

Case report

Korean J Pediatr 2013;56(11):496-499

<http://dx.doi.org/10.3345/kjp.2013.56.11.496>

pISSN 1738-1061 • eISSN 2092-7258



Liver abscess due to *Klebsiella pneumoniae* in a healthy 12-year-old boy

Da Hye Yoon, MD, Yeon Jin Jeon, MD, E Young Bae, MD, Dae Chul Jeong, MD, Jin Han Kang, MD

Department of Pediatrics, The Catholic University of Korea College of Medicine, Seoul, Korea

Pyogenic liver abscess (PLA) is rare in healthy children. We report a case of PLA in an immunocompetent 12-year-old boy. Percutaneous catheter drainage was performed for the abscess. In addition, parenteral antibiotics were administered for 3 weeks. *Klebsiella pneumoniae* was detected in the culture of blood and drained fluid. Here, we present this case and a brief review of the literature on this subject.

Key words: Pyogenic liver abscess, Drainage, Antibiotics, *Klebsiella pneumoniae*

Corresponding author: Jin Han Kang, MD

Department of Pediatrics, Seoul St. Mary's Hospital, The Catholic University of Korea College of Medicine, 222 Banpo-daero, Seocho-gu, Seoul 137-701, Korea
Tel: +82-2-2258-6183

Fax: +82-2-537-4544

E-mail: kjhan@catholic.ac.kr

Received: 6 December, 2012

Revised: 11 March, 2013

Accepted: 15 April, 2013

Introduction

Pyogenic liver abscess (PLA) occurs most frequently in persons with immunodeficiency, certain genetic disorders, infections of the skin or abdominal cavity and protein-calorie malnutrition^{1,2}. While PLA is rare in healthy children, it may occur in immunocompetent children³. Some common organisms of PLA include *Staphylococcus aureus*, *Streptococcus spp*, *Klebsiella pneumoniae*, *Escherichia coli*, *Pseudomonas aeruginosa*, *Salmonella* and anaerobes^{2,4}. Needle aspiration or catheter drainage of liver abscess in combination with antibiotics is the gold standard for the PLA¹⁻³. Advances in imaging technology and techniques for drainage as well as access to new antibiotics have led to reductions in morbidity and mortality of PLA recently². Here we describe the development of a liver abscess following *K. pneumoniae* infection in a 12-year-old boy who had no underlying disease. Early diagnosis with the computed tomography (CT) scans and percutaneous continuous catheter drainage at an appropriate time in combination with parenteral antibiotics were thought to be helpful, in our case.

Case report

A 12-year-old boy was admitted to Seoul St. Mary's Hospital after 5 days of fever. He had right upper quadrant (RUQ) abdominal pain when breathing for one day, but showed no other gastrointestinal symptoms such as vomiting or diarrhea. He was visiting Seoul as a tourist from Los Angeles, CA, USA. He had been healthy and had no history of any other disease; however, his grandfather had died of liver cancer related to hepatitis C. The patient had a travel history to lake about 2 weeks ago and appeared to have drunk contaminated water during swimming.

Based on physical examination, he appeared healthy. His body temperature was 39.6°C and he had RUQ tenderness. A complete blood count showed hemoglobin, 11.7 g/dL; white blood cells, 16,810/mm³ with segmented neutrophils of 78.2%; and platelets,

Copyright © 2013 by The Korean Pediatric Society

This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License (<http://creativecommons.org/licenses/by-nc/3.0/>) which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

270,000/mm³. The erythrocyte sedimentation rate was 120 mm/hr and his C-reactive protein was more than 34.1 mg/dL. Blood chemistry including liver function tests were normal. Abdomen and pelvis CT scans revealed a large (6.9 cm×7.1 cm×7.3 cm), lobular, low-density abscess in liver segments 7 and 8 with periportal edema and a small amount of ascites (Fig. 1A). The results of the tests for hepatitis viral markers, alpha fetoprotein, immunoglobulins, complements, and amoeba antibodies for the purpose of differential diagnosis were all normal. He was started on intravenous meropenem and metronidazole.

