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Evaluation of Clinical and Microbiological Features of Intraabdominal Abscesses in A Tertiary Hospital in Türkiye

Türkiye'de Üçüncü Basamak Bir Hastanede İntraabdominal Apselerin Klinik ve Mikrobiyolojik Özelliklerinin Değerlendirilmesi

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Abstract: Knowing the causative agents and microbiological susceptibility in intra-abdominal abscess (IAA) cases guides empirical antibiotic selection. We aimed to investigate the causative agents, susceptibility, and treatment options in intra-abdominal abscesses. Patients hospitalized with intra-abdominal abscesses between January 2020 and December 2022, in whom abscess material cultures yielded growth, were retrospectively analyzed. Risk factors, causative agents, antibiotic susceptibilities, and treatment options were evaluated. A total of 43 patients, with a mean age of 57.2 years (range 22-88), consisting of 30 males (69.8%) and 13 females (30.2%), were included in the study. Eleven patients had no underlying diseases, while gastrointestinal conditions constituted the majority of underlying diseases (n=11, 25.6%). The most common site of abscess was the liver (n=19, 44.2%), followed by intraperitoneal (n=14, 32.6%), retroperitoneal (n=5, 11.6%) regions. The most frequently used imaging method was computed tomography (CT) in 29 patients (67.5%). A total of 60 microorganisms were isolated from the 43 patients included in the study. The majority of the isolated microorganisms were Gram-negative bacteria (n=42, 70.0%). In 15 patients (34.9%) who initially received empirical antibiotic treatment, the treatment was subsequently modified to broad-spectrum antibiotics based on the resistance profile of the isolated microorganism. In patients monitored for intra-abdominal abscesses, initiating appropriate empirical antimicrobial therapy before culture results become available can be crucial. Once the infectious agent is identified and its resistance profile determined, targeted treatment can be administered. Each institution's awareness of its own antibiotic resistance patterns will guide empirical therapies effectively.
Keywords: Intra-abdominal abscess, treatment, antibiotic resistance

Özet: İntraabdominal apselerde (İAA) etken mikroorganizmaları ve mikrobiyolojik duyarlılığı bilmek, ampirik antibiyotik seçimine rehberlik eder. İAA' de etkenler, antibiyotik duyarlılığı ve tedavi seçeneklerini araştırmayı amaçladık. Ocak 2020 ile Aralık 2022 arasında intraabdominal apse nedeniyle hastaneye yatırılan ve apse materyali kültürlerinde üreme görülen hastalar risk faktörleri, etken ajanlar, antibiyotik duyarlılıkları ve tedavi seçenekleri açısından retrospektif olarak değerlendirildi. Çalışmaya ortalama yaşı 57,2 yıl (aralığı 22-88) olan 30 erkek (%69,8) ve 13 kadın (%30,2) olmak üzere toplam 43 hasta dahil edildi. On bir hastanın altta yatan hastalığı yoktu, altta yatan hastalıkların çoğunluğunu gastrointestinal durumlar oluşturuyordu (n=11, %25,6). En sık görülen apse bölgesi karaciğerdi (n=19, %44,2), bunu intraperitoneal (n=14, %32,6), retroperitoneal (n=5, %11,6) bölgeler izledi. En sık kullanılan görüntüleme yöntemi 29 hastada (%67,5) bilgisayarlı tomografi (BT) idi. Çalışmaya dahil edilen 43 hastadan toplam 60 mikroorganizma izole edildi. İzole edilen mikroorganizmaların çoğunluğu Gram negatif bakterilerdi (n=42, %70,0). Başlangıçta ampirik antibiyotik tedavisi alan 15 hastada (%34,9), tedavi daha sonra izole edilen mikroorganizmanın direnç profiline göre geniş spektrumlu antibiyotiklere değiştirildi. İntraabdominal apse nedeniyle takip edilen hastalarda kültür sonuçları çıkıncaya kadar uygun ampirik antimikrobiyal tedavi başlanması hayati öneme sahip olabilmektedir. Enfeksiyon etkeni saptandıktan ve direnç durumu belirlendikten sonra etkene yönelik tedavi yapılabilmektedir. Her kurumun kendi antibiyotik direnç durumunu bilmesi ampirik tedavilerde yol gösterici olacaktır.
Anahtar Kelimeler: İntraabdominal apse, tedavi, antibiyotik direnci

Ethics Committee Approval: The study was approved by Clinical Research Ethics Committee of Dr. Lütfi Kırdar Kartal City Hospital with the approval number 2023/514/260/5 on 30.10.2023.

