Characteristics and management of pyogenic liver abscess: A rural senegalese experience

Abstract

Background: The incidence of pyogenic liver abscess (PLA) has increased in recent years with the development of digestive surgery, particularly hepatobiliary surgery. In recent decades, progress in diagnostic techniques have improved patient prognosis. In Senegal, there are few studies of PLA. This study was carried out within this context.

Objective: the main objective was to describe the profile and the management of pyogenic liver abscesses cases in rural Senegal.

Results: we collected 17 cases of PLA among 47.553 patients,during the study period, representing a hospital frequency of 0.035%. The mean age of patients was 48.6 ± 18.9. The sex ratio (M/F) was 2:4. Most ofthe patients (58.82%) had at least one risk factor, the main ones being smoking, a history of abdominal surgery and alcoholism. Right upper abdominal pain was the main reason for consultation (94.11%). Right basithoracic pain and cough were the most frequent respiratory symptoms. *Escherichia coli* remained the most frequently isolated bacteria. The mean time to diagnosis was 17.8 days ± 14.4. All patients received antibiotic therapy, which was combined with echo-guided liver aspiration in 58.82% cases. Mean hospital stay was 17.5 days ± 7.65. The hospital lethality rate was 29.41%.

Conclusion: Liver abscesses are most often of amoebic origin in our context, but in recent years there has been an increase in cases of pyogenic liver abscesses, with the progress made in diagnosis.

Key words: pyogenic liver abscess, rural, Senegal

1. Introduction

Pyogenic liver abscess (PLA) is a suppurating infection of the hepatic parenchyma, caused by bacteria [1]. Its incidence has increased over the last few years with the development of digestive surgery, particularly hepatobiliary surgery. However, this incidence varies from regions.Early diagnosis and treatment are a crucial step in the management of these patients, as the presentation may be subtle and not specific. A high index of suspicion is the cornerstone for preventing misdiagnosis and improving prognosis [2]. In recent decades, improved diagnostic techniques (ultrasound, computed tomography, ultrasound-guided puncture) and antibiotic therapy combined with percutaneous drainage have considerably improved patient prognosis [3, 4]. Bacteria such as enterobacteria (*Escherichia coli, Klebsiella pneumoniae and Pseudomonas aeruginosa*), *staphylococcus, streptococcus* and anaerobes are the most frequently associated with pyogenic liver abscesses [5,6].

In Senegal, there are few studies of pyogenic abscesses. These were mainly conducted in the capital (Dakar). Our study was carried out within this context and

the main objective was to describe the profile and management of pyogenic liver abscesses cases in a rural areaof Senegal.

2. Methods

2.1. Study population

This was a retrospective study and concerned patients with pyogenic liver abscess (PLA) admitted to the 03 major public hospitals in Thies (Senegal), from January 01, 2012, to December 31, 2022. Patients were identified from medical records contained in the archiving system of these hospitals, by searching the International Classification of Diseases (ICD 9-1997) code for the diagnosis of "pyogenic liver abscess" (572.0.0). The diagnosis of PLA was based upon clinical aspects, imaging studies, and microbiology on aspirate culture results. Exclusion criteria were patients with age < 18 years, amoebic liver abscess, hydatid liver abscess.

2.2. Data collection

Data collected included demographic characteristics, clinical features, laboratory data, radiological findings (abdominal ultrasound, CT scan), microbiological findings, diagnostic and therapeutic methods, response to treatment and mortality. Cultures were isolated for aerobic and anaerobic organisms using the standard diagnostic techniques. If cultures were positive, organisms recovered from the abscess were assumed to be the etiologic.

All patients received antibiotic therapy: type, duration and mode of administration were recorded for each case. Abscesses were treated empirically with antibiotics; the antibiotic was being changed according to culture results. Lack of response to initial treatment was defined as a patient with persistent signs of sepsis after 5 days of intravenous antibiotics. Ultrasound-guided percutaneous needle aspiration and drainage were performed. Cure was defined as the absence of symptoms and regression of lesions on imaging. Lethality was defined as abscess-related death during hospitalization.

2.3. Statisticalanalysis

Statistical analyses were performed using SPSS 20.0 software. For descriptive analysis, categorical variables were expressed as absolute frequency and proportion.Quantitative variables were expressed by their position (mean, median) and dispersion (standard deviation, inter-quartile range,) parameters according to their distribution.

