incorporated stone length, number, and location, as well as the presence of pyuria (5). Similarly, the De Nunzio nomogram included hydronephrosis, stone length, stone location, and number of stones (7). The Zhang nomogram, on the other hand, was based on hydronephrosis, hypertension, stone location, transverse diameter, and white blood cell count (8). All of these parameters remain open to discussion and further refinement. Notably, the inclusion of variables such as hypertension and white blood cell count in the most recent nomogram remains scientifically debatable, as their independent impact on stone-free outcomes has yet to be established through robust evidence.

This study has several limitations that should be acknowledged. First, its retrospective and single-center design may introduce selection bias and limit the generalizability of the findings. In addition, although the sample size was relatively large, certain potentially relevant variables, such as stone composition, operative time, and surgeon-specific factors, were not included in the analysis. Future prospective multicenter studies with standardized operative techniques are needed to validate and refine the De Nunzio nomogram. Moreover, comparative evaluations involving multiple nomograms within the same patient population would be valuable to determine the most accurate and clinically applicable model for predicting stone-free outcomes following ureteroscopic lithotripsy.

CONCLUSION

In conclusion, our study confirms the external validity of the De Nunzio nomogram in predicting stone-free outcomes after semirigid ureteroscopic lithotripsy. The findings support its use as a reliable clinical tool for preoperative risk assessment and personalized treatment planning. By demonstrating consistent predictive performance in an independent cohort, this study contributes to the growing body of evidence favoring the integration of nomogram-based models into routine endourological practice. Further prospective, multicenter validation studies are encouraged to strengthen the nomogram's applicability across diverse clinical settings.

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

Funding: The authors declare that they have no relevant financial interests.

Ethical Approval: The study was approved by the local ethics committee at University of Health Sciences, Başakşehir Çam and Sakura City Hospital (KAEK/21.05.2025.165, Date: 2025-05-21). All procedures performed in our study involving human participants were in accordance with the ethical standards of the institutional and national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards, and this study was designed according to the STROCSS 2021 criteria.

Author Contributions

MŞ: corresponding author, protocol and project development, data analysis, and manuscript writing.
EA: project development, data analysis, and manuscript writing
YNA: project development, data analysis, and manuscript writing,
YCF: project development, manuscript writing, and editing
TÖ: project development, manuscript writing, and editing

MS: project development, manuscript writing, and editing
HLC: project development and editing,

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Original Article
Özgün Araştırma

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A Comparison Study of AI Response Quality in Kidney Stone-Related Questions: Google vs. ChatGPT

Böbrek Taşıyla İlgili Sorularda Yapay Zekâ (ChatGPT) ve Google Cevap Kalitesinin Karşılaştırılması

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ABSTRACT

Objective: This study intends to evaluate, in Türkiye during the previous 12 months, the readability, reliability, and general quality of responses given by Google and ChatGPT on often-requested inquiries about kidney stones.

Material And Methods: The 10 most often searched queries and 4 trending topics on kidney stones were found by means of Google Trends data. Fourteen queries in all were asked on Google and ChatGPT. Gunning Fog Index (readability), a modified 5-question DISCERN Score (reliability), the Global Quality Score, and expert urologists' assessments guided responses' analysis. Independent t-tests let one evaluate Google's and ChatGPT's performance differences.

Results: ChatGPT showed notably better performance than Google in terms of the DISCERN Score (mean: 21.4 vs. 18.0; p = 0.002), Global Quality Score (mean: 4.8 vs. 4.0; p = 0.001), and expert urologists' ratings (mean: 4.6 vs. 3.8; p = 0.001). Though ChatGPT had a lower Gunning Fog Index (mean: 15.84 vs. 18.23), indicating more legible text, this difference was not statistically significant (p = 0.165).

Conclusion: ChatGPT exceeded Google in offering consistent, high-quality, expert-endorsed knowledge about kidney stones. These results show the possibilities of artificial intelligence language models in access to correct healthcare information and patient education. Additionally, improving transparency of information sources and implementing further verification mechanisms for clinical accuracy are recommended to ensure the reliability of AI-generated medical information.

Keywords: artificial intelligence, health literacy, internet, kidney stone, patient education, urolithiasis

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ÖZET

Amaç: Türkiye'de böbrek taşıyla ilgili sık aranan sorularda Google ve ChatGPT'nin verdiği yanıtların okunabilirlik, güvenilirlik ve genel kalite açısından karşılaştırılması.

Gereç ve Yöntemler: Google Trends ile 2023 yılı için en sık aranan 10 soru ve ani yükseliş gösteren 4 konu belirlendi (toplam 14 sorgu). Google için ilk sayfa özetleri, ChatGPT (GPT-4) için doğrudan yanıtlar değerlendirildi. Okunabilirlik Gunning Fog İndeksi; güvenilirlik 5 maddelik modifiye DISCERN; genel kalite Global Quality Score ile puanlandı. Üç deneyimli üroloji uzmanı ayrıca klinik fayda ve doğruluk açısından 1–5 arası puan verdi.

Bulgular: ChatGPT, DISCERN (21,4 vs. 18,0; p = 0,002), Global Quality Score (4,8 vs. 4,0; p = 0,001) ve uzman değerlendirmelerinde (4,6 vs. 3,8; p = 0,001) Google'dan üstün bulundu. Okunabilirlik ChatGPT'de daha iyi olsa da (15,84 vs. 18,23) fark istatistiksel olarak anlamlı değildi (p = 0,165).

Sonuç: ChatGPT, böbrek taşıyla ilgili çevrim içi sağlık bilgisinin güvenilirliği ve genel kalitesi açısından Google'a göre daha tutarlı ve yüksek kaliteli içerik sunmaktadır. AI tabanlı dil modelleri hasta eğitimi ve sağlık okuryazarlığının desteklenmesinde potansiyele sahiptir; ancak kaynak şeffaflığının artırılması ve klinik doğruluk için ek doğrulama mekanizmaları önerilir.

Anahtar Kelimeler: böbrek taşları, hasta eğitimi, internet, sağlık okuryazarlığı, ürolitiyazis, yapay zekâ

INTRODUCTION

Patient education depends more and more on access to online health knowledge. For common yet complicated disorders like kidney stones, precise information is absolutely vital. People usually rely on search engines like Google nowadays to find health information. However, in this field, artificial intelligence (AI)-based language models, namely ChatGPT, have become a new substitute.

Google provides a vast pool of information, yet concerns exist regarding the accuracy, readability, and reliability of its content (1,2). AI-based language models such as ChatGPT increase accessibility and comprehension. ChatGPT produces coherent and contextually relevant replies, unlike conventional search engines that list several sources and demand users to filter and interpret information, hence perhaps lowering false information and improving patient understanding (3). In recent years, the impact of AI-based language models—especially for complex issues such as kidney diseases—has attracted significant attention. These models are noted not only for increasing the speed and scope of information access but also for enhancing patient education, providing clinical decision support, and improving the comprehensibility of medical knowledge. However, their occasional tendency to produce content that is inaccurate or not based on factual evidence—a phenomenon referred to as "hallucination"—highlights the need for cautious use of such systems. It has been shown that models like ChatGPT offer guideline-compliant and high-quality responses (4,5). Additionally, according to Google Trends data, internet searches related to kidney stones have been steadily increasing since 2004, reaching their peak in 2022 (6). Focusing on readability, reliability, general quality, and expert urologist reviews, this paper seeks to evaluate Google and ChatGPT in offering health information on kidney stones.

MATERIALS AND METHODS

Study Design and Data Source

This study evaluated the quality of the obtained information and assessed online search patterns of Turkish users connected to kidney stones using Google Trends. Conducted within Türkiye, the study examined Google search data ranging from January 1, 2023, to December 31, 2023.

Google Trends revealed four new searches with a dramatic rise in search frequency throughout the same period, and the top ten most often used search queries connected to "kidney stones". The investigation consisted of 14 search queries overall.

Top 10 Most Popular Search Queries

1. Kidney
2. Kidney stone
3. Kidney stone symptoms
4. Kidney pain
5. What causes kidney stones?
6. Kidney stone pain
7. Kidney stone surgery
8. How to pass a kidney stone?
9. What helps with kidney stones?
10. Kidney stone lithotripsy

Sudden Trending Queries During the Study Period

1. How to use horsetail herb for kidney stones?
2. What to eat to pass a kidney stone?
3. Does beer help pass kidney stones?
4. What relieves kidney stone pain?

Data Collection Process

The selected 14 queries were entered into both the Google search engine and the ChatGPT (GPT-4 model) platform. Google search results were compiled based on summaries of content appearing on the first page, while ChatGPT responses were directly retrieved from the platform. The collected data were then analyzed according to predefined evaluation criteria to assess readability, reliability, and quality of information.

Evaluation Criteria

The responses from Google and ChatGPT were evaluated based on four primary criteria:

1. Readability (Gunning Fog Index) (7)
2. The readability level of the responses was assessed using the Gunning Fog Index, which measures the years of formal education required to understand a given text. A lower index score indicates that the text is more accessible and easier to comprehend.
3. Reliability (Modified DISCERN Scale) (8)
4. The reliability of the information was assessed using a modified version of the DISCERN instrument, which consists of five key questions:
    - Is the study's objective clearly stated?
    - Are the information sources provided?
    - Is the presented information balanced and unbiased?
    - Does the content include up-to-date information?
    - Does the information assist patients in making informed decisions?
    - Each question was rated on a scale from 1 to 5, and a total reliability score was calculated.
5. Global Quality Score (9)
6. The overall quality of the responses was rated on a scale from 1 to 5 (1: Low quality, 5: High quality), considering readability, organization, and content richness.
7. Expert Urologist Review
8. The responses were evaluated by three experienced urology specialists (with a minimum of seven years of practice). The experts assessed the content based on scope, accuracy, and clinical usefulness, assigning a rating between 1 and 5 for each response.

Statistical Analysis

An independent t-test examined variations between Google's and ChatGPT's answers. A p-value of 0.05 was considered statistically significant. Every statistical analysis was done with Python version 3.9.

RESULTS

Gunning Fog Index

The Gunning Fog Index is a measure of text readability. GPT scored 15.84; the average Gunning Fog Index score for Google's content was 18.23. These numbers show that whilst GPT delivered knowledge more understandably, Google's material used a more sophisticated linguistic structure. The independent t-test results (t = -1.45, p = 0.165) revealed, nevertheless, that this variation was not statistically significant.

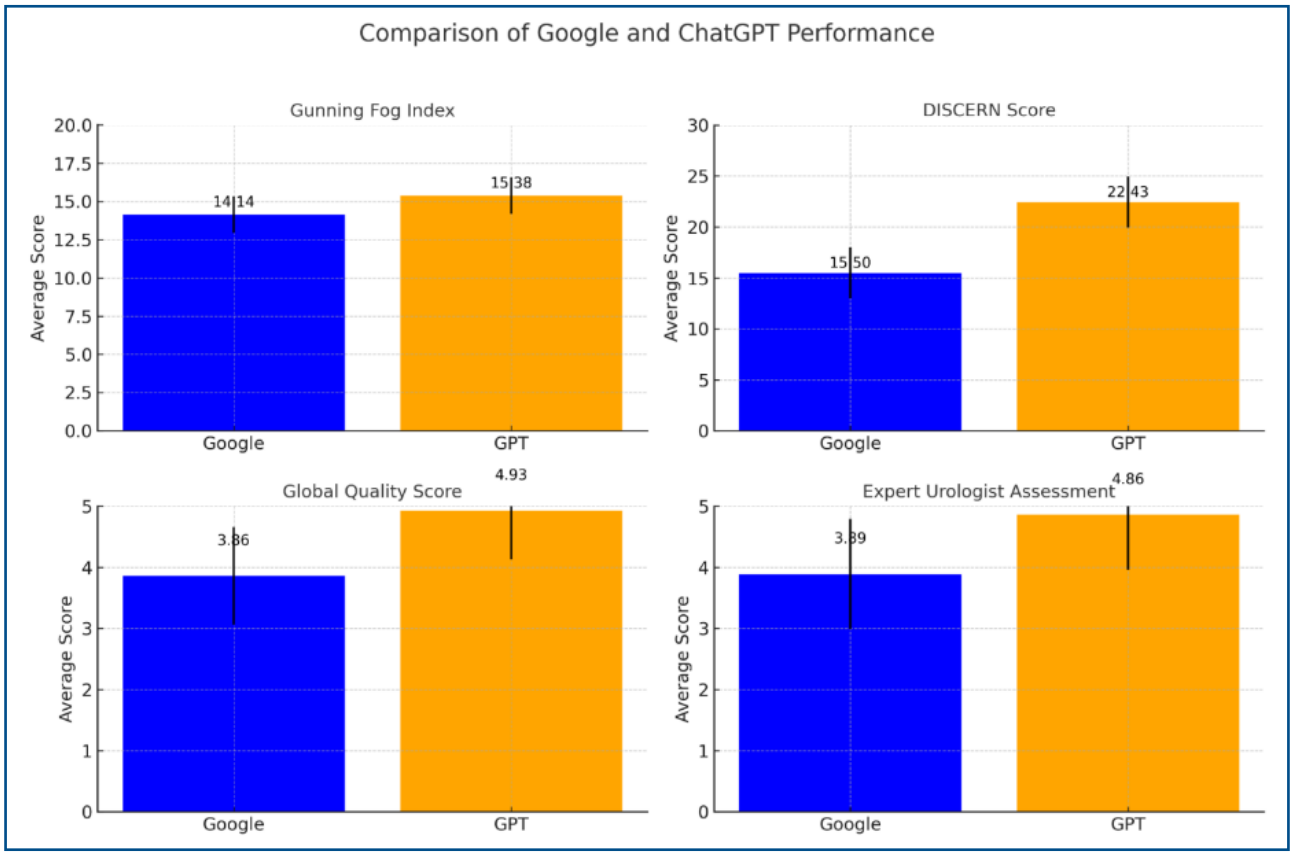


Figure 1. Comparison of readability (Gunning Fog Index), reliability (DISCERN Score), overall content quality (Global Quality Score), and expert urologist evaluation between Google and ChatGPT responses to kidney stone-related queries. ChatGPT consistently outperformed Google across all domains, with statistically significant differences for reliability, quality, and expert assessment ($p < 0.05$), whereas readability differences were not significant.

DISCERN Score

The DISCERN Score was used to assess the reliability of health information. Google's average DISCERN score was 18.0; GPT scored 21.4. With a statistically significant advantage in this criterion (t = -3.72, p = 0.002), GPT suggested offering more dependable and source-based health information.

Global Quality Score

The overall quality of the material was assessed using the Global Quality Score. GPT scored 4.8; the average score for Google material was 4.0. The t-test findings (t = -4.15, p = 0.001) showed that GPT beat Google noticeably in this regard, therefore confirming the idea that GPT-generated information is of better general quality.

Expert Urologist Review

Evaluations by seasoned urologists found that Google's material had an average score of 3.8, whereas GPT's material scored 4.6. With a t = -4.11, p = 0.001, this measure likewise revealed a statistically significant preference for GPT. Professional urologists thought GPT's comments were more accurate, relevant, and clinically helpful.

- **Gunning Fog Index Comparison:** This measure of text readability, Google and ChatGPT performed similarly, with ChatGPT showing a somewhat lower score, suggesting a rather more intelligible response structure.
- **DISCERN Score Comparison:** Assessing the reliability of information sources, ChatGPT demonstrated a significantly higher DISCERN score compared to Google, with a statistically significant difference.
- **Global Quality Score Comparison:** ChatGPT received a higher score than Google in terms of overall content quality, with this difference also being statistically significant.
- **Expert Urologist Assessment:** Based on evaluations by expert urologists, ChatGPT provided more accurate, reliable, and clinically relevant responses compared to Google, resulting in a higher overall score.

