



Case Report

Acute septic arthritis caused by *Klebsiella pneumoniae*Chi-Chou Tseng^a, Chung-Da Wu^b, Wei-Ting Lin^{b,*}, Huan-Tee Chan^a, Po-Yih Chen^a^a Department of Orthopedics, Chi Mei Medical Center, Liouying, Tainan, Taiwan^b Department of Orthopedics, Chi-Mei Medical Center, Tainan, Taiwan

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ABSTRACT

Septic arthritis caused by Gram-negative bacteria is uncommon. However, *Klebsiella pneumoniae* is one of the most common pathogens in Taiwan in several clinical entities, including severe community-acquired pneumonia, community-acquired lung abscess, empyema, necrotizing fasciitis, and liver abscess. However, the research focusing on septic arthritis caused by *K. pneumoniae* is only limited. Herein, we described three cases of *K. pneumoniae*-associated septic arthritis. Two of them had underlying diabetes mellitus, and one of them was caused by extended beta-lactamase-producing *K. pneumoniae*. All outcomes were favorable under appropriate management, which included antibiotic treatment or drainage. Copyright © 2013, Taiwan Orthopaedic Association. Published by Elsevier Taiwan LLC. All rights reserved.

1. Introduction

Septic arthritis is defined as bacterial, fungal, or mycobacterial infection in a joint; however, most of the acute forms of this clinical entity are caused by bacteria. *Staphylococcus aureus* is the most common pathogen causing the acute form of septic arthritis.^{1–3} By contrast, Gram-negative bacteria-related septic arthritis is only reported in some special settings, including trauma, intravenous drug abuser, neonates, the elderly, and immunocompromised patients. *Klebsiella pneumoniae* is one of the most common pathogens in several clinical entities, including severe community-acquired pneumonia, community-acquired lung abscess, empyema, necrotizing fasciitis, and liver abscess in Taiwan.^{4–12} However, the research focusing on septic arthritis caused by *K. pneumoniae* is rare and only limited in the form of case reports.^{13–15} Herein, we describe three rare cases of *K. pneumoniae*-associated septic arthritis.

2. Case reports

2.1. Case 1

A 76-year-old woman with hepatitis C virus-related liver cirrhosis and chronic kidney disease was admitted to our institution because of fever and painful swelling over the left knee for 2

days. On admission, the vital signs were: body temperature of 38.2°C, pulse rate of 79/min, respiratory rate of 18/min, and blood pressure of 100/58 mm Hg. Local examination of the left knee region showed tenderness and movement was painfully limited. Laboratory examination results were as follows: white blood cell count (WBC) 8,100/mm³ (99% neutrophils); creatinine 3.1 mg/dL (estimated glomerular filtration rate, 15.6 mL/min); fasting glucose 172 mg/dL, C-reactive protein 87.5 mg/L (normal reference <6 mg/L). Pus aspirated from the knee joint showed WBC 255,000/mm³ with predominance of neutrophils (91%). Empirical antibiotic with flomoxef was administered and pigtail drainage over the knee was performed. Three days later, aerobic bacterial culture of the joint fluid and blood yielded *K. pneumoniae*. Susceptibility testing revealed that *K. pneumoniae* is sensitive to amikacin, ceftazidime, ciprofloxacin, cefuroxime, ceftazolin, gentamicin, flomoxef, piperacillin/tazobactam, ceftiofime, and imipenem, but resistant to ampicillin. Therefore, the antibiotics were shifted to ceftazolin and the patient recovered completely, without complication, during the follow up of 6 months.

2.2. Case 2

A 53-year-old man presented with progressive, painful swelling over his right knee for 1 day. He had the medical history of diabetes mellitus. Physical examinations were unremarkable except for local heat and tenderness over the right knee. Laboratory examination showed WBC 12,100/mm³ (89% neutrophils), and C-reactive protein 128 mg/L. Pus aspirated from the knee joint showed WBC, 8,600/mm³ with predominance of neutrophils (85%) and the

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culture of synovial fluid grew *K. pneumoniae*, which was only resistant to ampicillin. Therefore, the antibiotics were shifted to cefazolin. However, the patient's clinical condition worsened and follow-up synovial fluid examinations showed progressive leukocytosis with WBC of 90,585/mm³ and the presence of Gram-negative bacteria. Thus, the antibiotic was switched to ciprofloxacin, and arthroscopic synovectomy and débridement were done. Finally, the clinical condition gradually improved and the patient was uneventfully discharged 16 days later.