3. Results

3.1. Epidemiological and clinical features

We collected 17 cases of PLA, among 47,553 patients hospitalized during the same period, representing a hospital frequency of 0.035%. More than half of cases (58.82%) were managed in surgery, and 41.17% in medicine. The mean age of patients was 48.6 ± 18.9. Male was predominant (70.59%), with a sex ratio (M/F) of 2.4. Mostpatients (58.82%) had at least one risk factor, the main ones being smoking, a history of abdominal surgery and alcoholism. Nearly half of patients (47.06%) had

at least one comorbidity,with hypertension and HIV infection being the main ones(Table 1).

Table 1. Epidemiological characteristics of cases

Epidémiological aspects	Number (n)	Frequency (%)
Sex		
Male	12	70.59
Female	5	29.41
Age (years)		
[20 – 40 [	7	41.17
[40 – 60 [	3	17.65
>60 ans	7	41.17
Risk factors		
Smoking	10	58.42
History of abdominal surgery	5	29.41
Alcoholism	3	17.65
comorbidities		
Hypetension	8	47.06
HIV	3	17.65
Diabetesmellitus	2	11.76
Chronique viral Bhepatitis	2	11.76
Cardiopathy	2	11.76
Chronicrenaldisease	1	5.88

Right upper abdominal pain was the main reason for consultation, reported in 94.11% of cases. Fever was reported in almost all cases (88.23%). Hepatomegaly was present in 64.70% of cases, with a mean clinical hepatic score of 14.9. cm ± 0.69. Jaundice was present in 58.82%. Right basithoracic pain and cough were the most frequent respiratory symptoms, with 64.70% and 58.82% respectively. A right pleural effusion syndrome was present in 58.82% of cases.

Table 2. clinical signsin patients with pyogenic liver abscess (n=17)

Signes cliniques	Number (n)	Frequency (%)
Right upper abdominal pain	16	94.11
Fever	15	88.23
Hepatomegaly	11	64.70
Right basithoracic pain	11	64.70
Cough	10	58.82
Right pleural effusion syndrome	10	58.82
Jaundice	10	58.82
Abdominal distension	9	52.94
Condensation	5	29.41
Respiratorydistress	5	29.41
Confusion	3	17.64

3.2. Laboratory features

Hyperleukocytosis was present in all our patients, as well as positive CRP. Anemia was present in almost all patients (94.11%). Cytolysis was remarkable in most patients (see Table 3).

Table 3. Summary of laboratory results at presentation in patients with pyogenic liver abscess.

Results	Range	Mean± SD	No. of cases outside range (%)
WBC (10^3 /l)	4.0 – 12.0	25953 ±12840	17 (100)
Hemoglobin, g/dl	< 12	8.49 ± 2.62	16 (94.11)
CRP, mg/l	> 6	150 ± 109.	17 (100)
AST, U/l	> 40	108.6 ± 120	13 (76.47)
ALT, U/l	> 40	88.3 ± 111	13 (76.47)
TP	< 70	69.0 ± 19.0	8 (47.05)
Creatinine, mg/l	> 13	17.19 ± 10.8	8 (47.05)

WBC white blood cell*
CRP C-reactive protein*
SD standard deviation*
ALP: Alkaline phosphatase
ALT: Alanine transferase

3.3. Radiological features

Abdominal ultrasound was performed in 16 patients (94.11%). It was 100% contributive, showing hepatomegaly with a mean hepatic arrowof 15.6 cm ± 2.62. Almost all abscesses (81.25%) were in suppurative stage, including one with multiple septations. The right lobe was the preferred location for abscesses (table 4).
Computed tomography (CT) scans were carried out in 07 patients, showing abscesses in the suppurative stage in 06 (including one multi-compartmental) and pre-suppurative in 01. The mean hepatic arrow measured on abdominal CT was 16.3 cm ± 2.57. Six patients had right-sided localization and one combined case.
Table 4. ultrasound findings in pyogenic liver abscesses cases (n=16)

Ultrasound data	Number (n)	Frequency (%)
Stage		
Suppurative stage	13	81.25
Pre-suppurative stage	3	18.75
Localisation		
Right lobe	15	93.75
combined	1	6.25
Nombre		
Single	11	68.75
Multiple (02)	5	31.25

3.4. Microbiology

Hepaticaspiration was performed in all patients. The fluid was purulent in more than half of cases (58.82%), and serohaematous in 35.29%. Examination of the fluid revealed a predominantly neutrophilic cytology in 100% of cases. *Escherichia coli* remained the most frequently found bacteria (58.82%) (table 5).
Table 5. Isolated bacteria during pyogenic abscesses (n=17)

Isolatedbacteria	Number (n)	Frequency (%)
Escherichia Coli	10	58.82
Klebsiella pneumoniae	3	17.64
Pseudomonasaeruginosa	2	11.76
Staphylococcus aureus	1	5.88
Xanthomonas spp	1	5.88

3.5. Management

The mean time to diagnosis was 17.8 days ± 14.4, with a median of 15 days [10 - 20 days].

