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Epidemiological, Clinical, Microbiological, and Risk Factors of Pyogenic Liver Abscess: An 18-years Retrospective Single-Center Analysis

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ABSTRACT

Background: A pyogenic liver abscess (PLA) is the most frequently observed subtype of liver abscess in the western world. The disease has been subjected to a remarkable change. We aimed to investigate the recent trend in pyogenic liver abscess's epidemiology, clinical, microbiological, and risk factors features.

Methods: A retrospective analysis of medical records was done for the patients diagnosed with PLA from January 2000 to June 2018. The institutional review board approved the study.

Results: We identified 113 patients with PLA, 60% were males, with a mean age of 54 ± 20 years, and 58 ± 19 years old for males and females, respectively (p = 0.298), with an increasing annual incidence in 2012–2013, and 2016–2017 (Figure 1). Fever and right upper quadrant abdominal pain were the most common symptoms (65%, 55%, respectively). Forty percent of the patients had Biliary tract diseases like cholecystitis or biliary intervention as cholecystectomy or ERCP, and 20% had diabetes mellitus (Table 1). The abscess culture was obtained in 96 cases, 37 cases were negative (39%), 27 cases showed polymicrobial growth (28%) and 15 cases showed Escherichia coli (16%) (Figure 2). The abscess cultures were mostly negative in the first 5 years, then changed to Streptococcus anginosus, and polymicrobial growth in the last four years.

Conclusions: PLA is more common in males with a recent increase in incidence. Culture negative PLA was observed in patients who were empirically treated with antibiotics. Polymicrobial was the most common identifiable organism with a change in the microbiological trend every 5 years.

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Pyogenic liver abscess; risk factors; retrospective analysis; microbiological trend

1. Introduction

A pyogenic liver abscess (PLA) is an old disease, it was outlined by Hippocrates around 400 BC, and 47 cases were described by Ochsner et al. [1] in 1938. Liver abscess is the most common visceral abscess, and Altemeier et al. [2] found that 48% of the cases included in his study with Liver abscess was Pyogenic in nature.

PLA risk factors have changed over the years; with biliary tract diseases, and biliary interventions being the most common, followed by diabetes mellitus, and the regular usage of proton pump inhibitors [3–7], and it can occur in the absence of risk factors [8]. It typically presents with fever, abdominal pain, and less frequent; nausea, fatigue, and weight loss [3,4].

Escherichia coli and Streptococcus species were the most commonly identified organism in the pyogenic liver abscess in the western world [3,6,9], while Klebsiella pneumonia was most widely reported in Taiwan [4–5].

The PLA is not an uncommon disease, as in a population-based analysis in the USA between 1994 and 2005, the incidence of the pyogenic liver abscess was 3.6 per 100,000 population, with a case-fatality rate of 5.6% [9], and based on that we investigated the pyogenic liver abscess's epidemiology, clinical, microbiological, and risk factors trend over 18 years at a single academic medical center.

2. Method

2.1. Data source

Retrospective data were extracted from the hospital's electronic medical records from January 2000 to June 2018. The institutional review board approved the study. This study was conducted in compliance with the ethical standards of the responsible institution on human subjects as well as with the Helsinki Declaration.

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2.2. Study sample

We used ICD-9-CM(572.0), and ICD-10-CM(K75.0) diagnosis codes to identify patients with a discharge diagnosis of liver abscess from January 2000 to June 2018, and the data were filtered to include only patients with pyogenic liver abscess.

2.3. Data extraction and analysis

The data about the patient's gender, age, ethnicity, risk factors, symptoms, microbiological results of the liver abscess, and blood culture were blotted into Microsoft Excel 2007 (Microsoft Corp., Redmond, WA, USA). At least two team members interpreted the data. The data analyses consisted of percentile and mean ratings.

3. Result

One hundred and thirteen patients were discharged from the hospital with a primary diagnosis of pyogenic liver abscess between January 2000 to June 2018. The highest annual incidence was in 2012–2013, and 2016–2017 (Figure 1).

3.1. Patient's characteristics

Sixty-eight patients were males (60%), and 45 females (40%), with a mean age of 54 ± 20, and 58 ± 19 years old, respectively (p = 0.298). Thirty-five percent of the included patients were White (n = 39), 22% Hispanic (n = 24), 20% African American (n = 22), 2% Asian (n = 3), and 21% other races.

