



Evaluation of the Causes of Perianal Abscess in Childhood

Çocuklarda Perianal Apse Nedenlerinin Değerlendirilmesi

Deniz Aygün¹, Necla Akçakaya¹, Haluk Çokuğraş¹, Yıldız Camcıoğlu¹

¹ Department of Pediatric Infection, Istanbul University Cerrahpaşa School of Medicine, Istanbul, Turkey

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Abstract

Objective: Perianal abscesses are common disorders of childhood. Predisposing conditions like immunodeficiency syndrome and inflammatory bowel disease should be investigated especially in older children. In infants younger than six months of age, the presence of a congenital anomaly such as perianal fistula should be ruled out. In the present study, it was aimed to evaluate the clinical and laboratory findings of perianal abscesses in childhood.

Material and Methods: The medical records of patients hospitalized with the diagnosis of perianal abscesses in the pediatric infection disease department between December 2009 and December 2017 were evaluated retrospectively.

Results: There were 35 patients diagnosed with perianal abscesses, of whom 30 (85.7%) were males and five (14.3%) were females. Age distributions ranged from 2 to 156 months and mean patient age was 25.88 ± 34.37 months. Eighteen (51.4%) patients were younger than one year of age. Twenty-two (62.9%) patients did not have any predisposing conditions. Five (14.3%) patients had perianal fistula, 4 (11.4%) patients had immunodeficiency, 3 (8.6%) patients had inflammatory bowel disease and 1 (2.9%) patient had hemangioma. Surgical drainage was performed in 9 (54.3%) patients, 12 (34.3%) patients did not have any invasive procedures, and 4 (11.4%) patients developed spontaneous drainage. Fourteen (40%) patients had a history of recurrence. The patients were divided into two groups according to recurrence. Male gender, older age, fever at admission, prolonged hospitalization, lymphocytosis and increased serum immunoglobulin levels were significantly associated with the recurrence of the perianal abscess.

Conclusion: Although, perianal abscesses are common in children, data in the management and treatment of the disease are limited. Children with recurrent perianal abscess should be examined in detail and risk factors be identified.

Keywords: Child, perianal abscess, perianal fistula

Öz

Giriş: Perianal apse, çocukluk çağında yaygın olarak görülen bir hastalıktır, özellikle büyük çocuklarda saptandığında altta yatan immünyetmezlik, inflamatuvar bağırsak hastalığı gibi predispozan faktörleri araştırmak gerekmektedir. Altı ayın altındaki süt çocuklarında ise hazırlayıcı nedenlerle nadiren ilişkili olup anal fistül gibi konjenital bir anomalî varlığı dışlanmalıdır. Çalışmamızda çocukluk yaş grubunda perianal apse tanısı alan olguların klinik ve laboratuvar bulgularının değerlendirilmesi amaçlanmıştır.

Gereç ve Yöntemler: Aralık 2009-Aralık 2017 tarihleri arasında fakültemiz Çocuk Enfeksiyon Servisi'nde perianal apse tanısıyla yatırılan hastaların tıbbi kayıtları, geriye dönük olarak araştırmanın amaçları doğrultusunda incelendi.

Bulgular: Perianal apse tanısı alan 35 hastanın 30 (%85.7)'ü erkek, 5 (%14.3)'i kızdı. Yaş ortalamaları 25.88 ± 34.37 aydı (2-156). Hastaların 18 (%51.4)'i bir yaşından küçüktü. Hazırlayıcı nedenler araştırıldığında 22 (%62.9) hastada herhangi hazırlayıcı bir patoloji saptanmadı. Beş (%14.3) hastada perianal fistül, 4 (%11.4) hastada immünyetmezlik, 3 (%8.6) hastada inflamatuvar bağırsak hastalığı vardı, 1 (%2.9) hastada hemanjiom zemininde apse gelişmişti. On dokuz (%54.3) hastaya cerrahi drenaj uygulandı, 12 (%34.3) hastaya herhangi bir girişim uygulanmadı, 4 (%11.4) hastada apse kendiliğinden drene oldu. On dört (%40) hastada tekrarlayan perianal apse öyküsü vardı. Hastalar apse tekrarına göre iki gruba ayrılıp risk faktörleri karşılaştırıldı. Erkek cinsiyet, yaşın büyük olması, başvuru sırasında ateş varlığı, yatış süresinin uzun olması, lenfositoz, serum immünglobülin düzeyinde yükseklik ile perianal apsenin tekrarlaması arasında istatistiksel anlamlı ilişki saptandı.

