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Clinical Characteristics of Patients with Cellulitis and Risk Factors for Recurrence: A Single-Center Study

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What is known on this subject?

Cellulitis is a common bacterial skin infection with high rates of recurrence despite appropriate antibiotic treatment. Several studies have identified risk factors such as advanced age, lymphedema, venous insufficiency, obesity, and vascular interventions as contributors to recurrent episodes. However, data from Türkiye are limited, and there is a need for local evidence to guide targeted prevention strategies.

What this study adds?

This study identifies clinical and microbiological factors associated with cellulitis recurrence in a large single-center cohort. We found that advanced age, lymphedema, peripheral arterial disease, higher body mass index, and living alone were significantly associated with recurrence. These findings provide locally relevant evidence to support risk stratification and targeted prevention strategies in clinical practice.

ABSTRACT

Objective: This study aimed to evaluate the clinical, microbiological, and sociodemographic characteristics of patients diagnosed with cellulitis and to identify risk factors associated with the development of recurrence.

Material and Methods: This retrospective, single-center observational study included 120 adult patients (aged ≥18 years) treated for cellulitis as inpatients or outpatients over a one-year period. Demographic, clinical, and laboratory data were extracted from electronic medical records. Predisposing factors, infection sites, treatment characteristics, and variables associated with recurrence were evaluated. Recurrence was defined as a history of at least two episodes of lower extremity cellulitis. Univariable and multivariable logistic regression analyses were performed to identify factors associated with recurrence. Statistical significance was set at a p value <0.05.

Results: Among the 120 patients diagnosed with cellulitis, the mean age was 56.4±15.7 years; 51% were male. The most commonly affected site was the lower extremity (91%). Although all patients presented with edema and erythema, increased local temperature (96%) and pain (80%) were also frequent findings, whereas fever was less common (15%). The most prevalent predisposing factors were tinea pedis (64.2%), obesity (56.7%), and onychomycosis (47.5%). The recurrence rate was 36.7%. Statistically significant associations were found between recurrence and advanced age, lymphedema, peripheral arterial disease, higher body mass index (BMI), and living alone or being homeless (p<0.05). In multivariable logistic regression analysis, living alone or being homeless [odds ratio (OR): 6.27, 95% confidence interval (CI): 1.36-28.87, p=0.018], older age (OR: 1.03 per year, 95% CI: 1.001-1.06, p=0.045), and the presence of lymphedema (OR: 3.08, 95% CI: 1.17-8.14, p=0.023) were independently associated with recurrence, while BMI showed a borderline association (OR: 1.06, 95% CI: 0.99-1.14, p=0.084). Additionally, C-reactive protein levels were positively correlated with duration of antibiotic treatment and length of hospital stay.

Conclusion: The findings suggest that cellulitis recurrence is closely associated not only with the treatment of the acute infection but also with the comprehensive management of underlying chronic conditions. In particular, controlling modifiable risk factors such as lymphedema, peripheral arterial disease, and higher BMI may play

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ABSTRACT

a crucial role in reducing recurrence rates. These results highlight the importance of risk-based and individualized approaches in clinical management.

Keywords: Cellulitis, predisposing factors, recurrence, risk factors

Introduction

Cellulitis is an acute bacterial skin infection involving the dermis and subcutaneous tissue, characterized by inflammatory signs such as erythema, warmth, edema, and tenderness. The most common causative agents are Gram-positive bacteria, particularly *Streptococcus pyogenes* (groups A, C, and G) and *Staphylococcus aureus* (1,2).

Although it can affect any part of the body, approximately 70% of cellulitis cases are localized in the lower extremities (1). Due to age-related structural changes in the skin and increased comorbidity burden, the incidence of cellulitis increases notably in older adults (2). Predisposing factors for infection are classified into systemic (e.g., obesity, smoking, alcohol use, immunosuppression) and local (e.g., tinea pedis, lymphedema, venous insufficiency, trauma, dermatitis, or a history of vascular interventions) categories (3,4,5).

Although cellulitis generally responds well to antibiotic therapy, the risk of recurrence remains high in individuals with persistent predisposing factors. Previous studies have reported recurrence rates ranging from 22% to 49% following the initial episode (2). This not only increases individual morbidity but also poses a significant burden on the healthcare system due to increased healthcare utilization, antimicrobial resistance, and loss of productivity (6).

