



Case Report

Hepato-Renal Relationship: A Rare Pathology- Hepatic Abscess Associated with Left Renal Abscess

Cristina Gluhovschi^{1,2*}, Florica Gadalean^{1,2}, Silvia Velciov^{1,2}, Ligia Petrica^{1,2}, Ciprian Duta³, Mircea Botoca⁴, Daniela Cipu⁴

¹Department of Internal Medicine II, Division of Nephrology, “Victor Babeş” University of Medicine and Pharmacy, County Emergency Hospital Timisoara, Timișoara, Romania.

²Faculty of Medicine, Centre for Molecular Research in Nephrology and Vascular Disease, “Victor Babeş” University of Medicine and Pharmacy, Timișoara, Romania.

³Department X Surgery II, Division of Surgery II, “Victor Babeş” University of Medicine and Pharmacy, County Emergency Hospital Timisoara, Timișoara, Romania.

⁴Department XV Orthopedics-Traumatology, Urology, Radiology and Medical Imaging, Division of Urology, “Victor Babeş” University of Medicine and Pharmacy, County Emergency Hospital Timisoara, Timișoara, Romania.

***Corresponding author:** Cristina Gluhovschi, Department of Internal Medicine II, Division of Nephrology, “Victor Babeş” University of Medicine and Pharmacy, County Emergency Hospital Timisoara, Timișoara, Romania.

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Abstract

The right kidney is located in the proximity of the liver, which allows the spreading of renal infectious processes to the liver, with the production of hepatic abscesses. This situation is rare, however, because of the anatomical structures that separate the two organs. Associations of left kidney abscesses with hepatic abscesses are little known. An abscess in the left kidney, which is located away from the liver, points to the improbability of an infection being transmitted to the liver and raises the issue of hematogenous microbial seeding. We present the case of a 23-year-old Caucasian female without any past history of kidney or liver disease. The patient presented sepsis with important leukocytosis (20,000 leukocytes/microl accompanied by renal symptoms, lumbar pain, urgency, frequency, and dysuria. The patient did not present leukocyturia and urine cultures were negative (1000 germs). Liver enzymes, serum bilirubin, and serum alkaline phosphatase were within normal limits. Renal function was not altered (serum creatinine within normal limits). Blood cultures were negative for both aerobic and anaerobic germs. Computed tomography exam showed a left renal abscess associated with a hepatic abscess, located in the right lobe (the IV hepatic segment). The issue of hematogenous spread of infection from the kidney to the liver is raised. Under treatment with imipenem associated with amikacin both the hepatic and the renal abscess had a favorable outcome.

Keywords: Renal Abscess; Hepatic Abscess; Left Kidney; Computed Tomography; Hepato-Renal Relationship.

Introduction

Bacterial infections of the liver, although rare, frequently have a severe outcome. One of the important bacterial diseases met in liver pathology is represented by the hepatic abscess. This requires early diagnosis and complex, sometimes surgical, therapy. The renal abscess represents one of the severe manifestations of urinary tract infections. It is met mainly in urological services, and more infrequently in nephrology services. Modern imaging methods like ultrasound and computed tomography allow at present accessible and early diagnosis of renal and hepatic abscesses. Difficult to diagnose before the introduction of these methods, renal and hepatic abscesses used to be detected with difficulty and late, with severe consequences. In general, both hepatic and renal abscesses are present in patients as unique structures, without being associated with each other. In, very rare situations a patient can present both a hepatic and a renal abscess, which aggravates the infectious process. The relationship between the two infectious processes, hepatic and renal, is little known, although the liver and the right kidney are located in proximity to one another.

When the two types of abscesses are present in a patient, it raises the issue of a possible relationship between them, namely whether the renal abscess was propagated at liver level, or vice-versa. The spreading of right renal abscesses to the liver with the production of secondary liver abscesses has already been reported [1, 2].

In other situations, an infectious focus with other localizations could disseminate both at the liver and at the kidney level. An example is bacterial endocarditis which can propagate the infection via septic emboli that can seed the liver, the kidney, and other organs as well, such as the spleen [3]. A special situation is represented by a hepatic abscess associated with a left renal abscess. Until present, as far as we know, this situation was not published in literature.