Informed Consent: The authors declared that it was not considered necessary to get consent from the patients because the study was a retrospective data analysis.

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1. Introduction

An intra-abdominal abscess (IAA) is an intra-abdominal infection that can arise from one or more bacterial, fungal, or parasitic microorganisms and is almost always secondary to another disease process (1). It can affect any organ and can be found in areas such as between intestinal loops, or within the abdominal or pelvic cavities. IAAs can be located intraperitoneally, retroperitoneally, or within the parenchyma. They usually originate from the normal gut flora due to a disruption of mucosal barriers. The most commonly encountered bacteria include *Escherichia coli*, *Klebsiella spp.*, *Proteus spp.*, coliform bacteria, streptococci, enterococci, and anaerobic bacteria (1-3).

Appendicitis, perforations due to intestinal obstruction, penetrating abdominal trauma, anastomotic leaks, acute necrotizing pancreatitis, peptic ulcer perforation, diverticulitis, volvulus, intussusception, gangrenous cholecystitis, inflammatory bowel diseases (such as ulcerative colitis and Crohn's disease), chronic calculous cholecystitis, and intra-abdominal tumors are risk factors for the development of intra-abdominal abscesses (4-6). Patient-specific risk factors include diabetes mellitus (DM), malnutrition, malignancy, radiotherapy, and a high American Society of Anesthesiologists (ASA) score. Additionally, a high APACHE-II score (≥15), prolonged preoperative hospital stay, prior antibiotic use, and extended postoperative antibiotic use are risk factors for resistant microorganisms (6).

Since most patients present to the emergency room with nonspecific symptoms such as fever, chills, shivering, loss of appetite, and abdominal pain, diagnosis is quite challenging. Patients may also present with hypotension and septic shock, and some may present with fever of unknown origin (5-7). Non-invasive diagnostic methods in diagnosis include imaging techniques such as US, CT, and MRI. Additionally, radionuclide scans using Gallium-67 and Indium-111 labeled leukocytes, as well as direct radiography, can be used. However, CT is more sensitive and specific compared to radiography and radionuclide scanning (7). Rapid and accurate diagnosis of intra-abdominal abscesses is crucial to ensure proper source control and reduce the likelihood of sepsis and septic shock (8). In differential diagnosis, excluding space-occupying lesions such as tumors is vital for the prognosis of patients (9).

The most important aspect of treatment is ensuring source control (6). Patients who have had a hospital stay of five days or more, use of antibiotics for over two days, and/or an abdominal procedure within the three months prior to hospital admission should be evaluated as having healthcare-associated intra-abdominal abscesses, and their treatment should be adjusted accordingly (6). Empiric antibiotic therapy should be effective against enteric Gram-negative aerobic and facultative bacilli, as well as enteric Gram-positive streptococci. Knowing the resistance profile of microorganisms present in the treating hospital will aid in the selection of appropriate therapy (6).

2. Materials and Method

Patients aged 18 years and older who were monitored for intra-abdominal abscess at our hospital between January 2020 and December 2022 were included in the study. The study was conducted in accordance with the principles of the Helsinki Declaration and was approved by the Clinical Research Ethics Committee of Dr. Lütfi Kırdar Kartal City Hospital with the approval number 2023/514/260/5 on 30.10.2023. Data were obtained from the hospital's record system. Patients were retrospectively evaluated based on age, gender, abscess location, microorganisms isolated from abscess material and their antibiotic susceptibility, imaging methods and laboratory tests used for diagnosis, treatment administered, and complications.

