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**RESEARCH**

# Comparison of preoperative examination findings and endoanal ultrasonography results with operation findings in perianal fistula disease

## Perianal fistül hastalığında preoperatif muayene bulguları ile endoanal ultrasonografi bulgularının ameliyat bulguları ile kıyaslanması

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**Abstract**

**Purpose:** The aim of the current study was to compare the preoperative examination findings, endoanal ultrasonography results, and operative findings in patients diagnosed with perianal fistula.

**Materials and Methods:** A prospective study was conducted between 2021 and 2022 on patients who underwent surgical treatment for perianal fistula. The patients were recorded and classified according to the Park classification by the surgeon performing the operation. Subsequently, a surgeon with 10 years of endoanal ultrasonography experience reclassified the patients and recorded the findings (Ultrasonographic Evaluation - USE). The surgery was performed by a different surgeon who was blind to the USE results and the final diagnosis was recorded (Evaluation Under Anesthesia - EAU). The preoperative examination findings, endoanal ultrasonography findings, and operative findings were compared postoperatively.

**Results:** The study included 60 patients, with 52 being male and 8 being female, and a mean age of 44.2 ± 12.6 years. The patients were classified as low transsphincteric (TSF), intersphincteric (ISF), and high TSF at ratios of 40%, 33.3%, and 26.7%, respectively (24, 20, and 16 patients, respectively). Endoanal ultrasonography found that 30%, 35%, and 21.7% of patients had low TSF, ISF, and high TSF, respectively (18, 21, and 13 patients, respectively), while postoperatively, 45%, 33%, and 21.7% of patients were classified as low TSF, ISF, and high TSF, respectively (27, 20, and 13 patients, respectively). The ISF rate in preoperative examination findings was significantly higher than in postoperative diagnoses, with intermediate coherence between the two diagnoses (κ: 0.462). The rates of low and high TSF were found to be significantly higher

**Öz**

**Amaç:** Bu çalışmada, perianal fistül tanısı alan hastaların preoperatif muayene bulguları ile endoanal ultrasonografi bulgularının ameliyat bulguları ile kıyaslanması amaçlandı

**Gereç ve Yöntem:** Çalışma 2021-2022 yılları arasında perianal fistül nedeniyle cerrahi olarak tedavi edilen hastalarda prospektif olarak yapıldı. Anal fistül nedeniyle ameliyat edilen hastalara operasyonu yapacak cerrah tarafından poliklinik şartlarında muayene edilerek Park sınıflamasına göre sınıflandırılarak kayıt altına alındı. Daha sonra tüm hastalar, 10 yılllık endoanal ultrasonografi deneyimi olan bir cerrah tarafından sınıflandırılarak kayıt altına alınmıştır (Ultrasonographic evaluation (USE)). Ameliyatı ise FM yapan cerrah tarafından EUS sonucundan habersiz olarak gerçekleştirmiş ve nihai tanıyı kayıt altına almıştır (EAU evaluation under anesthesia). Operasyondan sonra fizik muayene bulguları ve endoanal ultrsound bulguları operasyon bulguları ile karşılaştırıldı.

**Bulgular:** Hastaların 52'si erkek 8'i kadındı. Yaş ortalaması 44,2±12,6 idi. Klinik değerlendirme ile hastaların %40 alçak TSF(transfinkterik), %33,3'ü İSF (intersfinkterik) ve %26,7'si yüksek TSF olarak sınıflandırıldı (sırasıyla 24, 20 ve 16 hasta). Endosonografik olarak hastaların %30'u alçak TSF, %35'i İSF, %21,7'si yüksek TSF olarak sınıflandırıldı (sırasıyla 18, 21 ve 13 hasta). Perioperatif değerlendirilen hastaların %45'i alçak TSF, %33'ü İSF ve %21,7'si yüksek TSF olarak değerlendirildi (sırasıyla 27, 20 ve 13 hasta). Fiziki muayene bulgularının İSF oranı ile postop tanı bulgularında anlamlı derece yüksek bulundu. Fiziki muayene tanı bulguları ile postop tanı bulguları arasındaki uyumluluğun ise orta düzeyde bir uyumluluk gösterdiği tespit edildi (κ: 0,462) Ultrason muayene bulgularında Alçak ve Yüksek TSF oranlarının postop tanı bulgularında anlamlı derece yüksek olduğu tespit edildi. Ultrason

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in ultrasonography findings than in postoperative diagnoses, with high coherence between the two (κ: 0.701).
**Conclusion:** Endoanal ultrasonography is important for mapping, especially for transsphincteric fistulas, in the surgical treatment of perianal fistulas.