2.3. Case 3

An 81-year-old woman had a medical history of diabetes mellitus and chronic kidney disease, and was admitted to our hospital due to pneumonia with acute respiratory failure. After admission, her pneumonia responded to antibiotic therapy despite difficult weaning. Twenty days later, the patient experienced sudden onset of fever with erythematous change and tenderness over her left hip. Laboratory examination showed WBC 15,600/mm³ (86% neutrophils), and C-reactive protein 176 mg/L. Antibiotic with cefazolin was prescribed thereafter. Synovial fluid aspirated from the hip joint showed WBC, 7,845/mm³ with predominance of neutrophils (95%), and few Gram-negative bacteria. Four days later, aerobic bacterial culture of the joint fluid and blood yielded extended beta-lactamase (ESBL) producing *K. pneumoniae*. Therefore, the antibiotics were changed to imipenem and the clinical condition became stable. The patient was discharged uneventfully 1 month later.

3. Discussion

This is the first study focused on *K. pneumoniae* septic arthritis, and there were several significant findings. During the study period from 2004 to 2011, we had 51 patients with microbiology-confirmed septic arthritis, and in 26 patients (51.0%) this condition was caused by *S. aureus* ($n = 26$, 51.0%). This is consistent with previous studies that *S. aureus* is the most common bacteria causing acute forms of septic arthritis in adults.^{1–3} In addition, *K. pneumoniae* caused septic arthritis in three patients, and the overall prevalence of this clinical entity is 5.9%. Thus, we documented that *K. pneumoniae* should be considered in the differential diagnosis of septic arthritis in Taiwan.

In this study, all of the three cases had various underlying diseases, which led to *K. pneumoniae* septic arthritis. One patient had liver cirrhosis and two patients had diabetes mellitus. This finding is consistent with previous reports.¹⁴ Although the close relationship between *K. pneumoniae* and diabetes mellitus remains unclear, this kind of association was demonstrated in the various *K. pneumoniae*-related infections, such as meningitis, liver abscess, urinary tract infections, empyema, urinary tract infection, and bacteremia.^{6–12} Therefore, our findings suggest that physicians should always consider *K. pneumoniae* as possible pathogens causing septic arthritis, especially in patients with diabetes.

Of the three *K. pneumoniae* isolates, one (from Case 3) was identified as ESBL *K. pneumoniae*. According to the study by

Schelenz et al,¹⁵ our patient obtained the ESBL *K. pneumoniae* via healthcare-associated infections. ESBL confer resistance to most beta-lactam antibiotics, and community-acquired ESBL producing *Enterobacteriaceae*, including *K. pneumoniae*, become prevalent worldwide.¹⁶ Most important of all, the treatment options against serious ESBL *K. pneumoniae* are limited. Carbapenem is the only drug of choice for this clinical setting. Therefore, it suggests that broad-spectrum antibiotics may be given as the empirical treatment until the sensitivities that are confirmed in the setting of drug-resistant Gram-negative bacteria are suspected or prevalent.

In conclusion, *K. pneumoniae* is one possible etiology of septic arthritis in Taiwan, especially in patients with diabetes. In addition, ESBL *K. pneumoniae* should be considered as one of the pathogens causing healthcare-associated infections. Appropriate antibiotic based on the *in vitro* susceptibility tests and adequate drainage or debridement may improve the clinical outcome.