Abscesses specimens were investigated by standart cultivation procedures. Samples were inoculated onto Columbia Blood Agar, MacConkey agar and for isolation of fastidious bacteria Chocolate agar Poly ViteX Agar (bioMérieux, Marcy-l'Étoile, France). Agar plates were incubated at 35–37°C in ambient air (Columbia Blood Agar, MacConkey Agar) and under 5% carbondioxide (Chocolateagar Poly ViteX Agar). Gram stain was performed on all specimens and used relative numbers of WBCs, epithelial cells, and bacterial morphotypes in the evaluation of culture. All agar plates were incubated 2-5 days. Suspected colonies were identified by MALDI-TOF VITEK® MS systems (bioMérieux, Marcy-l'Étoile, France). Antimicrobial susceptibility testing was done by VITEK® 2 Compact system (bioMérieux, Marcy-l'Étoile, France) with VİTEK 2 AST cards.

The statistical analysis of the data was performed using the Statistical Package for the Social Sciences (SPSS) for Windows version 25.0. Numerical variables were presented as mean ± standard deviation and minimum-maximum values. Continuous variables were expressed as the median, while categorical variables were expressed as frequency and percentage.

3. Results

A total of 43 patients, consisting of 30 males (69.8%) and 13 females (30.2%), aged between 22 and 88 years (mean age 57.2), were included in the study. Patients with intra-abdominal collections detected by USG, CT, or MRI and with microorganisms identified in abscess cultures were retrospectively evaluated.

Eleven patients (25.6%) had no underlying disease, while the majority of underlying conditions (n=11, 25.6%) were gastrointestinal disorders (Table 1). Prior to abscess development, 24 patients (55.8%) underwent abdominal surgery, 8 patients (18.6%) underwent ERCP (Endoscopic Retrograde Cholangiopancreatography), and 6 of the surgical procedures (14.0%) were emergency surgeries. Three patients (7.0%) received both surgical and ERCP interventions (Table 1). The most common site for abscess formation was the liver (n=19, 44.2%), followed by intraperitoneal (n=14, 32.6%), retroperitoneal (n=5, 11.6%), and psoas abscesses (n=3, 7.0%). One patient had a splenic abscess, and another had a pancreatic abscess (Table 2). The largest abscess measured 170x50 mm and was located in the intraperitoneal area. To detect abscesses, CT was used in 29 patients (67.5%), USG in 13 patients (30.2%), and MRI in 1 patient (2.3%).

The duration for abscess development could not be determined in 19 patients (44.2%). For the 24 patients (55.8%) who underwent surgery or ERCP, the abscess development time ranged from 7 days to 1.5 years, with a mean duration of 33.4 days.

Forty-three patients were included in the study, and 60 microorganisms were isolated. Of the isolated microorganisms, 42 (70.0%) were Gram-negative bacteria. In eighteen patients (30.0%), Gram-positive bacterial growth was observed. The most frequently identified Gram-negative bacterium was *Escherichia coli* (n=24, 40.0%), followed by *Klebsiella pneumoniae* (n=7, 11.7%), *Pseudomonas aeruginosa* (n=4, 6.7%), and other Gram-negative bacteria (Figure 1). The most frequently isolated Gram-positive bacterium was *Enterococcus faecium* (n=9, 15.0%), followed by *Enterococcus faecalis* (n=4, 6.7%) and other Gram-positive bacteria (Figure 1). No fungal or parasitic agents were detected. Among Gram-negative bacteria, the highest resistance rate was observed for ampicillin-sulbactam (AMC) at 57.1%. The resistance rates were as follows: cefazolin (CZ) 47.6%, cefuroxime axetil (CXA) 45.2%, cefepime (FEP) and ceftazidime (CAZ) 42.9%, ceftriaxone (CRO) 40.5%, ciprofloxacin (CIP) 35.7%, piperacillin-tazobactam (TZP) 33.3%, trimethoprim-sulfamethoxazole (SXT) 26.2%, cefoxitin (FOX) 21.4%, ertapenem (ETP) 14.3%, meropenem (MER) and polymyxin-E (Colistin COL) 11.9%, and gentamicin (GN) and amikacin (AN) 7.1% (Table 3). Among Gram-positive bacteria, all *Enterococcus faecium* strains were resistant to ampicillin, while all *Enterococcus faecalis* strains were susceptible to ampicillin (Table 4). No anaerobic agents were detected in the abscess materials sent to the microbiology unit because anaerobic culture requests are not performed during anaerobic culturing.