In this study, we aimed to evaluate the demographic, clinical, and microbiological characteristics of patients diagnosed with cellulitis and identify risk factors associated with recurrence, thereby contributing to the development of risk-based preventive strategies for the management of cellulitis.

Material and Methods

Study Design and Patient Population

This single-center retrospective observational study was conducted at the Department of Infectious Diseases and Clinical Microbiology of a tertiary education and research hospital. The study included all adult patients (≥18 years) who were diagnosed with cellulitis and were followed up, either during hospitalization or in the outpatient clinic, between April 2015 and April 2016. Patients with suppurative or chronic infectious foci, such as cutaneous abscesses, necrotizing fasciitis, septic arthritis, osteomyelitis, or diabetic foot infections, were excluded. In addition, individuals receiving immunosuppressive therapy, human immunodeficiency virus-positive patients, and pregnant women were excluded; four patients with cellulitis who met these criteria were also excluded from the analysis.

The study was conducted in accordance with the Declaration of Helsinki and was approved by the Institutional Ethics Committee of University of Health Sciences Türkiye, Şişli Hamidiye Etfal Training and Research Hospital (approval number: 675, date: 24.05.2016); the requirement for informed consent was waived because of the retrospective nature of the study.

Definitions and Variables

The diagnosis of cellulitis was made by infectious diseases specialists based on inflammatory signs such as poorly demarcated erythema, edema, local warmth, and tenderness in the affected skin area, as well as systemic symptoms including fever, chills, and shivering. The diagnosis was further supported by elevations in acute-phase reactants.

Data extracted from patient records included age, sex, body mass index (BMI), comorbidities, smoking and alcohol use, history of surgical procedures, and predisposing dermatological conditions (e.g., tinea pedis, onychomycosis). The presence of lymphedema was determined from clinical evaluation findings documented in the patient records (e.g., chronic non-pitting edema, positive Stemmer sign) and by review of relevant International Classification of Diseases diagnostic codes in the electronic medical records. These dermatological diagnoses were recorded based on clinical findings. Obesity was defined as a BMI ≥30 kg/m².

In patients with a history of cellulitis, the number of previous episodes and the involved body region were also assessed. Recurrent cellulitis was defined as at least two prior documented episodes of cellulitis. Additionally, presenting complaints, physical examination findings, laboratory values, and imaging results were documented. For patients who

received antibiotic treatment, the selected antibiotic regimen, treatment duration, and length of hospital stay were recorded.

Statistical Analysis

All statistical analyses were performed using SPSS for Windows version 15.0 (Chicago, IL: SPSS Inc.). Descriptive statistics were presented as counts (n) and percentages (%) for categorical variables and as mean ± standard deviation for continuous variables. The distribution characteristics of continuous variables were assessed using the Kolmogorov-Smirnov test. For comparisons between two independent groups, Student's t-test was used when data followed a normal distribution, while the Mann-Whitney U test was applied when the assumption of normality was not met. The chi-square (χ^2) test was used to evaluate differences between categorical variables. All tests were two-tailed, and a p value of <0.05 was considered statistically significant. Logistic regression analyses were performed to identify factors associated with recurrence. Candidate variables were selected based on clinical relevance and univariable associations; model selection was guided by Akaike information criterion to yield a parsimonious final model. Adjusted odds ratios (ORs) with 95% confidence intervals (CIs) were reported.

Results

Patient Profile and Clinical Characteristics

A total of 120 patients were included in the study. Of these, 67 (55.8%) were male and 53 (44.2%) were female. Eighty patients received outpatient treatment, while forty patients were hospitalized. The mean age of all cases was 56.4±15.7 years (range, 18-87 years). The mean age was 53.2±15.7 years in males and 60.5±14.9 years in females, and this difference was statistically significant (p=0.01). When participants were stratified by age group, the most common age range was 61-70 years (26.7%, n=32), followed by 51-60 years (21.7%, n=26) and 41-50 years (16.7%, n=20).

Regarding anatomical localization, the majority of cases involved the lower extremities (91.6%, n=110). Upper extremity involvement was observed in 7 patients (5.9%). Involvement of the neck, abdomen, and gluteal region was rare; each was identified in only one case (0.8%).

The most commonly reported symptom at presentation was pain in the affected area (80%, n=96). Other symptoms included fatigue (28%, n=34), nausea and vomiting (17%, n=20), and fever (15%, n=18). Physical examination findings revealed erythema and increased temperature in the affected area in all patients (100%, n=120). Edema was present in 81% (n=97), and tenderness was present in 74% (n=89). Bullae formation was uncommon, occurring in only 6.7% (n=8) of patients.