On hospital day 4, ultrasound-guided drainage was performed by pig-tail catheter, and 40 mL of pus was drained. After drainage, the patient's fever began to subside and he began to feel more comfortable. On hospital day 9, *K. pneumoniae* was proven by bacterial culture. The isolate was extended-spectrum beta-lactamase-negative and was sensitive to meropenem and gentamicin. We added gentamicin to initiate triple-antibiotic therapy. We removed the pig-tail catheter on hospital day 14 because the drainage had ceased. At follow-up, a repeated complete blood count showed white blood cells, 8,500/mm³ with segmented neutrophils of 58.1%; erythrocyte sedimentation rate, 113 mm/hr; and C-reactive protein, 1.71 mg/dL. On hospital day 21,

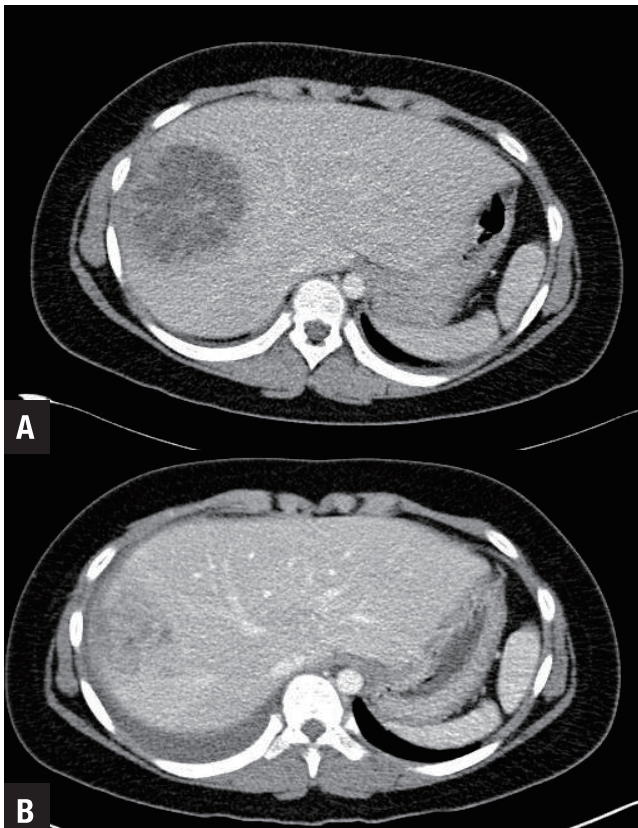


Fig. 1. (A) Computed tomography scan taken on hospital day 1 showing pyogenic liver abscess, (B) Computed tomographic scan taken on hospital day 21 showing improved pyogenic liver abscess.

abdominal and pelvic CT scans showed that the liver abscess was greatly diminished, but also showed a large amount of right pleural effusion with passive collapse of the right lower lung (Fig. 1B). Chest posterior-anterior (PA) also showed a large amount of right pleural effusion (Fig. 2A). No respiratory symptoms such as dyspnea were present. We inserted a pig-tail catheter for pleural effusion and drained 100 mL of fluid, which was shown to be transudate. The next day, as the drainage of pleural effusion ceased and chest PA showed no remaining fluid (Fig. 2B), we removed the pig-tail catheter. After treatment with intravenous antibiotics for 3 weeks (hospital day 22), we discharged the patient with oral administration of cefixime. The pleural effusion

