

Surgical management of pyogenic liver abscess

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Abstract. – Background and Aim: Although Pyogenic Liver Abscess (PLA) has lower mortality rate in recent years due to the broad spectrum antibiotic usage, developed imaging techniques and improved intensive care services, it is still a potentially fatal disease. The objective of this study is to examine the treatment methods and our case load with the current literature.

Materials and Methods: Of 55 patients with PLA, between January 2000 and December 2009, records of 28 who received surgical drainage treatment have retrospectively been analysed.

Results: Nineteen (67.9%) of the patients were male, while 9 (32.1%) were female. Average age was 41.07 (15-76). Seven (25%) had associated disease. The most common symptoms were fever and abdominal pain. Twenty three (82.1%) patients had single and 5 (17.9%) had multiple cavitory lesion. Nineteen (67.9%) patients had abscess on the right and 7 (25%) had on the left one, while 2 (7.1%) had on both lobes. All were treated surgically, because of 11 (39.3%) inappropriate localization for percutaneous treatment, 6 (21.5%) insufficient percutaneous drainage, 6 (21.5%) intraabdominal free rupture and 5 (17.7%) multiple cavitory lesion. We observed 5 pulmonary complications, 5 wound infections and 2 perihepatic collections. The average hospital stay was 11.2 days. We observed only two deaths (7.1%).

Conclusions: Surgical treatment is the sole option for the patients with PLA who; (a) can't be treated by percutaneous drainage or had an unsuccessful one, (b) have multiple abscess cavity, (c) are thought to have perforated abscess, (d) have additional abdominal pathology requiring laparotomy.

Key Words:

Liver, Pyogenic abscess, Surgery.

imaging techniques and improved intensive care services, it is still a potentially fatal disease¹⁻³. In spite of the varying rates, it is reported to have 5-13/100.000 prevalence^{4,5}. The most frequently isolated microorganisms in PLAs which are generally observed as a single cavitory lesion on the right lobe of liver are *Escherichia coli* and *Klebsiella pneumoniae*^{6,7}. The aim of this study is to examine the current approach to PLA in the light of the results belonging to the patients with PLA who were treated by us surgically.

Materials and Methods

Of 55 patients with liver abscess received between January 2000 and December 2009 to General Surgery Clinic, School of Medicine, Dicle University, in this study, we included 28 patients with PLA who were treated surgically. Non-pyogenic abscesses (amebiasis, cystic infected hydatidosis), medically treated patients and those who only had percutaneous drainage were excluded from the study. Patients with PLA were retrospectively examined for demographical features, laboratory and radiological findings, length of hospital stay, morbidity and mortality rates.

Statistical Analysis

We employed descriptive statistics for the evaluation of the data. We used Chisquare test for the comparison of data and Mann Whitney U test and Kruskal Wallis test for the comparison of the groups. Linear regression test was used for the statistical analysis of the effective factors on the length of hospital stay. $p < 0.05$ was interpreted as meaningful.

Introduction

Although Pyogenic Liver Abscess (PLA) has lower mortality rate in recent years due to the broad spectrum antibiotic usage, developed

Results

Nineteen (67.9%) of the patients were male while 9 (32.1%) were female. Average age was

41.07 ± 18.94 (15-76). 7 (25%) of the patients had associated disease; 5 of them had diabetes mellitus, 2 had hypertension and 1 patient had chronic liver disease. Twenty eight of the patients were treated with surgical drainage due to the following reasons: 11 had localization improper for percutaneous treatment, 6 had insufficient percutaneous drainage, 6 had intraabdominal free rupture and 5 multiple cavitory lesion (Table I). The number of the patients treated surgically decreased over years (Figure 1). The average start period of the symptoms was three weeks. The most common symptoms were fever and abdominal pain. All our patients had high C-Reactive Protein (CRP), while 24 patients had leucocytosis. We applied ultrasonography (US) to 27 patients and abdominal computerized tomography (CT) to 6 patients. Radiological inspection revealed 12 cystic and 16 solid-looking mass. 77.8% of the females had cystic lesion and 73.7% of the males had solid-like lesions. This difference was statistically meaningful ($p=0.017$). We confirmed single multiple cavitory liver abscess for twenty-three (82.1%) patients and multiple cavitory liver abscess for 5 (17.9%) patients. The lesion was located on the right lobe for 19 (67.9%) patients, on the left lobe for 7 (25%), and on both lobes for 2 (7.1%). The average length of the longer diameter of the abscess was 8.78 ± 3.65 cm (3-18 cm). Total 12 (42%) of the patients developed postoperative complications; 5 pulmonary, 5 wound infections, and 2 perihepatic collections. All the complications were healed completely with proper treatments. Average hospital stay time was 11.2 ± 10.3 (5-60) days. Stay time was longer for the patients who had operation due to intraabdominal free rupture and multiple cavitory lesions. This difference was statistically