**Keywords:**. Endoanal sonography; perianal fistula; preoperative diagnosis

muayene tanı bulguları ile postop tanı bulguları arasındaki uyumluluğun ise yüksek düzeyde bir uyumluluk gösterdiği belirlendi (κ: 0,701)
**Sonuç:** Perianal fistül cerrahi tedavisinde endoanal ultrasoun özellikle transfinkterik fistüllerin haritalandırmasında önemli olduğu saptanmıştır.
**Anahtar kelimeler**: Endoanal sonografi; perianal fistül;preoperatif tanı

## INTRODUCTION

The development of anal fistula is often a result of cryptoglandular infection, which can present in a multitude of clinical forms. Effective treatment of the disease necessitates the eradication of the septic focus and preservation of the continence mechanism, thus making preoperative classification and mapping of the anal fistula critical in the management of complicated cases[1,2].

The surgical treatment of simple anal fistulas (AFs) through sphincter cutting procedures offers high cure rates, though some level of morbidity can be expected. The potential for postoperative continence impairment is not insignificant and can negatively impact the patient's quality of life and satisfaction[2]. In selected patients, the adoption of sphincter-sparing procedures may minimize this risk, and diagnostic tests are necessary in this patient selection process[2].In some instances, fistulas that were initially thought to be simple may become complicated during the operation or secondary tracts may be overlooked during physical examination, leading to a misclassification as simple[3,4].

A comprehensive clinical examination is crucial in the evaluation of patients presenting with cryptoglandular anal fistula to a coloproctology clinic. The examination should determine the number and location of external openings, scarring from previous fistula surgeries or episiotomies, keyhole deformities, and the presence of undrained subcutaneous abscesses. The direction and size of firm fistula scars can be palpated, and a digital rectal examination can locate the internal opening.

The diagnosis and treatment planning of anal fistula disease require the use of imaging methods, with particular importance given to magnetic resonance imaging (MRI) and endoanal ultrasonography (EAUS). Many studies have demonstrated the efficacy of EAUS in diagnosing anal fistula disease[5-9]. A comparison of digital rectal examination, EAUS, and MRI in terms of correct classification of perianal fistulas revealed that rectal examination had an accuracy of 61%, EAUS had an accuracy of 81%, and MRI had an accuracy of 91%. In terms of locating the internal opening of the fistula, EAUS showed 91% accuracy, while MRI showed 97% accuracy. However, EAUS has a limited field of view, which restricts its use in evaluating fistulas that are superficial, suprasphincteric, extra sphincteric, or extend a significant distance from the EAUS probe. In such cases, MRI is preferred[5].

A study by Mantoo et al. compared the findings of endoanal ultrasonography and physical examination and found that 3D-EAUS, clinical examination, and intra-operative exploration could predict the location of the internal openings in 91.2%, 70.5%, and 82.4% of patients, respectively. The use of hydrogen peroxide-enhanced 3D-EAUS was found to accurately predict the location of the internal opening when compared to 3D-EAUS without hydrogen peroxide (concordance K = 0.963, P = 0.05). There was a high concordance between the intra-operative findings and 3D-EAUS in determining the type of perianal fistula. There was no significant difference between the suggested surgical treatment based on 3D-EAUS and the actual surgical treatment ($P > 0.05$)[9].

Accurate preoperative identification of perianal fistula tracts and internal openings is crucial in determining the appropriate surgical procedure and improving the healing rates. The aim of the present study was to investigate the effectiveness of three-dimensional endoanal ultrasonography (3D-EAUS) in determining the type of perianal fistula and planning operative management.

## MATERIALS AND METHODS

This study included 60 patients who were prospectively diagnosed with anal fistula, and had not undergone prior perianal surgeries. Twenty-four patients were excluded due to relapse, Crohn's disease, non-compliance with the study protocol, or

previous perianal surgery. The patients were recorded and initially classified using the Park classification system by the surgeon who performed the operation (Clinical Evaluation, CE). Subsequently, the patients underwent reclassification using endoanal ultrasonography by a surgeon with a decade of experience in this field and the results were documented (Ultrasonographic Evaluation, USE). The final diagnosis was recorded after the surgery was performed by a different surgeon who was blinded to the results of the ultrasonographic evaluation, and was based on the findings obtained during the Endoanal Ultrasonography Evaluation under Anesthesia (EAU). The study was approved by Çukurova University Faculty of Medicine Non-interventional Clinical Research Ethics Committee (Approval date: 2022-11-04, number 127-76) and all patients provided informed consent.

### Clinical assessment

The clinical evaluation was conducted at Seyhan State Hospital in Adana. Patients underwent a physical examination after obtaining a comprehensive medical history. The number of external openings, locations, and internal opening were determined through rectal examination and recorded on the prepared forms.