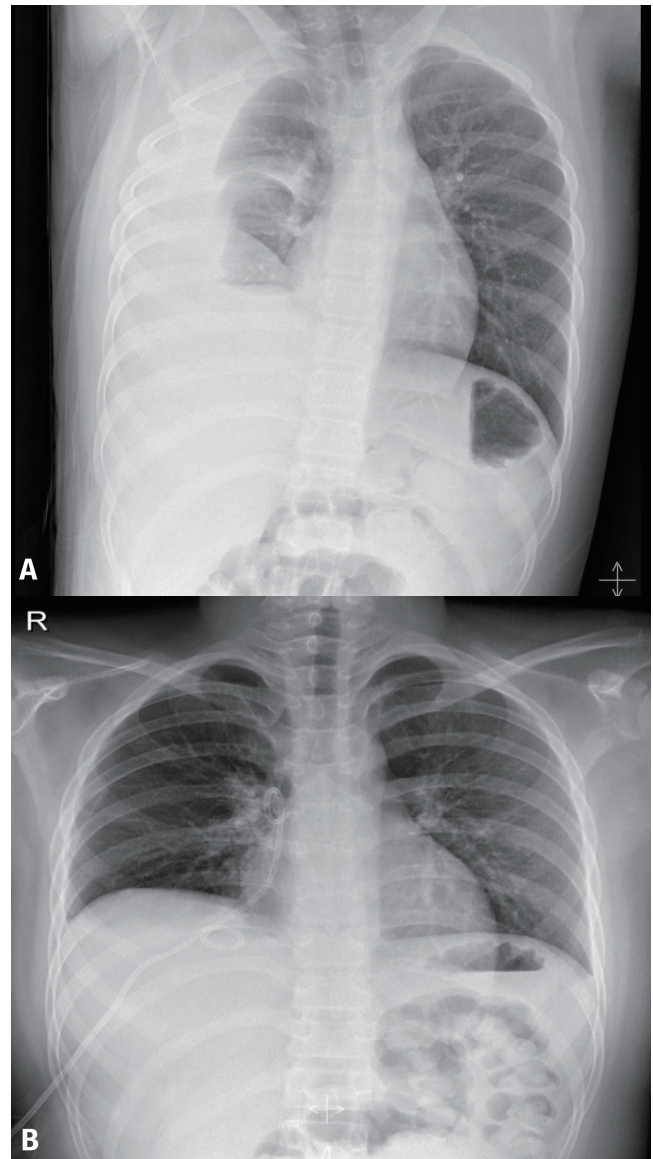


Fig. 2. (A) Chest X-ray taken on hospital day 21 showing pleural effusion on the right, (B) Chest X-ray taken on hospital day 22 showing the absence of pleural effusion after drainage.

showed no evidence of bacteria in culture.

Discussion

PLA is rare in children, with an incidence of 10/100,000 hospitalizations. It can be caused by bacteria entering the liver via the portal circulation in cases of intra-abdominal infection, abscess secondary to appendicitis or inflammatory bowel disease or ascending cholangitis associated with biliary tract obstruction in immunocompetent patients. PLA occurs most frequently in immunocompromised hosts with genetic disorders, chronic granulomatous disease, diabetes or protein calorie malnutrition¹⁻².

The common microbiology of PLA is *S. aureus*, *Streptococcus* spp, *K. pneumoniae*, *E. coli*, *P. aeruginosa*, *Salmonella* and anaerobic organisms^{1,2,4}. In 2003, a study in the Korean Journal of Hepatology found that *K. pneumoniae* is the most common organism (65.7%) causing PLA and showed a significant increase in number⁴. *K. pneumoniae* causes infections in the respiratory tract, urinary tract, lower biliary tract, and surgical wound sites⁵. In our case, the route of entry is probably from the gastrointestinal tract. Two hypotheses are possible yet it is difficult to explain the route of the origin. One is that *K. pneumoniae* was supposed to be one of carrier for our patient, the carrier rates are higher than we had expected. There is a report in Taiwan that 75% of healthy adults carry *K. pneumoniae* in feces⁶. Stool culture of the patient showed no growth but we used Hektoen enteric agar, a selective and differential agar primarily used to recover *Salmonella* and *Shigella* only. The other possibility was to get pathogen from contaminated water during swimming. The report in United States shows that *K. pneumoniae* is common organisms in the water, rivers, streams and lakes in the states of Oregon, Washington, and Idaho⁷.

Signs and symptoms are nonspecific and can include fever, nausea, vomiting, abdominal pain with RUQ tenderness, cough with breathing difficulty, and hepatomegaly^{3,4}. On the other hand liver abscesses may present as fulminant sepsis or acute abdomen.

