Klebsiella Pneumonia-Necrotizing Fasciitis followed by Liver Abscess

Seung Hyun Lee¹, Jeong Woo Choi, Myeung Su Lee*²
¹Department of Pediatrics, Wonkwang University School of Medicine
²Department of Emergency Medicine, Wonkwang University School of Medicine
³Department of Internal Medicine, Wonkwang University School of Medicine

Abstract
We report a case of a patient with necrotizing fasciitis followed by liver abscess. A 51-year-old man was admitted to our hospital with a 5-day history of fever and chills with painful swelling of the right thigh. A magnetic resonance imaging (MRI) scan showed fluid collection with numerous dark signal intensities considered as air-bubbles between the posteromedial and posterolateral groups of the right thigh, resulting in presumptive diagnosis of necrotizing fasciitis. At the time of admission, an ultrasonograph of the abdomen showed increased parenchymal echogenicity of both kidneys and no liver abscess. Ten days after fasciotomy, an abdominal computed tomography (CT) scan showed intrahepatic abscess. Sonography-guided percutaneous drainage was performed. Both cultures of pus specimens from the liver abscess and right thigh yielded Klebsiella pneumoniae (K. pneumoniae). The patient was treated with fasciotomy several times and parenteral antibiotics, after which he began to improve. After 5 weeks, liver abscess size was reduced, and after 10 weeks, liver abscess disappeared. To the best of our knowledge, this is the first case of K. pneumoniae-necrotizing fasciitis followed by liver abscess.

Keywords: Fasciotomy, Klebsiella Pneumonia, Liver Abscess, Necrotizing Fasciitis, Percutaneous Drainage.
1. Introduction

Necrotizing fasciitis (NF) is a life-threatening disease characterized by its spread along the fascial planes, resulting in adjacent tissue necrosis and secondary gangrene [1]. There were some reports of necrotizing fasciitis with *K. pneumonia* liver abscess [2-3]. However, necrotizing fasciitis followed by liver abscess has not been reported. Here, we report a case of a patient with *Klebsiella pneumoniae*-necrotizing fasciitis (KP-NF) followed by liver abscess. To our knowledge, this is the first report on *K. pneumoniae* liver abscess originated from necrotizing fasciitis.

2. Case Report

A 51-year-old man presented with a 5-day history of fever, chills, and myalgia. He had been treated at a local clinic for 1 week, but his symptom had been worsened and he had developed acute renal failure and right leg swelling with erythema 2 days before admission. He had no past history and was not currently on any regular medication. His vital signs were as follows: blood pressure, 120/70 mmHg; pulse rate, 102 /min; respiration rate, 20 /min; and body temperature, 38.5℃. Physical examination showed an acutely ill man and no direct tenderness on abdomen. His right thigh had marked swelling with induration and severe tenderness. Laboratory studies disclosed the following: Hemoglobin level, 12.0 g/dL; initial WBC count, 13,390 /uL; platelet count, 190,000 /uL; serum glucose level, 347 mg/dL; Hb A1c, 13.7%; serum albumin level, 2.6 g/dL; total bilirubin level, 1.0 mg/dL; AST/ALT, 101/72 IU/L; BUN, 70 mg/dL; Creatinine level, 5.71 mg/dL; alkaline phosphatase level, 1266 IU/L; Lactose dehydrogenase level, 485 IU/L; erythrocyte sedimentation rate, 120 mm/Hr and C-reactive protein level, 249.2 mg/L. An abdominal sonography showed mild dilatation of cystic duct without definite stone and increased renal parenchymal echogenicity in both kidneys. A MRI scan of the right thigh showed fluid collection with numerous dark signal intensity considered as air-bubble along the intermuscular septum between posteromedial and posterolateral group of right thigh (Fig.1). A presumptive diagnosis of necrotizing fasciitis with diabetes mellitus (DM) was made and extensive lateral fasciotomy and drainage were performed; necrotizing fasciitis was observed, and areas of necrosis were debrided. Culture of the material repeatedly yielded only *K. pneumoniae*. Therapy with parenteral carbapenem and clindamycin was administered with tight blood sugar control.

Fig. 1. MRI showing multiple very small low signal intensities along the intermuscular septum of right thigh suggesting gas bubble (arrow).