DISCUSSION

This study compares the responses provided by Google and ChatGPT to frequently asked kidney stone-related queries, evaluating readability, reliability, general quality, and expert assessment. The results indicate that ChatGPT outperformed Google in multiple key aspects, highlighting its potential as a valuable tool for disseminating health information. However, these findings should be considered in a broader context.

Google's Referral Policy and Approach to Questions

Google's investigation showed that search results regularly pointed people to Turkish private hospital websites. Particularly for the "kidney stone lithotripsy" search, consumers were frequently sent to promotional hospital pages instead of thorough, educational material. This could create commercial bias (10) and restrict access to trustworthy health information. By comparison, ChatGPT gave consumers a more all-encompassing viewpoint and a thorough description of lithotripsy and surgical techniques.

Response Length and Comprehensibility

Google's and ChatGPT's response lengths stood out as particularly different. Generally clear, direct, and straightforward Google answers let people get knowledge fast. Sometimes, though, this simplicity produced inadequate responses. Conversely, ChatGPT's answers were more thorough and instructive, which helped users to grasp kidney stones better. In our research, every search entered into ChatGPT produced answers giving consumers organized, all-encompassing knowledge. On the other hand, Google users sometimes found marketing material, which occasionally hampered their access to all the information.

Position in the Literature

Digital era access to health information has changed significantly. Previous research has thoroughly examined how well internet platforms provide health information, together with their drawbacks and obstacles. Even while Google is the most often used search engine for health-related searches, questions regarding information authenticity, reliability, and objectivity still exist. According to Eysenbach et al. (11), Google searches often direct consumers to commercial or partial content, therefore making dependable source access challenging. Morahan-Martin (2) further underlined that many sources of internet health information lack openness about their sources; therefore, users find difficulties assessing them.

Particularly, ChatGPT, an AI-based language model, constitutes a paradigm change in the distribution of health knowledge. Brown et al. (3) underlined that ChatGPT is a potential method for structured health information dissemination since it takes advantage of natural language processing capacity. According to Temsah et al. (12),

ChatGPT provides medical knowledge really well, but it needs further accuracy assurance through extra verification systems. Moreover, Nori et al. (13) evaluated AI models in the healthcare sector. They found that, although they improve patient-centered information accessibility, they also carry a risk of medical errors, which has to be reduced. In a recent study examining the compliance of AI-based applications with clinical guidelines, ChatGPT-4.0 and similar platforms demonstrated a high degree of adherence to the American Urological Association (AUA) guidelines in the management of vesicoureteral reflux (VUR) in children (14). This finding supports the potential use of AI as a clinical decision support tool. Additionally, large language models like ChatGPT offer healthcare professionals new opportunities in areas such as patient education, clinical decision support, and access to medical knowledge (15,16). Another important limitation of AI-based systems is the inherent risk of "hallucination," in which the model generates statements that appear plausible but are factually incorrect. This phenomenon underscores the need for ongoing validation, expert supervision, and external verification of AI-generated medical content to ensure clinical reliability. Supporting this, ChatGPT's responses to complex medical topics such as kidney transplantation were found to be largely accurate and sufficient based on expert evaluations (17,18).

Though ChatGPT has several benefits, our research found cases when the AI-generated answers included broad descriptions straying from the central question. Furthermore, direct contact with healthcare providers is still quite important for patients looking for medical guidance, considering Turkey's cultural focus on trust-based doctor-patient interactions.

Social and Commercial Influences on Search for Health Information

This study makes one of the major contributions by analyzing the social and commercial settings affecting popular health-related searches. For example, the search "How to use horsetail herb for kidney stones?" was often searched between June and July 2024, in line with a running advertisement campaign for this product in Turkey. This result implies that online search patterns capture not only actual health information requirements but also outside social and commercial factors. Future studies ought to investigate how online health information-seeking behavior is shaped by cultural and financial aspects.

Health Literacy and AI-Generated Content

The capacity of ChatGPT to provide thorough answers presents a benefit for encouraging health literacy. Topol (19) underlined how well artificial intelligence models reduce difficult medical subjects, therefore enabling the general public to find them more understandable. Nevertheless, too much detail could potentially overwhelm consumers. In this study, even if ChatGPT's thorough answers help to improve knowledge about kidney stones, some users could still want Google's simpler approach despite its restrictions. Recently, Bahçeci et al. conducted a comparative study evaluating the effectiveness of Microsoft Copilot and Google Search in answering patient inquiries about infertility (20). Their results showed that, similar to our findings, AI-based chatbots provided significantly higher understandability and actionability scores than Google Search responses, as assessed by the PEMAT-P tool. Although both platforms demonstrated readability levels above the recommended eighth-grade threshold, the AI model generated more comprehensive and patient-centered information. Together with the present research on urolithiasis, these complementary studies emphasize the growing role of large language models in improving online patient education and health literacy across different domains of urology.

Moreover, as artificial intelligence models continue to evolve rapidly, their performance and accuracy are expected to change over time. Future evaluations should therefore consider version-specific analyses to ensure the long-term applicability and reproducibility of AI-based findings in clinical communication and patient education.

Limitations

This study is among the first to evaluate Google and ChatGPT in the framework of Turkish health information searches, therefore providing an insightful analysis of digital health information availability. Still, certain restrictions have merit. The study focused on 14 frequently searched questions related to kidney stones, which may limit the statistical generalizability of the results. However, this focused and exploratory design ensured methodological consistency and enabled a detailed qualitative assessment by expert urologists, thereby offering a reliable baseline for future, larger-scale research. A key limitation is that the study relied only on search queries from the year 2023. Given the rapid evolution of Google and ChatGPT algorithms, the results may change over time, potentially affecting reproducibility and comparability in future analyses. Furthermore, constantly changing their algorithms and reactions, Google and ChatGPT could influence the repeatability of the findings over time. Additionally, during the conduct of this research, the release of ChatGPT-5 highlighted the rapid advancement of large language models. Such fast-paced developments may lead to notable differences in performance, content generation, and reliability across versions, potentially affecting the relevance of our current findings over time. Future research should therefore consider incorporating newer model versions and conducting longitudinal evaluations to capture the dynamic nature of these technologies and provide more up-to-date, generalizable insights.

CONCLUSION

According to this study, AI-based language models could be a great substitute for the distribution of health knowledge. Still, ChatGPT and related models ought to increase openness about their information sources. To improve the accessibility of accurate and objective health information, Google should thus hone its algorithm to lead people towards more balanced and neutral sources. Future studies should broaden this investigation by examining several health subjects using more extensive data sets.

Furthermore, more research might evaluate how diverse user profiles—especially those with varied degrees of education—interpret health information from several platforms. Such studies would offer a closer understanding of the efficiency of search engine-based and artificial intelligence-driven information.

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Informed Consent: Not applicable (no human participants or identifiable data).

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Ethical Approval: This study is based solely on the analysis of publicly available online data; therefore, ethical committee approval was not required. As no human participants or personal data were involved, this study did not necessitate ethical approval according to institutional and journal policies.

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- Writing—Original Draft: Burak Elmaağaç
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Original Article
Özgün Araştırma

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Comparison of A Novel Open Fingertip Technique for Laparoscopic Entry with the Veress Needle

Laparoskopik Girişte Veress İğne Tekniği İle Açık Fingertip Tekniğinin Karşılaştırılması

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ABSTRACT

Objective: To compare our novel abdominal entry technique (i.e., the fingertip technique) with the Veress needle technique in laparoscopic urological surgery, in terms of feasibility and complications.

Material And Methods: A total of 90 patients who underwent laparoscopic transperitoneal surgery were assigned to either the Fingertip technique group (n = 45) or the Veress needle technique group (n = 45). The duration of time for initial entry, the occurrence of gas leakage, the number of attempts for successful entry into the abdomen, and the complications were evaluated.

Results: The two groups had comparable demographic characteristics. The laparoscopic entry time was shorter in the fingertip group than it was in the Veress needle group (175.7 ± 64.9 versus 103.8 ± 26.7 s; $p < 0.001$). Pneumoperitoneum was established at the first attempt in 35 (77.7%) of the Veress needle patients and in 45 (100%) patients in the fingertip method group. The overall complication rates were 4 (8.8%) in the Veress needle group and 3 (6.6%) in the fingertip group ($p = 0.693$). In the Veress needle group, minor complications included liver injury in one patient, intestinal injury in one patient, subcutaneous emphysema in one patient and omental injury or insufflation in one patient. In contrast, in the fingertip group, subcutaneous bleeding occurred in three patients.

Conclusion: The fingertip technique may be considered as a feasible option for laparoscopic entry with its lower complications rates and shorter applying time compared to the Veress needle technique.

Keywords: complication, fingertip technique, gas leakage, laparoscopic abdominal entry, veress needle technique

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ÖZET

Amaç: Laparoskopik ürolojik cerrahide yeni abdominal giriş tekniğimizi (fingertip tekniği) Veress iğnesi tekniği ile uygulanabilirlik ve komplikasyon açısından karşılaştırmayı planladık.

Gereç ve Yöntemler: Laparoskopik transperitoneal cerrahi planlanan 90 hasta, veress iğne tekniği (n = 45) ve fingertip tekniği (n = 45) olmak üzere üzere iki gruba ayrıldı. Batına giriş süresi, gaz kaçağı oluşumu, batına başarılı giriş deneme sayısı ve komplikasyonlar değerlendirildi.

Bulgular: İki grup benzer demografik özelliklere sahipti. Laparoskopik giriş süresi fingertip grubunda Veress iğnesi grubuna göre daha kısaydı (175,7 ± 64,9' a karşılık 103,8 ± 26,7 sn; p < 0,001). Veress iğnesi grubundaki hastaların 35' inde (%77,7), fingertip yöntemi grubunda ise 45 (%100) hastada ilk denemede pnömoperiton oluştu. Genel komplikasyon oranları Veress iğnesi grubunda 4 (%8,8) ve parmak ucu grubunda 3 (%6,6) idi (p = 0,693). Veress iğnesi grubunda minör komplikasyonlar; bir hastada karaciğer hasarı, bir hastada bağırsak yaralanması, bir hastada cilt altı amfizemi ve bir hastada omentum yaralanması veya insuflasyonu olarak raporlandı. Fingertip grubunda ise 3 hastada cilt altı kanama meydana geldi.

Sonuç: Fingertip tekniği, Veress iğnesi tekniğine göre daha düşük komplikasyon oranları ve daha kısa uygulama süresi ile laparoskopik giriş için uygun bir seçenek olarak değerlendirilebilir.

Anahtar Kelimeler: komplikasyon, fingertip tekniği, gaz kaçağı, laparoskopik abdominal giriş, veress iğne tekniği

INTRODUCTION

Laparoscopic surgery has many advantages, such as early convalescence, less blood loss, minimal incision, and magnified endoscopic vision. It has become the gold standard in many abdominal surgeries. To obtain a safe pneumoperitoneum is the first and most crucial step of laparoscopic surgery. Ideally, the initial abdominal entry should be safe, easy, fast, cost-effective, and feasible for all abdominal procedures, including in patients with previous abdominal surgery or morbid obesity.

The closed Veress needle and open Hasson techniques are the most commonly used abdominal entry techniques in laparoscopy. Although no differences have been shown between the techniques, open entry seems to be safer than the Veress needle technique because all the structures are passed under view during entry (1).

Because incisions larger than the trocar diameter require a special Hasson cannula or purse-string suture to prevent gas leakage during surgery in open-entry techniques, it can be technically challenging and time-consuming, particularly in obese patients. In contrast, many complications have been reported in the Veress needle technique, including major and minor vascular injuries and solid organ injury. Approximately 40% of laparoscopic complications occur during primary port placement, including the insertion of the Veress needle (2); the mortality rate has been reported as 4 to 8 deaths per 100,000 surgeries due to initial abdominal entry (3). While life-threatening complications are not usual, minor complications are not rare (4).

Although more than 25 different techniques have been described to achieve safe, easy, and feasible abdominal entry, there is no consensus on the ideal approach for initial abdominal entry (1,3,5-17). We described a novel abdominal entry technique; the fingertip technique, and evaluated it in terms of feasibility, previously (18). This technique allows easy and fast entry to be made in any place on the abdomen without any solid organ and vascular injury, in all patients even if they have undergone previous surgery or have obesity (18).

In this study, we aimed to compare the fingertip technique with the Veress needle technique in terms of feasibility and complications.

MATERIAL AND METHODS

This is a retrospective, single-center study that was performed in a referral center for laparoscopic urologic surgeries between January 2019 and January 2020. Ninety patients who underwent transperitoneal laparoscopic surgery as part of their routine medical care were enrolled in this study. A retrospective review of prospectively collected data

was performed. We designed the study in a single surgeon setting in which the same surgeon (AS) performed all the operations to avoid confounding factors. This study was approved by the Ethical Committee of Kartal. Dr. Lutfi Kirdar City Hospital (Desicion Number: 2025/010.99/20/33, Date: 2025-09-29). All steps of the study were planned and applied carefully, according to the Declaration of Helsinki.

Demographic characteristics including age, gender, body mass index (BMI), initial entry site, previous abdominal surgery, and type of performed surgery were recorded. The primary outcome of the study was the duration of time required for initial abdominal entry. Secondary outcomes included successful entry at first attempt, gas leakage and entry related complications.

Surgical techniques

The initial entry place was selected based on each patient's status and planned surgery. The initial port placement was decided on in the reference to the midclavicular line in upper urinary system surgeries. We planned to place an upper working channel into the inferior of the costal margin on the midclavicular line. Initially, a 10 mm camera port was placed 4 to 5 finger-widths inferior to the medial side of the upper working channel. In pelvic surgeries, we placed initial access 2 cm superior to the umbilicus.

Fingertip technique

Briefly, in the fingertip technique, the skin is marked with a 10 mm empty disposable trocar tip to prevent excessive incision. The skin is vertically incised at the boundaries of the marked area until the subcutaneous adipose tissue can be seen. Then, blunt dissection is done with the index finger down until the upper sheet of the abdominal fascia is felt. A 15 mm scalpel is placed on the inside of the index finger and held with the proximal part of the thumb. The tip of the scalpel should not exceed the tip of the finger. After that, the finger and the scalpel are held perpendicular to the fascia while applying mild pressure on the fascia. The finger and scalpel are bent 45 degrees cranially, without moving the tip of the finger or the scalpel. Due to the softness of the fingertip, the scalpel passes the fingertip by only a few millimeters and incises the fascia. Only mild pressure on the layer during the maneuver is needed to achieve a 3 to 4 mm incision. Then, the abdominal muscle is dissected bluntly with the index finger. Finally, the peritoneal layer is incised millimetrically again using the fingertip technique and enlarged bluntly with the index finger to enter the abdomen. Then, the abdominal wall is elevated bilaterally next to the incision, and a 10 mm trocar is inserted bluntly through the incision (18-20) (Figure 1 and 2).