Laboratory testing did not have the specificity to help diagnose the PLA¹. Leukocytosis and elevation of erythrocyte sedimentation rate and C-reactive protein are common. Elevations in liver function tests are common, but may also be normal.

Ultrasound or CT scans are used to confirm the diagnosis of PLA. Ultrasound is quick, safe and accurate but may miss very small abscesses or abscesses in areas of the liver that are difficult to examine with poor patient cooperation⁸. CT scans are more sensitive in detecting even small abscesses anywhere in the liver but have the risk of contrast nephropathy^{2,8}. We performed CT scans the first day of hospitalization, which allowed us to make

early detection. Solitary liver abscess in the right lobe is more common than multiple abscesses or solitary left lobe abscess.

Needle aspiration percutaneous continuous catheter drainage in combination with parenteral antibiotics is the gold standard treatment^{1,3,4,8}. Antibiotic therapy should initially be broad spectrum but then narrowed, based on the culture results of the abscess fluid. The initial empirical antibiotic regimen includes ampicillin+aminoglycoside±metronidazole or vancomycin+aminoglycoside+metronidazole^{1,8,9}. Imipenem or meropenem may also be used^{1,8}. Others recommend a combination of a third-generation cephalosporin+metronidazole⁸. Antibiotic therapy is intravenous for 2–3 weeks followed by oral therapy to complete a 4–6 week course³. Advances in imaging technology and techniques for drainage as well as access to new antibiotics have led to reductions in morbidity and mortality of PLA⁴.

Complications of PLA include pulmonary complications, acute renal failure, peritonitis and abscess rupture, pleural effusion, pneumonia, empyema and pulmonary edema⁴. Common pulmonary complication in PLA include pleural effusion, pneumonia, empyema, and pulmonary edema⁴.

PLA is rare in children. Our patient had the typical solitary node in the right lobe and *K. pneumoniae* was proven in bacterial culture by catheter drainage. The abscess resolved with percutaneous catheter drainage and 3 weeks of parenteral antibiotic therapy in addition to oral antibiotic therapy. Our patient developed a right pleural effusion, which resolved with subsequent drainage. He was treated well without significant complications due to early diagnosis and early drainage.

Conflict of interest

No potential conflict of interest relevant to this article was reported.

References

1. Salahi R, Dehghani SM, Salahi H, Bahador A, Abbasy HR, Salahi F. Liver abscess in children: a 10-year single centre experience. *Saudi J Gastroenterol* 2011;17:199-202.
2. Sharma MP, Kumar A. Liver abscess in children. *Indian J Pediatr* 2006;73:813-7.
3. Byun JL, Bae SH, Park SW. A case of pyogenic liver abscess in a 10-year-old girl. *Korean J Pediatr* 2010;53:666-8.
4. Nah BK, Kim YS, Moon HS, Park KO, Kim SM, Lee YS, et al. Recent changes of organism and treatment in pyogenic liver abscess. *Taehan Kan Hakhoe Chi* 2003;9:275-83.
5. Mishra K, Basu S, Roychoudhury S, Kumar P. Liver abscess in children: an overview. *World J Pediatr* 2010;6:210-6.
6. Fung CP, Lin YT, Lin JC, Chen TL, Yeh KM, Chang FY, et al. *Klebsiella pneumoniae* in gastrointestinal tract and pyogenic liver abscess. *Emerg Infect Dis* 2012;18:1322-5.

7. Knittel MD. Occurrence of *Klebsiella pneumoniae* in surface waters. *Appl Microbiol* 1975;29:595-7.
8. Israeli R, Jule JE, Hom J. Pediatric pyogenic liver abscess. *Pediatr Emerg Care* 2009;25:107-8.
9. Sakran W, Kavar B, Chervinsky L, Siplovich L. Solitary liver abscess in a healthy child presenting with fever of unknown origin. *Eur J Pediatr Surg* 2005;15:193-5.