All patients received antibiotic therapy, which was combined with echo-guided liver aspiration in 10 patients (58.82%), transcutaneous drainage in 09 patients (52.94%), and surgical drainage in 02 patients whose indication was acute generalized peritonitis following rupture of the liver abscess into the peritoneum. Antibiotic therapy was readapted in all cases, according to the antibiogram data received after cytobacteriological examination of the puncture fluid. In 52.94% of cases, the germ was sensitive to ciprofloxacin, making this molecule the most prescribed when readapting antibiotic therapy. Average aspiration time was 3.10 days ± 2.47. The mean drainage time was 5.22 days ± 3.53, the mean drainage duration was 13.8 days ± 5.09.

3.6. Outcomes

Mean hospital stay was 17.5 days ± 7.65. the mean delay to apyrexia was 6.06 days ± 5.21. Fifteen patients (88.23%) developed complications during follow-up. These were predominantly right pleurisy (35.29%). Two patients (11.76%) had peritonitis due to abscess rupture, and 04 patients (23.52%) had septic shock, including 02 postoperatively.

All patients underwent an abdominal ultrasound examination before discharge. Almost all patients (88.23%) had a clear regression in abscess size. Four cases of recurrence (23.52%) were recorded at the time of ultrasound monitoring. Five patients died during hospitalization,i.e., a hospital lethality rate of 29.41%.

4. Discussion

In this study, the epidemio-clinical characteristics, microbiology, treatment, and mortality of 17 patients with pyogenic abscesses are reviewed and reported.The mean age of our patients was 48.6 years ±18.9 with extremes ranging from 33 to 65 years. This confirms data from other series showing that the mean age of patients developing pyogenic liver abscess is relatively high **[7,8]**. We found a clear predominance of males,which can be explained by the factthat men are more exposed to the identified risk factors for liver abscesses such as alcoholism, smoking, drugs, etc...

Symptoms of PLA were multiple and unspecific. However, hepatalgia is a constant symptom in liver abscesses. Along with hepatomegaly and fever, it constitutes the classic FONTAN triad, characteristic of liver abscesses. It was complete in 64.70% of our cases. In liver abscesses, jaundice may be secondary to hepatocellular damage, biliary tract compression or fistulization of the abscesses in the bile ducts **[8].** Jaundice was noted in 58.82% of our patients.

In all our cases, hyperleukocytosis was marked, with a predominance of neutrophils and an elevated CRP. These two abnormalities form the non-specific biological

inflammatory syndrome. Although non-specific, when associated with a disturbed liver function, it should raise the suspicion of a liver abscess **[8, 9]**. While the index of suspicion for pyogenic abscess is low due to the non-specific features of the presentation, the diagnosis could be suggested by underlying predisposing pathological processes **[8]**. Almost a third of our patients (29.41%) had a history of abdominal surgery,which has been recognized as a risk factor for liver abscessesparticularly pyogenic abscesses **[10].**

Imaging tests are used to diagnose hepatic abscess (HA) in over 90% of cases**[10]**. in our study, ultrasound was 100% contributive. Thirteen of our patients (81.25%) had abscesses in the suppurative phase,as a result ofthe long delay in consultation in our context. We have confirmed the suggestion that pyogenic abscesses are mainly confined to the right hepatic lobe, due to the anatomy of the portal vein, the larger hepatic mass, and the denser network of biliary canaliculi in this lobe **[1, 2]**.

Abdominal CT was performed in 41.17% of our patients. The use of this technique in the diagnosis of liver abscesses varies from series to series conditioned by its accessibility, its cost remaining high for certain population living in developing countries. CT is more sensitive than ultrasound, it can be required in the event of technical difficulties in performing ultrasound, or when lesions found on ultrasound are difficult to distinguish, especially in the pre-suppurative phase**[11, 12]**.