In empirical treatment, ceftriaxone + metronidazole was used in 24 patients (55.8%), followed by piperacillin-tazobactam (n=9, 20.9%), meropenem (n=6, 14%), ciprofloxacin + metronidazole (n=3, 7.0%), and ertapenem (n=1, 2.3%). Initially, in 15 patients (34.9%), the empirical treatment of ceftriaxone + metronidazole was changed to broader-spectrum antibiotics due to the detection of resistant microorganisms. In addition to antibiotic therapy, 29 patients (67.5%) underwent percutaneous drainage, and in 14 patients (32.5%), abscess material was aspirated via surgery. White Blood Cell (WBC) count and C-reactive protein (CRP) levels were used to monitor the treatment response in laboratory follow-ups. At the beginning of treatment, leukocytosis (WBC >11,000 cells/µl) was observed in 34 patients (79.1%), and all patients exhibited elevated CRP levels (>5 mg/L). Changes in WBC and CRP from the beginning to the end of treatment are shown in Figure 2 and Figure 3.

The patients' average hospital stay ranged from 2 to 83 days (mean 16.6 days), and the duration of antibiotic treatment ranged from 2 to 51 days (mean 13.6 days). The patient with the shortest stay died on the second day of hospitalization. Oral sequential antibiotic therapy was arranged for 26 patients (60.5%) who received parenteral treatment while hospitalized but could not complete the treatment duration before discharge.

Four patients (9.3%) died while their treatments were ongoing. The causative agent was *Klebsiella pneumoniae* in two of these patients and *Enterococcus faecium* in the other two. One of the deceased patients had a simultaneous blood culture growth of *Enterococcus faecium*. The other patients did not have any blood culture growth.

Table 1. Characteristics of the patients

Female, n (%)	13 (30.2)
Male, n (%)	30 (69.8)
Underlying condition*, n (%)	
GIS malignancy	9 (21.0)
DM	8 (18.6)
HT	6 (14.0)
Hydatid cyst	4 (9.3)
Other malignancy	4(9.3)
CAD	3 (7.0)
COPD	3 (7.0)
Crohn's disease	2 (4.6)
Obesity	1 (2.3)
Down syndrome	1 (2.3)
Intervention, n (%)	
Abdominal surgery	24 (55.8)
ERCP	8 (18.6)
Abdominal surgery +ERCP	3 (7.0)
Type of abdominal surgery	
Gallbladder	10 (23.2)
Colon	5 (11.6)
Gastric	3 (7)
Pancreas	2 (4.6)
Other **	4 (9.3)

**GIS: gastrointestinal system, DM: diabetes mellitus, HT: hypertension, CAD: coronary artery disease, COPD: chronic obstructive pulmonary disease*
***Duodenum, liver cyst, obesity surgery, trauma*

Table 2. Abscess characteristics

Abscess size **Site of involvement**	**0-5 cm** **n (%)**	**6-10 cm** **n (%)**	**>10 cm** **n (%)**
Liver	7 (16.3)	11 (25.6)	1 (2.3)
Intraperitoneal	2 (4.6)	7 (16.3)	5 (11.6)
Retroperitoneal	0	2 (4.6)	3 (7)
Psoas	2 (4.6)	1 (2.3)	0
Pancreas	1 (2.3)	0	0
Spleen	1 (2.3)	0	0
Total	13 (30.2)	21 (48.8)	9 (21)

Table 3. Number of resistant microorganisms in Gram negative bacteria

	AMP	**CZ**	**CXA**	**GN**	**AN**	**FEP**	**TZP**	**ETP**	**CRO**	**MER**	**CIP**	**CAZ**	**FOX**	**COL**	**SXT**
E. coli **n=26**	17	13	14	1	1	12	7	4	12	2	11	12	6	2	9
K.pneumoniae **n=7**	5	5	5	2	2	4	5	2	5	2	3	4	2	1	2
P. aeruginosa **n=4**	*	*	*	*	0	2	2	*	*	1	1	2	*	0	*
P. mirabilis **n=1**	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
E. aerogenes	1	1	*	0	0	0	0	0	0	0	0	0	1	0	0

n=1															
M. morganii	1	1	0	0	0	0	0	0	0	0	0	0	0	1	0
n=1															
A. xylosoxidans	*	*	*	*	1	*	0	*	*	0	0	*	*	*	0
n=1															
S. maltophilia	*	*	*	*	*	*	*	*	*	*	*	0	*	*	0
n=1															
Toplam	24	20	19	3	3	18	14	6	17	5	15	18	9	5	11
n=42															
%	**57.1**	**47.6**	**45.2**	**7.1**	**7.1**	**42.9**	**33.3**	**14.3**	**40.5**	**11.9**	**35.7**	**42.9**	**21.4**	**11.9**	**26.2**