In this case, the issue of hematogenous spread of microbial infection is raised. Analyzing 67 cases of renal abscesses hospitalized in a clinic of nephrology we detected a case that presented a left kidney with several confluent abscesses and an associated hepatic abscess. In drawing attention to this rare case we aim at presenting the specifics of this association and the relationship between renal and hepatic abscesses in general.

Case Report

We present the case of a 23-year-old Caucasian female without any past history of kidney or liver pathology who came to our hospital with 38.1° Celsius fever, left lumbar pain, urgency, frequency, and dysuria. She also presented epigastric and left flank pain. Laboratory data showed a WBC of 20000 leukocytes/microl, AST: 21 U/L, ALT 25 U/L, alkaline phosphatase 62 U/L, serum Bilirubin 0.6 mg/dL, serum creatinine 1 mg/dL, proteinuria 0.9 g/24 h, urine WBC 1200/ min, urine RBC 1200/min; urine culture: <1000germs/ml. The absence of important leukocyturia and the absence of positive urine cultures is a sign that the abscess does not communicate with the renal excretory system. The slightly elevated proteinuria could be in relationship with the tubular lesions accompanying an upper urinary tract infection (UTI). Urine cultures have not been repeated for ethical reasons, the clinical situation making emergency medical treatment mandatory.

CT at the level of the left kidney showed multiple hypoechoic areas of up to 2 cm in diameter which had a tendency to coalesce (Figure 1) at liver level an Iodine-capturing 15/10 mm hypoechoic area was found at the level of the IV segment, with moderate mass defect, without a proper wall, with irregular, weak and non-homogeneous contour, which was judged to be a hepatic abscess based on clinical grounds. The ultrasound exam showed similar lesions. The urological consultation confirmed the suspicion of renal abscess and excluded an obstructive factor which could have favored its occurrence. Gall bladder- examined clinically and by imaging techniques had no apparent pathology. The patient did not present any other concomitant intra-abdominal organ involvement, nor did she present any thrombosis of the portal venous system as a source of an infectious process. The patient did not show any signs of infective endocarditis. Blood cultures were negative.