Table I. Demographic variables of 28 patients with pyogenic hepatic abscess.

Variable	n (%)
Age ≥ 50 y	9 (32)
Gender (male)	19 (67.9)
Diabetes mellitus	5 (17.7)
Hypertension	2 (7.1)
Liver disease	1 (3.6)
Surgical Indications	
Multiple cavitory lesion	5 (17.7)
Inappropriate localization for percutaneous intervention	11 (39.3)
Inadequate percutaneous drainage	6 (21.5)
Intraabdominal rupture	6 (21.5)

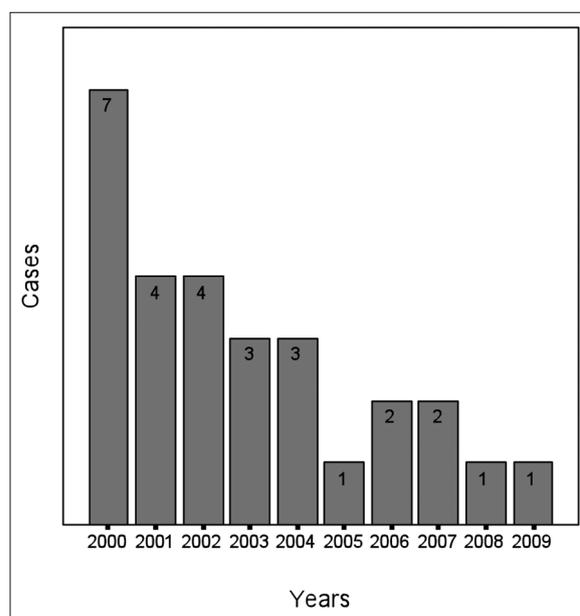


Figure 1. Distribution of the patients according to the years.

meaningful ($p=0.001$). The effective factors on stay period were the multiple number of abscesses ($p=0.001$) and hypoalbuminemia ($p=0.015$) while age, gender, associated disease and diameter and localization of the abscess were statistically ineffective on stay period ($p>0.05$). The localization and diameter of the PLA and existence of an associated disease were not statistically meaningful on stay period ($p>0.05$). We observed mortality on two (7.1%) patients; one due to fulminant liver failure and the other due to sepsis + multiple organ failure (Table II). Abscess samples of all patients were sent to laboratory for antibiogram culture inspection and the empiric antibiotherapy was started. The abscess culture laboratory results yielded *Escherichia coli* for eight patients, *Streptococcus* for 4, including *Streptococcus viridans* for 2, *Streptococcus bovis* for 1 and *Streptococcus porcinus* for 1, *Klebsiella pneumoniae* for 3 and polymicrobial factor for 7. Cultures of 6 patients yielded no microorganisms (Table III). The applied therapy was revised in accordance with the antibiogram culture results for all the patients and continued for 6 weeks in average.

Discussion

PLA is a rarely encountered disease with a high mortality rate. While it had a 10-40% mortality before², nowadays its mortality rate de-

Table II. Presenting characteristics, laboratory findings and therapeutic measures.