Sonuç: Perianal apseler çocuklarda sık görülmekle birlikte hastalığın yönetiminde ve tedavisindeki veriler kısıtlıdır. Tekrarlayan perianal apse şikayeti olan çocuklar ayrıntılı olarak tetkik edilmeli ve risk faktörleri belirlenmelidir.

Anahtar Kelimeler: Çocuk, perianal fistül, perianal apse

Yazışma Adresi / Correspondence Address

Deniz Aygün

İstanbul Üniversitesi Cerrahpaşa Tıp Fakültesi,
Çocuk Enfeksiyon Bilim Dalı, İstanbul-Türkiye

E-mail: fdenizaygun@gmail.com

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Introduction

Perianal abscess is an anorectal disease seen very commonly not only in adulthood but also in childhood. Patients generally refer to hospitals with complaints such as swelling in the anal region, tenderness and fever. Perianal abscesses forming as a result of obstruction of the anal crypts and glands are frequently seen in male children under the age of 1 (1-4). It has been suggested that androgen excess or the imbalance between androgen and estrogen causes the formation of perianal abscess (5,6). In 30-50% of perianal abscesses, fistula can develop between the perianal skin and anal canal due to the surfacing of the inflammation. Immunodeficiency or inflammatory bowel diseases (IBD) in older children and a congenital anomaly like anal fistula in children under the age of 1 can be predisposing conditions to the formation of perianal abscess (6,7). Along with the preference of conservative treatment methods in perianal abscess treatment, surgical intervention may be necessary in symptomatic patients (8). Data on the management of perianal abscess in childhood are limited and are based mostly on surgical reports and clinical experience. To that end, this study aimed to report the predisposing conditions, treatment preferences, outcomes and clinical and laboratory findings of the patients hospitalized in our clinic for perianal abscess.

Materials and Methods

Study Plan

Data of all patients hospitalized with the diagnosis of perianal abscess between December 2009 and December 2017 in the Pediatric Infection Disease Department of Istanbul University Cerrahpasa Medical Faculty were retrospectively reviewed from patient files and electronic record system. Consent from all parents of our patients and approval from the local ethics committee of our faculty (21.05.2018-29430533) were received for the study.

Patient Selection and Data Collection

The patients were evaluated for age, gender, complaints at admission and treatment method. Hemogram, C-reactive protein (CRP), erythrocyte sedimentation rate (ESR), serum immunoglobulin (Ig) levels, lymphocyte sub-groups, and nitroblue tetrazolium test (NBT) were assessed in all patients. Abscess culture from patients receiving spontaneous or surgical drainage and blood culture from all patients that had fever were taken. Antibiotherapy preferences and length of hospital stay according to culture antibiogram results were recorded. Prolonged diarrhea and presence of recurrent abscess were investigated.

Statistical Analysis

SPSS (21.0 version, IBM Company, SPSS Inc.) was used for statistical analysis. Numerical values were stated by mean \pm standard deviation and categorical data by frequency (n) and

percentage (%). Statistical significance between the groups was analyzed by one way ANOVA. Pearson chi-square test was used for the evaluation of the association between two nominal variables. The association between recurrent perianal abscess and laboratory findings were assessed by ROC curve analysis. P value below 0.05 was accepted statistically significant.