### Endoanal Ultrasonography

Endoanal ultrasonography was performed at the Anal Physiology Laboratory of Cukurova University. Patients underwent endoanal evaluation using a BK Focus 400 probe, during which hydrogen peroxide was injected through the external orifice while the patient was in the left lateral decubitus position. The radiologic findings, sphincter type, and presence of an external tract were recorded on the prepared forms and kept confidential from the surgeon performing the surgery.

### Perioperative evaluation

The Perioperative Evaluation was conducted at Seyhan State Hospital in Adana. After recording the examination findings, patients were operated on by the surgeon who had performed the Clinical Evaluation. The patient was then examined under sedation anesthesia with ketamine-Dormicum and local anesthesia, with Marcaine injected into four quadrants around the anal canal. The Clinical, Endoanal Ultrasonography, and Perioperative Anal Fistula classifications were statistically analyzed. Two surgeons participated in the study, both unaware of each other's involvement. The data were recorded and analyzed by an independent statistics unit.

### Statistical analysis

A sample size of 48 patients was calculated using g. power 3.1, with a desired effect size of 0.5, alpha significance level of 0.05, and 95% power. The data was analyzed using IBM SPSS Statistics (version 25.0). Categorical data were presented as numbers and percentages, and continuous data were presented as mean and standard deviation, median and minimum-maximum values as required. Cohen's Kappa coefficient was used to evaluate the agreement between the different evaluations and diagnoses. The Kappa coefficient values were interpreted as follows: <0 "worse agreement than expected by chance"; 0.01-0.20 "insignificant level"; 0.21-0.40 "weak agreement"; 0.41-0.60 "intermediate agreement"; 0.61-0.80 "high degree of agreement"; and 0.81-1.00 "very high level of agreement." The significance level was set at 0.05 in all tests.

## RESULTS

The results show that of the 60 patients studied, 52 were male and 8 were female, with a mean age of 44.2±12.6 years. The patients were classified into low transsphincteric (TSF), intersphincteric (ISF) and high TSF by clinical evaluation, endosonography and perioperative evaluation. The ratio of patients classified as ISF in the physical examination was found to be significantly higher than the postoperative diagnoses ($p<0.001$). The agreement between the physical examination and postoperative diagnostic findings was found to be at an intermediate level ($\kappa$: 0.462). The rates of low and high TSF were found to be significantly higher in the endosonography findings than in the postoperative diagnoses ($p<0.001$). The agreement between the endosonography findings and postoperative diagnostic findings was found to be at a high level ($\kappa$: 0.701).

**Table 1. Demographic and clinical data**

| | Frequency (n) | Percentage (%) |
|---|---|---|
| Gender | | |
| Male | 52 | 86.7 |
| Female | 8 | 13.3 |
| PE diagnosis | | |
| Low TSF | 24 | 40.0 |
| ISF | 20 | 33.3 |
| High TSF | 16 | 26.7 |
| EUS Diagnosis | | |
| Low TSF | 18 | 30.0 |
| ISF | 21 | 35.0 |
| High TSF | 13 | 21.7 |
| Could not be clearly evaluated | 4 | 6.7 |
| Submucosal | 1 | 1.7 |
| Suprasphincteric | 1 | 1.7 |
| Could not tolerate the procedure | 2 | 3.3 |
| Postoperative Diagnosis | | |
| Low TSF | 27 | 45.0 |
| ISF | 20 | 33.3 |
| High TSF | 13 | 21.7 |
| | Mean±SD | Median (Min-Max) |
| Age | 44.2±12.6 | 42 (18-69) |

Physical examination (PE) Transsphincteric (TSF), Intersphincteric (ISF), Endoscopic ultrasound (EUS)

**Table 2. Correlation with physical examination**

| | Physical Examination Diagnosis | | | p |
|---|---|---|---|---|
| | Low TSF | ISF | High TSF | |
| | n(%) | n(%) | n(%) | |
| Postoperative diagnosis | | | | |
| Low TSF | 15 (62.5) | 3 (15.0) | 9 (56.3) | <0.001** |
| ISF | 3 (12.5) | 17 (85.0) | - | |
| High TSF | 6 (25.0) | - | 7 (43.8) | |

Transsphincteric (TSF), Intersphincteric (ISF)
Cohen's Kappa * p<0.05, **p<0.001, $\kappa$: 0.462

## DISCUSSION

Perianal fistula is a significant source of morbidity that was first documented in the era of Hippocrates[10]. The fistula tract was succinctly described by Goodsall in 1900 as the connection between the skin and anus[11]. The traditional method of diagnosing perianal fistula is through clinical observations, with the distribution of the fistula tract determined through physical examination. In 1976, Parks et al. established a widely used classification system for perianal fistulas, based on surgical examination of the anal anatomy[12]. However, this study has some limitations as it only considers surgical examination and excludes imaging findings. Additionally, the classification approach may not assess the fistula tract accurately in cases of complex fistulas, recurrent fistulas, or in patients with inflammatory bowel disease, potentially leading to overlooked secondary tracts and recurrent issues[13].

