Original Investigation / *Özgün Araştırma*

**DOI:** 10.5578/ced.20229806 • *J Pediatr Inf 2022;16(2):e106-e110*

# Perianal Abscess in Children: Are Resistant Microorganisms a Real Problem?

## Çocuklarda Perianal Apse: Dirençli Mikroorganizmalar Gerçek Bir Sorun Mu?

Taylan Çelik[1](İD), Emre Kaan[2](İD), Özgür Çağlar[3](İD)

[1] *Division of Pediatric Infectious Diseases, Çanakkale Onsekiz Mart University Faculty of Medicine, Çanakkale, Türkiye*
[2] *Clinic of Pediatrics, Kayseri State Hospital, Kayseri, Türkiye*
[3] *Clinic of Pediatric Surgery, Dr. Sami Ulus Obstetrics and Gynecology Training and Research Hospital, Ankara, Türkiye*

**Cite this article as:** Çelik T, Kaan E, Çağlar Ö. Perianal abscess in children: Are resistant microorganisms a real problem? J Pediatr Inf 2022;16(2):e106-e110.

**Abstract**

**Objective:** Perianal abscess is a common purulent disease in daily pediatric practice caused by infection of perianal tissues and cavities. There is a strong male dominance in affected children less than two years old. In our study, we aimed to investigate the clinical and laboratory studies of cases diagnosed with perianal abscess in childhood.

**Material and Methods:** Medical data followed by the diagnosis of perianal abscess by Kayseri Training and Research Hospital, Pediatric Infectious Diseases between October 2016, and June 2018, were retrospectively analyzed.

**Results:** A total of 15 patients were followed up with a diagnosis of perianal abscess. Fourteen (93.3%) of the patients were male. Their average age was 19.10 ± 8.86 months. Seven (46.6%) of the patients were less than six months old and 11 (73.3%) were younger than one year old. Fever was associated with only one (6.7%) correspondence complaints, 13 (86.6%) patients were brought close to perianal row swelling. Surgical drainage was applied to all 12 (80%) patients who were hospitalized and followed up. There was growth in the abscess culture in 10 (83.3%) of the patients. In 60% of the patients with culture growth, the agents were resistant microorganisms. In 50% of our hospitalized cases, treatment change was required according to the culture antibiogram results, and the combined use of meropenem and amikacin was preferred in these patients.

**Conclusion:** In conclusion, although perianal abscesses are common in children, data on the management and treatment of the disease are limited. Our study highlights the benefit of routine abscess culture in the treatment of perianal abscesses.

**Keywords:** Child, perianal abscess, resistant microorganism

**Öz**

**Giriş:** Perianal apse, perianal doku ve boşlukların enfeksiyonunun neden olduğu günlük pediyatri pratiğinde yaygın bir pürülan hastalıktır. Genellikle süt çocukluğu döneminde ortaya çıkar ve iki yaşından küçük çocuklarda güçlü bir erkek egemenliği vardır. Çalışmamızda çocukluk çağında perianal apse tanısı alan olguların klinik ve laboratuvar çalışmalarını incelemeyi amaçladık.

**Gereç ve Yöntemler:** Ekim 2016-Haziran 2018 tarihleri arasında Kayseri Eğitim ve Araştırma Hastanesi, Çocuk Enfeksiyon Hastalıkları tarafından perianal apse tanısı ile takip edilen tıbbi veriler retrospektif olarak incelendi.

**Bulgular:** Perianal apse tanısıyla toplam 15 hasta takip edilmişti. Hastaların 14 (%93.3)'ü erkekti. Yaş ortalamaları 19.10 ± 8.86 aydı. Hastaların 7 (%46.6)'si altı aylıktan, 11 (%73.3)'i ise bir yaşından küçüktü. Sadece bir (%6.7) hastada başvuru yakınmalarına ateş eşlik etmekteydi, 13 (%86.6) hasta perianal bölgede şişlik yakınması ile getirilmişti. Hastaneye yatırılarak takip edilen 12 (%80) hastanın hepsine cerrahi drenaj uygulandı. Hastaların 10 (%83.3)'unda apse kültüründe üreme oldu. Kültür üremesi olan hastaların %60'ında etkenler dirençli mikroorganizmalardı. Hastanede yatan olgularımızın %50'sinde kültür antibiyogram sonuçlarına göre tedavi değişikliği gerekmiş ve bu hastalarda meropenem ve amikasin kombine kullanımı tercih edilmişti.