AMP: *ampicillin,* ***CZ:*** *cefazolin,* ***CXA:*** *cefuroxim axetil,* ***GN:*** *gentamicin,* ***AN:*** *amikacin,* ***FEP:*** *cefepime,* ***TZP:*** *piperacillin-tazobactam,* ***ETP:*** *ertapenem,* ***CRO:*** *ceftriaxone,*
MER: *meropenem,* ***CIP:*** *ciprofloxacin,* ***CAZ:*** *ceftazidime,* ***FOX:*** *cefoxitin,* ***COL:*** *polymyxin-E (Colistin),* ***SXT:*** *trimethoprim-sulfamethoxazole,*
******* *not tested*

Table 4. Number of resistant microorganisms in Gram positive bacteria

	AMP	**SAM**	**CZ**	**CIP**	**LEV**	**NIT**	**SXT**	**AMC**	**VAN**	**TEC**	**LZD**	**MET**	**PEN**	**CLI**	**ERY**	**DAP**	**FA**	**OX**	**TGC**	**CTX**
E. faecalis	0	0	*	0	0	0	*	0	0	0	0	*	*	*	*	*	*	*	0	*
n=4																				
E.faecium	9	9	*	5	5	*	*	9	0	0	0	*	*	*	*	*	*	*	*	*
n=9																				
S. aureus	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	*
n=1																				
KNS	*	1	1	2	2	*	0	1	0	0	0	1	*	0	0	0	0	0	0	*
n=2																				
S.anginosus	0	*	*	*	*	*	*	*	0	0	*	*	0	*	*	*	*	*	*	0
n=1																				
S. sanguinis	0	*	*	*	*	*	*	*	0	0	*	*	0	*	*	*	*	*	*	0
n=1																				
Toplam	10	9	1	7	7	0	0	10	0	0	0	1	1	0	0	0	0	0	0	0
n=18																				
%	**55,6**	**50**	**5.6**	**39**	**39**	**-**		**55,6**	**-**	**-**	**-**	**5,6**	**5,6**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

AMP: *ampicillin,* ***SAM:*** *ampicillin-sulbactam,* ***CZ:*** *cefazolin,* ***CIP:*** *ciprofloxacin,* ***LEV:*** *levofloxacin,* ***NIT:*** *nitrofurantoin,* ***SXT:*** *trimethoprim-sulfamethoxazole,* ***AMC:*** *amoxicillin-clavulanic acid,* ***VAN:*** *vancomycin,* ***TEC:*** *teicoplanin,* ***LZD:*** *linezolid,* ***MET:*** *methicillin,* ***PEN:*** *penicillin,* ***CLI:*** *clindamycin,* ***ERY:*** *erythromycin,* ***DAP:*** *daptomycin,* ***FA:*** *fucidic acid,* ***OX:*** *oxacillin,* ***CTX:*** *cefotaxime,* ******* *not tested*

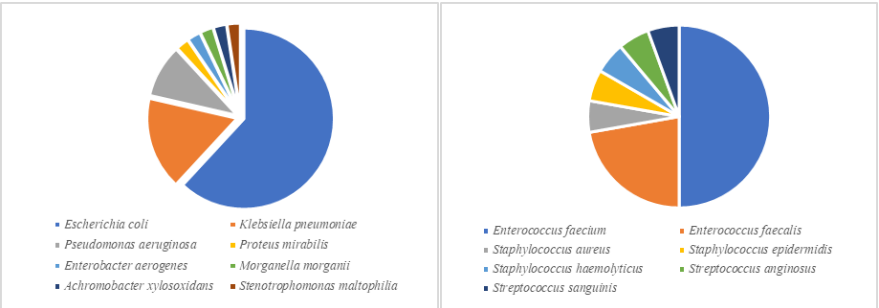

Figure 1. Distribution of Gram-negative and Gram-positive bacteria causing abscesses