Variable	n (%) or median (range)
Symptoms at glance	
Fever	19 (67.9)
Abdominal pain	15 (53.6)
Nausea	10 (35.7)
Anorexia	10 (35.7)
Night sweating	8 (28.6)
Cough	4 (14.3)
The height of C-Reactive Protein	28 (100)
Leukocytosis	24 (85.7)
Hypoalbuminemia	23 (82.1)
Hyperbilirubinemia	6 (21.4)
White blood cell count, K/UL	14.50 (6.70-74.20)
Creatinine, mg/dL	0.73 (0.20-2.40)
Albumin, mg/dL	2.65 (1.30-3.60)
Total bilirubin, mg/dL	0.70 (0.20-43.0)
International normalized ratio	1.14 (0.88-2.20)
Abscess location	
Single cavitory	23 (82.1)
Right lobe	16 (69.6)
Left lobe	7 (30.4)
Multiple cavitory	5 (17.9)
Right lobe	3 (60)
Right and left lobe	2 (40)
Abscess structure	
Cystic	12 (42.9)
Solid	16 (57.1)
Abscess size, cm	8 (3-18)
< 5 cm	6 (21.4)
5-10 cm	14 (50.0)
> 10 cm	8 (28.6)
Complications	
Pulmonary complications	5 (17.9)
Wound infection	5 (17.9)
Intraabdominal collections	2 (7.1)
Hospital stay, day	8 (5-60)
Mortality	2 (7.1)

creased in parallel with the medical developments⁷. Until the use of broad spectrum and combined antibiotics, the most frequent factors were infectious diseases like diverticulum, appendicitis, intraabdominal abscess causing to PLA via portal vein. Today the most encountered etiologic factors are ascending cholangite and haematogenous spread⁸. Nevertheless, it is not possible to determine the underlying cause in many patients⁹. We did not determine intraabdominal additional pathology in our patients.

Therefore, the lesions emerged rather due to haematogenous spread; however, we could not establish an etiologic factor in accordance with the literature.

For male patients PLA is encountered more frequently at 5th and 6th decades¹⁰. Diabetes mel-

litus and hypertension are the two most encountered diseases together with PLA¹¹. There is also an increase of PLA frequency due to immunosuppression and malignant diseases in advanced ages¹². 67.9% of our patients were female and the average age was 41.07 (15-76). Contrary to the literature only 32% of the patients were over 50 years. Diabetes mellitus (17.8%) and hypertension (7.2%) were the most frequent additional systemic diseases. The fact that our patients were younger and none of them had malignancy or immunosuppression disagreed with the literature. However, given that the initial period of the average symptoms of the patients were three weeks, that difference could be attributed to late apply to the Hospital and non-use of antibiotics.

Specific examination and laboratory findings were not available for PLA patients. The patients generally arrived with a fever and pain in hypochondriac region. Laboratory inspection revealed leukocytosis and CRP elevation^{2,7}. The most frequent symptoms determined in our patients were abdominal pain and fever, while all had elevated CRP. 82.5% had leukocytosis.

Ultrasound (US) was the most utilized imaging method to diagnose PLA due to being widespread and cheap⁴. Contrast enhanced abdominal computerized tomography (CT) provided detailed information about lesion and additional pathologies. Therefore, it is advised as gold standard to diagnose PLA. US has 85-90% sensitivity while CT's is close to 100%¹¹. We used US diagnosis for almost all our patients as per the literature, that was because the first-line method for diagnosis of PLA was US.

PLA is frequently seen as a single solitary structure located on the right lobe^{9,10}. In our pool, 67.9% of the patients had PLA in right lobe and 82.1% had it as a single lesion. In concordance with the literature, more than half of the patients' PLAs were solitary. Especially the solitary ones reduce the success rate of the percutaneous intervention due to the density of abscess content and

Table III. Microbiology from final cultures of initial abscess cavity drainage.

Growth from culture	n (%)
Polymicrobial	7 (30.4)
<i>Escherichia coli</i>	8 (28.6)
<i>Streptococcus</i>	4 (14.3)
<i>Klebsiella pneumoniae</i>	3 (10.7)
Negative	6 (21.4)

make surgical application obligatory⁹. In our study the patients who went under surgery due to the failure of percutaneous intervention did not have any difference regarding the structure of the cyst.