**Sonuç:** Perianal apseler çocuklarda sık görülmekle birlikte hastalığın yönetiminde ve tedavisindeki veriler kısıtlıdır. Çalışmamız perianal apselerin tedavisinde rutin apse kültürünün yararının altını çizmektedir.

**Anahtar Kelimeler:** Çocuk, perianal apse, dirençli mikroorganizma

**Correspondence Address/Yazışma Adresi**

**Taylan Çelik**

Çanakkale Onsekiz Mart Üniversitesi Tıp Fakültesi,
Çocuk Enfeksiyon Hastalıkları Bilim Dalı
Çanakkale-Türkiye

**E-mail:** taylanchelik@hotmail.com

**Received:** 27.04.2021 **Accepted:** 26.07.2021 **Available Online Date:** 30.06.2022

## Introduction

Perianal abscess is a purulent disease that is common in daily pediatric practice, caused by acute infection of perianal tissues and cavities, and can be seen in both children and adults. It usually occurs during infancy and there is a strong male dominance in this period (1-3). It has been suggested that an excess of androgen or an imbalance between androgen and estrogen cause perianal abscess development. Immunodeficiency or inflammatory bowel diseases in older children and a congenital anomaly such as an anal fistula in children younger than one year old may predispose to the development of perianal abscess, but it is not clear whether anal fistula is a cause or a consequence. Symptoms are usually mild; It may present with low-grade fever, mild anal pain, and swelling, redness, and tenderness in the perianal region (3,5).

The most frequently isolated microorganisms in perianal abscesses are a mix of aerobic [*Escherichia coli* (*E. coli*), *Klebsiella pneumoniae* (*K. pneumoniae*), *Staphylococcus aureus* (*S. aureus*)] and anaerobic (*Bacteroides* spp., *Clostridium*, *Veillonella*) flora. In 10-15% of patients, *E. coli*, *S. aureus* or *Bacteroides fragilis* (*B. fragilis*) is the only agent (1-5).

Data and guidelines that can inform its diagnosis and treatment are limited. Treatment is controversial in children without a predisposing disease because the disease is usually self-limiting (2,5). For these reasons, we aimed to determine the clinical and laboratory characteristics and treatment preferences in patients treated for perianal abscess in our clinic.

## Materials and Methods

The data of all patients diagnosed with perianal abscess between October 2016 and December 2018 in Kayseri Training and Research Hospital, Pediatrics Health and Diseases Training Clinic, Pediatric Infectious Diseases Unit were analyzed retrospectively on the Hospital Information Management System. Approval for the study was obtained from the local ethics committee (2019-20).

In the case form, data on patients enrolled on the hospital information management system with the ICD code K61.0, such as age, gender, complaints at admission, presence of recurring abscess, and treatment techniques, were recorded. Patients' hemograms, C-reactive protein (CRP) levels, serum immunoglobulin (Ig) levels, lymphocyte subsets, and phagotest evaluations were all documented. The abscess culture results of patients who had surgical drainage were documented. Antibiotherapy preferences and length of hospital stay were documented based on culture antibiogram results.

SPSS software (version 23.0, IBM Company, SPSS Inc.) was used for all statistical analysis. Descriptive statistics such as mean ± standard deviationfor continuous variables and frequency (n) and percentage (%) for categorical variables were used to summarize baseline characteristics.

## Results

A total of 15 patients were followed up in our clinic with the diagnosis of perianal abscess. Of the patients, 14 (93.3%) were male and 1 (6.7%) was female. The mean age was 19.10 ± 8.86 months (1-126 months). Seven of the patients (%46.6) were younger than six-month-old and eleven of them (%73.3) were younger than one-year-old. 13 patients (86.6% presented with perianal swelling and only one patient (6.7%) had fever. Six (40%) patients had a history of recurrent perianal abscess (Table 1).