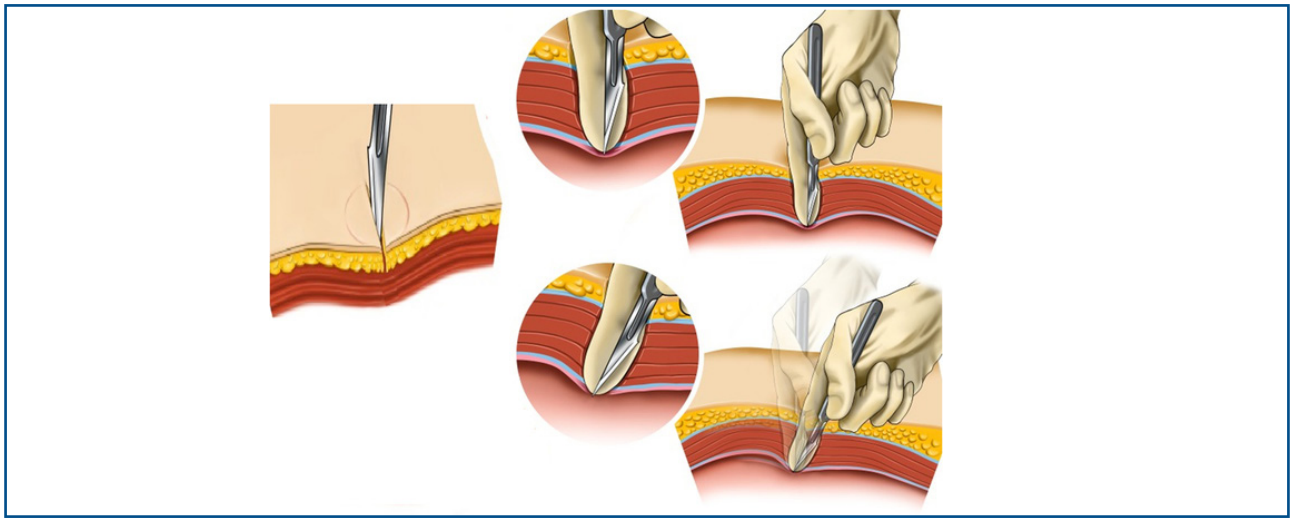


Figure 1. Illustration of the fingertip technique. The skin is marked with a 10 mm empty disposable trocar tip to prevent excessive incision. . A 15 mm scalpel is placed on the inside of the index finger and held with the proximal part of the thumb. The tip of the scalpel should not exceed the tip of the finger. The finger and the scalpel are held perpendicular to the fascia while applying mild pressure on the fascia. The finger and scalpel are bent 30 degrees medially, without moving the tip of the finger or the scalpel.

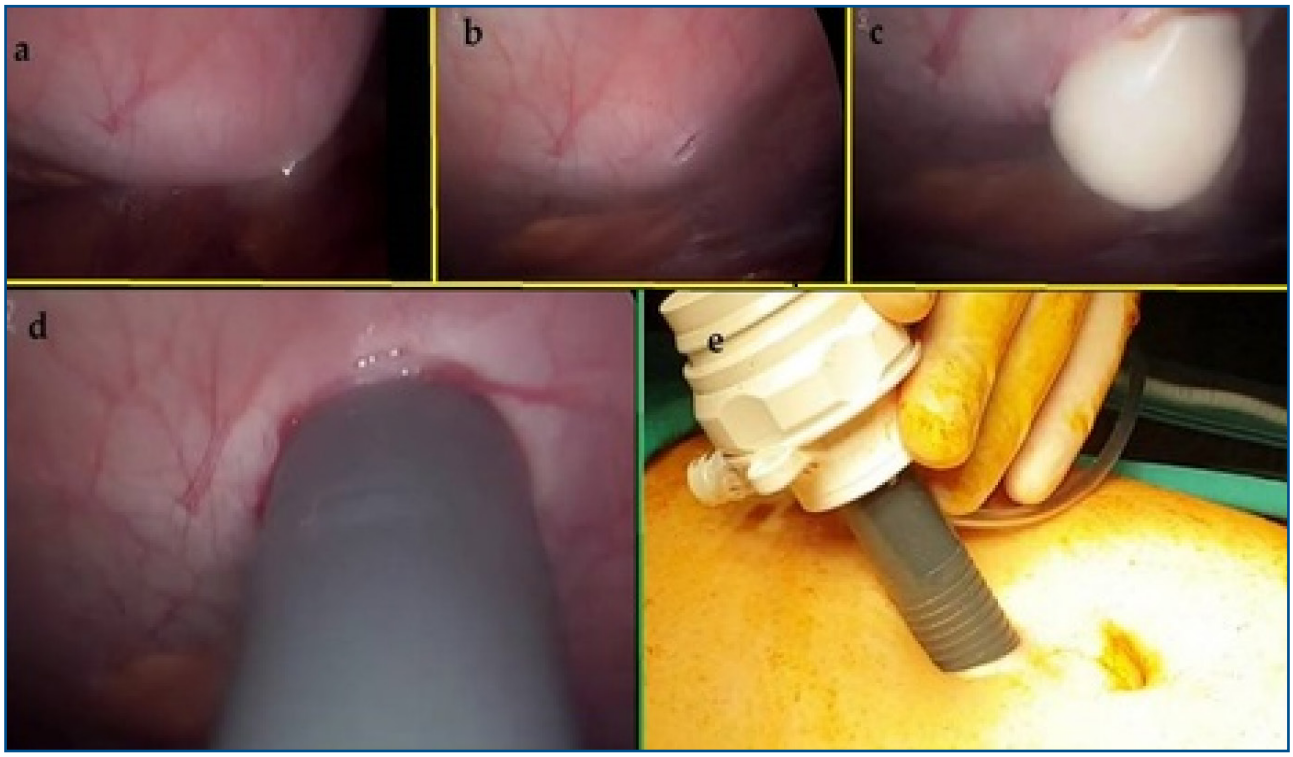


Figure 2. a) Image of the tip of the scalpel during peritoneal incision with fingertip technique b) Millimetric peritoneal incision, c) Insertion of the tip of the finger to the peritoneal cavity, d) Image of initial entry after trocar insertion intraperitoneally, e) skin is firmly cover the cannula

Veress Needle Technique

In the Veress needle technique, after deciding on the initial port placement, a 5 mm skin incision is done and the abdominal wall is elevated with towel clamps 2 cm from the incision. Then, the Veress needle is inserted through the incision with controllable pressure at 90 degrees to the abdominal wall, until it enters the peritoneal cavity. Appropriate entry is confirmed by hearing the double click sound of the Veress needle, using the saline drop test. The initial pressure is usually 4–5 mmHg; if the pressure increases slowly from this to 14 mmHg, pneumoperitoneum has been successfully established. After obtaining pneumoperitoneum, a 10 mm trocar is inserted and intra-abdominal organs are carefully inspected for possible injury.

We recorded the number of attempts to successful entry and the duration of time elapsed during initial entry (i.e., the first incision to entrance into the intra-abdomen with the camera safely). Gas leakage after entry and failed entry was also recorded. Additionally, complications, such as vascular injury (i.e., any injury to any intra-abdominal vessels), visceral injury (i.e., any serosal or deep injury to the small intestine or colon), solid organ injury (e.g., the liver or spleen), omental injury (i.e., bleeding or omental insufflation), and extraperitoneal insufflation were recorded. Failed entry was defined as the failure to obtain pneumoperitoneum after three Veress insufflation attempts. When failed entry occurred in the Veress needle group, we achieved pneumoperitoneum using the fingertip technique.

Statistical Analysis

SPSS version 20.0 (IBM Co., Armonk, NY) was used for statistical analysis. Descriptive analyses were presented using means and standard deviations. The chi-squared test or Fisher's exact test were applied to evaluate categorical data, and the two-tailed p-value was used in inference, with $p<0.05$ accepted as significant. The variables were investigated using visual (i.e.,histogram) and analytic (i.e., Kolmogorov–Smirnov) methods to determine normal distribution. The Student t test was used to compare normally distributed parameters (i.e., age, BMI, and duration of time during initial entry).

RESULTS

Overall, 90 patients were enrolled in the study; of which 45 patients undergone the Veress needle technique and 45 undergone the fingertip technique. Patients' characteristics in both groups were similar in age, gender, BMI, and presence of previous abdominal surgery ($p > 0.05$) (Table 1). The mean duration for initial abdominal entry was 175.7 ± 64.9 sec for the Veress group and 103.8 ± 26.7 sec for the fingertip group ($p = 0.001$). Successful entry at the first attempt was achieved in 35 (77.7%) patients of the Veress group and 45 (100%) of the fingertip group (Table 2). A failed entry due to subcutaneous emphysema was recorded in one patient in the Veress group, and fingertip technique was applied in this case. Gas leakage was observed in two (4.4%) patients of the Veress Group and four (8.8%) patients of the fingertip group ($p = 0.398$). This problem was resolved with switching from 10 mm to a 15mm trocar. There was no significant difference between the two groups regarding the type of operations performed ($p > 0.05$) (Table 2).

Table 1. Patient Demographics according to the groups.

	Veress needle (n:45)	Finger-tip (n:45)	p value
Age; years (mean ± sd)	58.3 ±12.9	55.4 ± 13.4	0.209
Gender (Male / Female)	16/29	13/32	0.499
Laterality; R/L/M	20/16/9	19/19/7	0.766
Body mass index; kg/m^2 (mean ± sd)	26.8 ±3.6	26.5 ± 3.2	0.780
Presence of previous abdominal surgery;n	6 (13.3 %)	5 (11.1 %)	0.748

n: number; sd: standard deviation, R: Right, L: Left, M: Midline, Mann Whitney U test was used in comparing age and BMI. A Chi-square test was used to compare proportions in different groups.

Table 2. Comparison of perioperative parameters among the groups

		Veress needle (n:45)	Finger-tip (n:45)	p value
Duration of time during initial entry; seconds. (mean ± sd)		175.7 ± 64.9	103.8 ± 26.7	0.001
Gas leakage		2 (4.4%)	4 (8.8%)	0.398
Number of attempt to succesful entry; n (%)	1	35 (77.7%)	45 (%100)	NA
	2	7 (13.3%)	0	
	3	2 (4.4%)	0	
	Failed	1 (2.2%)	0	
Performed Laparoscopic Surgery	Radical nephrectomy	11(24.2%)	10 (22.2%)	0.958
	Partial nephrectomy	10 (22.2%)	12 (26.7%)	
	Simple nephrectomy	10 (22.2%)	8 (16.6%)	
	Nephroureterectomy	2 (4.4%)	2 (4.4%)	
	Pyeloplasty	1 (2.2%)	2 (4.4%)	
	Uretero-Pyelolithotomy	2 (4.4%)	4 (8.8%)	
	Prostatectomy	6(13.3%)	5 (11.1%)	
	Cystoprostatectomy	3 (6.6%)	2 (4.4%)	

n: number; sd: standard deviation

Table 3. Complication of initial abdominal entry between the groups.

	Veress needle group (n:45)	Finger-tip group (n:45)
Mild liver injury; n%	1 (2.2)	0
Mild intestinal injury; n%	1 (2.2)	0
Omental injury or insufflation; n%	1 (2.2)	0
Subcutaneous emphysema; n%	1 (2.2)	0
Subcutaneous bleeding; n%	0	3 (6.6)
Total complication rate*; n%	4 (8.8)	3 (6.6)

*p value: 0.693, n: number

There were no cases of vascular injury or gas embolism in either group. In the Veress needle group, we recorded four complications that did not require any intervention. These cases included 1 (2.2%) case with liver injury, 1 (2.2%) case with intestinal injury, 1 (2.2%) case with omental insufflation, and 1 (2.2 %) case with subcutaneous emphysema. The patient who had mild liver injury did not need further intervention, whereas the intestinal injury was detected intraoperatively and only serosal tearing was observed in ascending colon. In the Fingertip group, we recorded three cases with subcutaneous bleeding that were controlled with cauterization. The overall complication rates were similar between the two groups (p = 0.368) (Table 3). All complications that occurred in both groups were classified as Grade 1 according to the Clavien-Dindo classification system.

DISCUSSION

Although laparoscopic surgery has become a well-established procedure in recent years, there is still controversy about the optimal method for entering the abdomen and creating the pneumoperitoneum. Complications are the most important concern related to initial entry. Mortality rates after closed and open laparoscopy entry methods are relatively low and have been reported as 0.003% and 0%, respectively (21). Open entry seems to be safer than closed entry, although no differences in the complications of the techniques have been shown (3). Because complications are seen rarely, statistically significant differences in complication rates have not been shown in previous studies using small sample size (3).

Although the Veress needle technique is one of the most commonly closed entry techniques, there is no reliable test to check the accurate placement of the Veress needle. Teoh et al. reported that the double click, aspiration, and hanging drop tests provide very little useful information about the placement of the Veress needle at initial entry; in their study, the initial gas pressure was the only valuable measure reflecting correct intraperitoneal Veress needle placement (22). The ultrasound-guided visual insertion of the Veress needle has been described in order to minimize entry-related complications (23). In the present study we have observed one case with mild liver injury, one case with intestinal injury, and one case with omental injury which did not require any surgical intervention in the Veress needle technique. Using the fingertip technique, we have not observed any complications during the initial entry. This can be explained by the method that the surgeon enters the peritoneal cavity with the tip of the finger bluntly after millimetrically incised peritoneal layer with fingertip technique. Also, the surgeon can check the peritoneal cavity with the finger to ensure that entering process is performed correctly. In addition, in patients with history of previous surgery the (fingertip technique can be applied in any localization) initial trocar can be inserted in any localization of the abdomen easily.

In a study published by Nasab et al, gas leakage was reported with the rate of 15% and 9.5% for open-entry and the Veress technique respectively (19). For open entry technique and direct trocar insertion technique the leakage rates were reported as 8.8% and 1% respectively by Kaistha et al. Although we haven't used additional suturing**,** our results are still comparable with previous studies which utilized suturing after trocar insertion (6,19,24)**.** In our study, leakage that needs suturing around the standard 10 mm trocar was observed in only 4 (8.8%) patients in the fingertip

technique group and 2 (4.4%) patients in the Veress needle group. In these patients, we switched the 10 mm trochar with a 15 mm trochar instead of reducing the incision line with sutures. Gas leakage was observed in two patients with subcutaneous bleeding (two of four patients) in the fingertip group due to skin retraction during cauterization of the bleeding area. The other two patients with leakage were obese. Gas leakage was controlled either by changing the trocar with 15 mm size or suturing around the cannula. In these patients, the whole finger had to be inserted into the abdominal layer to reach the peritoneal cavity; however, the diameter of the proximal part of the finger is larger, and this causes the enlargement of the incision. It is notable that there is no need for extractors or assistance during entry when using the fingertip technique, in comparison to open entry techniques, which do require such measures. In our experience, the most important point to prevent gas leakage is to make the skin incision slightly smaller than the diameter of the trocar. Also, another tip to prevent gas leakage is to insert the only tip of the finger during the peritoneal layer blunt dissection. With these maneuvers, peritoneal layer was not open too large. Furthermore, using a cannula with a helical structure shaft can also decrease the gas leakage than straight shaft cannula.

The duration of the initial entry into the abdomen is another important issue. In a prospective study, the time required for entry was 375 s for open entry technique and 331 s for the Veress technique (19). In another study, the mean access time was reported as 180 s for the open-entry technique and 80 s for the direct trocar insertion technique (24).

In the current study, the duration of entry was shorter in the fingertip technique than the Veress needle technique. Also, for this matter, the results of the fingertip technique were better than open entry technique and direct trocar insertion technique (7,11,12,24-28). Our better results can be explained by some technical advantages that the fingertip technique has over the other methods. Open entry techniques require maneuvers such as traction of skin, suturing around the trocar which are time-consuming (7,11,12,24-27). Also, high flow modification Veress technique requires a longer time to fill the peritoneal cavity with CO_2 in order to achieve proper pressure compared to the fingertip technique. Unsuccessful attempts while performing the Veress needle technique also increase the duration of entry.

Moreover, failed attempts can also increase the procedure time. In the literature, successful entry was achieved in second or more than two attempts in 12% to 33% of cases when using various modified Veress needle techniques (9,29,30), and in 7.8% of cases when using the indirect trocar entry technique (30). It is well known that the complication rate increases with the number of entry attempts. Two or more attempts during Veress needle technique was associated with a significantly higher risk of preperitoneal insufflation (22). In our study, we achieved pneumoperitoneum in 77.7% of patients in the Veress needle group and in 100% of patients in the fingertip group by a single attempt; this ratio obtained in our Veress needle group is similar to ratios in previous studies. Concerning the fingertip technique, we safely achieved pneumoperitoneum in a short time in all patients, without the need for second attempts or different entry techniques. Furthermore, we were able to achieve pneumoperitoneum using the fingertip technique safely and easily in a patient for whom entry with the Veress needle technique had failed.-

Habibi et al stated that obesity is the most challenging factor for a successful abdominal entry during laparoscopic surgery and it is irrespective of the used technique (14). Fingertip technique enables easily reach into the peritoneum to finger length, and the abdominal wall layers were passed with the fingertip bluntly. Unfortunately, in our experience, gas leakage is observed more frequently in obese patients because the diameter of the proximal of the finger is larger than that of the fingertip. In these cases, the problem may be resolved by initial entry being done in the lateral position (i.e., the working channel position) and by then inserting the camera port.