Predisposing Factors and Findings Associated with Recurrence

The most commonly identified predisposing factor among the included patients was tinea pedis (64.2%; n=77). This was followed by obesity (56.7%; n=68), onychomycosis (47.5%; n=57), and diabetes mellitus (DM) (33.3%; n=40). Among the patients diagnosed with DM, 90% had type 2 diabetes, and 10% had type 1 diabetes. Additionally, three patients were newly diagnosed with DM during their cellulitis episode. The mean glycated hemoglobin level measured within the previous three months in these patients was 8.63% (range: 5.8%-12.9%).

Of the 120 patients included in the study, 26 (21.6%) had a history of vascular surgery involving the lower extremity. In 92.3% of these cases, cellulitis occurred on the same side as the previous surgical intervention. The detailed distribution of predisposing factors is presented in Table 1.

Among the patients, 76 (63.3%) experienced their first episode of cellulitis, while 44 (36.7%) had a prior history of cellulitis. None of the patients with recurrent cellulitis had received antibiotic prophylaxis. Among the 44 patients with recurrent cellulitis, the most common counts were two episodes (n=15) and three episodes (n=15), followed by four episodes (n=7), five episodes (n=2), and six episodes (n=4). The highest number of episodes observed was ten, recorded in one patient. In 88.6% (n=39) of patients with a history

Table 1. Risk factors and comorbidities identified in cellulitis cases (n=120)

Predisposing factor	n	%
Tinea pedis	77	64.2
Obesity	68	56.7
Onychomycosis	57	47.5
Diabetes mellitus	40	33.3
Vascular pathologies (lymphatic drainage disorder, lymphedema, venous insufficiency)	28	23.3
History of lower extremity vascular surgery	26	21.6
Congestive heart failure	24	20.0
Trauma (e.g., contusion, blunt injury)	16	13.3
Skin lesion (e.g., wound, fissure, ulcer)	9	7.5
Penetrating/cutting injury (e.g., nail puncture, IV access)	5	4.2
Bite/scratch (cat, dog, human)	4	3.3

IV: Intravenous

of recurrence, the infection recurred in the same extremity, whereas 11.4% (n=5) had recurrence in a different extremity.

Table 2 summarizes the relationship between sociodemographic, clinical, and laboratory characteristics and recurrent lower-extremity cellulitis. The mean age of patients with recurrence was significantly higher (p<0.001). Additionally, statistically significant associations were observed between recurrence and lymphedema (p<0.001), peripheral arterial disease (p=0.045), BMI ≥30 (p=0.016), and living alone or being homeless (p=0.007).

No significant associations were found between recurrence and variables such as tinea pedis, onychomycosis, DM, coronary artery disease, history of lower extremity surgery, smoking, or alcohol consumption (p>0.05). Similarly, no significant differences were observed between the groups in terms of initial C-reactive protein (CRP), white blood cell (WBC) count, and procalcitonin (PCT) levels, length of hospital stay, or duration of antibiotic therapy (p>0.05).

Factors associated with recurrence identified by univariable logistic regression analysis are presented in Table 3. In multivariable logistic regression analysis, living alone

Table 2. Comparison of socio-demographic, clinical, and laboratory characteristics according to recurrence status

Variable	Non-recurrent cases (n,%) (n=76)	Recurrent cases (n,%) (n=44)	p value
Socio-demographic characteristics			
Age (mean ± SD)	54.4±15.7	59.7±14.5	**<0.001**
Sex			0.86
Male	44 (57.9%)	23 (52.3%)	
Female	32 (42.1%)	21 (47.7%)	
Educational level			**0.038**
Illiterate	6 (7.9%)	11 (25%)	
Primary school	58 (76.3%)	29 (65.9%)	
Secondary school	10 (13.2%)	2 (4.5%)	
University	2 (2.6%)	2 (4.5%)	
Smoking	27 (35.5%)	9 (20.5%)	0.10
Alcohol use	7 (9.2%)	3 (6.8%)	0.46
Living arrangement (living alone or being homeless)	3 (3.9%)	9 (20.5%)	**0.007**
Predisposing factors			
Tinea pedis	47 (61.8%)	30 (68.2%)	0.48
Onychomycosis	36 (47.4%)	24 (54.5%)	0.48
Diabetes mellitus	23 (30.3%)	17 (38.6%)	0.23
Lymphedema	11 (14.5%)	17 (38.6%)	**<0.001**
Coronary artery disease	14 (18.4%)	7 (15.9%)	0.87
Peripheral artery disease	6 (7.9%)	7 (15.9%)	**0.045**
History of lower extremity surgery	13 (17.1%)	13 (29.5%)	0.12
BMI ≥30	31 (40.8%)	32 (72.7%)	**0.016**
Clinical and laboratory findings			
CRP (>200 mg/L)	12 (15.8%)	9 (20.5%)	0.61
WBC (>17000/mm³)	10 (13.2%)	9 (20.5%)	0.31
PCT (>0.5 ng/mL)	33 (43.4%)	17 (38.6%)	0.64
Hospitalization >7 days	16 (21.1%)	14 (31.8%)	0.22
Antibiotic duration >14 days	55 (72.4%)	28 (63.6%)	0.32

