



Pilonidal Abscess Management: Microbiological Findings and Clinical Outcomes Following Empirical Cefuroxime–Ciprofloxacin Therapy

Fırat Erkmen¹, Firuzan İdemem², Mehmet Gerger¹, Faik Tath¹

1 Harran University, Department of General Surgery, Şanlıurfa, Türkiye

2 Balıklıgöl State Hospital, Department of Microbiology, Şanlıurfa, Türkiye

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Abstract

Objective: This study aimed to evaluate the microbiological profile and antibiotic susceptibility patterns in patients undergoing drainage for pilonidal sinus abscess and to assess the efficacy of an empirical cefuroxime-ciprofloxacin regimen.

Methods: Between November 2021 and February 2024, 88 patients who underwent drainage for pilonidal abscess at Balıklıgöl State Hospital and Harran University Faculty of Medicine Hospital were included. Pus cultures were obtained under sterile conditions. Patients received cefuroxime 500 mg (twice daily) and ciprofloxacin 500 mg (twice daily) postoperatively. Treatment success was defined as resolution of erythema and pain by day 7. Culture results and antibiograms were analyzed descriptively.

Results: In the study included 63.6% of the patients were male (n=56), and 36.4% (n=32) were female. Staphylococcus (41.2%) and Streptococcus (31.4%) were the predominant isolates. Resistance to the empirical regimen occurred in 3 cases (3.4%), requiring escalation. The overall success rate was 96.6%. Culture negativity (42%) was noted but did not impact outcomes.

Conclusion: Pilonidal abscess microbiologically resembles skin/soft tissue infections. The cefuroxime-ciprofloxacin combination demonstrated high efficacy, though regional resistance patterns and anaerobic coverage merit further study.

Keywords: Pilonidal abscess, culture, antibiogram, antibiotic resistance

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Correspondence / Yazışma Adresi: Fırat Erkmen, Harran University, Department of General Surgery, Şanlıurfa, Türkiye e-mail: firaterkmen@gmail.com

Pilonidal Apse Tedavisi: Ampirik Sefuroksim-Siprofloksasin Tedavisi Sonrası Mikrobiyolojik Bulgular ve Klinik Sonuçlar

Öz

Amaç: Bu çalışmada pilonidal sinüs apsesi nedeniyle drenaj uygulanan hastalarda mikrobiyolojik profil ve antibiyotik duyarlılık paternlerinin değerlendirilmesi ve ampirik sefuroksim-siprofloksasin rejiminin etkinliğinin değerlendirilmesi amaçlanmıştır.

Yöntemler: Kasım 2021 ile Şubat 2024 tarihleri arasında Balıklıgöl Devlet Hastanesi ve Harran Üniversitesi Tıp Fakültesi Hastanesi'nde pilonidal apse nedeniyle drenaj uygulanan 88 hasta çalışmaya dahil edildi. Apse kültürleri steril koşullar altında elde edildi. Hastalar postoperatif olarak sefuroksim 500 mg (günde iki kez) ve siprofloksasin 500 mg (günde iki kez) aldı. Tedavi başarısı eritem ve ağrının 7. güne kadar gerilemesi olarak tanımlandı. Kültür sonuçları ve antibiyogramlar tanımlayıcı olarak analiz edildi.

Sonuçlar: Çalışmaya dahil edilen hastaların %63,6'sı erkek (n=56), %36,4'ü (n=32) kadındı. Staphylococcus (41.2%) ve Streptococcus (31.4%) baskın izolatlardı. Ampirik rejime direnç 3 olguda (%3,4) görüldü ve yatış gerektirdi. Genel başarı oranı %96,6'dır. Kültür negatifliği (42%) kaydedilmiş ancak sonuçları etkilememiştir.

Sonuç: Pilonidal apse mikrobiyolojik olarak deri/yumuşak doku enfeksiyonlarına benzemektedir. Sefuroksim-siprofloksasin kombinasyonu yüksek etkinlik göstermiştir, ancak bölgesel direnç paternleri ve anaerobik kapsama daha fazla çalışmayı hak etmektedir.