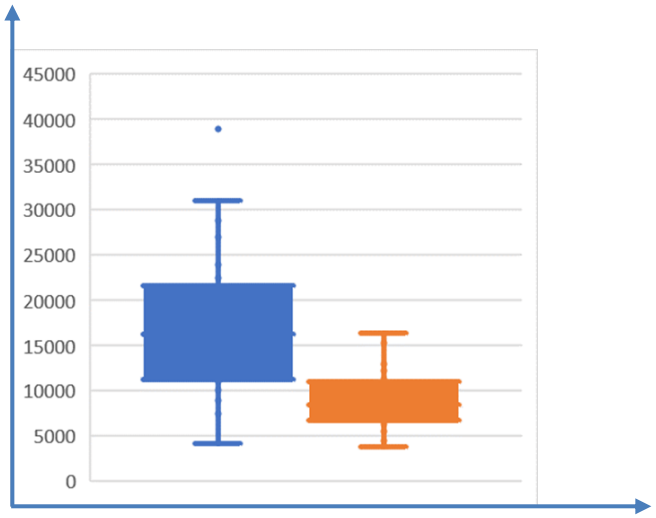

Figure 2. WBC (x10^3/µL) level change at the before and after the treatment (Blue: before treatment, orange: after treatment)

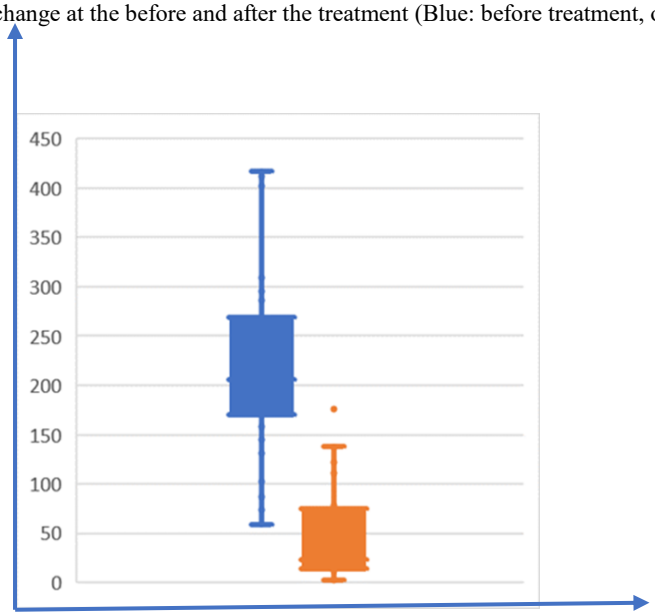

Figure 3. CRP (mg/L) level change at the before and after the treatment (Blue: before treatment, orange: after treatment)

4. Discussion

IAA refers to a localized, walled-off collection of infected fluid associated with an underlying inflammatory process, peritonitis, or a complication of intraoperative contamination (10). The most common site for abscess formation is the liver, followed by the intraperitoneal and retroperitoneal areas to a lesser extent (5, 11). In our study, the liver was the most frequent site of abscess formation, in agreement with the literature, followed by abscesses in the intraperitoneal, retroperitoneal, and psoas regions, respectively.

In the etiology, causes such as ruptured acute appendicitis, acute diverticulitis, gastrointestinal perforation, or postoperative anastomotic leakage, and cholecystectomy operations play a significant role in the development (6, 10). Prior to abscess development, 32 patients (74.4%) had undergone abdominal surgery or ERCP. The most frequently performed abdominal surgery was gallbladder surgery.