p values were calculated using chi-square test or independent t-test, as appropriate

SD: Standard deviation, BMI: Body mass index, CRP: C-reactive protein, WBC: White blood cell count, PCT: Procalcitonin

or being homeless (OR: 6.27, 95% CI: 1.36–28.87, p=0.018), older age (OR: 1.03 per year, 95% CI: 1.001-1.06, p=0.045), and the presence of lymphedema (OR: 3.08, 95% CI: 1.17-8.14, p=0.023) were independently associated with recurrence. BMI showed a borderline association with recurrence (OR: 1.06, 95% CI: 0.99-1.14, p=0.084).

Microbiological, Laboratory, and Treatment Data

Blood cultures were obtained from all 40 hospitalized patients, and growth was detected in 5% (n=2); one isolate was MRSA (methicillin-resistant *Staphylococcus aureus*), and the other was MSSA (methicillin-sensitive *Staphylococcus aureus*). Among 21 patients with lesions (e.g., abscesses, bullae), tissue cultures yielded microbial growth in 19% (n=4), of which three isolates were *S. aureus* and one was *E. coli*.

The relationships between pre-treatment laboratory parameters (WBC, CRP, PCT) and clinical outcomes are summarized in Table 4. CRP level was strongly positively correlated with hospital stay duration and moderately correlated with antibiotic use; both correlations were statistically significant. WBC showed a weaker but significant correlation with hospital stay. No significant correlation was observed for PCT.

Amoxicillin-clavulanic acid was initiated as first-line treatment in the majority of outpatients (65%, n=52); combination therapy including ciprofloxacin was

Table 3. Univariable and multivariable logistic regression analysis of factors associated with recurrence

Characteristics	Univariable analysis OR (95% CI)	p value	Multivariable analysis OR (95% CI)	p value
Sociodemographic and clinical characteristics				
Age (years)	1.041 (1.014-1.070)	**0.003**	1.03 (1.001-1.06)	**0.045**
Sex				
Male	2.621 (1.223-5.621)	**0.013**		
Female	Reference			
Body mass index	1.073 (1.012-1.139)	**0.019**	1.06 (0.99-1.14)	0.084
Education level				
No formal education	Reference			
Primary education	0.27 (0.09-0.81)	**0.019**		
Secondary education	0.11 (0.02-0.67)	**0.017**		
University education	0.55 (0.06-4.92)	0.589		
Living alone/homeless	6.257 (1.594-24.559)	**0.009**	6.27 (1.36-28.87)	**0.018**
Smoking	0.467 (0.195-1.110)	0.086		
Alcohol use	0.721 (0.177-2.944)	0.649		
Comorbidities and local predisposing factors				
Diabetes mellitus	1.451 (0.665-3.164)	0.349		
Coronary artery disease	0.838 (0.310-2.265)	0.727		
Peripheral artery disease	2.207 (0.691-7.047)	0.181		
History of surgery	2.032 (0.842-4.904)	0.115		
Lymphedema	3.721 (1.541-8.981)	**0.003**	3.08 (1.17-8.14)	**0.023**
Tinea pedis	1.322 (0.603-2.900)	0.486		
Onychomycosis	1.333 (0.633-2.808)	0.449		
Laboratory parameters				
White blood cell count (per 1 × 10^3/μL increase)	1.000 (1.000-1.000)	0.624		
C-reactive protein (per 1 mg/L increase)	1.002 (0.998-1.005)	0.353		
Procalcitonin (per 1 ng/mL increase)	0.998 (0.939-1.061)	0.952		