Results

Demographics

A total of 35 patients, of whom 30 (85.7%) were males and 5 (14.3%) were females, were hospitalized and treated for perianal abscess. Mean age of the patients was 25.88 ± 34.37 months (2-156). Eighteen of the patients (51.4%) were under the age of 1. Fever was detected in 12 (34.2%) patients at admission. Recurrent perianal abscess and prolonged diarrhea were found in 14 (40%) and 7 (20%) patients, respectively.

Clinical and Laboratory Factors Associated with Perianal Abscess

Laboratory evaluation of the patients was as follows; mean sedimentation: 4457 ± 24.40 mm/h, mean CRP: 8.09 ± 6.60 mg/dL, mean leukocyte count: $15.412 \pm 6729/\text{mm}^3$, mean neutrophil count: $10.416 \pm 7135/\text{mm}^3$, mean lymphocyte count: $3733 \pm 1757/\text{mm}^3$, mean thrombocyte count: $360.108 \pm 154.391/\text{mm}^3$, and mean hemoglobin: 11.1 ± 1.6 g/dL. When predisposing conditions were scrutinized, no predisposing pathology was determined in 22 (62.9%) patients. Five (14.3%) patients had perianal fistula, 4 (11.4%) patients had immunodeficiency, 3 (8.6%) patients had inflammatory bowel disease and 1 (2.9%) patient had hemangioma. Immune system evaluation was carried out in all patients. Two of our patients had already been followed by the Pediatric Immunology Polyclinic of our hospital for chronic granulomatous disease (CGD) and Wiskott Aldrich syndrome. Two patients were diagnosed with CGD during hospitalization. Two of the patients were priorly diagnosed with IBD, and infantile IBD was suspected in an 18-months-old patient.

Surgical drainage was performed in 19 (54.3%) patients. No invasive procedures were carried out in 12 (34.3%) patients, and the abscesses were spontaneously drained in 4 (11.4%). There was growth in the drainage cultures of 17 (48.6%) patients. *Klebsiella pneumoniae* that produces wide-spectrum beta-lactamase (WSBL) was detected in 11 (31.4%) patients, *Escherichia coli* that produces WSBL was confirmed in 5 (14.3%) patients, and enterococcus-type microorganism was seen in 1 (2.9%) patient. There was growth in the blood culture of 3 (8.6%) patients. *Stenotrophomonas maltophilia* grew in one patient diagnosed with CGD and *K. pneumoniae* in two. Our patient with a preliminary diagnosis of IBD, in whose blood culture *K. pneumoniae* that produces WSBL grew, died due to sepsis. Having no other disease than liminal mental retardation and microcephaly, the

Table 1. Patient demographics

Total patient number	(n= 35) Mean ± SD
Gender	
Male	30 (85.7%)
Female	5 (14.3%)
Age distribution of the patients (month)	25.88 ± 34.37 (2-156)
Number of patients younger than 1 year of age	18 (51.4%)
Presence of fever	12 (34.2%)
History of recurrence	14 (40%)
Prolonged diarrhea	7 (20%)
Presence of fistula	5 (14.3%)
Immunodeficiency	4 (11.4%)
Inflammatory bowel disease	3 (8.6%)
Surgical drainage	19 (54.3%)
Growth in abscess culture	17 (48.6%)
Growth in blood culture	3 (8.6%)
Mean length of hospital stay (day)	21.37 ± 12.81

infection advanced to the lower abdomen, and femur and osteomyelitis developed in an 11-year-old patient with a diagnosis of perianal abscess secondary to anal fissure that developed after prolonged diarrhea. WSBL-producing *E. coli* developed in two drainage cultures of this case. Deeply located fistula was detected in the patient whose immune system evaluation was normal. Meropenem-amicasin, cephazolin-amicasin, and ampicillin-cephotaxime treatments were administered to 17 (48.6%), 14 (40.0%) and 4 (11.4%) patients, respectively. Mean treatment and length of hospital stay of the patients were 21.37 ± 12.81 days. Table 1 shows the demographics of the patients.