The Fingertip technique and Veress needle technique are different regarding several features. In addition to being a safe, easy, fast, and feasible method for any kind of laparoscopic surgery, it minimizes the possible complications, which also prevents time loss. Especially for surgeons just starting to learn, laparoscopic entry is challenging most of the time; as such, surgeons are always seeking a safe entry method.

There are, however, some flaws in this technique. First, if the surgeon has a large index finger, the initial incision will also be enlarged. In this situation, the little finger may be used as a guide. Second, although this technique helps

avoid major intra-abdominal vascular injury and solid organ injury, in cases of adhesion due to previous surgery, the technique does not allow for the accurate assessment of intra-abdominal adhesion, as in other techniques. This problem can be solved by entering the abdominal cavity using the fingertip technique in a location away from the previous incision line.

Limitations

This study has several limitations. First of all, our study was designed with a retrospective nature while the data were collected prospectively. Secondly, the study is based on data from a single tertiary center. This study uses a small sample size to show differences between the two groups according to major complications; A larger sample size would provide more reliable results. The fact that all procedures were performed by the same surgeon should be stated as an another weakness. Furthermore, our results should be confirmed by a prospective, multi-institutional study. In addition, we could not assess long-term complications, such as port-site hernia and port-site infection.

CONCLUSION

The fingertip technique may be considered as an option for initial laparoscopic entry during any kind of laparoscopic abdominal surgery with its lower major and minor complications rates and shorter applying time compared to the Veress needle technique.

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Conflict of interest: All authors report no conflict of interest

Ethical Approval: This study was approved by the Ethical Committee of Kartal. Dr. Lutfi Kirdar City Hospital (Desicion Number: 2025/010.99/20/33, Date: 2025-09-29).

Author contributions: Conceptualization and Methodology: AS, OO, ED ; Investigation; ED, UC, CC, ; Resources: AC ; Writing - Original Draft; AC,OO,CC,ED; Writing - Review & Editing; ED,UC,CC; Supervision: AS, OO.

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Original Article
Özgün Araştırma

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Lesion-Based Comparison of Storz Professional Image Enhancement System and White-Light Cystoscopy for Detecting Bladder Carcinoma In Situ

Mesane Karsinoma İn Situ Tanısında Storz Professional Image Enhancement System ile Beyaz Işık Sistoskopisinin Lezyon Bazlı Karşılaştırılması

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ABSTRACT

Objective: This study aimed to evaluate whether the Storz Professional Image Enhancement System (SPIES) offers superior diagnostic accuracy compared with white-light cystoscopy (WLC) in the detection of bladder carcinoma in situ (CIS), given the limited evidence available for CIS-suspicious lesions.

Material and Methods: This retrospective study included 46 patients who underwent cystoscopy under local anesthesia for microscopic or macroscopic hematuria between July 2022 and July 2025. Patients with prior cystoscopy, pelvic radiotherapy, or active urinary tract infection were excluded. CIS-suspicious lesions identified during WLC prompted scheduling for TUR-BT under general anesthesia. During TUR-BT, all lesions were evaluated sequentially with WLC followed by three SPIES modes (Clara+Chroma, Spectra A, and Spectra B) by a single experienced urologist. A total of 95 CIS-suspicious lesions were recorded, individually resected, and submitted for separate pathological analysis.

Results: A total of 95 CIS-suspicious lesions were identified in 46 patients, of which 28 were CIS-positive. Lesion-based diagnostic accuracy was 30.5% for WLC and 33.7% for SPIES. SPIES detected 23 additional lesions not visualized with WLC, corresponding to an incremental lesion detection contribution of 24.2% overall and 31.9% relative to WLC-positive findings. Among CIS-positive lesions, SPIES provided an incremental diagnostic gain of 35.7% and a 55.6% relative improvement over WLC. McNemar's test demonstrated a statistically significant difference in paired detection outcomes between the modalities ($\chi^2 = 8.1$, $p = 0.004$), confirming the superior detection performance of SPIES.

Conclusions: SPIES outperformed WLC in detecting bladder CIS, indicating a meaningful diagnostic benefit that warrants validation in prospective comparative studies.

Keywords: bladder, carcinoma in situ, cystoscopy

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ÖZET

Amaç: Bu çalışma ile Storz Professional Image Enhancement System (SPIES) yönteminin mesane karsinoma in situ (CIS) tespitinde beyaz ışık sistoskopiye (WLC) kıyasla üstün tanısal doğruluk sağlayıp sağlamadığının değerlendirilmesi amaçlandı.

Gereç ve Yöntemler: Bu retrospektif çalışmaya, Temmuz 2022 ile Temmuz 2025 arasında mikroskopik veya makroskopik hematüri nedeniyle lokal anestezi altında sistoskopi yapılan toplam 46 hasta dahil edildi. Daha önce sistoskopi öyküsü bulunanlar, pelvik radyoterapi geçmişi olanlar ve aktif üriner sistem enfeksiyonu bulguları taşıyan hastalar dışlandı. WLC sırasında CIS şüphesi oluşturan lezyonlar tespit edildiğinde hastalar genel anestezi altında TUR-BT için planlandı. TUR-BT sırasında tüm lezyonlar sırasıyla WLC ve ardından üç SPIES modu (Clara+Chroma, Spectra A ve Spectra B) ile değerlendirildi. Toplam 95 CIS-şüpheli lezyon kaydedildi; her biri ayrı olarak rezeke edilerek patolojik incelemeye gönderildi.

Bulgular: Çalışmada 46 hastada toplam 95 CIS-şüpheli lezyon belirlendi ve bunların 28'i CIS-pozitifti. Lezyon bazlı tanısal doğruluk WLC için %30,5, SPIES için %33,7 olarak bulundu. SPIES, WLC ile görüntülenemeyen 23 ek lezyonu saptadı; bu durum tüm lezyonlar içinde %24,2'lik ve WLC-pozitif lezyonlara göre %31,9'luk artırılmış lezyon tespit katkısına karşılık gelmekteydi. CIS-pozitif lezyonlar arasında SPIES, WLC'nin kaçırdığı 10 lezyonu ek olarak tespit ederek %35,7'lik artırılmış tanısal kazanç ve WLC'ye göre %55,6'lık göreceli tanısal iyileşme sağladı. McNemar testi, iki yöntem arasında eşleştirilmiş tespit sonuçları bakımından anlamlı fark olduğunu gösterdi ($\chi^2 = 8.1$, $p = 0.004$) ve SPIES'in üstün tespit performansını destekledi.

Sonuç: SPIES, mesane CIS tespitinde WLC'ye kıyasla daha üstün performans göstermiş olup, klinik açıdan anlamlı bir tanısal avantaj sunduğu düşünülmektedir. Bu etkinin daha net ortaya konulması için ileri görüntüleme yöntemlerini içeren prospektif karşılaştırmalı çalışmalar gereklidir.

Anahtar Kelimeler: karsinoma in situ, mesane, sistoskopi

INTRODUCTION

Carcinoma in situ (CIS) is a high-grade, non-invasive urothelial tumor that is confined to the epithelium and demonstrates distinct macroscopic and microscopic features compared with papillary bladder tumors. CIS may occur alone or in conjunction with papillary lesions and can also be detected in the upper urinary tract and urethra. Its appearance under white-light cystoscopy (WLC) often mimics benign conditions such as inflammation, catheter-related hyperemia, and post-intravesical treatment changes, making accurate differentiation from these lesions particularly challenging (1).

Numerous studies have investigated whether advanced imaging modalities offer superior diagnostic performance compared with WLC in the detection of bladder tumors, including the challenging subgroup of CIS lesions. In the study by Pederzoli et al., which evaluated 135 bladder biopsies from 79 patients, CIS detection rates under WLC and blue-light cystoscopy (BLC) were compared; notably, 23 of the 41 CIS lesions (56%) were not visible on WLC and were identified only with BLC (2). Similarly, in the cohort of 139 patients assessed by Geavlete et al., narrow-band imaging (NBI) demonstrated significantly higher lesion-based CIS detection rates compared with WLC (93.75% vs. 71.90%) (3). In a multicenter study by Drejer et al., including 482 biopsies, sensitivity analyses performed on each biopsy revealed that both BLC and NBI provided markedly higher sensitivity than WLC (NBI 72.7% and BLC 78.2% vs. WLC 52.7%; $p<0.05$) (4). Collectively, these findings indicate that WLC alone may be insufficient for reliable CIS detection and highlight the clinical importance of incorporating enhanced imaging modalities to improve diagnostic sensitivity.

Although several studies have evaluated the effectiveness of the SPIES (Storz Professional Image Enhancement System) system in the diagnosis and follow-up of bladder tumors, research focusing exclusively on CIS cases remains limited. This study aims to determine whether SPIES provides superior diagnostic performance compared with WLC in the detection of bladder CIS.

MATERIALS AND METHODS

This study was approved by the Institutional Review Board of Bağcılar Training and Research Hospital (Approval Number: 2025/11/05/105, Date: 2025-11-28). Between July 2022 and July 2025, a total of 46 patients over the age of 18 who underwent cystoscopy under local anesthesia for microscopic or macroscopic hematuria at Bağcılar Training and Research Hospital were retrospectively included. Patients with a prior history of cystoscopy for any indication, a history of pelvic radiotherapy, or clinical findings suggestive of an active urinary tract infection were excluded. Demographic and clinical variables, including age, sex, type of hematuria at presentation (microscopic or macroscopic), and whether transurethral resection of bladder tumor (TUR-BT) was subsequently performed under spinal or general anesthesia, were recorded. When CIS-suspicious lesions were identified during cystoscopy performed under local anesthesia using WLC, the patients were scheduled for TUR-BT under general anesthesia.

All cystoscopic evaluations and transurethral resections during TUR-BT were performed by a single experienced urologist (IU). Before resection, a detailed cystoscopic examination was first carried out using WLC, and all CIS-suspicious lesions were recorded. The bladder was then re-examined using three SPIES modalities (Clara+Chroma, Spectra A, and Spectra B). During this evaluation, additional suspicious lesions not detected with WLC were identified, and lesions initially considered suspicious under WLC but assessed as benign with SPIES were also documented (Figure 1). When evaluated separately with WLC and SPIES, a total of 95 CIS-suspicious lesions were identified in 46 patients. Each lesion was subsequently resected individually with bipolar energy under the Clara+Chroma mode, and all specimens were submitted separately for pathological analysis according to their endoscopic descriptions. All histopathological assessments were performed by a single pathologist specialized in urologic pathology.

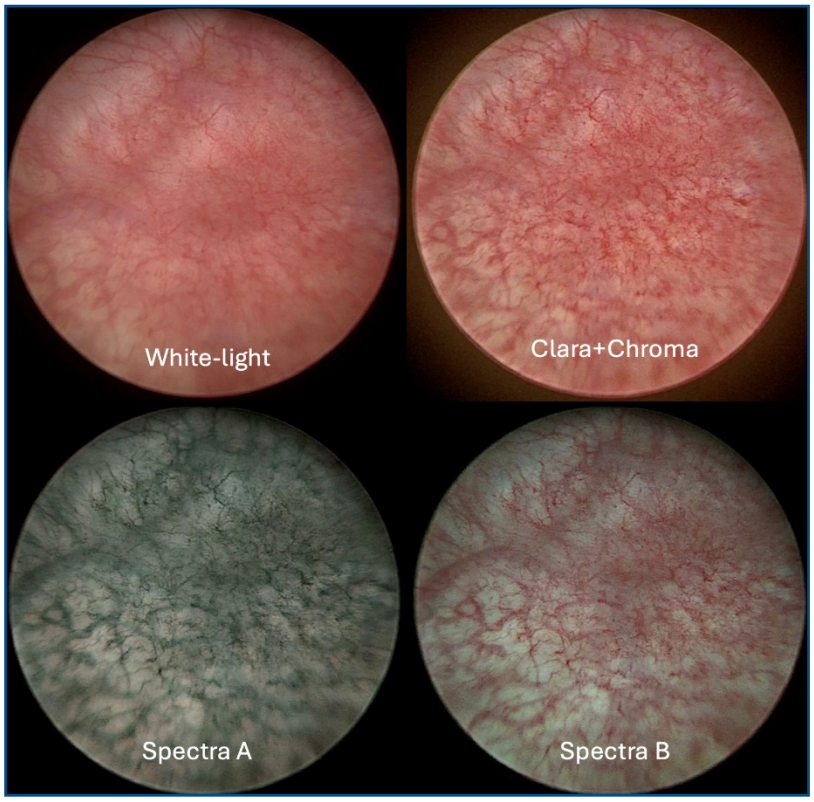


Figure 1. Representative images of a CIS-suspicious lesion obtained with WLC, Clara+Chroma, Spectra A, and Spectra B modalities.

Statistical Analysis

The primary outcome of the study was the detection of additional CIS-positive lesions by the two imaging modalities. Descriptive statistics were presented as frequencies, percentages, means, and standard deviations. Comparisons of clinical and operative characteristics between groups were performed using the independent samples t-test and Fisher's exact test. The efficacy of the diagnostic modalities was evaluated using sensitivity and accuracy measures. McNemar's test was applied to compare paired diagnostic detection outcomes between WLC and SPIES. A p-value of <0.05 was considered statistically significant for all analyses. All statistical analyses were performed using IBM SPSS Statistics for Windows, version 29.0 (IBM Corp., Armonk, NY, USA).

RESULTS

The mean age of the patients was 67.6±4.4 years. There were no statistically significant differences between the CIS-positive and CIS-negative groups with respect to age, sex, type of hematuria, anesthesia method, or lesion multiplicity (Table 1). Among the 46 patients included in the study, at least one CIS-positive lesion was identified in 19 patients, and CIS positivity was confirmed in 28 of the 95 lesions evaluated. WLC detected 18 of the 28 CIS-positive lesions, whereas SPIES did not miss any CIS-positive lesions. Consequently, on a lesion-based analysis, the sensitivity was 60.7% for WLC and 100% for SPIES, and the diagnostic accuracy rates were 30.5% and 33.7%, respectively (Table 2).

Using a paired lesion-based analysis, SPIES demonstrated a significantly higher detection rate compared with WLC. In the concordance assessment, SPIES detected 23 additional lesions that were not identified by WLC, corresponding to an incremental lesion detection contribution of 24.2% of all lesions and 31.9% relative to WLC-positive findings. Among the 28 CIS-positive lesions, SPIES detected all lesions, whereas WLC missed 10 of them. This represents an incremental CIS diagnostic gain of 35.7% and a 55.6% relative improvement over the CIS-positive lesions identified by WLC. McNemar's test demonstrated a statistically significant difference in paired detection outcomes between the two modalities ($\chi^2 = 8.1$, $p = 0.004$), indicating that SPIES provides a markedly higher diagnostic yield for detecting CIS-positive lesions.

Table 1. Comparison of patient characteristics according to CIS status

	CIS-negative	CIS-positive	p-value
Age, mean±SD	68.29±4.00	66.63±4.85	0.105
Gender, n (%) Male Female	 22 (81.5) 5 (18.5)	 17 (89.5) 2 (10.5)	 0.552
Hematuria, n (%) Microscopic Macroscopic	 15 (55.6) 12 (44.4)	 13 (68.4) 6 (31.6)	 0.379
Anesthesia, n (%) Spinal General	 19 (70.4) 8 (29.6)	 14 (73.7) 5 (26.3)	 0.806
Number of lesions, n (%) Single Multiple	 12 (44.4) 15 (55.6)	 4 (21.1) 15 (78.9)	 0.101

CIS: carcinoma in situ, SD: standard deviation.