References

- C.J. Methews, G. Coakley. Septic arthritis: current diagnostic and therapeutic algorithm. *Curr Opin Rheumatol* 20 (2008) 457.
- D.L. Goldenberg, J.L. Reed. Bacterial arthritis. *N Engl J Med* 312 (1985) 764.
- B.W. Frazee, C. Fee, L. Lambert. How common is MRSA in adult septic arthritis? *Ann Emerg Med* 54 (2009) 695.
- N.C. Cheng, Y.C. Yu, H.C. Tai, P.R. Hsueh, S.C. Chang, S.Y. Lai, W.C. Yi, et al. Recent trend of necrotizing fasciitis in Taiwan: focus on monomicrobial *Klebsiella pneumoniae* necrotizing fasciitis. *Clin Infect Dis* 55 (2012) 930–939.
- H.C. Hu, C.C. Huang, Y.H. Tsai, C.H. Lee, M.J. Hsieh. Outcome analysis of patients requiring mechanical ventilation with severe community-acquired pneumonia and identified bacterial pathogens. *Chang Gung Med J* 28 (2005) 229–236.
- J.L. Wang, K.Y. Chen, C.T. Fang, P.R. Hsueh, P.C. Yang, S.C. Chang. Changing bacteriology of adult community-acquired lung abscess in Taiwan: *Klebsiella pneumoniae* versus anaerobes. *Clin Infect Dis* 40 (2005) 915–922.
- K.Y. Chen, P.R. Hsueh, Y.S. Liaw, P.C. Yang, K.T. Luh. A 10-year experience with bacteriology of acute thoracic empyema: emphasis on *Klebsiella pneumoniae* in patients with diabetes mellitus. *Chest* 117 (2000) 1685–1689.
- J.H. Wang, Y.C. Liu, S.S. Lee, M.Y. Yen, Y.S. Chen, J.H. Wang, S.R. Wann, et al. Primary liver abscess due to *Klebsiella pneumoniae* in Taiwan. *Clin Infect Dis* 26 (1998) 1434–1438.
- D.L. Cheng, Y.C. Liu. *K. pneumoniae* in Taiwan. *J Infect Dis Soc ROC* 8 (1997) 2–5.
- W.N. Chang, C.R. Huang, C.H. Lu, C.C. Chien. Adult *Klebsiella pneumoniae* meningitis in Taiwan: an overview. *Acta Neurol Taiwan* 21 (2012) 87–96.
- S.S. Tsai, J.C. Huang, S.T. Chen, J.H. Sun, C.C. Wang, S.F. Lin, B.R. Hsu, et al. Characteristics of *Klebsiella pneumoniae* bacteremia in community-acquired and nosocomial infections in diabetic patients. *Chang Gung Med J* 33 (2010) 532–539.
- W.H. Lin, M.C. Wang, C.C. Tseng, W.C. Ko, A.B. Wu, P.X. Zheng, J.J. Wu. Clinical and microbiological characteristics of *Klebsiella pneumoniae* isolates causing community-acquired urinary tract infections. *Infection* 38 (2010) 459–464.
- B.A. Cunha, S. Ienopoli, J.E. Hage. *Klebsiella pneumoniae* septic wrist arthritis successfully treated with ertapenem and levofloxacin. *J Chemother* 23 (2011) 376–377.
- C.J. Lin, C.Y. Lin, W.Y. Li, H.C. Hsiue, Y.T. Huang, S.Y. Ruan, J.T. Wang, et al. Repeated bacteremia with subsequent septic arthritis caused by *Klebsiella pneumoniae* capsular serotype K57 in a patient with diabetes. *Clin Infect Dis* 49 (2009) 1284–1286.
- S. Schelenz, K. Bramham, D. Goldsmith. Septic arthritis due to extended spectrum beta lactamase producing *Klebsiella pneumoniae*. *Joint Bone Spine* 74 (2007) 275–278.
- R. Ben-Ami, J. Rodríguez-Baño, H. Arslan, J.D. Pitout, C. Quentin, E.S. Calbo, O.K. Azap, et al. A multinational survey of risk factors for infection with extended-spectrum beta-lactamase-producing enterobacteriaceae in nonhospitalized patients. *Clin Infect Dis* 49 (2009) 682.