Clinical and Laboratory Factors Associated with Patients Having Recurrent Perianal Abscess

The patients were divided into two groups as regards abscess recurrence, and the risk factors were compared. A statistically significant relation was found between male gender, older age, fever at admission, longer hospital stay, lymphocytosis, elevated levels of serum IgG, IgM, IgA, IgE and recurrence of the perianal abscess. Respectively, p values were as follows: p= 0.049, p= 0.024, p= 0.006, p= 0.013, p= 0.025, p= 0.001, p= 0.016, p= 0.011, p= 0.004. History of prolonged diarrhea was lower in patients with recurrent abscess (p= 0.028) (Table 2).

Table 2. Comparison of risk factors according to abscess recurrence

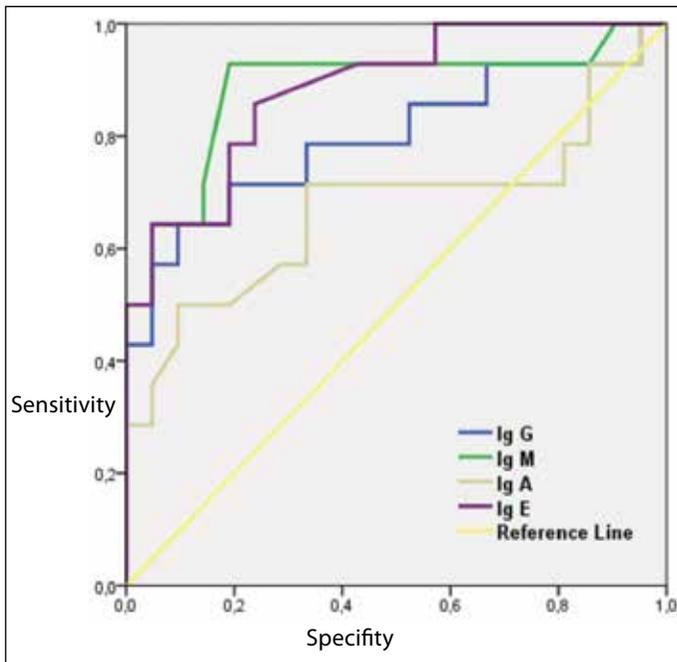
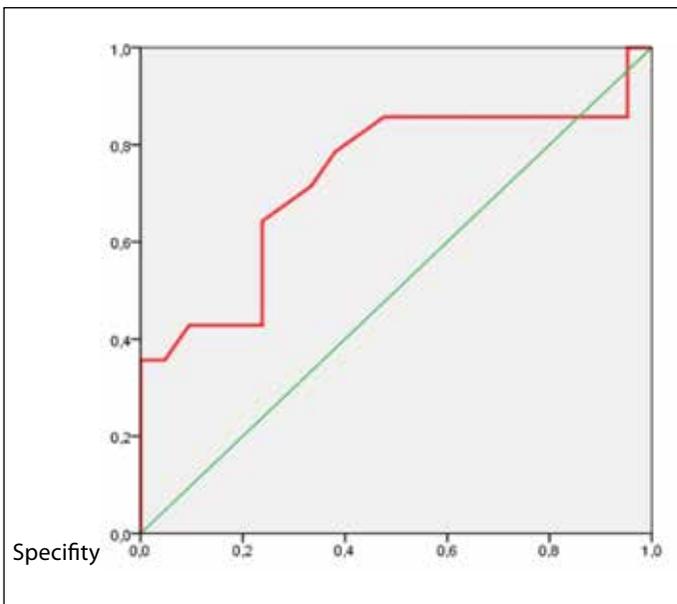
	Recurrence		p
	Yes (n= 14)	No (n= 21)	
Gender			
Male	10 (71.5%)	1 (4.8%)	0.049
Female	4 (28.5%)	20 (95.2%)	
Age (month)	41.71 ± 48.70	15.33 ± 13.23	0.024
Fever	38.42 ± 0.76	37.57 ± 0.89	0.006
Leucocyte count	17807.14 ± 8690.09	13816.19 ± 4606.00	0.086
Neutrophil	11980.71 ± 10267.72	9372.86 ± 3895.49	0.296
Lymphocyte	4535.71 ± 2268.38	3198.57 ± 1074.08	0.025
Hgb	11.09 ± 1.08	11.48 ± 1.07	0.302
Thrombocyte	256729 ± 249073	248349 ± 172840	0.907
CRP	8.97 ± 7.32	7.50 ± 6.20	0.527
Sedimentation	49.36 ± 24.05	41.38 ± 24.69	0.351
IgG	867.21 ± 398.95	536.43 ± 148.07	0.001
IgM	98.41 ± 91.69	46.52 ± 16.64	0.016
IgA	68.79 ± 70.09	24.79 ± 14.23	0.011
IgE	79.33 ± 104.25	9.92 ± 8.86	0.004
Length of hospital stay	27.78 ± 16.41	17.10 ± 7.49	0.013
Culture taken	10 (71.5%)	13 (61.9%)	0.193
Prolonged diarrhea	1 (7.1%)	6 (28.5%)	0.028
Recurrences	5 (35.7%)	9 (42.8%)	0.129
Growth in wound	6 (42.8%)	11 (52.3%)	0.063
Surgical drainage	8 (57.1%)	11 (52.3%)	0.411