Table 2. Distribution of CIS-suspicious lesions by WLC and SPIES findings

	CIS-negative	CIS-positive	Total	p-value
WLC-positive/SPIES-positive	51	18	69	0.004*
WLC-negative/SPIES-positive	12	10	22	
WLC-positive/SPIES-negative	4	0	4	

* McNemar's test. CIS: carcinoma in situ, WLC: white-light cystoscopy, SPIES: Storz Professional Image Enhancement System

DISCUSSION

The SPIES platform offers four enhancement modes designed to improve image quality without the use of intravesical contrast agents. Chroma enhances image sharpness, whereas Clara increases the visibility of darker regions, and their combined application provides clearer and more detailed endoscopic views. Spectra A and Spectra B modify the spectral response of the system, thereby improving color contrast and potentially facilitating the detection of subtle mucosal abnormalities (5). In a study by Kamphuis et al. involving 73 participants, 20 bladder lesions were evaluated using four imaging modalities (WLC, Clara+Chroma, Spectra A, and Spectra B), and Clara+Chroma, Spectra A, and Spectra B consistently demonstrated statistically significant superiority over WLC in terms of image quality, although no significant differences were observed in delineation time (6). Similarly, in a web-based survey by Mulawkar et al., including 273 observers who assessed suspicious lesions from 16 patients, both Spectra A and Spectra B significantly improved the diagnostic accuracy of WLC ($p<0.001$) (7).

Several studies have demonstrated that performing TUR-BT under SPIES guidance enhances diagnostic accuracy in bladder cancer. In a study by Howard et al. involving 49 patients with 165 lesions, the Chroma mode was compared with WLC and yielded an additional malignancy detection rate of 36% across both low-grade and high-grade tumors (8). In another study, Gnyawali et al. compared Spectra A with WLC in 64 patients with 193 lesions; the false-positive rates of TUR-BT performed under Spectra A and WLC guidance were 21.19% and 15.86% ($p = 0.006$), while the false-negative rates were 4% and 19.2% ($p = 0.001$), respectively (9). Beyond diagnostic performance, some studies have focused on comparing recurrence rates in patients undergoing TUR-BT with SPIES versus WLC. In a prospective randomized study by Trelles Guzmán et al. involving 103 patients, recurrence outcomes were assessed over a median follow-up of 12 months. The overall recurrence rates in the SPIES and WLC groups were 12.2% and 25.9%, respectively, with a statistically significant difference in the low- and intermediate-risk subgroup (7.7% vs. 30.8%, $p = 0.003$) (10). Similarly, in a multicenter prospective study conducted by de la Rosette et al., including 689 patients with 18 months of follow-up, recurrence rates differed significantly between the two modalities in the primary low- and intermediate-risk subgroup (31.9% vs. 22.3%, $p = 0.035$), whereas no significant differences were identified between the groups in the remaining risk categories (11).

In our study, SPIES outperformed WLC in the diagnosis of bladder CIS by identifying 10 additional CIS-positive lesions that were missed by WLC. This enhanced detection capability, reflected by higher sensitivity, greater lesion-based diagnostic accuracy, and a statistically significant difference in paired detection outcomes on McNemar's analysis, suggests that SPIES may provide a clinically meaningful advantage in the endoscopic evaluation of patients at risk for CIS. The most prominent limitations of the study include the lack of assessment of the impact of SPIES use on operative time, the absence of lesion classification based on their intravesical location, and the lack of a comparative analysis with simultaneous cytological evaluation. However, to the best of our knowledge, our study holds particular significance as it is the first to perform a comparative evaluation specifically in CIS-suspicious lesions rather than within a predefined subgroup.

CONCLUSIONS

SPIES markedly improved the endoscopic detection of CIS, identifying additional CIS-positive lesions that were missed by WLC. Its superior sensitivity, diagnostic accuracy, and the statistically significant difference in paired detection outcomes indicate a meaningful clinical advantage in evaluating patients at risk for bladder CIS. To better delineate the magnitude of this benefit, prospective comparative studies incorporating other advanced imaging modalities such as NBI and BLC are warranted.

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Informed Consent: Informed consent was obtained from all individual participants included in the study.

Data Availability: All data generated or analyzed during this study are included in this article. Further inquiries can be directed to the corresponding author.

Author Contributions: IU: Concept and design, data collection, data analysis and interpretation, manuscript writing, statistical analysis. YED: Concept and design, data collection, data analysis and interpretation. AYM: Critical revision of the manuscript, supervision. All authors read and approved the final manuscript.

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Case Report
Olgu Sunumu

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Knotting of Percutaneous Nephrostomy Catheter within the Renal Calyx and Endoscopic Removal: An Extremely Rare Complication

Perkütan Nefrostomi Kateterinin Renal Kaliks İçinde Düğümlenmesi ve Endoskopik Çıkarılması: Son Derece Nadir Bir Komplikasyon

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ABSTRACT

Percutaneous nephrostomy catheter placement is a widely used decompression method for upper urinary tract obstructions. This case report presents the successful endoscopic management of an extremely rare complication: spontaneous knotting of a nephrostomy catheter within the renal calyx.

A 31-year-old female patient presented to the urology clinic with right flank pain of colicky nature. Non-contrast computed tomography imaging revealed a 17 mm stone in the right proximal ureter and grade 3 hydronephrosis in the right kidney, while laboratory tests indicated urinary tract infection. An emergency percutaneous nephrostomy catheter was placed, and endoscopic stone treatment was planned following infection treatment and hospitalization. During the operation, it was discovered that the nephrostomy catheter could not be removed and the catheter tip was knotted. Under flexible renoscopy guidance, stone formations around the catheter were fragmented with holmium laser, and the catheter was successfully removed. The patient was discharged on the first postoperative day without complications.

Nephrostomy catheter knotting is an extremely rare but serious complication reported in the literature. Endoscopic approaches represent a safe and effective treatment option in such cases. Proper technical use during catheter placement and regular follow-up are crucial in preventing this complication. For clinicians encountering similar situations, endoscopic solution methods should be the preferred choice.

Keywords: catheter knotting, complication management, flexible renoscopy, percutaneous nephrostomy

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ÖZET

Perkütan nefrostomi kateteri yerleştirilmesi, üst üriner sistem obstrüksiyonlarında yaygın olarak kullanılan bir dekompresyon yöntemidir. Bu olgu sunumu, son derece nadir bir komplikasyonun başarılı endoskopik yönetimini sunmaktadır: nefrostomi kateterinin renal kaliks içinde spontan düğümlenmesi.

31 yaşında kadın hasta sağ yan ağrısı şikayeti ile üroloji kliniğine başvurdu. Kontrastsız bilgisayarlı tomografi görüntülemesinde sağ proksimal üreterde 17 mm taş ve sağ böbrekte grade 3 hidronefroz saptanırken, laboratuvar testlerinde üriner sistem enfeksiyonunu saptandı. Acil perkütan nefrostomi kateteri yerleştirildi, enfeksiyon tedavisi ve hastaneye yatış sonrası endoskopik taş tedavisi planlandı. Operasyon sırasında nefrostomi kateterinin çıkarılamadığı ve kateter ucunun düğümlendiği keşfedildi. Fleksible renoskopi rehberliğinde, kateter çevresindeki taş oluşumları holmium lazer ile parçalandı ve kateter başarıyla çıkarıldı. Hasta postoperatif birinci günde komplikasyon olmaksızın taburcu edildi.

Nefrostomi kateteri düğümlenmesi literatürde bildirilen son derece nadir ancak ciddi bir komplikasyondur. Endoskopik yaklaşımlar bu tür vakalarda güvenli ve etkili bir tedavi seçeneğini temsil eder. Kateter yerleştirme sırasında uygun teknik kullanımı ve düzenli takip bu komplikasyonun önlenmesinde kritiktir. Benzer durumlarla karşılaşan klinisyenler için endoskopik çözüm yöntemleri tercih edilecek seçim olmalıdır.

Anahtar Kelimeler: fleksible renoskopi, kateter düğümlenmesi, komplikasyon yönetimi, perkütan nefrostomi

INTRODUCTION

Percutaneous nephrostomy (PCN) has been used since 1955 to provide urinary diversion in upper urinary tract obstructions and has become one of the standard treatment modalities today—a safe decompression procedure (1,2). With technical advances and increased experience, success rates have exceeded 95%, and morbidity and mortality rates have significantly decreased.

Current literature reports PCN-related complication rates between 4-25%, mostly consisting of minor complications such as bleeding, infection, adjacent organ injury, catheter migration, and obstruction (3,4). The vast majority of these complications can be successfully managed with conservative treatment or minimally invasive interventions.

Nephrostomy catheter knotting is an extremely rare complication reported in the literature but involves serious technical challenges (5). Multiple factors play a role in the development of this condition, including inappropriate catheter length for renal pelvis anatomy, prolonged catheterization, development of catheter coiling with kidney movements, and the effects of inflammatory processes (6). While removal of a knotted catheter has traditionally been considered a complex situation requiring open surgery, recent advances in endoscopic techniques, particularly the widespread adoption of flexible renoscopy and holmium laser lithotripsy combinations, have made minimally invasive solutions possible for such complicated situations. The high success rates and low morbidity profile of endoscopic combination techniques (ECIRS) offer safe alternatives to open surgery.

This case report presents the spontaneous knotting of a percutaneous nephrostomy catheter placed for ureteral stone and its successful endoscopic removal using flexible renoscopy with holmium laser lithotripsy, discussing management strategies for this rare complication in light of similar cases in the literature.

CASE PRESENTATION

A 31-year-old female patient presented to the urology clinic with right flank pain of colicky character persisting for three days. The patient's medical history included parathyroid adenoma, with no previous urological surgical history. Physical examination revealed right costovertebral angle tenderness and right flank pain. Laboratory tests showed serum creatinine at 0.9 mg/dL within normal limits, while hemoglobin was 9 g/dL indicating mild anemia, and erythrocyte count was 173/µL showing decreased levels. White blood cell count was elevated at 15,600/µL and C-reactive protein at 88 mg/L. Complete urinalysis revealed 273 erythrocytes and 328 leukocytes. These findings

were generally consistent with inflammatory process and mild anemia.

Computed tomography (CT) examination revealed thinning of the right kidney parenchyma and grade 3 hydronephrosis, particularly prominent in the calyces. A 17 mm hyperdense lesion in the right proximal ureter was consistent with stone, while a 16 mm hyperdense lesion in the right kidney lower pole was similarly evaluated as consistent with stone. These imaging findings supported the diagnosis of obstructive uropathy and multiple stone disease (Figure 1).

The patient was hospitalized in the urology clinic with diagnoses of urinary tract infection and obstructive uropathy. Right percutaneous nephrostomy was placed emergently. Urine culture showed Pseudomonas aeruginosa growth at 100,000 CFU/mL. The patient received meropenem 3×1 g intravenous treatment for 10 days. Following sterile control urine culture, endoscopic stone treatment was planned.

The patient was taken to surgery under general anesthesia in the lithotomy position. Initially, a 9.5 Fr ureterorenoscope was inserted through the external meatus via guide wire through the right ureteral orifice to reach the proximal ureter. The 17 mm stone observed in the proximal ureter was fragmented with holmium laser.

During the operation, it was noticed that the nephrostomy catheter could not be removed, and fluoroscopic imaging showed that the catheter tip was knotted (Figure 2). In this situation, an access sheath was placed over the guide wire, and the kidney was entered with a flexible renoscope. The tip of the nephrostomy catheter was observed to be knotted in the right kidney middle-lower calyx and surrounded by stone fragments. Stone fragments around the catheter were fragmented using holmium laser, and the nephrostomy catheter was successfully removed (Figures 3, 4). At the completion of the procedure, the access sheath was removed and a 4.8 Fr, 26 cm single-ended double J catheter was placed retrogradely into the right kidney (Figure 5). Postoperative control imaging showed the double J catheter in appropriate position, and the procedure was completed successfully. The patient, who developed no complications on the first postoperative day, was discharged with recommendations.

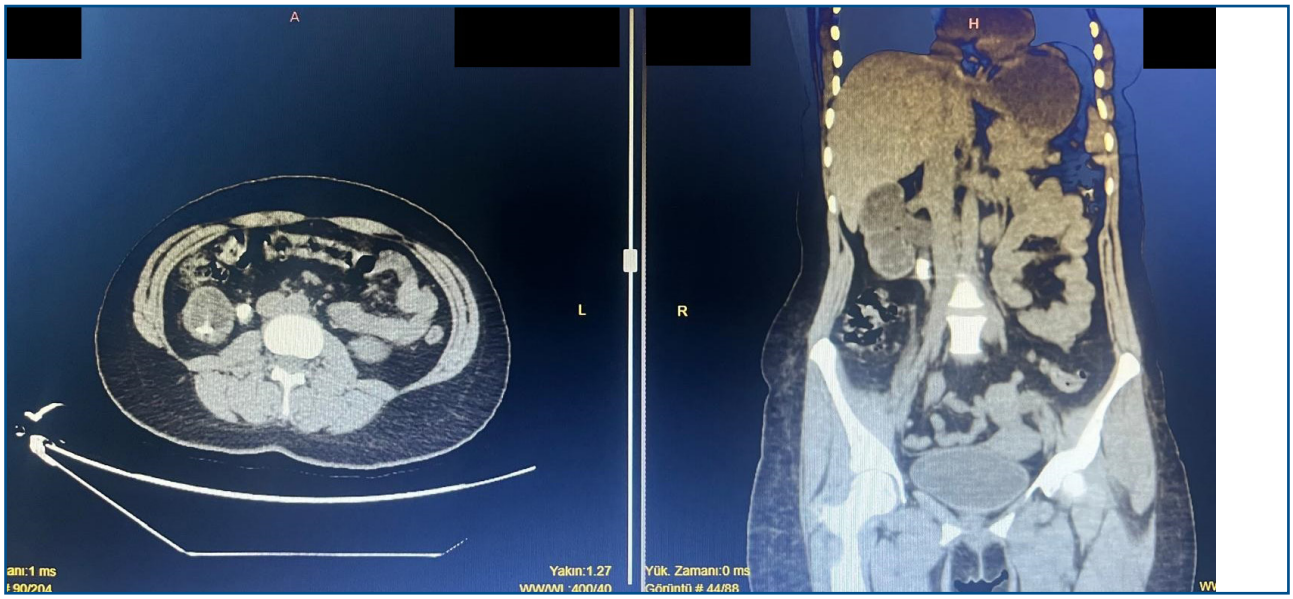


Figure 1. Axial and coronal CT appearance - grade 3 hydronephrosis and ureteral stone

Technetium 99m Dimercaptosuccinic acid (Tc-99m DMSA) static renal scintigraphy showed significantly decreased radiopharmaceutical uptake in the right kidney, with global function contribution calculated as 16%. Multiple photopenic areas disrupting parenchymal contour integrity were observed, indicating parenchymal damage findings. The left kidney showed diffusely decreased uptake in the upper portion with photopenic areas disrupting contour regularity, and global function contribution was calculated as 84%.

Technetium-99m diethylene-triamine-pentaacetate (Tc-99m DTPA) diuretic dynamic renal scintigraphy showed decreased size in the right kidney with functional contribution calculated as 32% and inadequate response to diuretic.