Microbiological documentation is essential to confirm the diagnosis and optimize treatment. It is based on blood cultures, and essentially on aspiration of the abscess, which is the reference examination **[10].** This aspiration must always be performed rapidly under ultrasound control. All our patients underwent ultrasound guidance. Blood cultures were not taken in any of our patients, even though, they are routinely recommended before antibiotics are prescribed, at the time of peak fever or chills. However, they were negative in over half of cases, and the concordance between blood cultures and abscess aspiration cultures was less than 60% **[1]**. This explains why it was not carried out in our study, our patients' limited financial resourcesmade prefer the bacteriological examination of abscess aspiration fluid. Gram-negative bacilli (GNB) are implicated in 40-60% of cases of PLA, particularly enterobacteria (*Escherichia coli, Klebsiella pneumoniae*) and *Pseudomonas aeruginosa*. Anaerobic bacteria account for 35-45%, in particular *Bacteroides sp*. Gram-positive cocci, most frequently *Streptococcus sp., Staphylococcus sp*. and *Enterococcus sp.***[8, 10, 13]**. In our series, we found *E. coli* in 58.82% of cases, followed by *Klebsiella pneumoniae* (17.64%) and *Pseudomonas areuginosa* (11.76%).

Identification of bacteria enables antibiotic therapy to be readapted. Management involves medical treatment, drainage of the abscess if necessary, and treatment of the underlying cause **[10].** The development of interventional radiology (aspiration and percutaneous drainage) has reduced the role of surgery in treatment of PLA. However, surgery still plays an important role in the treatment of the causative pathology. Overall, there are no specific recommendations for the management of liver abscesses **[10]**. In all cases, antibiotic therapy is always indicated**[14]**. It can be used exclusively in small HA (less than 3-5cm), especially if they are multiple, guaranteeing therapeutic success close to 100% **[14, 15]**. In our study, there was no exclusive medical treatment. Most of our patients were managed surgically. There is also no consensus on the combination of antibiotics used. In the absence of bacteriological data, antibiotic therapy should be probabilistic and cover a broad spectrum for the digestive germs most frequently responsible for HA, i.e. aerobic Gram-negative bacilli, anaerobes, and streptococci. Antibiotic therapy should then be readapted to the isolated germ and the antibiogram **[10, 11]**. In all our patients,

antibiotic therapy was readapted according to the antibiogram, and the most used molecule was ciprofloxacin. There is little formal data on the optimal duration of antibiotic therapy, but most units use a 2-week parenteral regimen, followed by a longer course (4-6 weeks), switching to oral antibiotics when clinical and inflammatory responses allow **[16]**.

Medical treatment combined with hepatic aspiration and/or transcutaneous drainage is the gold-standard therapy for liver abscesses. Aspiration or percutaneous drainage techniques have a dual advantage: they enable microbiological documentation and reduce bacterial inoculum **[10, 17, 18]**.In our study, 37.3% of patients underwent antibiotic therapy in associated with aspiration.

The main complication of percutaneous drainage is abscess rupture, especially when drainage is performed "blindly" [19]. Subcapsular hematoma of the liver and pleural contamination are also reported complications of drainage [10]. In our series, all punctures were ultrasound guided.

Until the late 1970s, surgical drainage was the only invasive treatment for liver abscesses. Today, it is performed less frequently, especially in countries where interventional radiology is well developed **[11]**.However, surgical drainage is still indicated in cases where percutaneous drainage has failed, in multi-compartment abscesses, in difficult-to-access locations, and in cases where the abscess has ruptured in the peritoneal cavity**[10].** Surgical drainage may also be preferred if treatment of the cause is required, with evacuation of the abscess taking place at the same time. In our study, surgical drainage was performed in 02 patients, and was indicated for peritonitis due to abscess rupture.

The main evolutionary risk of HA is the extension of the process to neighboring organs. The resulting complications are locoregional, involving rupture **[1, 19].** Peritonitis is one of the most serious complications of liver abscesses, accounting for a high mortality rate, especially in our setting. Peritonitis occurred in 02 of our patients, who had developed septic shock post-surgery.Hospital mortality was 29.41% in our cases. Today, better imaging, more effective use of antibiotics and percutaneous drainage of abscesses have improved the mortality rate of pyogenic abscesses **[20, 21].**

5. Conclusion

This study describes the profile, diagnosis, and management of pyogenic liver abscesses in in a rural context in a tropical zone. In our context, liver abscesses are most often of amoebic origin, but in recent years there has been an increase in cases of pyogenic liver abscesses, with the progress made in diagnosis. In practice, clinicians should maintain a high index of suspicion for pyogenic liver abscess in patients presenting with the risk factors; and clinical scenarios of fever, right upper abdominal pain, increased C-reactive protein levels and hyperleukocytosis. Early diagnosis of the disease can improve the prognosis considerably. Unlike ALA, patients with PLA require an upfront combination of drainage and appropriate antibiotics, along with appropriate treatment of etiology.

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