Hgb: Hemoglobin, IgG: Serum immunoglobulin G, IgM: Serum immunoglobulin M, IgA: Serum immunoglobulin A, IgE: Serum immunoglobulin E.

Table 3. Evaluation of the relation between recurrent perianal abscess and Ig levels with ROC analysis

Parameter	Area under the curve of ROC curve	Standard deviation	p	95% confidence interval OR		Threshold value	Sensitivity	Specificity
				Lower limit	Upper limit			
IgG	0.96	0.085	0.003	0.629	0.963	578.50	78.6%	66.7%
IgM	0.884	0.067	≤ 0.001	0.754	1.000	63.25	92.9%	81.0%
IgA	0.672	0.104	0.089	0.467	0.876	25.50	71.4%	66.7%
IgE	0.884	0.057	≤ 0.001	0.773	0.995	15.00	78.3%	81.0%

Hgb: Hemoglobin, IgG: Serum immunglobulin G, IgM: Serum immunglobulin M, IgA: Serum immunglobulin A, IgE: Serum immunglobulin E.

**Figure 1.** Relation between recurrent perianal abscess and immunoglobulin levels.**Figure 2.** Relation between recurrent perianal abscess and hemogram parameters.

ROC Analysis of the Relation Between Recurrent Perianal Abscess and Ig Levels

For the relation between recurrent perianal abscess and Ig levels, ROC curve analysis was performed, and specificity and sensitivity were detected as 78.6% and 66.7% respectively for a cut-off point of 578.50 mg/dL and area under the curve (AUC) of 0.796 for IgG. On the same curve, specificity and sensitivity were 92.9% and 81.0% respectively for a cut-off point of 63.25 mg/dL and AUC of 0.884 for IgM. Specificity and sensitivity were 71.4% and 66.7% respectively for a cut-off point of 25.50 mg/dL and AUC of 0.672 for IgA and specificity and sensitivity were 78.3% and 81.0% respectively for a cut-off point of 15.00 mg/dL and AUC of 0.884 (Table 3). Relation between recurrent perianal abscess and IgG levels are shown in ROC curve Figure 1.