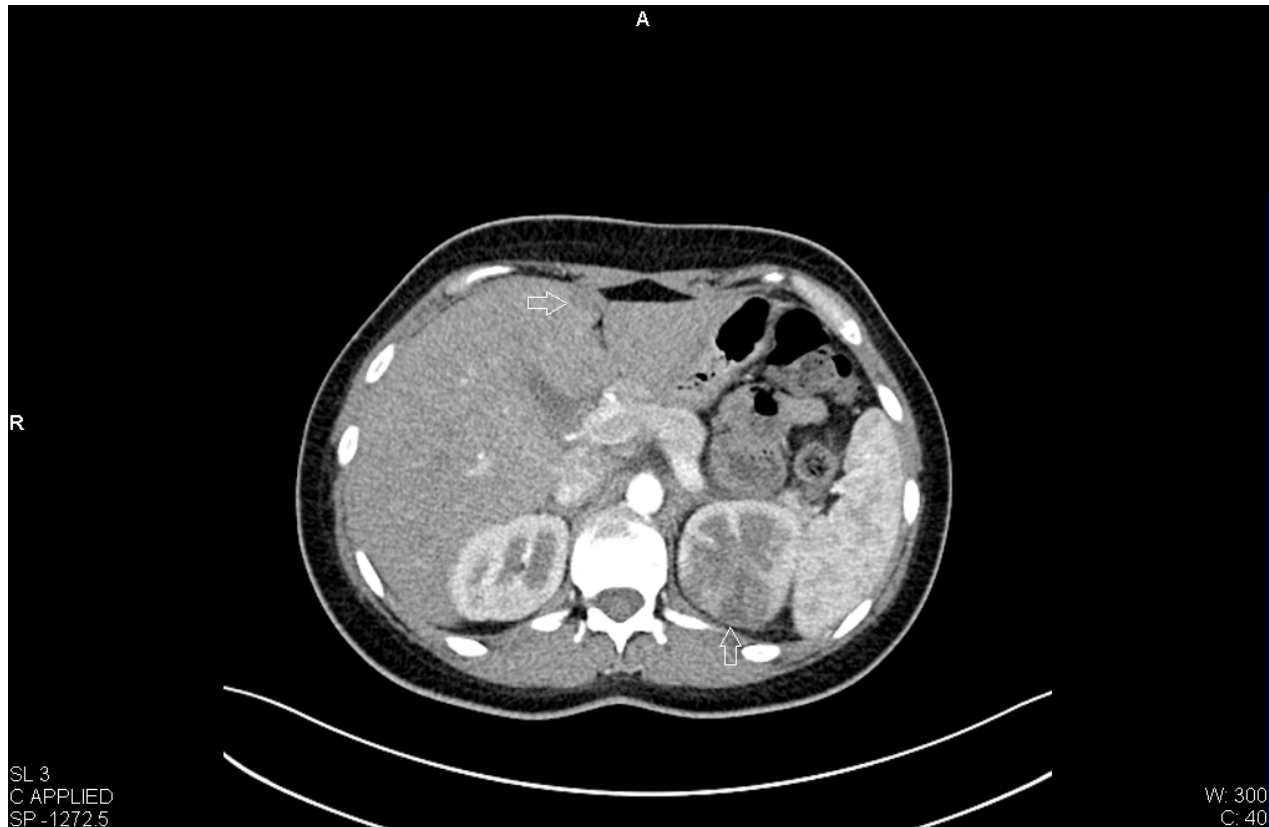


Figure 1: CT of the left kidney showing multiple hypochoic areas of up to 2 cm in diameter.

The normal values of serum creatinine (1 mg/dL) ruled out chronic kidney disease as a favoring factor for a renal abscess, while the normal liver values ruled out cirrhosis as a favoring factor for a hepatic abscess. Another possible favoring factor, diabetes mellitus, was ruled out (serum glucose: 91 mg/dL). Treatment consisted of antibiotics without drainage of either the liver or the renal abscess. Therapy consisted initially of Ciprofloxacin associated with Gentamicin, followed by Ertapenem with Amikacin. Thereafter Cefuroxime therapy was initiated. Control ultrasound examination revealed a favorable outcome and the subsequent CT scan showed a resolution of the liver and kidney pathology.

Discussion

Bacterial infections, unlike viral ones (hepatitis B, hepatitis C), occur less frequently at liver level. One should consider the specifics of the immune system, sensibly more permissive for viral infections. One of the frequent bacterial infections of the liver is the hepatic abscess.

Urinary tract infections (UTIs) represent the most frequent pathology in nephrology. One of the most severe infections of the urinary tract is represented by the renal abscess. The association

of renal and hepatic microbial pathology is little known. We present a case in which a left renal abscess is associated with a hepatic abscess. Such an association has been presented very rarely. Usually, one detects either a hepatic or a renal abscess. The association of two infectious foci (hepatic abscess with renal abscess) can produce a much more severe infectious condition than when a single organ is affected.

Our patient presented a deteriorated general condition, with high fever, shakes, and chills, and lab tests found 20.000 leukocytes/microl leukocytosis, in concordance with the infectious process. It is to be noted that the patient's past history did not contain any renal, hepatic, or gallbladder disease.

Renal Abscesses

First, we are going to present renal and hepatic abscesses separately, and then we will analyze possible relationships between them. As far as renal involvement is concerned, the patient presented at the moment of hospitalization frequency, urgency, dysuria, and left lumbar pain. CT showed several confluent renal abscesses at the level of the left kidney. It should be mentioned that, although the infectious process affected two important

organs, it was not accompanied by renal function impairment. Urine cultures were negative, due to the fact that the abscesses did not present any continuity with the renal excretory system. Urine cultures were not repeated for ethical reasons, since the deteriorated general condition of the patient required emergency antimicrobial treatment.

Renal abscesses represent a serious form of UTI most frequently encountered in urology services. This high incidence could be secondary to the high-frequency obstructive processes, for example, renal lithiasis or stenosis of the pelvico-calyceal junction, which could favor UTIs. Trauma with kidney involvement or direct wounds are less frequently involved. Renal abscesses can also occur as a consequence of urological handling during exams or even therapeutic interventions.

Our case was hospitalized in a nephrology department, where neither renal lithiasis at the level of the affected left kidney, nor any other obstructive factor was detected. She did not undergo any invasive urologic procedures. It is to be noted that renal abscesses are rarely met in a nephrology clinic. A 5-year study by Velciov et al. found 44 cases of renal abscess in a nephrology clinic [4]. Since renal abscesses represent severe infections of the urinary tract, they have to be known and looked for in nephrology and urology departments, especially since they often occur in young women, without any explanation for their occurrence such as obstructive factors.