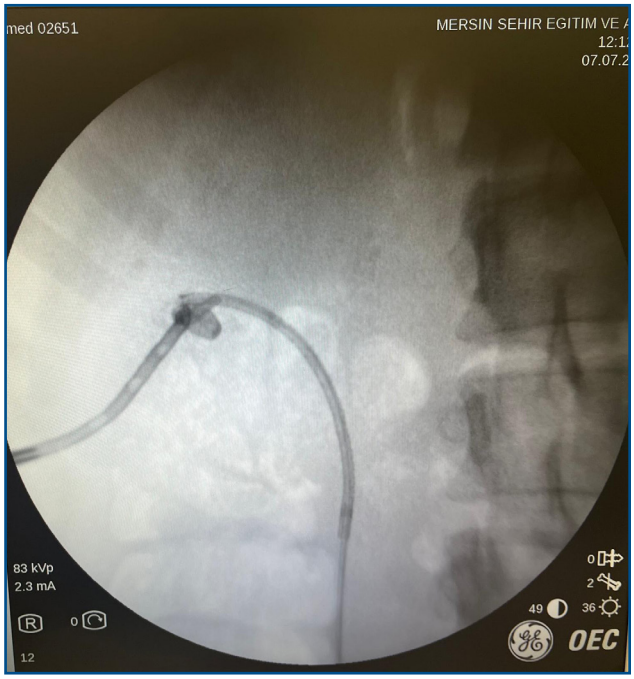


Figure 2. Fluoroscopic image of nephrostomy catheter - appearance of knotted catheter tip

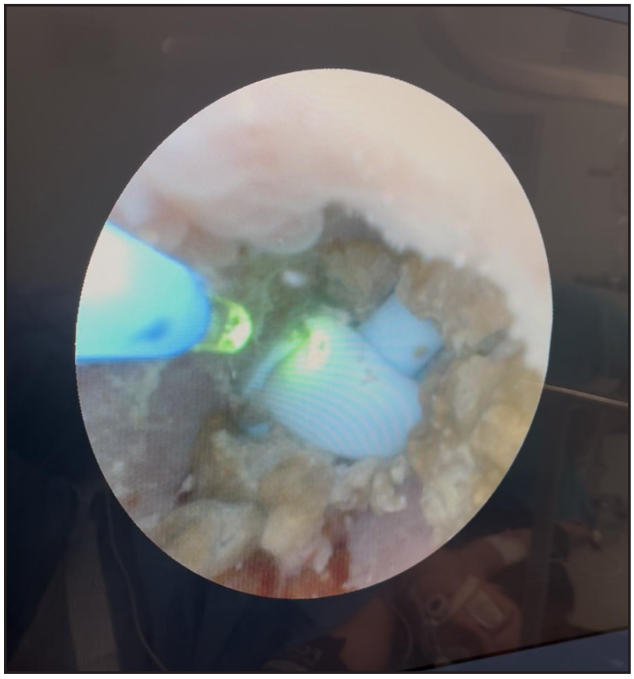


Figure 4. Intraoperative image of stone fragments around the catheter

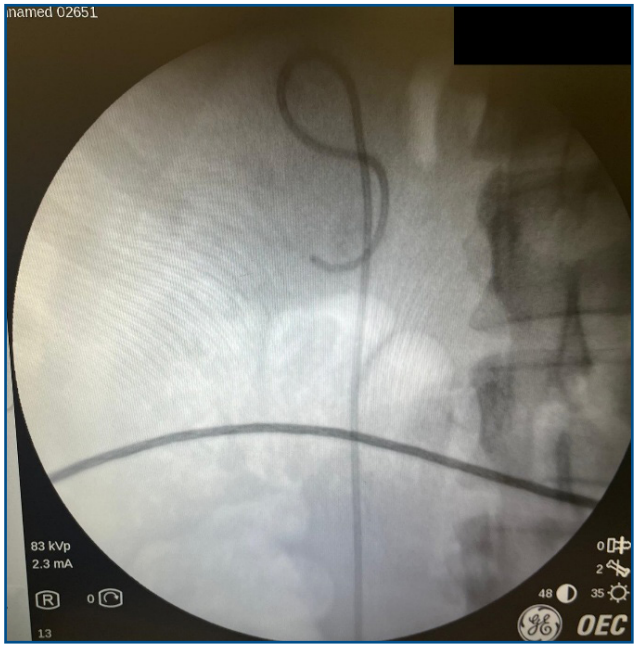


Figure 3. Fluoroscopic image of double J catheter placed after procedure

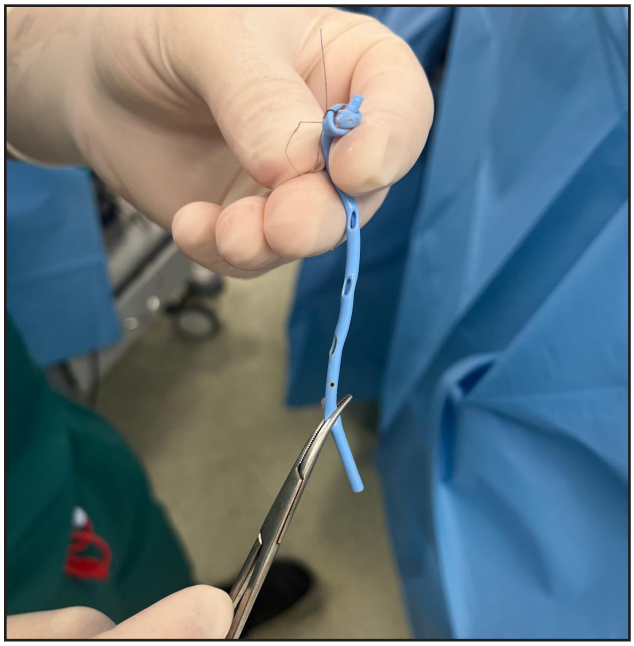


Figure 5. Image of removed nephrostomy catheter in knotted state

The left kidney showed increased size with functional contribution calculated as 68% and partial response to diuretic. These findings were consistent with severe function loss in the right kidney.

DISCUSSION

PCN is applied as a standard treatment method in upper urinary tract obstructions and is one of the preferentially chosen therapeutic modalities, especially in cases accompanied by urinary tract infections. Current literature reports complication rates varying between 4-25%, mostly minor complications (4). Nephrostomy catheter knotting is an extremely rare complication with limited case reports in the literature (5).

Nephrostomy catheter knotting can develop as a result of a combination of various factors. One study identified risk factors for catheter displacement in long-term nephrostomy patients, noting that first-time catheter placement, inexperienced operator, and catheter type significantly influence displacement risk (6). Comparative analysis of catheter designs revealed that pigtail-type catheters tend toward earlier accidental dislodgement compared to Foley-type catheters, with mean times of 20 versus 61 days respectively (6). The knotting mechanism observed in our case was likely formed by a combination of catheter length being excessively long relative to renal pelvis size, development of catheter coiling with kidney movements, accumulation and fixation of stone fragments around the catheter, and inflammatory process developing after infection. Our imaging findings support this mechanism. Several case reports in the literature document similar catheter-related mechanical complications including intravenous migration, malposition, and encrustation with stone formation, all requiring endoscopic or open surgical intervention (7,8).

Various approaches exist for removing knotted nephrostomy catheters and retained urological materials. In a similar case, successful removal of a guide wire fragment remaining in renal parenchyma by retrograde intrarenal surgery has been reported (9). Successful removal of foreign body forgotten after percutaneous nephrolithotomy (PCNL) with endoscopic methods has been reported (10). The endoscopic approach chosen in this case offered a safe alternative to open surgery due to its minimally invasive nature. Comparative analysis of management approaches for catheter-related mechanical complications demonstrates that endoscopic techniques have largely replaced open surgery, with success rates exceeding 90% and significantly shorter hospital stays compared to historical open approaches (11,12). The combination of flexible renoscopy with holmium laser lithotripsy, as employed in our case, provides both visualization and therapeutic capability for managing encrusted or knotted catheters (9,10).

Current literature reports that ECIRS shows high success rates. A series of 1000 cases reported that ECIRS is safe and effective, and tract localization does not affect stone-free rates (13). Additionally, simultaneous fragmentation of stone fragments around the catheter with holmium laser was made possible, allowing the patient to be discharged the same day with less complication risk compared to traditional open surgery (14,15). Vacuum mini-PCNL technique has also been reported to give successful results in similar complicated situations (16). These advantages are clearly seen in our imaging follow-up.

A reported case of knotted double J catheter shares similar endoscopic approach principles with our case (17). In both cases, successful results were achieved with minimally invasive methods using lithotripsy techniques.

A reported case of non-inflatable nephrostomy balloon catheter demonstrates the diversity of nephrostomy complications (18). This emphasizes the importance of creative endoscopic approaches in managing such complications.

A multicenter study investigating infectious complications after mini-ECIRS found that female gender, presence of ureteral stone, preoperative pyuria, and presence of previous nephrostomy were risk factors for postoperative fever

(19). Most of these risk factors were present in our case, and treatment was completed without complications with appropriate antibiotic therapy. Therefore, appropriate antibiotic treatment is critically important in complicated cases. In light of current literature, prevention of nephrostomy catheter knotting and other mechanical complications requires systematic attention to multiple technical factors. First, appropriate catheter size and type selection is crucial for preventing malposition. Studies comparing different catheter designs demonstrate that catheter type significantly impacts displacement risk, with pigtail catheters requiring more careful monitoring in the initial weeks post-placement compared to Foley-type designs (6). Second, catheter length must be carefully matched to renal pelvis anatomy and degree of hydronephrosis. In cases of grade 3 hydronephrosis, as observed in our patient, excessive catheter length within the dilated collecting system creates redundancy that predisposes to coiling and knotting (11). Current guidelines recommend selecting catheter length based on renal pelvis diameter measurements from preoperative imaging, avoiding excessive intraparenchymal coiling (4,5). Third, in patients requiring long-term nephrostomy drainage, planned catheter exchanges at regular intervals (typically 6-8 weeks) reduce the risk of encrustation, stone formation, and mechanical complications (20). Fourth, operator experience plays a significant role in complication prevention, with studies showing higher displacement rates when catheters are placed by less experienced operators (6). Micro-percutaneous nephrostomy technique has been reported to have advantages in critically ill patients and complex obstructive cases, potentially reducing mechanical complication risks through smaller caliber catheters (21). A study comparing nephrostomy tube with double J catheter showed that spontaneous stone passage was higher in the nephrostomy group and quality of life scores were better, though catheter-related complications must be carefully managed in both approaches (22). Systematic reviews comparing percutaneous nephrostomy with retrograde stenting have demonstrated that while PCN has lower initial failure rates, displacement remains a concern requiring attention to the technical factors outlined above (11,12).

Regular follow-up imaging should be performed for early detection of catheter position and complications, with fluoroscopic or ultrasonographic assessment recommended within the first week and subsequently as clinically indicated (20). Recent advances in home monitoring protocols and early warning systems have demonstrated significant reduction in catheter-associated complications, with remote monitoring reducing risk of catheter detachment (OR 0.060), poor drainage (OR 0.061), and retrograde infection (OR 0.195) compared to conventional follow-up methods (23). Infection control should be provided with appropriate antibiotic prophylaxis and treatment. Particularly in female patients, in the presence of ureteral stones, and in cases requiring preoperative nephrostomy, infectious complication risk is high, so a proactive approach should be adopted (11,19). These evidence-based preventive measures are critically important in preventing the mechanical and infectious complications seen in our case in the future.

CONCLUSION

Percutaneous nephrostomy catheter knotting is a rare but serious complication. As demonstrated in this case, endoscopic approach offers a safe and effective solution. With current literature support, cleaning stone fragments around the catheter and catheter removal under flexible renoscopy guidance can yield successful results. The development of endoscopic combination techniques makes minimally invasive solutions possible in such complicated situations. For complication prevention, evidence-based strategies are essential including appropriate catheter type and size selection matched to renal pelvis anatomy, consideration of hydronephrosis grade in catheter length selection, regular catheter exchanges in long-term drainage patients, and systematic imaging follow-up protocols (6,11,20). Particularly in patients with high infection risk and in cases of severe hydronephrosis as seen in our patient, multidisciplinary approach and proactive complication management with attention to catheter selection criteria are critical success factors.

Conflict of Interest: The authors declare no conflict of interest.

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Informed Consent: An informed consent form was signed by the patient, and permission was obtained for publication of the case.

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The journal's Editorial Board handles all appeal and complaint cases within the scope of Committee on Publication Ethics (COPE) guidelines. In such cases, authors should contact the editorial office directly regarding their appeals and complaints. When needed, an ombudsperson may be assigned to resolve cases that cannot be resolved internally. The Editor in Chief is the final authority in the decision-making process for all appeals and complaints.

The editorial and publication processes of the journal are shaped following the guidelines of the International Council of Medical Journal Editors (ICMJE).

The journal conforms to the Principles of Transparency and Best Practice in Scholarly Publishing (DOAJ).

Originality, high scientific quality, and citation potential are the most important criteria for a manuscript to be accepted for publication. Manuscripts submitted for evaluation should not have been previously presented or already published in an electronic or printed medium. Manuscripts presented in a meeting should be submitted with detailed information on the organization, including the name, date, and location of the organization.

An approval of research protocols by the Ethics Committee following international agreements (World Medical Association Declaration of Helsinki "Ethical Principles for Medical Research Involving Human Subjects") is required for experimental, clinical, and drug studies and some case reports. If required, ethics committee reports or an equivalent official document will be requested from the authors.

- For manuscripts concerning experimental research on humans, a statement should be included that shows that written informed consent of patients and volunteers was obtained following a detailed explanation of the procedures they may undergo.
- For studies carried out on animals, the measures taken to prevent pain and suffering of the animals should be stated clearly.
- Information on patient consent, the name of the ethics committee, and the ethics committee approval number should also be stated in the Materials and Methods section of the manuscript.
- It is the authors' responsibility to protect the patients' anonymity carefully. For photographs that may reveal the identity of the patients, releases signed by the patient or their legal representative should be enclosed.

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Preparation of Manuscript
Yazının Gönderimi

Makaleler yalnızca online olarak https://dergipark.org.tr/pub/endouroloji adresinden gönderilebilir. Başka bir yolla gönderilen yazılar değerlendirilmeye alınmayacaktır.
Dergiye gönderilen yazılar, öncelikle yazının dergi kurallarına uygun olarak hazırlanmasını ve sunulmasını sağlayacakları teknik değerlendirme sürecinden geçer. Derginin kurallarına uymayan yazılar, teknik düzeltme talepleri ile gönderen yazara iade edilir. Editör, ana metni değiştirmeden düzeltme yapabilir. Editör, yukarıda belirtilen şartlara uymayan makaleleri reddetme hakkını saklı tutar.
Yazarların aşağıdaki belgeleri göndermeleri gerekir:

- Yazar Katkı ve Telif Hakları Formu
- Bilgilendirilmiş Onam Formu
- ICMJE Çıkar Çatışması Formu
- Başlık Sayfası (Makale Başlığı, kısa başlık, yazarın adı, unvanı ve kurumu, sorumlu yazarın iletişim bilgileri, araştırmayı destekleyen kuruluş varsa kuruluşun adı)
- Ana belge (Tüm makalelerde, ana metinden önce de Özet bölümü yer almalıdır)
- Şekiller (JPEG formatı)
- Tablolar (en fazla 6 tablo)

Ana Belgenin Yayına Hazırlığı

Yazılar bilgisayar ile çift aralıklı olarak 12 punto büyüklüğünde ve Times New Roman karakteri ile yazılmalıdır. Her sayfanın bütün kenarlarında en az 2.5 cm boşluk bırakılmalıdır. Ana metin, yazarların adları ve kurulları hakkında hiçbir bilgi içermemelidir.
Yayın çeşitleri;

Araştırma Türü	Özet	Kelime Sayısı	Referans Sayısı	Tablo ve Figürler
Özgün Araştırma	250	4000	30	10
Derleme	250	5000	100	10
Olgu Sunumu	300	2000	20	10

Özgün makaleler yapılandırılmış bir Özet (abstract) (Giriş, Gereç ve yöntemler, Bulgular, Sonuçlar, Referanslar, Tartışma, gerekli ise Onam, Figürler; resim, grafik çizim, video, Tablolar) içermelidir.
Olgu sunumları için yapılandırılmış Özet gerekmez. Özet bölümü 300 sözcük ile sınırlandırılmalıdır. Özet de kaynaklar, tablolar ve atıflar kullanılamaz. Özün bittiği satırın altında sayısı 3-5 arasında olmak üzere anahtar kelimeler verilmelidir.
Türkiye dışındaki ülkelerden yazı gönderen yazarlar için Başlık, Özet, Anahtar Kelimeler ve yazıyla ilgili diğer bazı temel bölümlerin Türkçe olarak gönderilmesi zorunlu değildir. Bu bölümlerin çevirileri, yazarlar tarafından gönderilen özgün İngilizce metinler dikkate alınarak dergi editörlüğü tarafından yapılacaktır.
Makalede kullanılan tüm kısaltmalar, ilk kullanımda tanımlanmalıdır. Kısaltma, tanımı ardından parantez içinde verilmelidir.
Ana metinde bir ilaç, ürün, donanım veya yazılım programından bahsedildiğinde, ürünün adı, ürünün üreticisi, üretim şehri ve üreten şirketin ülkesi de dahil olmak üzere ürün bilgileri (ABD'de ise devlet dahil) parantez içinde verilmelidir.
Anahtar kelime seçimi için lütfen Index Medicus'un (MeSH) tıbbi konu başlıklarına bakınız: https://meshb.nlm.nih.gov/MeSHonDemand .
Tüm kaynaklara, tablolara ve şekillere ana metinde atıfta bulunulmalı ve kaynaklar, ana metinde geçen sıraya göre numaralandırılmalıdır. Kullanılan semboller, sembollerin standart kullanımlarına uygun olmalıdır.