ROC Analysis of the Relation Between Recurrent Perianal Abscess and Hemogram Parameters

Recurrence was only found to be associated with lymphocyte count when ROC analysis was performed for the relation between recurrent perianal abscess and hemogram parameters (Figure 2). Specificity and sensitivity were detected as 78.6% and 61.9% respectively for a cut-off point of 3450 mm³ and area under the curve (AUC) of 0.731 for lymphocyte value (Table 4).

Discussion

Perianal abscess is mostly the disease of newborn and infancy periods, and it is seen at a frequency of 0.5-4.3% in infants. Rates of cases under the age of 1 have been reported as 57-86%, and infancy frequency in perianal abscesses in our country has been put forth between 62% and 85.1% in studies conducted in our country (1,2,4,5,9,10). In our study, only 51.4% of our cases was under the age of 1 and the mean age was 25.88 ± 34.37 months.

As in other perianal region pathologies, male dominance is present in perianal abscesses. While Meyer et al. have reported the rate of male gender as 92.5%, male dominance in Serour et al.'s report has been determined as 97%. 85.7% of the cases in our study was male, which was lower than the other reports in the literature (7,9). The reason for male dominance in perianal abscesses is not clearly known. The hypotheses put forward in-

Table 4. Evaluation of the relation between recurrent perianal abscess and hemogram parameters with ROC analysis

Parameter	Area under the curve of ROC curve	Standard deviation	p	95% confidence interval OR		Threshold value	Sensitivity	Specificity
				Lower limit	Upper limit			
Leucocyte	0.621	0.097	0.232	0.431	0.810	15150	64.3%	61.9%
Neutrophil	0.583	0.104	0.409	0.380	0.787	11250	57.1%	66.7%
Lymphocyte	0.731	0.095	0.022	0.545	0.917	3450	78.6%	61.9%
Hemoglobin	0.396	0.100	0.304	0.199	0.593	10.95	57.1%	28.6%
Thrombocyte	0.473	0.109	0.788	0.259	0.687	110.000	64.3%	28.6%

clude the fact that blood testosterone levels in male babies reach the maximum level between the 1st-3rd months of pre-pubertal period, deep and thick Morgagni crypts are infected with the androgen effect and that there is an imbalance between androgen and estrogen levels (4,10,11).

Predisposing conditions should be investigated in patients detected having perianal abscess. Arditi et al. have indicated that there is a predisposing factor in 52% of 50 cases (12). It has been suggested that perianal abscesses in infants are associated with congenital anomalies like fistula. Shafer et al. have emphasized that perianal fistulas can be related to thickened dentate line in addition to deep and thick Morgagni crypts and pave the way for abscess formation (11). Apart from the reports stating rates of fistula frequency as high as 60%-88%, there are reports indicating rates as low as 15-20% (5,9,12-14). Fistula frequency was reported as 14.3% in our study. Skin infections and setback in the cell migration from the urogenital sinus during embryologic development of the perineum are other possibilities considered (3). Skin infection hypothesis is supported by the gluteal-localized abscess development in hemangioma. No pathology was detected in 22 of our patients (62.9%).

All patients with recurrent perianal abscess complaint should be evaluated for immunodeficiency, and CGD should be ruled out. Perianal abscess formation has been reported in 15%-18% of the patients diagnosed with chronic granulomatous disease (15). As perianal abscess can be the first finding of these patients at admission, it can also develop later in life. Two of our patients had referred to us with perianal abscess complaint and received CGD diagnosis. The case with CGD had developed perianal abscess for the first time at the age of 12. Immunodeficiency rate in our study was detected as 11.4%. Due to the fact that immunodeficiency scans are expensive and carried out in a limited of centers, it is not routinely recommended in patients having perianal abscesses. However, since our university is the reference center for immunodeficiency, it was investigated in all patients.