Hepatic Abscesses

Our patient presented nausea, malaise, vomiting, pain, and sensitivity upon palpation at the level of the right upper quadrant, a fact that pleaded for a digestive pathology. CT scan detected a 15/10 mm hepatic abscess in the IV segment. According to Malik et al, CT has a sensitivity of 95% for allowing the detection of abscesses as small as 0.5 cm and it can also delineate small abscess near the diaphragm [5]. It is to be noted that the hepatic abscess in our case was small and difficult to detect. However, CT visualized it but the image did not present evident contrast. Jeffrey et al. reported that small hepatic pyogenic abscesses seem to cluster [6]. Our case was a small isolated abscess.

Hepatic abscesses are located mainly in the right hepatic lobe. They can be related to diseases of the biliary ducts (cholangitis, choledocholithiasis) or to acute cholecystitis. Hepatic abscesses can also be related to organs in proximity, for example, processes of suppuration could be transmitted from the right kidney, or from infectious processes such as suppurated appendicitis associated with peritonitis. Hepatic abscesses can occur after hepatic trauma, especially wounds, the infection propagating directly. But in our case, this situation could not be taken into account. Ultrasound and CT exams excluded gallbladder disease, including gallbladder lithiasis, as the gallbladder presented no alterations. CT confirmed

the result of the ultrasound exam. No other abdominal suppurative process was found. The bile ducts were normal and bilirubin and alkaline phosphatase were also within reference range.

Liver tests such as AST and ALT were also normal, probably because in our case, the hepatic abscess had impaired only a limited fragment of parenchyma. As far as favoring factors are concerned, we mention the absence of diabetes mellitus (normal glycaemia) and any other hepatic disease. It is to be noted that the immunogram, namely the values of serum immunoglobulins and the C3 fraction of the complement system, did not present significant alterations. This fact pleads against immune deficiency.

Associations of hepatic abscesses with renal abscesses represent special situations very rarely mentioned in literature which warrant attentive analysis. This association, met in our case, has its specifics, being located at the level of the left kidney. As far as the relationship between the two organs is concerned, we have to mention that the liver and the right kidney are in proximity to one another, while the left kidney is situated at a distance. This brings about different ways of spreading infection from one organ to the other. In spite of the proximity of the two organs, namely the liver and the right kidney, direct propagation from one organ to the other is not simple, since the two organs are separated by well-defined anatomical structures.

First, we have to mention that the liver is located in the peritoneal cavity and the kidneys are located retroperitoneally. Secondly, the kidneys are delineated by the renal capsule and separated from the retroperitoneal tissue by a firm anatomical structure, Gerota's fascia, and the liver is surrounded by Glisson's capsule. Generally, there is no communication between the two organs. When it exists, it can be due to lesions of these structures, possibly fistulae through which an infection could spread. Medical literature presents some rare cases of association of a renal abscess with a hepatic one. They only refer to abscesses located in the right kidney. Tanvar et al signaled a case of right kidney pyonephrosis caused by renal lithiasis spreading to the liver and producing an abscess [1]. Vojinovic et al. also reported a case of hepatic abscess spread from a right renal suppurative process [2]. Chung et al. mentioned a granulomatous pyelonephritis whereby the infectious process extended to the liver by means of a renohepatic fistula [7].

In our case, CT did not detect any lesion extended from the right kidney to the liver, the renal abscess being located at the level of the left kidney. One can discuss venous propagation of suppurative processes from an abdominal organ to the liver and, at the same time, to the kidney. The liver with its portal system allows extension of a suppurative process from a tributary organ via the veins. The kidney presents a venous system, independent from the portal system; the renal veins flowing into the inferior

vena cava. Different examinations, CT included, did not find any such process.

We still have to discuss another route of communication between a renal and a hepatic suppurative process and vice-versa, namely the hematogenous route. The germs released at the level of a hepatic or renal focus can thus reach, via the general circulation, the other organ, producing a secondary abscess. In our case, we had an association of a hepatic abscess with a left renal abscess. Since the left kidney is located away from the liver, direct transmission between the two organs is very difficult. A possibility could be represented by a ruptured renal abscess into the peritoneum, with secondary peritonitis and secondary infection of the liver, with possible formation of a hepatic abscess. The localization of a would-be hepatic abscess would very probably be related to the peritoneal cavity.