10 days after fasciotomy, he still had fever and right upper quadrant abdominal tenderness with elevated liver enzyme. A CT scan of the abdomen showed a 7x6 cm sized intrahepatic abscess and bilateral pleural effusion (Fig.2). Sonography-guided percutaneous drainage was performed. Cultures of pus specimens from the liver abscess and right thigh both yielded *K. pneumoniae*. After antibiotics therapy was continued, patient was discharged 80 days after admission. He remained free of liver abscess for 1 year of follow-up.
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Fig. 2. Post-contrast CT showing a large low attenuated mass-like lesion (arrow) in right lobe of liver suggesting liver abscess.

3. Discussion

NF typically begins as a slightly inflamed area of soft tissue that suddenly and dramatically progresses to overt fasciitis with systemic toxicity[4]. However, it rarely spreads to the internal organ. To our knowledge, this is the first time that necrotizing fasciitis followed by liver abscess has been reported.

Bacteria of the Streptococcus species seem to be the most common single causative organism[5]. In the recent report, the relatively high frequency of K. pneumoniae made it one of the predominant pathogens that caused monomicrobial NF[6].

The clinical features of necrotizing fasciitis caused by Klebsiella spp. are similar to those of necrotizing fasciitis caused by other organisms, i.e., severe sepsis, a propensity for multi-organ failure and high mortality[7]. However, the potential for multifocal infection is unique to necrotizing fasciitis caused by Klebsiella spp. Some cases were noted to had one or more distant foci of infection including the brain, liver, lung, kidney and/or abdomen, including endogenous endophthalmitis[2]. In our case, it was thought that necrotizing fasciitis with Klebsiella bacteremia may spread to liver, since an abdominal sonography at admission showed no liver abscesses and cultures from right thigh fascia and liver abscess have identified the same result. There were many cases reports on necrotizing fasciitis from internal organ such liver abscess and ophthalmitis but it was the first time that liver abscess was originated from necrotizing fasciitis.

More than half of the patients developing NF have preexisting medical conditions, 35% at least two[8]. The most common predisposing risk factors include DM(30%), immune suppression(17%), end-stage renal failure, liver cirrhosis, pulmonary diseases(6%), malignancy(5%), and use of injection drugs. Especially, Monomicrobial K. pneumoniae NF(KP-NF) typically occurred in patients with underlying immunocompromising conditions, such as DM or liver cirrhosis[9]. But, the presence of DM and adequacy of glycemic control has, so far, not been shown to be associated with increased mortality or occurrence of metastatic infections[10]. Our patient also had diabetes that acts as a risk factor of NF, but he had not known and had not taken any medication.

NF is a surgical emergency, and early debridement is life-saving. Patients with NF due to Klebsiella spp. who develop cutaneous signs of soft tissue infections, such as erythema, swelling and tenderness, should be treated with caution and a high index of suspicion. A high index of suspicion and awareness are important, since early diagnosis and surgical debridement have been shown to improve survival[7].

The antimicrobial susceptibility patterns of the Klebsiella strains causing necrotizing fasciitis showed resistance to ampicillin but susceptibility to other antibiotics, including all cephalosporins and aminoglycosides tested. Multiple antimicrobial resistances were not detected[11]. But, there is the rationale for use of extended-spectrum cephalosporins or a carbapenem based on their better ability to penetrate the central nervous system, eye, and prostate, and the possibility that they may prevent metastatic infections[6]. The antimicrobial regimen chosen to treat our patients therefore included parenteral carbapenem in combination with a clindamycin. The parenteral antimicrobial agents were continued until 12 weeks depending on clinical response.
4. Conclusion

In conclusion, rarely NF can cause abscess of internal organ like our patient. Because of the potential for multifocal infection of \textit{K. pneumoniae}, physicians should try to find out other metastatic foci with careful examination and try to treat combined lesion promptly when a patient with NF is not improved despite of proper treatment especially in the case of \textit{K. pneumoniae} infection.

References


Seung Hyun Lee [Regular member]

• Jun. 2016 ~ current : Department of Pediatrics, Wonkwang University School of Medicine, Professor

<Research Interests>
Neonatology, Pediatrics, Clinical Medicine

Jeong Woo Choi [Lifetime member]

• Jun. 2016 ~ current : Department of Emergency Medicine, Wonkwang University School of Medicine, Professor

<Research Interests>
Emergency Medicine, Emergency Medical System, Clinical Medicine
Klebsiella Pneumonia—Necrotizing Fasciitis followed by Liver Abscess

Myeung Su Lee

• Sep. 2012 ~ current : Department of Internal Medicine, Wonkwang University School of Medicine, Professor

Research Interests
Rheumatology, Internal Medicine, Clinical Medicine