Anahtar kelimeler: Pilonidal apse, Kültür, Antibiyogram, Antibiyotik direnci.

INTRODUCTION

Pilonidal disease is an acute or chronic pathology that develops in the subcutaneous tissue of the intergluteal sulcus in the sacrococcygeal region. Etiologically derived from the combination of the words 'pilus' (hair) and 'nidus' (nest), this condition may show variable presentations from asymptomatic cyst form to acute abscess, chronic sinus formation or diffuse cellulitis¹.

Pilonidal sinus abscess is one of the most common complications of the disease. This acute condition causes delay in definitive surgical treatment and significantly decreases the quality of life of patients². Although wide excisions have been used in the treatment of abscess in the historical period, this approach is not preferred today because of long hospitalisation times and morbidity risk³. Current guidelines recommend incisional drainage through the lateral sulcus as a day case surgical procedure⁴.

The role of antibiotics—particularly in empiric regimens—is debated due to limited culture-guided data^{5,6}. Current guidelines lack consensus on optimal antibiotic selection, with cephalosporin-metronidazole or fluoroquinolone monotherapy often employed^{6,7}. Notably, the high prevalence of anaerobic bacteria in the sacrococcygeal region raises questions about the adequacy of regimens without anaerobic coverage⁸.

Although the clinically commonly used cefuroxime-ciprofloxacin regimen is known to provide a high cure rate after drainage, studies are scarce in the literature. This study retrospectively evaluates microbiological profiles and antibiotic susceptibility patterns to inform empiric treatment choices.

METHODS

All pilonidal abscess drainage cases treated at Balıklıgöl State Hospital and Harran University Faculty of Medicine Hospital between November 2021 and February 2024 were

evaluated for inclusion. Patients with chronic wounds, recurrent abscesses, diabetes, pregnancy, immunosuppression, preoperative antibiotic use, non-compliance with the study protocol, or incomplete medical records were excluded. A total of 123 patients underwent abscess drainage during the study period; however, after applying the exclusion criteria, 88 patients were included in the final analysis. The study protocol was approved by the decision of Harran University Faculty of Medicine Ethics Committee dated 18.03.2024 and numbered HRÜ/24.02.58.

Culture samples and incisional drainage procedures were standardized and uniformly applied across the centers. Before the surgical procedure, a pus sample was taken from the abscess cavity with a syringe under sterile conditions and sent for microbiological examination. Cefuroxime axetil 500 mg (2x1) and Ciprofloxacin 500 mg (2x1) combination was started in the postoperative period in patients who underwent incisional drainage after standard surgical preparation.

Patients were called for follow-up on the 7th postoperative day and wound healing was evaluated as regression of erythema and pain complaints. Pain and erythema were evaluated using the Visual Analog Score (VAS) system. For pain assessment; the patient marks on a line between 0-10 cm (0: No pain; 10: Intolerable pain). For erythema assessment (scoring between 0-4); 0: None, 1: Mild (pale pink), 2: Moderate (marked pink/red), 3: Severe (intense red), 4: Very severe (dark red, purplish) scale was used. In patients who came to the follow-up visit; the change in VAS scores was compared. Response was defined as a $\geq 50\%$ score reduction from baseline. Continuous and ordinal variables were expressed as mean values. Pre- and post-procedural comparisons were performed using the Wilcoxon signed-rank test. A p value < 0.05

was considered statistically significant. Oral antibiotic treatment was stopped in cases with wound healing, while intravenous antibiotic treatment was initiated in unresponsive cases according to the antibiogram results.

Samples were processed per the European Committee on Antimicrobial Susceptibility Testing (EUCAST) guidelines aerobic cultures⁹. Our microbiology laboratory lacks the capability to support anaerobic culture. The absence of bacterial growth after a five-day incubation period of the collected samples was interpreted as a negative result. Disc diffusion tested susceptibility to penicillins, cephalosporins, erythromycin, daptomycin, Trimetoprim/sulfametoksazol, tetracyclines, topical antibiotics (Fusidic acid and mupirocin), clindamycin, fluoroquinolones, glycopeptides, aminoglycosides. Data were analysed in terms of patient demographic characteristics, isolated microorganisms and antibiotic susceptibility profiles. As a descriptive cohort study, our analysis was limited to summarizing demographic, clinical, and microbiological data.