The objective of surgical treatment for perianal fistula is to effectively eliminate present and recurring septic foci, and any associated epithelized tracts, while preserving continence. It is important to note that a single surgical technique may not be sufficient to accomplish these goals in all types of anal fistulas[14]. The choice of surgical procedure is influenced by various factors, such as the surgeon's experience, availability of hospital facilities, patient history and expectations, determination of the location of the perianal fistula anatomy, and its relationship with surrounding tissues.

The mapping of perianal fistulas is essential for

effective treatment, and the most commonly used imaging modalities are Magnetic Resonance Imaging (MRI) and Endoanal Ultrasonography (EAUS). While MRI provides high accuracy in perianal fistula classification, it also has disadvantages such as limited accessibility, higher cost, and inconsistencies in practice and reporting[15].

EAUS, on the other hand, utilizes high-frequency transducers to accurately interpret the relationship between the fistula and the anal sphincter complex, rectal wall, and sphincter complex. The accuracy of digital rectal examination, EAUS, and MRI in perianal fistula classification was reported to be 61%, 81%, and 91%, respectively, while the evaluation of the internal orifice of the fistula was found to have a 91% accuracy for EAUS and 97% accuracy for MRI. However, EAUS has a major drawback of limited field of view (FOV), which hinders its use in the evaluation of fistulas located far from the probe, superficial fistulas, suprasphincteric fistulas with secondary tracts, and extrasphincteric fistulas[5,16,17].

Buchanan et al. reported that the most effective method for identifying secondary fistula tracts and internal orifices of fistulas was MRI, based on a study comparing physical examination, endoanal ultrasonography, and MRI[10]. Mantoo et al. found that three-dimensional endoanal ultrasonography (3D-EAUS) was effective in determining the type of perianal fistula and the optimal surgical method by accurately estimating the type of fistula and localizing the internal orifice. The authors recommended the routine use of hydrogen peroxide ($H_2O_2$) during 3D-EAUS as it improved the accuracy of internal orifice localization (79.4%) compared to intraoperative localization, although not to a significant degree. The recommendation was based on the possibility of closure of the internal orifice between 3D-EAUS and surgery. To minimize the potential for changes in the findings, the authors recommended performing 3D-EAUS a week prior to surgery to allow for the detection of any potential anorectal sepsis. The correlation between endoanal ultrasonography and low and high transsphincteric fistulas was found to be high, while the accuracy of physical examination in estimating intersphincteric fistulas was deemed acceptable[9].

The efficacy of endoanal sonography in the diagnosis of perianal fistulas was investigated in a study, which found that the sensitivity, specificity, and accuracy of the modality were 92.2%, 100%, and 93.4%, respectively. Additionally, the accuracy of endoanal sonography in classifying the fistula type and identifying the internal orifices was found to be 87.4% and 94.6% based on Parks classification. The study demonstrated a high accuracy in diagnosing transsphincteric and intersphincteric fistulas (93.0% and 87.8%, respectively), but only 50% of extrasphincteric fistulas and 66.7% of suprasphincteric fistulas were accurately diagnosed[7]. Fistula mapping was not performed in four patients, and two patients could not tolerate the procedure.

Endoanal sonography has limitations in cases when the fistula is located in deep or high portions of the anal canal, or when it is associated with abscesses, recurrent lesions, or gas. The modality also requires an intermediate learning curve and has high operator dependency, with limited ability to visualize suprasphincteric and extrasphincteric fistulas[8]. The field of view in endoanal sonography is limited, providing a small depth and area compared to MRI.

The study has limitations, including a small sample size, a lack of long-term follow-up data, and an absence of evaluation of surgical treatment success. Physical examination alone may be sufficient for the diagnosis of intersphincteric fistulas, but in cases of transsphincteric fistulas, additional imaging techniques may be necessary to determine the removal and treatment method. The study's randomized, prospective, and double-blind design contributes to its value.

In conclusion, the use of endoanal ultrasonography is crucial in mapping transsphincteric fistulas during perianal fistula surgery. Physical examination alone can suffice for intersphincteric fistulas, but three-dimensional endoanal ultrasonography (3D-EAUS) is recommended for the diagnosis of transsphincteric fistulas. Given its accuracy in classifying perianal fistulas and strong correlation with intraoperative evaluation, 3D-EAUS may be adopted as the primary evaluation method for patients with perianal fistulas, enabling a more personalized approach to perianal fistula surgery and potentially improving patient outcomes.

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