1. Orijinal Araştırma Makaleleri

Amaç

Orijinal Araştırma Makaleleri, eleştirel okuyucular için güvenilirliği garanti altına almak için yeterli dokümantasyonla klinik veya temel araştırma sonuçlarını sunmalıdır. Bu makaleler alana yeni bakış açıları katmalı ve sağlam veriler ve sağlam metodoloji ile desteklenmelidir.

Gönderme Yönergeleri
Kelime Sınırı: Maksimum 4.000 kelime (kaynaklar, tablolar ve şekil başlıkları hariç).
Yapı: El yazmaları aşağıdaki şekilde yapılandırılmalıdır:
Başlık (hem Türkçe hem de İngilizce)
Özet (hem Türkçe hem İngilizce)
Anahtar Kelimeler (hem Türkçe hem İngilizce)
Giriş
Materyaller ve Yöntemler
Sonuçlar
Tartışma
Sonuçlar
Şekil ve Tablo Başlıkları (varsa)
Referanslar

İnceleme Süreci
Gönderilen tüm araştırma makaleleri, bilimsel değerlerini, özgünlüklerini ve derginin kapsamıyla alakalarını değerlendirmek için çift kör hakem incelemesinden geçecektir. İstatistiksel analizler ve metodoloji açıkça sunulmalı ve yeniden üretilebilir olmalıdır.

2. Olgu Sunumları
Amaç
Vaka Raporları, tanı zorlukları, tedavi yaklaşımları veya yeni gözlemler hakkında değerli içgörüler sağlayan benzersiz veya nadir klinik vakaları tanımlamalıdır. Bu raporlar iyi belgelenmeli ve tıbbi bilginin ilerlemesine katkıda bulunmalıdır.

Gönderme Yönergeleri
Kelime Sınırı: Maksimum 2.000 kelime (referanslar, tablolar ve şekil başlıkları hariç).
Yapı: El yazmaları aşağıdaki gibi yapılandırılmalıdır:
Başlık (hem Türkçe hem de İngilizce)
Özet (hem Türkçe hem de İngilizce)
Anahtar Kelimeler (hem Türkçe hem de İngilizce)
Giriş
Vaka Sunumu
Tartışma ve Sonuç
Şekil ve Tablo Başlıkları (varsa)
Referanslar

İnceleme Süreci
Vaka Raporları, önemli bir öğrenme fırsatı sunduklarından, uygun şekilde referanslandırıldıklarından ve klinik uygulamaya veya tıbbi araştırmaya katkıda bulunduklarından emin olmak için editöryal ve çift kör hakem değerlendirmesine tabidir.

3. Derleme Makaleleri
Amaç
Derleme Makaleleri, belirli bir konunun kapsamlı ve yapılandırılmış bir analizini sunar, mevcut literatürü özetler ve eleştirel olarak değerlendirir. Bu makaleler iyi organize edilmeli ve araştırma bulgularının güncel bir sentezini içermelidir.

Gönderme Yönergeleri
Kelime Sınırı: Maksimum 5.000 kelime (kaynaklar, tablolar ve şekil başlıkları hariç).
Yapı: El yazmaları aşağıdaki gibi yapılandırılmalıdır:
Başlık (hem Türkçe hem de İngilizce)
Özet (hem Türkçe hem İngilizce)
Anahtar Kelimeler (hem Türkçe hem İngilizce)
Ana Metin

Sonuç
Şekil ve Tablo Başlıkları (varsa)
Referanslar

Sistematik İncelemeler
Sistematik inceleme gönderen yazarlar, şeffaflığı ve metodolojik titizliği sağlamak için PRISMA yönergelerine uymalıdır. PRISMA kontrol listesine şu adresten ulaşılabilir: PRISMA Kontrol Listesi

İnceleme Süreci
İnceleme Makaleleri, analiz derinliği, alaka düzeyi ve bilimsel topluluğa katkısı açısından editör kurulu ve editöryal ve çift kör hakem değerlendirmesi tarafından değerlendirilecektir.

4. Editöre Mektuplar
Amaç
Editöre Mektuplar, okuyucuların daha önce yayınlanmış makalelere yanıt vererek, kısa bilimsel gözlemler sunarak veya derginin okuyucularının ilgisini çeken konulara değinerek akademik tartışmalara katılmalarını sağlar.

Gönderim Yönergeleri
Yapı: El yazmaları aşağıdaki şekilde yapılandırılmalıdır:
Başlık (hem Türkçe hem de İngilizce)
Anahtar Sözcükler (hem Türkçe hem İngilizce)
Ana Metin
Şekil ve Tablo Başlıkları (varsa)
Referanslar

İçerik: Mektuplar öz olmalı, söz konusu makalenin belirli yönlerine odaklanmalı ve akademik söyleme anlamlı bir şekilde katkıda bulunmalıdır. Bunlar şunları içerebilir:
Yayınlanmış bir makalenin metodolojileri, yorumları veya sonuçları hakkında eleştirel analiz veya yorum.
Konuyu daha iyi anlamayı sağlayan doğrulayıcı veya çelişkili verilerin sunumu.
Makalenin bulgularını daha geniş çalışma alanı içinde bağlamlandıran tartışmalar.
Uzunluk: Genellikle, mektuplar referanslar dahil 1.000 kelimeyi geçmemelidir.
Başlık: Orijinal makaleye atıfta bulunan bir başlıkla başlayın, örn. “[Yazar Adı(ları)] tarafından [Makale Başlığı] hakkında yorum.”
Yazar Bilgileri: Tüm katkıda bulunan yazarların tam adlarını, akademik bağlantılarını ve iletişim bilgilerini ekleyin.
Referanslar: Orijinal makaleyi ve diğer ilgili literatürü uygun şekilde atıfta bulunun.
Ton: Kişisel yorumlardan ziyade akademik eleştiriye odaklanarak saygılı ve profesyonel bir ton koruyun.

İnceleme Süreci
Gönderilen tüm mektuplar, açıklık, akademik değer ve etik standartlara uyumu sağlamak için editör ekibi tarafından incelenecektir. Mektuplar profesyonel bir üslupla yazılmalı ve anlamlı bir akademik söyleme katkıda bulunmalıdır.

5. Araştırma Notu
Amaç
Bir Araştırma Notu, tam uzunlukta bir makaleyi gerektirmeyen ancak yine de bilim camiası için değerli olan ön bulguların, yeni metodolojilerin veya önemli gözlemlerin kısa raporlarını yaymak için kullanılır.

Gönderme Yönergeleri
Uzunluk: Ana metin, referanslar, şekiller ve tablolar hariç 2.000 kelimeyi geçmemelidir.
İçerik: Araştırma Notları şunları içerebilir:
Potansiyel bir atılım veya yeni bir içgörü öneren ön veriler.
Yenilikçi tekniklerin veya metodolojilerin açıklamaları.
Daha fazla araştırmayı teşvik eden veya ortaya çıkan eğilimleri vurgulayan gözlemler.

Yapı
Notu, aşağıdaki gibi net başlıklarla düzenleyin:
Başlık (hem Türkçe hem de İngilizce)
Özet (hem Türkçe hem İngilizce)
Anahtar Kelimeler (hem Türkçe hem İngilizce)
Giriş: Çalışmanın bağlamını ve önemini kısaca ana hatlarıyla belirtin.
Yöntemler: Kullanılan yaklaşımı ve teknikleri özetleyin.
Sonuçlar: Temel bulguları özlü bir şekilde sunun.
Tartışma: Sonuçları ve potansiyel gelecekteki yönleri tartışın. Referanslar: Çalışmayı destekleyen temel alıntılarla sınırlayın.
Şekiller ve Tablolar: Yalnızca notun netliğini ve etkisini artırıyorsa ekleyin.

İnceleme Süreci
Araştırma Notları, bilimsel geçerliliği, özgünlüğü ve derginin kapsamıyla alakalı olmasını sağlamak için çift kör hakem incelemesinden geçecektir.

6. Kitap İncelemesi
Amaç: Kitap İncelemesi, alandaki son yayınların eleştirel bir değerlendirmesini sunarak okuyuculara kitabın içeriği, önemi ve devam eden akademik tartışmalarla alakalılığı hakkında fikir verir.

Gönderim Yönergeleri
İçerik: İncelemeler şunları içermelidir:
Uzunluk: Genellikle 1.500 ila 2.500 kelime arasındadır.
Kitabın ana temalarını ve argümanlarını özetleyin.
Çalışmanın güçlü ve zayıf yönlerini değerlendirin.
Kitabın alana katkısını ve güncel araştırma veya uygulamayla alakalılığını tartışın.
Kitabı mevcut literatüre yerleştirin ve benzersiz bakış açılarını veya yaklaşımları not edin.
Başlık: İncelemenin başında kitabın tam başlığını, yazar(lar), yayıncı, yayın yılı, sayfa sayısı ve ISBN'yi ekleyin.
Ton: Nesnel ve akademik bir ton koruyun, kanıtlarla desteklenen dengeli eleştiriler sunun.

İnceleme Süreci
Kitap İncelemeleri, editör ekibi tarafından açıklık, analiz derinliği ve derginin okuyucu kitlesiyle alakalılık açısından değerlendirilecektir.

Şekillerin ve Tabloların Yayına Hazırlığı
Şekiller, grafikler ve fotoğraflar, makale yükleme sistemi aracılığıyla ayrı dosyalar (JPEG formatında) halinde sunulmalıdır.
Dosyalar bir Word belgesine veya ana belgeye gömülmemelidir.
Şeklin alt birimleri olduğunda; alt birimler tek bir görüntü oluşturmak için birleştirilmemelidir. Her alt birim, başvuru sistemi aracılığıyla ayrı ayrı sunulmalıdır.
Şekil alt birimlerini belirtmek için görüntüler Arabik rakamlarla (1,2,3...) numaralandırılmalıdır.
Gönderilen her bir şeklin en düşük çözünürlüğü 300 DPI olmalıdır.
Şekillerin başlıkları ana belgenin sonunda listelenmelidir.
Bilgi veya resimler hastaların tanımlanmasına izin vermemelidir. Kullanılan herhangi bir fotoğraf için hastadan ve/veya yasal temsilcisinden yazılı bilgilendirilmiş onam alınmalıdır.

Tablolar ana belgeye gömülmeli veya ayrı dosyalar halinde sunulmalıdır. Tablo sayısı altı adet ile sınırlandırılmalıdır. Tüm tablolar, ana metinde kullanıldığı sırayla art arda numaralandırılmalıdır. Tablo başlıkları ve açıklamaları ana belgenin sonunda listelenmelidir.

Kaynaklar
Kaynaklar yazıda kullanılan kaynaklar cümlenin sonunda parantez içinde belirtilmelidir. Kaynaklar makalenin sonunda yer almalı ve makalede geçiş sırasına göre sıralanmalıdır. Kaynaklar yazarların soyadlarını ve adlarının baş harflerini, makalenin başlığını, derginin adını, basım yılını, sayısını, başlangıç ve bitiş sayfalarını belirtmelidir. Altı ve daha fazla yazarı olan makalelerde ilk

3 yazardan sonrası için ‘et al.’ veya ‘ve ark.’ ifadesi kullanılmalıdır. Kısaltmalar Index Medicus’ a uygun olmalıdır.
Kaynakların sonuna alıntı yapılan makalelerin doi linki eklenmelidir.

Örnekler

Makaleler için:

1. Tasci A, Tugcu V, Ozbay B, Mutlu B, Cicekler O. Stone formation in prostatic urethra after potassium-titanyl-phosphate laser ablation of the prostate for benign prostatic hyperplasia. J Endourol 2009;23:1879-81. https://doi.org/10.1089/end.2008.0596

Kitap için:

1.Günalp İ: Modern Üroloji. Ankara: Yargıçoğlu matbaası, 1975. Kitap bölümleri için: Anderson JL, Muhlestein JB. Extra corporeal ureteric stenting during laparoscopic pyeloplasty. Philadelphia: W.B. Saunders; 2003. p. 288-307

Web sitesi için;

Gaudin S. How moon landing changed technology history [Internet]. Computerworld UK. 2009 [cited 15 June 2014]. Available from: http://www.computerworlduk.com/in-depth/it-business/2387/how-moon-landing-changed-technology-history/

Bildiriler için;

Proceedings of the Symposium on Robotics, Mechatronics and Animatronics in the Creative and Entertainment Industries and Arts. SSAISB 2005 Convention. University of Hertfordshire, Hatfield, UK; 2005.

Tez için;

Ercan S. Venöz yetmezlikli hastalarda kalf kası egzersizlerinin venöz fonksiyona ve kas gücüne etkisi. Süleyman Demirel Üniversitesi Tıp Fakültesi Spor Hekimliği Anabilim Dalı Uzmanlık Tezi. Isparta: Süleyman Demirel Üniversitesi. 2016.

Geri Çekme veya Reddetme

Yazıyı Geri Çekme: Gönderilen yazının değerlendirme sürecinde gecikme olması vb. gibi gerekçelerle yazıyı geri çekmek ve başka bir yerde yayınlatmak isteyen yazarlar yazılı bir başvuru ile yazılarını dergiden geri çekebilirler.
Yazı Reddi: Yayınlanması kabul edilmeyen yazılar, gerekçesi ile geri gönderilir.

Kabul Sonrası

Makalenin kabul edilmesi durumunda, kabul mektubu iki hafta içinde sorumlu yazara gönderilir. Makalenin baskıdan önceki son hali yazarın son kontrolüne sunulur. Dergi sahibi ve yayın kurulu, kabul edilen makalenin derginin hangi sayısında basılacağına karar vermeye yetkilidir.
Yazarlar, makalelerini kişisel veya kurumsal web sitelerinde, uygun alıntı ve kütüphane kurallarına bağlı kalarak yayınlayabilirler.
Yazar değişikliği (isim, yazar ekleme) talebi, değerlendirme süreci tamamlanmadan önce tüm yazarlar tarafından imzalanmış bir mektupla Yayın Kurulu’na (yayıncı/dergi adresi) iletilmelidir.
Geri çekme ve düzeltmeler hakkında daha fazla bilgi için lütfen Geri Çekme ve Düzeltme Politikası sayfasını inceleyiniz.

PREPARATION OF MANUSCRIPT

Manuscripts can only be submitted through the journal's online manuscript submission and evaluation system, available at https://dergipark.org.tr/ Manuscripts submitted via any other medium will not be evaluated.

Manuscripts submitted to the journal will first go through a technical evaluation process where the editorial office staff will ensure that the manuscript has been prepared and submitted following the journal's guidelines. Submissions that do not conform to the journal's guidelines will be returned to the submitting author with technical correction requests. The editor reserves the right to reject manuscripts that do not comply with the aforementioned requirements. Corrections may be done without changing the main text.