The laboratory results of the patients were as follows: mean total leukocyte count 13.909 ± 4.109/mm$^3$, neutrophil count 5.906 ± 4.481/mm$^3$, lymphocyte count 6.340 ± 2.385/mm$^3$, platelet count 472.478 ± 121.112/mm$^3$, hemoglobin 11.3 ± 1.3 g/dL and CRP 5.43 ± 2.7 mg/dL. While no predisposing cause was found in 14 (93.3%) patients, perianal fistula was detected in only one patient who was 10 years old (6.7%), who presented with recurrent abscess (Table 1). No pathology was found in 9 (60%) patients who were evaluated for immunodeficiencies (immunoglobulin, lymphocyte subsets and phagotest).

Surgical drainage was performed in all 12 (80%) patients who were hospitalized, and no procedures were performed in 3 (20%) outpatients. There was growth in the abscess culture of 10 (83.3%) out of 12 patients who underwent surgical drainage.

*E. coli* growth was detected in 8 (80%) of these patients; of these, 4 (50%) were found to produce extend-

**Table 1.** Patient demographics

| Variable | Patients (n= 15, %), Mean ± SD (Min-Max) |
|---|---|
| Gender | |
| Boy | 14 (93.3%) |
| Girl | 1 (6.7%) |
| Age distribution of patients (months) | 19.10 ± 8.86 (1-126) |
| Number of patients younger than six months | 7 (46.6%) |
| Number of patients younger than one year old | 11 (73.3%) |
| Presence of fever | 1 (6.7%) |
| History of recurrence | 6 (40%) |
| Presence of fistula | 1 (6.7%) |
| Surgical drainage | 12 (80%) |
| Growth in abscess culture **(n= 12)** | 10 (83.3%) |
| Mean length of stay (days) | 8.25 ± 2.97 (3-14) |

**Table 2.** Antibiotic susceptibility of microorganisms grown in abscess culture

| | *E. coli* | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | ESBL (-) | | | | ESBL (+) | | | | | | |
| **Antibiotic** | **1** | **2** | **3** | **4** | **1** | **2** | **3** | **4** | ***K. pneumoniae*** | ***E. cloacae*** | **Total Resistance Ratio** |
| Amoxicilin/Clavulonic acid | R | R | S | R | S | R | R | | S | R | 66.6% |
| Ampicillin | R | R | S | R | R | S | R | R | R | R | 80% |
| Cefuroxime | S | S | S | R | R | R | R | R | S | | 55.5% |
| Ceftriaxone | S | | R | | R | R | R | R | | R | 83.3% |
| Cefepime | S | | | R | R | R | S | R | | R | 57.1% |
| Gentamicin | R | S | S | R | S | S | | R | S | R | 44.4% |
| Amikacin | S | S | | S | S | S | | S | S | S | 0% |
| Meropenem | S | | | S | | S | S | S | | | 0% |
| Ciprofloxacin | | | | S | | | | | | R | 50% |
| TMP-SMX | R | S | S | R | S | R | R | S | S | S | 40% |

R: Resistant, S: Susceptible/sensitive.

ed-spectrum beta-lactamase (ESBL), and one had a similar resistance profile even though it did not produce ESBL. While no polymicrobial growth was detected, *K. pneumoniae* and *Enterobacter Cloacae* (*E. cloacae*) were detected in one patient each; *E. cloacae* also had a similar resistance profile, although it did not produce ESBL. It was observed that 44.4% of the microorganisms studied for gentamicin susceptibility, and 40% of those studied for trimethoprim/sulfamethoxazole (TMP-SMX) susceptibility were resistant, and 50% of growths with the dominant pathogen *E. coli* were TMP-SMX resistant. No resistance was detected in any of the microorganisms whose susceptibility to amikacin was studied. There was resistance in 80% of the microorganisms whose ampicillin susceptibility was studied, and 66.6% of those whose amoxicillin/clavulanic acid susceptibility was studied. In addition, in microorganisms other than ESBL producers, resistance was found in 25% of those whose cefuroxime susceptibility was studied, and in 66.6% of those whose ceftriaxone susceptibility was studied (Table 2).