3.2. Risk factors

Forty percent of the patient had an underlying biliary tract disease like cholecystitis or biliary intervention as cholecystectomy or ERCP, and 20% had diabetes mellitus.

3.3. Clinical presentation

Sixty-five percent of the patients had a fever, 55% had right upper quadrant abdominal pain, 20% had generalized fatigue, 9% had nausea, and only 2% of the patients had vomiting (Table 1).

3.4. Imaging

Abdominal ultrasound and CT scan of the abdomen with intravenous contrast were used for diagnosis, 65% of the patients had a single abscess, 12%, and 23% had two or multiple abscesses, respectively.

Table 1. Clinical characteristics, risk factors, symptoms, and disease complications of the included patients.

Gender (n, %)	
Male	68 (60%)
Female	45 (40%)
	p = 0.298
Age (mean, SD)	
Male	54 ± 20
Female	58 ± 19
Ethnicity (n, %)	
White	39 (35%)
Hispanic	24 (22%)
African American	22 (20%)
Asian	3 (2%)
Other	25 (21%)
Risk factors (n, %)	
Biliary tract disease/intervention	45 (40%)
Diabetes mellitus	23 (20%)
Symptoms (n, %)	
Fever (T > 37.5)	74 (65%)
Right upper quadrant abdominal pain	55 (62%)
Generalized fatigue	23 (20%)
Nausea	10 (9%)
vomiting	2 (2%)
Complications (n, %)	
Septic shock	19 (17%)
pleural effusion	10 (9%)
Acute kidney injury	4 (3%)
Portal venous thrombosis	2 (1%)

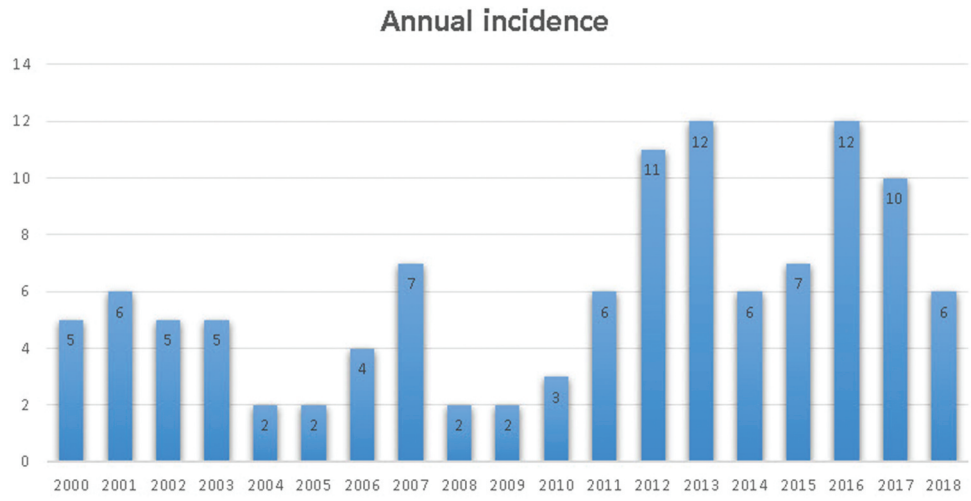

Figure 1. The annual incidence of pyogenic liver abscess from 2000-2018.

3.5. Microbiology

The abscess culture was only obtained in 96/115 cases (85%), as 15% of the cases showed septicemia prior to the biopsy, improved on antibiotics, and were discharged. Out of the cases biopsied, 37 cases did not show bacterial growth in the abscess culture (39%) which is related to empiric intake of antibiotics. Polymicrobial growth was the most common identified culture results (n = 27, 28%), *Escherichia coli* was the second most common (n = 15 cases, 16%), *Klebsiella pneumonia* was the third identified organism (n = 7 cases, 7%). Enterococcus species and *Streptococcus anginosus* were identified alone in 10% of the patients (Figure 2). Blood culture was obtained in 94 cases, and only 29 cases were positive (30%).

3.6. Complications

Nineteen cases developed septic shock (17%), 10 patients had pleural effusion (9%), 4 patients developed acute kidney injury (3%), and 2 patients developed portal venous thrombosis (1%).