RESULTS

There were 88 patients in whom culture and antibiogram samples were obtained due to pilonidal abscess. 56 of the patients were male (63.6%) and 32 were female (36.4%). The mean age was 27.8 years (15-67). In 42% (n:37) of the patients who were cultured, the causative agent could not be produced in the microbiology laboratory. In 51 (58%) of our patients, the agent was produced and antibiograms were performed. Of the agents produced, 21 (41.2%) were Staphylococcus (Stahy), 16 (31.4%) Streptococcus (Strep), 7 (13.7%) E.Coli, 3 (5.9%) Kocuria, 1 Enterococcus (2%), 1 Morganella (2%), 1 Proteus (2%), 1 Pseudomonas (2%) (Table I). Antibiotherapy susceptibility is shown in Table II according to the agents.

Table I: Distribution of bacteria produced from pilonidal sinus abscess and response to treatment

	Reproduction status	Healing those receiving prophylactic treatment	Secondary treatment recipients
Those with reproduction	58.0% (n:51)	94.1% (n:48)	5.9% (n:3)
Staphylococcus	23.9% (n:21)	95.2% (n:20)	4.8% (n:1)
Streptococcus	18.2% (n:16)	100% (n:16)	0
E.coli	8% (n:7)	71.4% (n:5)	28.6% (n:2)
Kocuria	3.4% (n:3)	100% (n:3)	0
Enterococcus	1.1% (n:1)	100% (n:1)	0
Morganella	1.1% (n:1)	100% (n:1)	0
Proteus	1.1% (n:1)	100% (n:1)	0
Pseudomonas	1.1% (n:1)	100% (n:1)	0
Non-reproductive	42% (n:37)	100% (n:37)	0
Total	100% (n:88)	96.6% (n:85)	3.4% (n:3)

Table II: Antibigram sensitivity rates

	Staphy (n:21)	Strept (n:16)	E.Coli (n:7)	Kocuria (n:3)	Enterococcus (n:1)	Morganella (n:1)	Proteus (n:1)	Pseudomonas (n:1)
Penicillin	23.8% (n:5/21)	93.7% (n:15/16)	57.1% (n:4/7)	33.3% (n:1/3)	100% (n:1/1)	-----	100% (n=1/1)	-----
Cephalosporin	95% (n:19/20)	100% (n:14/14)	71.4% (n:5/7)	-----	-----	100% (n:1/1)	100% (n:1/1)	100% (n=1/1)
Erythromycin	71.4% (n:15/21)	100% (n:10/10)	-----	66.7% (n:2/3)	-----	-----	-----	-----
Daptomycin	93.7% (n:15/16)	100% (n:15/15)	-----	100% (n:2/2)	-----	-----	-----	-----
TMP-SMX	84.2% (n:16/19)	66,6% (n:9/14)	80% (n:4/5)	66.7% (n:2/3)	-----	100% (n:1/1)	-----	-----
Tetracycline	50% (n:8/16)	75% (n:12/16)	100% (n:4/4)	66.7% (n:2/3)	-----	-----	-----	-----
Topical Antibiotics	77.8% (n:14/18)	100% (n:15/15)	-----	50% (n:1/2)	-----	-----	-----	-----
Clindamycin	61.5% (n:8/13)	100% (n:16/16)	-----	0% (n:0/2)	-----	-----	-----	-----
Fluoroquinone	93.7% (n:15/16)	93.7% (n:15/16)	71.4% (n:5/7)	100% (n:2/2)	100% (n:1/1)	100% (n:1/1)	100% (n:1/1)	-----
Glycopeptide	100% (n:14/14)	100% (n:14/14)	-----	100% (n:3/3)	100% (n:1/1)	-----	-----	100% (n:1/1)
Aminoglycosid	100% (n:13/13)	91.6% (n:11/12)	100% (n:7/7)	-----	100% (n:1/1)	100% (n:1/1)	-----	100% (n:1/1)