Cefotaxime and clindamycin were preferred as initial treatment in 11 of 12 patients who to be hospitalized, and gentamicin was added to the initial treatment of two (16.6%) patients. Initial treatment of a one-month-old patient was arranged as cefotaxime and ampicillin combination. Based on the antibiotic susceptibility results, 50% of the patients with culture growth required a change in treatment. Meropenem and amikacin were given to all of the patients whose treatment was re-adjusted based on susceptibility data. In outpatients, there was no need for a therapy change. While the mean length of stay of the patients was 8.25 ± 2.97 (3-14 days) days, the length of stay of the patients with ESBL producing microorganisms was 11.75 ± 1.7 days.

## Discussion

Perianal abscess is a purulent disease that is common in daily pediatric practice, caused by acute infection of perianal tissues and cavities. It is mostly a disease of the newborn and infants, with a prevalence of 0.5-4.3% in infants. Children younger than one year constitute 57-86% of perianal abscess cases (1,2,6). In studies conducted in our country, the rate of patients younger than one year was reported as 51.4%-85.1% (2,3,7). In our study, similar to the literature, 46.6% of our patients were younger than six months and 73.3% were younger than one year old. In their meta-analysis published in 2020, Stokes et al. reported a five-day-old patient among 1049 cases younger than two years, and Afşarlar et al. reported a 15-day-old patient. Our study's youngest subject was one month old (4,7).

Symptoms of perianal abscess in infants are often mild, with discomfort caused by mild anal pain and cellulitis in the perianal region (1). They are typically systemically fine at presentation and usually have no fever. The frequency of fever was reported to be 21.2-34.2% in studies conducted in our country (2,3). Samuk et al. reported that they had no febrile cases related to perianal abscess (8). Perianal abscess in infants is unlikely to be associated with a systemic infection, yet patients with febrile convulsions have been documented in the literature (9). Fever was present in 6.7% of the cases in our study, which was consistent with the literature.

Although the necessity of microscopy and culture studies of perianal abscess material is unclear, gastrointestinal flora pathogens frequently grow when cultured. *Escherichia coli* is the most frequently detected pathogen, while *Klebsiella* spp., *B. fragilis* and *S. aureus* are other microorganisms isolated. In the meta-analysis of Stokes et al., *E. coli* (50.9%) and *Klebsiella*

species (19.3%) were the most frequently isolated microorganisms (4). In the study of Shaughnessy et al., methicillin-resistant *S. aureus* was the most frequently isolated microorganism with a frequency of 35.5%, while *E. coli* was reported with a frequency of 0.5% (10). Aygün et al. reported that culture growth was observed in 89.4% of the patients and the most frequently isolated microorganism was *K. pneumoniae* with 64.7% (2). On the other hand, Tanır et al. reported the growth rate in culture as 79.4%, while they reported enteric flora mixture (*E. coli*, *Klebsiella*, Proteus spp.) in 52% of the patients and *E. coli* as the only isolated microorganism in 29% (3). In the study by Zhu et al., which included 66 patients younger than three months in 2019, *K. pneumoniae* was the most frequently isolated microorganism with 72.7% (11). There was growth in the abscess culture of 83.3% of our cases, and similar to the literature, the growth of GI tract pathogens, especially *E. coli*, was prominent. We did not detect *S. aureus* and *B. fragilis* growth in any of our patients.