The effective treatment of PLA is appropriate antibiotic use and abscess drainage.¹³ The reason of abscess and the underlying disease should be taken into consideration when choosing antibiotherapy. The most used antibiotherapy protocol includes ampicilline-sulbactam/2nd generation cephalosporin and aminoglycoside and/or metronidazole combination⁶. The administration should continue average 4-6 weeks, the first two weeks intravenously and then orally^{2,10}. Antibiotic treatment alone has a low success rate and can not be accepted as standard treatment¹⁴. Especially for the lesions larger than 5 cm PLA drainage is necessary to achieve success in antibiotherapy¹³. Hope et al¹⁵ reported that sole antibiotherapy has a higher success rate for lesions smaller than 3 cm with single cavity, while for lesions larger than 3 cm with single cavity percutaneous treatment has a high success rate, and for lesions larger than 3 cm with multi cavity surgical drainage together with antibiotherapy has high rates. The cultures obtained during the drainage of the lesions are important for the preparation and maintenance of antibiotherapy. The most frequently isolated microorganisms in PLA are *Escherichia coli* and *Klebsiella pneumoniae*. *Streptococcus* and anaerobe are detected as well^{9,11}. In our study, all the lesions were larger than 3cm and 22 of them were larger than 5 cm, which made antibiotherapy together with drainage a must. Small abscesses with single cavity were excluded from our study as they were treated by antibiotic therapy. As for the other single cavity lesions, we included the ones for which percutaneous drainage (PD) was inapplicable or the ones which were surgically treated due to PD failure. The most frequently isolated microorganism of our study samples was *E. coli*.

In recent years, drainage with minimal invasive methods are preferred for PLA treatment and, therefore, the use of PD accompanied with imaging methods is increasing¹⁶. PD is mostly applied for the lesions having single cavity, placed generally on the right with proper localization for the drainage and especially not having additional surgical pathology⁴. It is reported that PD has been insufficient or failed for 17-21% of the cases¹⁷. Evaluating the liver and seeing other abscesses the surgery ensures to choose the best

drainage type and increases the success rate, which in return provides early clinical recovery in patients^{19,20}. Tan et al²⁰ have reported that in the abscesses larger than 5 cm, when compared with PD, surgical treatment provides shorter hospital stay, higher success rate and decrease of need for secondary intervention procedures. The patients with proper conditions had had PD and were excluded from our study. Of the patients received PD only six patients who had surgical intervention due to insufficient percutaneous drainage were included in our study. PD was not applied to eleven patients due to improper localization and to five due to multiple cavitary lesions. Intrabdominal free rupture rate in PLA is 7-15%²¹ whereas our study had a rate of 21.4%, which was for us another indication made surgical intervention obligatory. Besides, the longer diameter of our patients' abscesses was 8.73 (3-18) cm, a case which required surgical drainage. The average hospital stay time was 11.2 days. The factors effecting on hospital stay time were multiple number of abscess and hypoalbuminemia. The diameter of the lesions did not have a meaningful effect on stay time.

The pulmonary complications (20-34%) prevail in the course of PLA²². On the other hand subhepatic and subphrenic abscesses are the most common abdominal complications^{14,23}. We observed pulmonary complication in five (17.9%) of the patients and perihepatic collection in two. Additionally, we encountered wound infection in five patients. Patients with perihepatic collections were treated with PD.

The morbidity and mortality of surgery is higher than PD. This can be attributed to the following factors: application of PD solely to the selected cases, ignoring additional systemic diseases and etiologic factors, application of surgery to the patients who had unsuccessful PD, and application of surgery mostly as a life saving option²⁴. The mortality rate of surgery has been reported as 6-14% in recent years⁷. We observed total two (7.1%) mortalities, one as fulminant liver failure and the other as multiple organ failure, which was in accordance with literature rates.

In conclusion, minimal invasive methods must be preferred for the treatment of PLA. However, surgical intervention is the only option for the patients who can not receive PD or received an unsuccessful PD, have multiple abscess cavity, thought to have perforated abscess or have additional abdominal pathology requiring laparoscopy.

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