Perianal abscess can be a complication or even the first finding of IBD, and especially Crohn’s disease. Chronic immunosuppression, diarrhea, and delayed wound healing can be considered the causes of perianal abscess in these patients. Perianal abscesses are more frequently complicated in patients diagnosed with inflammatory bowel disease (16). In a wide-scale, retrospective study including 7218 cases with perianal disease, complication rate in patients with Crohn’s disease has been found as 24 and as 4.8% in patients without any predisposing conditions (16,17). Two of our cases had previously received Crohn’s disease diagnosis. An 18-month-old female case with history of recurrent perianal abscess accompanied with perianal fistula and who was suspected of having IBD was lost due to sepsis while being treated in the department. *K. pneumonia* had grown in the abscess and blood culture of the case.

Generally, gastrointestinal flora pathogens grow in perianal abscess culture materials. Along with the fact that *E. coli* is the most frequently detected pathogen, *Klebsiella spp*, *Bacteroides fragilis* ve *Staphylococcus aureus* are other microorganisms. Brook et al. have determined aerobe and anaerobe flora pathogens in 104 cases, anaerobe bacteria in 27 cases, and aerobe or facultative bacteria in 13 cases in their culture examination including 144 cases (18). There was growth in the drainage cultures of 17 (48.6%) of our cases, and the most commonly detected microorganism was WSBL-producing *K. pneumoniae*. Along with the fact that differences in the growing pathogen as regards gender has been suggested in two different reports and that *E. coli* has been more frequently seen in males and *S. aureus* in females, a difference was not detected in our study in terms of growth as regards gender (19). According to culture antibiogram results, concomitant use of meropenem and amicasin was preferred in 48.6% of the cases.

Although there is no consensus reached on the treatment approach to perianal abscesses in the literature, medical follow-up is more commonly preferred. Many authors recommend a conservative treatment consisting of a hip bath and

antiseptic and antibiotic use (8,9,20). Even though Kubota et al. have reported success in local abscess treatment with fibroblast growth factor (FGF) which is a cytokine effective in angiogenesis and tissue regeneration, it is not yet a supported treatment choice (21). A group of authors indicates that the perianal abscess must certainly be drained and that medical treatment results in longer hospital stay and antibiotic use (22,23). On the other hand, it has been reported that surgical intervention increases the risk of perianal fistula formation and recurrence (8). Surgical drainage had to be performed in 19 (54.3%) patients in our study; however, a statistically significant relation was not detected between surgical intervention and abscess recurrence.

When risk factors for perianal abscess recurrence were investigated, a statistically significant relation was found between the recurrence of perianal abscess and the male gender, older age, fever at admission, longer hospital stay, lymphocytosis, and elevated serum immunoglobulin level. We are of the opinion that more frequent encountering of perianal abscess in males and high levels of immunodeficiency and IBD in patients with predisposing factors explain the risk factors for abscess recurrence.

As seen in ROC curve, Ig levels were detected distinctly higher in patients with recurrent perianal abscesses. Area under the curve for IgM and IgE was determined markedly high (AUC: 0.884). High serum Ig levels can be explained by the increase in inflammation, as in the high Ig levels in our CGD diagnosed cases.

Among the hemogram parameters, which are other risk factors for patients with perianal abscess, lymphocyte level was detected statistically significant on the ROC curve. AUC for ROC curve was 0.731 for lymphocyte value at admission.

There are some limitations to our study. First, our study was constructed as a retrospective one with a few number of patients. Second, perianal abscess localizations were not recorded and a standard surgical method was not specified. On the other hand, wide disease profile, high growth rate in tissue and blood cultures and significant risk factors of perianal abscess recurrence, and especially elevated serum Ig and lymphocyte values make our study valuable.

All in all, along with the fact that perianal abscesses are frequently seen in children, data are limited in the management and treatment of the disease. Children with recurrent perianal abscess complaint should be examined thoroughly and risk factors be identified.

Ethics Committee Approval: Consent from all parents of our patients and approval from the local ethics committee of our faculty (21.05.2018-29430533) were received for the study.

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