Although perianal abscess is common in children, its treatment is controversial. While the abscess may resolve spontaneously without treatment, oral or intravenous antibiotics and/or surgery may be required in symptomatic children who present with persistent abscess, fever and/or significant pain (1). Although it has been suggested that perianal abscesses may heal spontaneously in children younger than one year of age, some authors have recommended surgery first, while others have recommended conservative treatment with sitz baths, with or without antibiotics (12-14). Preferred antibiotics are mainly β-lactam/β-lactamase inhibitors and nitroimidazoles due to frequent growth of GI flora pathogens (12). Draining the abscess is the most common surgical procedure to prevent spread of the abscess and necrosis of surrounding healthy tissues. The use of antibiotics after surgical drainage can effectively shorten the clinical course and reduce the spread of abscess or the rate of fistula formation (7,12). It is reasonable to plan only antibiotic treatment before surgical drainage in patients who are not febrile and can be followed closely in outpatient setting (10). However, as a result of the irrational use of antibiotics, the resistance profile of microorganisms grown in culture is changing day by day, and children are increasingly affected by resistant agents such as ESBL-producing microorganisms. In a surveillance study conducted in the United States, the prevalence of ESBL-producing gram-negative bacillus isolates in pediatric samples increased from 0.28% between 1999 and 2001 to 0.92% between 2010 and 2011. Extended-spectrum beta-lactamases are enzymes that confer resistance to most beta-lactam antibiotics, including penicillins and cephalosporins, and infections with ESBL-producing microorganisms have been associated with poor outcomes (16). Zhu et al. reported low drug resistance rates of *K. pneumonia*, a dominant pathogen, but reported TMP-SMX resistance of 73.5% and ceftriaxone resistance of 29.5% in patients with *E. coli* growth, similar to our study (11). Aygün et al. reported surgical drainage performed in 54.3% of the patients, high resistance rates with ESBL producing *K. pneumoniae* in 64.7% of the microorganisms grown in the culture and *E. coli* producing ESBL in 29.4%. In the same study, they reported that 48.6% of the patients were treated with meropenem and amikacin due to resistant microorganisms grown in culture (2). Alabbad et al. reported that *E. coli* was the most frequently detected microorganism, but the overall incidence of this type of isolate was low despite an increase in community-acquired multi-resistant strains (15). According to Shaughnessy et al., 73.5 percent of patients had abcess drainage and culture, with only five (2.7 percent) requiring treatment adjustment based on culture results. There was no statistically significant difference in recurrence between patients who were or were not cultured (10). In our study, surgical drainage was performed in 12 patients, and growth was detected in the cultures of 10. In six of these growths, the agents were resistant microorganisms. In 50% of our inpatients, treatment adjustment was needed based on the culture results, and the combined use of meropenem and amikacin was preferred in these patients. The high rate of culture growth and the high frequency of resistant microorganisms in our study may explain the high need for treatment adjustment.

Perianal fistulas are reported to develop at a rate of 20-85% after a perianal abscess (7). Given that fewer fistula cases are reported in the literature when simple drainage and antibiotic treatment are combined (7,15), and given the high resistance of microorganisms grown in culture to amoxicillin/clavulanic acid, TMP-SMX, cefuroxime, and ceftriaxone, which are commonly used in daily practice, in cases where the disease does not resolve spontaneously after treatment with these agents, treatment failure and an increase in fistula frequency can be speculated. Further prospective studies on this subject are required.

Our study has certain shortcomings and limitations. First of all, due to the retrospective nature of our study, some data may have been overlooked due to incomplete information. Second, because we included data from a single center, the number of our patients is limited. On the other hand, our study is valuable because of the high rate of growth and frequency of resistant microorganisms in our abscess cultures, which were not reported in previous studies.

In conclusion, although perianal abscesses are common in children, data on the management and treatment of the disease are limited. Our study highlights the benefit of routine abscess culture in the treatment ofperianal abscesses. Based on our findings, we recommend that abscess cultures be performed routinely following abscess drainage, both to avoid unnecessary antibiotic use and to adjust treatment plans based on susceptibility results if culture growth is detected.

**Ethics Committe Approval:** This study was approved by Çanakkale Onsekiz Mart University Clinical Research Ethics Committee (Decision no: 2019-20, Date: 11.12.2019).

**Informed Consent:** Patient consent was obtained.

**Peer-review:** Externally peer-reviewed.

**Author Contributions:** Concept- All of authors; Design- All of authors; Supervision- TÇ, ÖÇ; Resource- TÇ; Data Collection and/or Processing- TÇ, EK; Analysis and/or Interpretation- All of authors; Literature Search - All of authors; Writing- All of authors; Critical Review- All of authors.