Typically, IAAs are polymicrobial. In cases where appropriate culture methods can be used, anaerobes are found in 60% to 70% of cases, with *Bacteroides fragilis* being the most common (7). Other frequently isolated bacteria include *E. coli*, *Klebsiella spp.*, *Enterobacter spp.*, *Proteus spp.*, *P. aeruginosa*, *S. aureus*, and enterococci. Streptococci can also be involved as pathogens (7, 12, 13). The presence of underlying conditions, such as DM, and the type of surgery previously performed can affect the type of possible microorganisms (14). In our study, anaerobic pathogens could not be demonstrated as anaerobic culture requests were not made. The most frequently detected Gram-negative

bacterium was *E. coli*, followed by *K. pneumoniae*, *P. aeruginosa*, and other Gram-negative bacteria. The most frequently isolated Gram-positive bacterium was *E. faecium*, followed by *E. faecalis* and other Gram-positive bacteria. In our cases, the highest resistance rate among Gram-negative bacteria, similar to the literature, was observed with ampicillin-sulbactam at 57.1% (15). This was followed by cefazolin, cefuroxime axetil, cefepime, ceftazidime, ceftriaxone, ciprofloxacin, piperacillin-tazobactam, trimethoprim-sulfamethoxazole, cefoxitin, ertapenem, meropenem, and polymyxin-E (colistin), gentamicin, and amikacin. All E. *faecium* strains among Gram-positive bacteria were resistant to ampicillin, while all *E. faecalis* strains were susceptible to ampicillin.

Antibiotic therapy should be adjusted under the assumption that the patient is at risk of infection with a resistant Gram-negative pathogen if they have recently received broad-spectrum antibiotic therapy, have had prolonged hospital stays, have undergone numerous invasive procedures, or have been colonized with a resistant Gram-negative microorganism (16, 17). In our study, empirical treatment initially involved the use of ceftriaxone with metronidazole most frequently, followed by piperacillin-tazobactam, meropenem, ciprofloxacin with metronidazole, and ertapenem. For 15 patients (34.9%) who initially received empirical therapy with ceftriaxone and metronidazole, the treatment was adjusted to broader-spectrum antibiotics such as piperacillin-tazobactam, meropenem or ertapenem based on the antibiotic susceptibilities of the isolated microorganisms.

The cornerstone of treatment is the control of the source along with antibiotic therapy. In a study conducted in Turkey, the recurrence rate of abscesses managed with percutaneous drainage was 19%, all of which were treated with subsequent interventions (18). Another study achieved clinical success in 94.8% of cases with drainage [11.] In our treatment, in addition to antibiotic therapy, 29 patients (67.5%) underwent percutaneous drainage, and in 14 patients (32.5%), the abscess material was removed surgically. If the source of a documented infection is adequately controlled, it is recommended to limit antimicrobial therapy to four to seven days (6, 19). Collins et al. demonstrated that in children, particularly those with abscesses smaller than 4 cm following appendectomy, treatment can be conducted safely and effectively without surgery or drainage (20). One of our patients experienced mortality and could only receive two days of antibiotic therapy, whereas the other patients received an average of 13.6 days of antibiotic therapy depending on the status of source control.

Laboratory tests conducted during admission revealed leukocytosis and elevated CRP levels in the majority of patients. WBC and CRP were used to monitor treatment response; other studies have noted significant changes in CRP values following abscess treatment (5, 21). Various studies indicate that high CRP levels are not necessarily specific to or directly correlated with the severity of the disease, although CRP levels can exceed 100 mg/L in severe bacterial infections (5) In our patients, initial CRP levels ranged from 59 to 417 mg/L, with an average of 219.3 mg/L.

Mortality ranges between 10% and 40%, primarily related to the underlying disease and the location of the abscess (5). Among our cases, 4 patients (9.3%) were died during treatment. In two of these patients, the causative agent was *K. pneumoniae*, and in the other two, it was *E. faecium*. One of the patients with *E. faecium* also had concurrent growth of the same organism in the blood culture. No blood culture growth was observed in the other patients.

The limitations of our study include its retrospective nature, the data being obtained from a single center, and the lack of appropriate culture requests to identify anaerobic agents.

5. Conclusion

In IAA, the treatment goals are to ensure source control and administer appropriate antibiotic therapy. When selecting the proper antibiotics, factors such as hospitalization within the past three months, antibiotic use for more than two days, and the presence of abdominal interventions should be considered. Patients with these conditions should be evaluated as having healthcare-associated intra-abdominal abscesses, and their treatment should be adjusted accordingly. The empiric antibiotics used should be effective against enteric Gram-negative aerobic and facultative bacilli, as well as enteric Gram-positive streptococci.

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