Authors are required to submit the following:

- Copyright Agreement&Acknowledgement of Authorship Form
- Informed Consent Form
- ICMJE Disclosure of Interest Form
- Title Page (including Title of Manuscript, Running title, author (s) 's name, title, and institution, corresponding author's contact information, Name of the organization supporting the research)
- Main document (All articles should have an abstract before the main text).
- Figures (Jpeg format)
- Tables (max 6 tables)

Preparation of the Main Document

The articles should be written double-spaced in 12 pt, Times New Roman character and at least 2.5 cm from all edges of each page. The main text should not contain any information about the authors' names and affiliations.

Publication Types;

Type of Article	Abstract	Text (Word)	References	Table&Figures
Original Article	250	4000	30	10
Review Article	250	5000	100	10
Case Reports	300	2000	20	10

Original articles should have a structured abstract. (Aim, Material and Methods, Results, Conclusion). For case reports, the structured abstract is not used. Limit the abstract to 300 words. References, tables, and citations should not be used in an abstract. Authors must include relevant keywords (3-5) on the line following the end of the abstract. The Turkish title, abstracts, and Turkish keywords are not required for the international authors. The editorial office will provide these.

All acronyms and abbreviations used in the manuscript should be defined first, both in the abstract and in the main text. The abbreviation should be provided in parentheses following the definition.

When a drug, product, hardware, or software program is mentioned within the main text, product information, including the name of the product, the producer of the product, and city and the country of the company (including the state if in the USA), should be provided in parentheses.

All references, tables, and figures should be referred to within the main text, and they should be numbered consecutively in the order they are referred to within the main text. The symbols used must be nomenclature used standards.

1. Original Research Articles

Purpose

Original Research Articles should present the results of clinical or basic research with sufficient documentation to ensure credibility for critical readers. These articles must contribute novel insights to the field and be supported by robust data and sound methodology.

Submission Guidelines
Word Limit: Maximum 4,000 words (excluding references, tables, and figure captions).
Structure: Manuscripts must be structured as follows:
Title (in both Turkish and English)
Abstract (in both Turkish and English)
Keywords (in both Turkish and English)
Introduction
Materials and Methods
Results
Discussion
Conclusions
Figure and Table Captions (if applicable)
References
Review Process

All submitted research articles will undergo double-blind peer review to assess their scientific merit, originality, and relevance to the journal's scope. Statistical analyses and methodology must be clearly presented and reproducible.

2. Case Reports

Purpose

Case Reports should describe unique or rare clinical cases that provide valuable insights into diagnostic challenges, treatment approaches, or novel observations. These reports should be well-documented and contribute to the advancement of medical knowledge.

Submission Guidelines
Word Limit: Maximum 2,000 words (excluding references, tables, and figure captions).
Structure: Manuscripts must be structured as follows:
Title (in both Turkish and English)
Abstract (in both Turkish and English)
Keywords (in both Turkish and English)
Introduction
Case Presentation
Discussion and Conclusion
Figure and Table Captions (if applicable)
References

Review Process

Case Reports are subject to editorial and double-blind peer review to ensure they present a significant learning opportunity, are properly referenced, and contribute to clinical practice or medical research.

3. Review Articles

Purpose

Review Articles provide a comprehensive and structured analysis of a specific topic, summarizing and critically evaluating existing literature. These articles should be well-organized and include an up-to-date synthesis of research findings.

Submission Guidelines
Word Limit: Maximum 5,000 words (excluding references, tables, and figure captions).
Structure: Manuscripts must be structured as follows:
Title (in both Turkish and English)
Abstract (in both Turkish and English)
Keywords (in both Turkish and English)
Main Text

Conclusion
Figure and Table Captions (if applicable)
References

Systematic Reviews
Authors submitting systematic reviews must adhere to PRISMA guidelines to ensure transparency and methodological rigor. The PRISMA checklist can be accessed at: PRISMA Checklist

Review Process
Review Articles will be evaluated by the editorial board and editorial and double-blind peer review for their depth of analysis, relevance, and contribution to the scientific community.

4. Letters to the Editor

Purpose
Letters to the Editor allow readers to engage in academic discussions by responding to previously published articles, presenting brief scientific observations, or addressing issues of interest to the journal's readership.

Submission Guidelines
Structure: Manuscripts must be structured as follows:
Title (in both Turkish and English)
Keywords (in both Turkish and English)
Main Text
Figure and Table Captions (if applicable)
References

Content: Letters should be concise, focused on specific aspects of the article in question, and contribute meaningfully to the academic discourse. They may include:
Critical analysis or commentary on the methodologies, interpretations, or conclusions of a published article.
Presentation of corroborative or contradictory data that enhances the understanding of the topic.
Discussions that contextualize the article's findings within the broader field of study.

Length: Typically, letters should not exceed 1,000 words, including references.
Title: Begin with a title that references the original article, e.g., "Comment on [Article Title] by [Author Name(s)]."
Author Information: Include full names, academic affiliations, and contact details of all contributing authors.
References: Cite the original article and any other relevant literature appropriately.
Tone: Maintain a respectful and professional tone, focusing on academic critique rather than personal remarks.

Review Process:
All submitted letters will be reviewed by the editorial team to ensure clarity, academic merit, and adherence to ethical standards. Letters must be professional in tone and contribute to meaningful scholarly discourse.

5. Research Note

Purpose: A Research Note serves to disseminate brief reports of preliminary findings, novel methodologies, or significant observations that may not warrant a full-length article but are nonetheless valuable to the scientific community.
Submission Guidelines
Length: The main text should not exceed 2,000 words, excluding references, figures, and tables.
Content: Research Notes may include:
Preliminary data that suggest a potential breakthrough or novel insight.
Descriptions of innovative techniques or methodologies.
Observations that prompt further investigation or highlight emerging trends.

Structure
Organize the note with clear headings, such as:
Title (in both Turkish and English)
Abstract (in both Turkish and English)
Keywords (in both Turkish and English)
Introduction: Briefly outline the context and significance of the work.
Methods: Summarize the approach and techniques employed.
Results: Present key findings succinctly.
Discussion: Discuss the implications and potential future directions.
References: Limit to essential citations that support the work.
Figures and Tables: Include only if they enhance the clarity and impact of the note.

Review Process
Research Notes will undergo double-blind peer review to ensure scientific validity, originality, and relevance to the journal's scope.

6. Book Review

Purpose: A Book Review offers a critical evaluation of recent publications in the field, providing readers with insights into the book's content, significance, and relevance to ongoing scholarly discussions.

Submission Guidelines
Content: Reviews should:
Length: Typically between 1,500 to 2,500 words.
Summarize the book's main themes and arguments.
Assess the strengths and weaknesses of the work.
Discuss the book's contribution to the field and its relevance to current research or practice.
Situate the book within the existing literature, noting any unique perspectives or approaches.
Title: Include the book's full title, author(s), publisher, publication year, page count, and ISBN at the beginning of the review.
Tone: Maintain an objective and scholarly tone, offering balanced critiques supported by evidence.

Review Process
Book Reviews will be evaluated by the editorial team for clarity, depth of analysis, and relevance to the journal's readership

Preparation of the Figures and Tables

The submission system should submit figures, graphics, and photographs as separate files (in JPEG format).

- The files should not be embedded in a Word document or the main document.
- When there are figure subunits, the subunits should not be merged to form a single image. Each subunit should be submitted separately through the submission system.
- Arabic numbers should number images to indicate figure subunits.
- The minimum resolution of each submitted figure should be 300 DPI.
- Figure legends should be listed at the end of the main document.
- Information or illustrations must not permit the identification of patients, and written informed consent for publication must be sought for any photograph.

Tables should be embedded in the main document or submitted as separate files, but if tables are submitted separately, please note where it is suitable in the main text. Tables are limited to six tables. All tables should be numbered consecutively in the order they are used to within the main text. Tables legends should be listed at the end of the main document.

References

The references used in the article must be written in parenthesis at the end of the sentences. References should be numbered in the order they appear in the text and placed at the end of the article. References must contain surnames and initials of all authors, article title, name of the journal, the year, and the first and last page numbers. Articles with 6 or more authors 'et al.' are mixed with the first three authors. Abbreviations should be according to index Medicus.
Authors must add the DOI (Digital object identifier) at the end of each reference.

For Examples;
Article in journal: 1. Tasci A, Tugcu V, Ozbay B, Mutlu B, Cicekler O. Stone formation in prostatic urethra after potassium-titanyl-phosphate laser ablation of the prostate for benign prostatic hyperplasia. J Endourol 2009;23:1879-81. https://doi.org/10.1089/end.2008.0596
For Books: 1.Günalp İ: Modern Üroloji. Ankara: Yargıçoğlu matbaası, 1975. Chapters in books: Anderson JL, Muhlestein JB. Extra corporeal ureteric stenting during laparoscopic pyeloplasty. Philadelphia: W.B. Saunders; 2003. p. 288-307
For website; Gaudin S. How moon landing changed technology history [Internet]. Computerworld UK. 2009 [cited 15 June 2014]. Available from: http://www.computerworlduk.com/in-depth/it-business/2387/how-moon-landing-changed-technology-history/
For conference proceeding; Proceedings of the Symposium on Robotics, Mechatronics and Animatronics in the Creative and Entertainment Industries and Arts. SSAISB 2005 Convention. University of Hertfordshire, Hatfield, UK; 2005.
For Thesis; Ercan S. Venöz yetmezlikli hastalarda kalf kası egzersizlerinin venöz fonksiyona ve kas gücüne etkisi. Suleyman Demirel University Faculty of Medicine Sports Medicine Department Thesis. Isparta: Suleyman Demirel University. 2016.
Retraction or Reject; Manuscript Retraction: For other reasons, authors may withdraw their manuscript from the journal with a written declaration.

Manuscript Reject

Withdrawal of the Article: Authors are required to submit a written application addressed to the Editor who has declared their withdrawal request and justification. They must wait for the Editor's response before submitting the manuscript to another journal.
Rejection: The manuscripts which are not accepted to be published are rejected with explanations.

AFTER ACCEPTANCE

If the manuscript is accepted, the acceptance letter is sent within two weeks, the last version of the manuscript is sent to the author for the last correspondence. The journal owner and the editorial board are authorized to decide which volume of the accepted article will be printed.
Authors may publish their articles on their personal or corporate websites by linking them to the appropriate cite and library rules.
Should you wish to request a change of author (name, author addition), we kindly ask that you submit this to the Editorial Board (publisher/journal address) with a letter signed by all authors before the evaluation process is completed.

For more information about withdrawals and corrections, please see the Retraction and Correction Policy page.

Peer Review Process
Yayın Değerlendirme Süreci

Çift-Kör Değerlendirme Süreci

1. Makale Başvurusu

İlgili yazar, makalesini Dergipark çevrimiçi sistemi aracılığıyla dergiye gönderir.

2. Editöryal Değerlendirme

Editörlük, ilgili makalenin derginin yazım kurallarına göre düzenlenip düzenlenmediğini kontrol eder. Bilimsel içeriği bu aşamada değerlendirmez.

3. Editör tarafından değerlendirme

Editör, makalenin orijinal olup olmadığını denetler. Değilse, makale ret edilerek süreç tamamlanır.

4. Hakem Daveti

Editör, makalenin bilimsel içeriğinin değerlendirilmesi için konu ile ilgili hakemlere davet gönderir. Genellikle 2 hakeme davet gönderilir. İlgili yazıyı hakemlerden birisi ret diğeri kabul ettiği takdirde, bölüm editörü uygun görürse üçüncü bir hakemin incelemesi için davetiye gönderebilir.

5. Davete Yanıt

Seçilen hakemler, daveti gönderilen yazıyı kendi uzmanlıklarına, çıkar çatışmalarına ve kullanılabilirlik durumlarına karşı gizli olarak değerlendirir. Daha sonra kabul veya reddetmektedirler.

6. İnceleme Süreci

Hakem, makaleyi çeşitli açılardan değerlendirdikten sonra (15 gün içerisinde) eleştiri ve önerilerini içeren hakem değerlendirme formunu editöre gönderir. Major veya minör revizyonlar sonrasında hakem yazıyı tekrar değerlendirmek istemiş ise öneri ve eleştiriler yazarlara iletilerek düzeltilmiş yazıyı tekrar sisteme yüklemeleri istenir. Bu süreç hakemin kabul veya ret cevabı verene kadar devam eder.

7. Derginin Değerlendirme Süreci

Bölüm Editörü, genel bir karar vermeden önce geri gönderilen tüm değerlendirmeleri dikkate alır. Hakem değerlendirme sonuçları çok farklıysa, editör bir karar almadan önce fazladan bir fikir edinmek için ek bir inceleme isteyebilir.

8. Kararın İletilmesi

Bölüm Editörü, yazı hakkındaki son kararına hakem isimleri gizlenerek hakem raporlarını da ekler ve yazara çevrimiçi sistem ve e-mail aracılığı ile gönderir.

9. Sonraki Adımlar

Makale kabul edilirse, dil editörüne gönderilir. Bu aşamalardan sonraki adımlar;

- Son kopya gönderisi
- Mizanpaj
- Düzeltmeler
- Yayınlanacak gönderilerin erken baskı olarak web sayfasına yerleştirilmesi
- Sayı oluşturulması
- İçindekiler sayfası düzenlenmesi
- Web sitesinde sayı olarak yayınlanması ve baskı

**Kurum içi değerlendirme sürecinde; çift kör değerlendirme sürecindeki adımlar izlenmektedir.*

The Double-Blind Peer Review Process

1. Submission of Paper

The corresponding author submits the paper via Dergipark online system to the journal.new

2. Editorial Office Assessment

Editorial Office checks the paper's composition and arrangement against the journal's Author Guidelines to make sure it includes the required sections and stylizations. The quality of the paper is not assessed at this point.

3. Appraisal by the Editor

Editor checks that the paper is appropriate for the journal and is sufficiently original and interesting. If not, the paper may be rejected without being reviewed any further.

4. Invitation to Reviewers

Editor sends invitations to individuals he or she believes would be appropriate reviewers. As responses are received, further invitations are issued, if necessary, until the required number of acceptances is obtained – commonly this is 2.

5. Response to Invitations

Potential reviewers consider the invitation as anonymous against their own expertise, conflicts of interest and availability. They then accept or decline. If possible, when declining, they might also suggest alternative reviewers.

6. Review is Conducted

The reviewer sets time aside to read the paper several times. The first read is used to form an initial impression of the work. If major problems are found at this stage, the reviewer may feel comfortable rejecting the paper without further work. Otherwise they will read the paper several more times, taking notes so as to build a detailed point-by-point review. The review is then submitted to the journal, with a recommendation to accept or reject it – or else with a request for revision (usually flagged as either major or minor) before it is reconsidered.

7. Journal Evaluates the Reviews

The Section Editor considers all the returned reviews before making an overall decision. If the reviews differ widely, the editor may invite an additional reviewer so as to get an extra opinion before making a decision.

8. The Decision is Communicated

The Section Editor sends a decision email to the author including any relevant reviewer comments as anonymous.

9. Next Steps

If accepted, the paper is sent to language Editor. If the article is rejected or sent back for either major or minor revision, the Section Editor should include constructive comments from the reviewers to help the author improve the article. At this point, reviewers should also be sent an email or letter letting them know the outcome of their review. If the paper was sent back for revision, the reviewers should expect to receive a new version, unless they have opted out of further participation. However, where only minor changes were requested this follow-up review might be done by the Section Editor. After these;

- Copyedit submission
- Layout
- Corrections
- Publishing the submissions on the web page as early print
- Creating issues
- Organize Table of Contents
- Publishing the issue on the web page and printing hardcopy

**We are applying the same steps on The Double-Blind Peer Review Process when we got the in-house submission.*

Prof.Nurettin Öktel St
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