We have not found in the literature any case of hepatic abscess related to the left kidney. But there exists a description of a case in whom a staghorn calculus of the left kidney with pyonephrosis caused by rupture peritonitis with sub-phrenic and splenic abscesses [8].

Chu et al. reported a case of liver abscess originating in a ruptured renal abscess extending to the para-renal space, spreading into the peritoneal cavity and then into the liver, forming a hepatic abscess [9]. As a consequence, in our case, we had an association of a hepatic abscess with a left renal abscess, the left kidney being located away from the liver, which makes the direct transmission between the two organs virtually impossible. In this situation, we have to discuss a hematogenous spreading of the infectious process from an organ to the other. We also mention that in our case renal infection was more evident than the hepatic one, possibly being a source of germs that reached the liver via the hematogenous route. The localization in the right lobe of the liver would be more probably related to the hematogenous route of liver seeding.

It is to be noted that blood cultures were negative, so we could not demonstrate this route of seeding between the two organs. We could not repeat the blood cultures for ethical reasons (antibiotics had to be started immediately after hospitalization because of the patient's condition, therefore blood cultures were drawn only once. Blood cultures are known to be only intermittently positive in abscesses. The dissemination of an infectious process in the body could represent possible concomitant liver and kidney involvement, namely a hepatic abscess associated with a renal abscess (in our case in the left kidney). Thus, bacterial endocarditis can be associated with the detachment of septic emboli disseminated primarily at the spleen level, but also at the liver and kidney (including the left kidney) level. Mendez et al. described a case in which a hepatosplenic and a renal embolism associated in infective endocarditis [3]. Our clinical and ultrasound exams, as well as CT, did not detect the presence of bacterial endocarditis;

neither did they find another suppurative focus with another localization which could have affected the liver and the kidneys with formation of consecutive abscesses.

Liver involvement with the formation of hepatic abscesses under the form of cystic structures was also found in amoebiasis, usually without renal involvement. Literature reports a case of amoebic hepatic and renal abscesses related to amoebic colitis [10]. Neither the clinical image nor the CT aspect argued in favor of such a disease. The formation of cystic hepatic and renal structures that can get infected is described in hepatic hydatidosis. Neither hepatic nor renal cystic structures were found in our patient since she had not been in contact with areas where this disease is endemic. We found no elements pleading for concomitant hepatic and renal hydatidosis with ensuing infection.

In fact, after antimicrobial treatment, repeated imaging exams did not detect such a disease. No concomitant hepatic and renal abscessed tumors and no abscessed infarctions were detected. The case we present had a favorable outcome under treatment with antibiotics. Hope et al. also reported favorable results in the treatment of <3cm hepatic abscesses only with antibiotics [11] Malik et al. also reported favorable outcomes upon treatment with antibiotics alone [5]. Frey et al consider that pyogenic abscesses > 1.5 cm should be aspirated [12].

The paper has a debatable point: it cannot use blood cultures as an argument for hematogenous transmission of the infection that produced the hepatic abscess as blood cultures were negative when the patient was hospitalized. Because of ethical reasons (immediate initiation of treatment after blood culture testing), possible bacteremia could not be subsequently detected. In fact, bacteremia can be intermittent in case of an abscess.

Conclusions

The case presents an unusual association of a hepatic abscess with a left renal abscess. It is to be noted, that, although the renal involvement- confluent left renal abscesses- is more severe than the hepatic one, we cannot know whether the extended renal abscess initiated the hepatic abscess or vice-versa. In case of a hepatic abscess we have to take into consideration distant foci as well, in our case an abscess located on the left kidney. It is worth mentioning that, as far as we know, it is the first time the literature describes an association of a left renal abscess with a liver abscess. This case points to the complexity of the liver-kidney relationship encountered in clinical practice.

Ethical standards: The study was approved by the Ethics Committee of the Emergency Clinical County Hospital Timisoara, Romania

Conflict of Interest: The authors report no conflict of interest.

Authors' Contribution: Manuscript Written by Cristina Gluhovschi. Primary Patient Care by Florica Gadalean, Silvia Velciov and Ligia Petrica. Surgical Consultation by Ciprian Duta. Urological Consultation by Mircea Botoca, and Medical Imaging Technique by Daniela Cipu.

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