Statistically significant p values (p<0.05) are shown in bold
OR: Odds ratio, CI: Confidence interval

Table 4. Relationship between acute phase reactants and length of hospital stay and duration of antibiotic use (pearson correlation analysis)

Parameter	Length of hospital stay (r)	Length of hospital stay (p value)	Duration of antibiotic use (r)	Duration of antibiotic use (p value)
WBC	0.18	**0.04**	0.08	0.35
CRP	0.62	**<0.001**	0.30	**<0.001**
PCT	-0.08	0.37	-0.03	0.70

p values <0.05 were considered statistically significant

r: Pearson correlation coefficient

WBC: White blood cell count; CRP: C-reactive protein; PCT: Procalcitonin

administered to a smaller subset. Among hospitalized patients, the most frequently prescribed antibiotic was ampicillin-sulbactam (65%, n=26), followed by tigecycline.

The average duration of antibiotic therapy for all patients was 14 days, ranging from a minimum of 8 days to a maximum of 28 days. Clinical follow-up revealed a favorable response in all patients, who achieved complete clinical recovery.

Discussion

Cellulitis is a common superficial soft-tissue infection that is frequently encountered in clinical practice and may require hospitalization. Given its economic burden on the healthcare system and potential complications, effective diagnostic and treatment strategies are of great importance. In this study, the sociodemographic, clinical, laboratory, and microbiological characteristics of patients diagnosed with lower extremity cellulitis were evaluated, with a particular focus on identifying risk factors associated with recurrence.

Several epidemiological studies have reported that cellulitis is more common among males, which has generally been attributed to greater exposure to risk factors, such as trauma, tinea pedis, and environmental conditions (7,8). In our study, the proportion of male cases was 55.8%, consistent with the previously reported prevalence range. The significantly higher mean age observed among female patients compared with male patients suggests that age-related physiological changes may play a role in the development of cellulitis. In particular, the decrease in estrogen levels during the postmenopausal period may negatively affect lymphatic drainage, connective tissue integrity, and immune response, thereby increasing susceptibility to infection (9). However, to better understand this relationship, prospective studies stratified by age groups are needed.

The recurrence rate in the studied patient group was 36.7%, which is consistent with the reported incidence range of 22-49% in the literature (10,11,12,13). Notably, a retrospective study involving patients diagnosed with cellulitis and followed for up to three years reported a recurrence rate of 47% (14). Similarly, in another study of 233 patients, a recurrence was reported in 29% of cases within three years of the initial episode (15). The fact that recurrent cases predominantly occurred in the same extremity suggests that local risk factors -particularly lymphedema and venous insufficiency- may not have been adequately controlled. The findings revealed that both individual and environmental risk factors, such as advanced age, lymphedema, peripheral arterial disease, high BMI, and living alone, have a significant impact on cellulitis recurrence.

Advanced age is a significant risk factor for cellulitis recurrence. Fisher et al. (16) demonstrated that individuals aged 65 years and older had a markedly higher risk of rehospitalization and recurrence of cellulitis. With aging, the weakening of the immune system and pathophysiological changes such as venous insufficiency and lymphedema are known to increase the risk of recurrent infection (1). Consistent with these findings, advanced age remained an independent predictor of recurrence in our multivariable analysis, underscoring the importance of age-specific preventive strategies. In this context, it is clinically important to consider elderly individuals a high-risk group for cellulitis and to implement long-term follow-up strategies after acute treatment.

Low socioeconomic conditions are significant risk factors for the recurrence of skin and soft tissue infections and should not be overlooked. Living alone, inability to maintain personal hygiene, difficulty managing chronic diseases, and limited access to healthcare services increase the likelihood of recurrent infection. Gregory et al. (17) demonstrated that infections such as cellulitis are common among homeless individuals with compromised skin integrity and that lack of access to hygiene facilities negatively affects the clinical course of these infections. Consistent with these observations, living alone or being homeless emerged as independent risk factors

for recurrence in our multivariable analysis, highlighting the critical role of social vulnerability in disease outcomes. These findings highlight that infections should be evaluated not only from a biological perspective but also in terms of their social dimensions, and that an effective management strategy requires a multidisciplinary approach.