(TMP-SMX: Trimetoprim/sulfametoksazol, Staphy: Staphylococcus, Strept: Streptococcus)

A statistically significant reduction was observed in both pain and erythema scores following abscess drainage. The mean VAS score decreased from 7.2 before drainage to 1.3 at postoperative day 7, while the mean erythema score decreased from 3.4 to 1.7. These differences were statistically significant according to the Wilcoxon signed-rank test ($p < 0.001$ for both comparisons) Table III.

Table III: Comparison of Pre-Drainage and Postoperative Day 7 Visual Analog Scale and Erythema Scores with Statistical Analysis

	Pre-drainage Mean	Postoperative Day 7 Mean	Statistical Test	P value
VAS score	7.2	1.3	Wilcoxon signed-rank	<0.001
Erythema score	3.4	1.7	Wilcoxon signed-rank	<0.001

No allergic reactions or side effects were observed in any patient after empirical treatment. Hospitalisation was given to 3 (3.4%) patients who did not have wound

healing after drainage. Demographic characteristics, identified microorganisms, and susceptibility profiles of three cases resistant to empirical therapy are presented in Table IV. While intravenous vancomycin therapy was administered to the first patient, the second and third patients received intravenous amikacin treatment. Patients whose treatment was changed achieved complete healing after appropriate antibiotic treatment. Treatment was provided in 85 patients in whom we applied prophylactic antibiotics after drainage and the cure rate was found to be 96.6%.

Table IV: Demographic characteristics, identified microorganisms, and antibiogram results of three cases resistant to empirical treatment.

	1.Case	2.Case	3.Case
Sex	Men	Female	Female
Age	25	42	67
Culture result	<i>Staphylococcus</i>	<i>E.coli</i>	<i>E.coli</i>
Culture antibiogram results			
Penicillin	Resistant	Resistant	Sensitive
Cephalosporin	Resistant	Resistant	Resistant
TMP-SMX	Resistant	---	Resistant
Tetracycline	Resistant	Sensitive	Sensitive
Fluoroquinone	Resistant	Resistant	Resistant
Glycopeptide	Sensitive	---	---
Aminoglycosid	Sensitive	Sensitive	Sensitive

(TMP-SMX: Trimetoprim/sulfametoksazol)

DISCUSSION

Pilonidal abscess is a common complication in the course of pilonidal sinus disease and requires urgent intervention. Various treatment modalities, including incisional drainage, excisional drainage, flap techniques, and antibiotic therapy following aspiration, have been evaluated for the management of pilonidal abscess^{8,10,11}. In a study by Matter et al. it was reported that recurrence rates were similar in patients who underwent incisional and excisional drainage, but hospital stay and return to work were longer in the excisional surgery group⁸. In the current revision of the German Guideline for Pilonidal Sinus Disease, incisional drainage is recommended in all pilonidal

abscesses and elective surgical methods are recommended after the acute inflammation subsides⁴. Accordingly, incisional drainage was performed in our study.

In the study by Khan et al. on superficial soft tissue abscesses, aerobic microorganisms were isolated in 47% of cases. Of the total 162 cases, 35 were pilonidal abscesses. Microbiological analyses of these cases demonstrated a high prevalence of anaerobic microorganisms¹². In that study, the culture positivity rate in patients with pilonidal abscess was reported to be approximately 80%¹². Another study reported that the prevalence of anaerobic bacteria was very high (70–100%) in the pilonidal abscess group¹³. In our study, the absence of anaerobic

culture capability, together with the inherent limitations of standard aerobic culture conditions, likely contributed to the relatively high proportion of culture-negative results.

Although routine culture studies are not performed in cases of pilonidal abscess, it is known that *Staphylococcus* and *Streptococcus* species are most frequently isolated in skin and soft tissue infections^{14,15}. In our study, when the culture results were analysed, it was found that the most common agents were *Staphylococcus* (41.2%) and *Streptococcus* (13.7%). These findings support the notion that the microbiological profile of pilonidal abscesses largely overlaps with that of other skin and soft tissue infections.