**Conflict of Interest:** All authors declare that they have no conflicts of interest or funding to disclose.

**Financial Disclosure:** The authors declared that this study has received no financial support.

## References

1. *Shanti CM. Perianal Abscess and Fistula. Brehman RE, Kliegman RM, Jenson H (Ed.). Nelson Textbook of Pediatrics. 21st ed. Philadelphia: Elsevier Saunders. 2020;2059-60.*
2. *Aygün D, Akçakaya N, Çokuğraş H, Camcıoğlu Y. Evaluation of the causes of perianal abscess in childhood. J Pediatr Inf 2019;13(1):21-7. [CrossRef]*
3. *Tanır Basaranoglu S, Ozsurekci Y, Cengiz AB, Karadag Oncel E, Aykac K, Kara A, et al. Absceso perianal en ninos: Perspectiva desde el campo de la infectología pediátrica. An Pediatr (Barc) 2019;90:370-5. [CrossRef]*
4. *Stokes R, Wanaguru D, Saadi A, Adams S. Management of perianal abscesses in infants without general anaesthesia: A systematic review of the literature. Pediatr Surg Int 2020;1-9. [CrossRef]*
5. *Park J. Management of perianal abscess and fistula-in-ano in infants and children. Clin Exp Pediatr 2020;63(7):261-2. [CrossRef]*
6. *Tan Tanny SP, Wijekoon N, Nataraja RM, Lynch A, Pacilli M. Surgical management of perianal abscess in neonates and infants. ANZ J Surg 2020;90(6):1034-6. [CrossRef]*
7. *Afşarlar ÇE, Karaman A, Tanır G, Karaman İ, Yılmaz E, Erdoğan D, et al. Perianal abscess and fistula-in-ano in children: Clinical characteristic, management and outcome. Pediatr Surg Int 2011;27(10):1063-8. [CrossRef]*
8. *Samuk I, Avinadav E, Barak U, Seguier E, Steiner Z, Freud E. Perianal abscess in infants: Amenable to conservative treatment in selected cases. Pediatr Int 2019;61(11):1146-50. [CrossRef]*
9. *Taylor GM, Erlich AH. Perianal abscess in a 2-year-old presenting with a febrile seizure and swelling of the perineum. OMCR 2019;01:26-8. [CrossRef]*
10. *Shaughnessy MP, Park CJ, Zhang L, Cowles RA. The limited utility of routine culture in pediatric pilonidal, gluteal, and perianal abscesses. J Surg Res 2019;239:208-15. [CrossRef]*
11. *Zhu Y, Xu F. The pathogens and curative effects analysis of perianal abscess of infants under 3 months. Turk J Pediatr 2019;61(1):40-3. [CrossRef]*
12. *Ding W, Sun YR, Wu ZJ. Treatment of perianal abscess and fistula in infants and young children: From basic etiology to clinical features. Am Surg 2021;87(6):927-32. [CrossRef]*
13. *Boenicke L, Doerner J, Wirth S, Zirngibl H, Langenbach MR. Efficacy of conservative treatment of perianal abscesses in children and predictors for therapeutic failure. Clin Exp Pediatr 2020;63(7):272-7. [CrossRef]*
14. *Juth Karlsson A, Salö M, Stenström P. Outcomes of various interventions for first-time perianal abscesses in children. BioMed Res Int 2016;2016:9712854. [CrossRef]*
15. *Alabbad J, Abdul Raheem F, Alkhalifa F, Hassan Y, Al-Banoun A, Alfouzan W. Retrospective clinical and microbiologic analysis of patients with anorectal abscess. Surg Infect 2019;20:31-4. [CrossRef]*
16. *Munoz-Price LS. Extended-spectrum beta-lactamases. In: Hooper DC (Ed.), Uptodate. Retrieved 2021. Available from: https://www.uptodate.com/contents/extended-spectrum-beta-lactamases*