4. Discussion

Our study demonstrated that Male gender and increasing age are still more prone to develop a pyogenic liver abscess, and this data was consistent with other study results [4,7,10].

Biliary tract diseases and intervention are still the leading risk factor for PLA. Still, the clinical diagnosis can be challenging as right upper quadrant pain and fever was only observed in around 55% to 65% of the cases, so combining the risk factors, symptoms, imagining, and microbiological results is crucial for diagnosis. Up trending in PLA cases was observed after 2010 which is likely related to increasing biliary interventions (Figure 1).

The microbiological trend in our study changed over the years; the most common abscess culture results in the first five years were negative for bacteria (culture-negative PLA), followed by *Streptococcus anginosus* from 2005 to 2009, then *Escherichia coli* in the subsequent five years. However, polymicrobial growth was the most common in the last four years. Culture negative PLA was observed in patients who were empirically treated with antibiotics prior to admission.

Culture negative PLA (CNPLA) has a lesser length of hospital stay than culture-positive PLA (CPPLA) (P = 0.002), but there was no difference in mortality (P = 0.08).

5. Conclusion

Male gender and increasing age are still more common to develop PLA. Biliary intervention lead to an increase in the trend of PNL after 2010; however, the clinical diagnosis is challenging, as only 55% to 65% of the patients had a fever and right upper quadrant pain. Polymicrobial was the most common identifiable organism, followed by Escherichia coli, with a change in the microbiological trend every 5 years, and CNPLA was related to the empiric intake of antibiotics and it is associated with lesser length of hospital stay than CPPLA with no difference in mortality.

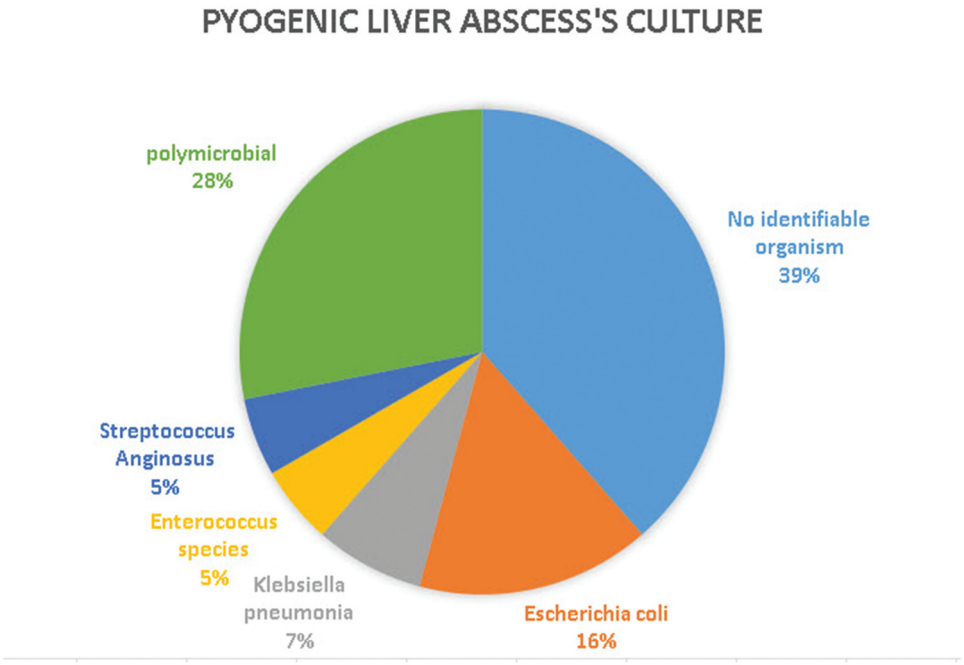

Figure 2. Pyogenic liver abscess's culture results from 2000-2018.

Author contributions

All authors contributed to the study conception and design. Screening and extraction were done by Elias Estifan, and Mina Fransawy Alkomos. Data analysis and its interpretation were done by Mina Fransawy Alkomos and revised by Elias Estifan. Tables and figures were done by Mina Fransawy Alkomos. All authors contributed to writing and revising the manuscript. All authors read and approved the final version.

Disclosure statement

No potential conflict of interest was reported by the authors.

Informed consent

It was not required. The Institutional Review Board Approval approved the study.

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