Obesity is a significant risk factor for both the development and recurrence of cellulitis through systemic and local mechanisms. An increased BMI contributes to susceptibility to infection through mechanisms such as thickening of subcutaneous adipose tissue, impaired lymphatic drainage, and suppression of immune responses (18). Studies have reported significantly higher cellulitis recurrence rates in individuals with high BMI. In particular, individuals with a BMI ≥30 kg/m² have a markedly increased risk of recurrence compared to those with normal weight (19). However, in our multivariable analysis, BMI showed only a borderline association with recurrence, suggesting that obesity may contribute indirectly to recurrence through mechanisms such as impaired lymphatic drainage and chronic edema rather than acting as an independent risk factor. These findings highlight the necessity of close follow-up of obese individuals after infection, with an emphasis on long-term monitoring and lifestyle modifications.

Lymphedema and peripheral arterial disease are two major vascular risk factors prominently associated with cellulitis recurrence. Lymphedema, resulting from impaired lymphatic drainage, leads to chronic edema and inflammation, weakening tissue integrity and creating a predisposition to recurrent infections. Chronic edema has been identified as an independent risk factor for the development of cellulitis, with a reported 6.8-fold higher risk of infection in affected individuals (2). Additionally, approximately 26-56% of individuals with lymphedema experience recurrent cellulitis (20,21). Consistent with this evidence, lymphedema remained independently associated with recurrence in our analysis. Peripheral arterial disease may contribute to cellulitis recurrence by creating an ischemic tissue environment and has been identified as an independent risk factor in previous studies (22). Although peripheral arterial disease was more frequently observed among patients with recurrence in unadjusted analyses, this association was not significant in either univariable or multivariable logistic regression analyses in our study, suggesting that its effect may not be independent in this cohort.

Although tinea pedis, onychomycosis, and DM were among the most frequently observed predisposing factors in our study, no statistically significant association was found between these variables and recurrence. However, some publications have reported that these factors may influence recurrence (10). The discrepancies among studies may stem from differences in patient characteristics, follow-up durations, and diagnostic criteria. Therefore, larger prospective studies are needed to clarify the potential impact of these factors on recurrence.

In the present analysis, the most common clinical symptoms were erythema, edema, localized warmth, and pain, which are consistent with the classic clinical presentation of cellulitis. These findings align with the inflammatory symptom profile frequently reported in the literature (23). In addition, lower extremity involvement was observed in 92% of cases, supporting previous studies that emphasize the susceptibility of this anatomical region to cellulitis (24,25). The increased vulnerability of the lower extremities to infection is thought to result from factors such as circulatory disturbances (impaired lymphatic and venous return due to gravity and venous insufficiency) and common epidermal barrier defects (e.g., tinea pedis) in this region (26). These pathophysiological features highlight the lower extremities as high-risk regions for cellulitis.

Study Limitations

This study has certain limitations. Its single-center, retrospective design may limit the generalizability of the findings to broader patient populations. The relatively small sample size may have reduced the statistical power in some subgroups. Since the data were obtained from medical records, there is a risk of missing or inaccurate information. In particular, the recurrence interval (i.e., the time between cellulitis episodes) could not be assessed because the timing of previous episodes was not consistently documented. Additionally, the lack of microbiological data for all patients restricts the ability to draw conclusions regarding the causative pathogens.

Conclusion

This study demonstrated that advanced age, vascular pathologies, obesity, and low socioeconomic status are significant risk factors for recurrent lower-extremity cellulitis. Although predisposing dermatological conditions were frequently observed, they were not predictive of recurrence. Among laboratory markers, CRP emerged as a valuable biomarker for assessing infection severity, whereas PCT levels were shown to have limited prognostic value. The findings underscore the need to develop individualized treatment and follow-up strategies to reduce the risk of recurrence. Furthermore, adopting holistic approaches that consider social determinants may enhance infection control outcomes.

Ethics

Ethics Committee Approval: The study was approved by the Institutional Ethics Committee of University of Health Sciences Türkiye, Şişli Hamidiye Etfal Training and Research Hospital (approval number: 675, date: 24.05.2016)

Informed Consent: The requirement for informed consent was waived because of the retrospective nature of the study.

Footnotes

Authorship Contributions

Surgical and Medical Practices: N.D.D., Concept: N.D.D., N.U., D.Y.S., İ.D., Design: N.D.D., N.U., İ.D., Data Collection or Processing: N.D.D., Ö.G., C.A.T., Analysis or Interpretation: N.D.D., Literature Search: N.D.D., N.U., Writing: N.D.D., Ö.G., N.U.

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