Although antibiotic therapy is generally recommended only in the presence of specific risk factors following drainage, antibiotics are frequently prescribed in routine clinical practice^{5,15}. In a survey study conducted with the participation of 520 general surgery specialists in Turkey, it was found that the rate of antibiotic use after pilonidal abscess treatment was 82.5%, and it was reported that the participants especially preferred antibiotics with anti-aerobic and anti-anaerobic spectrum of action¹⁵. Similarly, in another study in the literature, it was observed that ampicillin+sulbactam combination was routinely used after treatment of pilonidal abscess with Limberg flap¹¹.

Antibiotic treatment in skin and soft tissue infections should be planned according to the clinical condition of the patient. If there is no suspicion of a resistant pathogen, agents such as penicillins, cephalosporins, clindamycin or trimethoprim-sulfamethoxazole (TMP-SMX) are recommended^{15,16}. The antibiotic susceptibility rates observed in our study were higher than those reported in the literature^{9,17}, which may be related to the absence of prior antibiotic exposure in our patient population. Nevertheless, continuous surveillance of

antimicrobial resistance and larger sample sizes remain essential for guiding empirical therapy. Despite the overall favorable susceptibility profile, our antibiogram results demonstrated relatively high resistance rates to penicillin derivatives, clindamycin, and TMP-SMX. In cases of suspicion of polymicrobial infection or infections close to the anogenital region, treatment should be broad-spectrum. In this case, agents providing broad-spectrum coverage, including beta-lactam/beta-lactamase inhibitor combinations, fluoroquinolones, or tigecycline, should be considered^{18,19}. In our study, cephalosporins, fluoroquinolones, glycopeptides, aminoglycosides and daptomycin showed high sensitivity in pilonidal abscesses due to their proximity to the anal region. Since the use of intravenous forms of glycopeptides, aminoglycosides and daptomycin may not be practical, cephalosporins and fluoroquinolones, which are widely available in oral forms, may be a more appropriate in a study by Lasithiotakis et al., 7-day cephalosporin and metronidazole combination was administered after aspiration of pilonidal abscess and a satisfaction rate of 83% was reported⁷. The observed 96.6% clinical success rate with the cefuroxime-ciprofloxacin combination reflects favorable short-term outcomes in this cohort; however, resistance among Gram-negative organisms, particularly *E. coli*, warrants cautious interpretation.

Although the cefuroxime-ciprofloxacin combination does not provide formal anaerobic coverage, the consistently high clinical success observed in both culture-positive and culture-negative patients suggests that adequate surgical drainage represents the primary determinant of treatment outcome in acute pilonidal abscess. Similar observations have been reported in previous studies, emphasizing that, particularly in uncomplicated cases, effective drainage may outweigh the

contribution of antibiotic spectrum to clinical resolution^{5,20}. Notably, comparable clinical success rates between culture-positive and culture-negative patients indicate that the absence of microbiological growth did not adversely influence treatment outcomes.

Our study has some limitations. Key limitations of this study include the absence of anaerobic culture analysis and sampling limited to a single anatomical region. The 42% culture negativity rate—potentially due to prior drainage or sampling errors—underscores the need for standardized protocols. Notably, the absence of metronidazole in our regimen contrasts with guidelines emphasizing anaerobic coverage^{4,7}. Future prospective, adequately powered studies should compare different antimicrobial regimens (e.g., cephalosporins with or without metronidazole) and evaluate both short- and long-term clinical outcomes.

CONCLUSION

Cefuroxime-ciprofloxacin is effective for pilonidal abscess in regions with low resistance. However, local antibiograms and anaerobic coverage should guide therapy. Prospective trials are needed to optimize protocols

Ethical Approval: The study protocol was approved by the decision of Harran University Faculty of Medicine Ethics Committee dated 18.03.2024 and numbered HRÜ/24.02.58.

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