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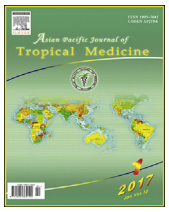

Case report http://dx.doi.org/10.1016/j.apjtm.2016.11.014

Prostatic abscess of *Klebsiella pneumonia* complicating septic pulmonary emboli and meningitis: A case report and brief review

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ARTICLE INFO

Article history:
Received 30 Sep 2016
Received in revised form 26 Oct 2016
Accepted 23 Nov 2016
Available online 28 Dec 2016

Keywords:
Klebsiella pneumoniae
Lung abscess
Meningitis
Prostatic abscess
Septic emboli

ABSTRACT

Prostatic abscess is a rare entity with an incidence of 0.5%–2.5% in all prostate diseases and usually occurs in the 5th and 6th decades of life with immunocompromised status. Prostatic abscess might be a process of evolution from acute prostatitis. *Klebsiella pneumoniae* is the leading microorganism in the diabetic patients of prostatic abscess in Taiwan. A 60-year-old diabetic man, with a one-week history of acute bacterial prostatitis was reported in this study, presenting to the emergency department with sudden altered mental status. The abdominal computed tomographic scan demonstrated lobulated prostatic abscess and multiple septic pulmonary emboli with lung abscesses. Analysis of cerebrospinal fluid showed white blood cells of 10771 counts/mm^3 with segmented neutrophils of 99%. Cultures of blood, cerebrospinal fluid and sputum yielded *Klebsiella pneumoniae*. We concluded that computed tomographic scan can make a definite diagnosis of prostatic abscess associated with complications and management with empiric antibiotics and adequate drainage is suggested.

1. Introduction

Prostatic abscess (PA) is a rare entity with an incidence of 0.5%–2.5% in all prostatic disease and usually occurs in the 5th and 6th decades of life with immunocompromised status. PA may be a process of evolution from acute prostatitis and it has a mortality rate of 30%. Only 1%–2% of patients with PA present prostatic symptoms, so it is difficult to diagnose initially. Gram-negative bacilli are major microorganisms in 60%–80% of PA, but *Klebsiella pneumoniae* (*K. pneumoniae*) is only 2.4% [1–7]. However, *K. pneumoniae* is the leading microorganism in the diabetic patients of PA in Taiwan [8–13]. This study reported a case of disseminated bacteremia of *K. pneumoniae* with septic pulmonary abscess and meningitis from prostatic abscess in a 60-year-old diabetic man.

2. Case report

A written informed consent was obtained from the patient's adult son for publication of this case report and all accompanying images.

A 60-year-old man had a past medical history of hypertension, diabetes mellitus (DM) and coronary artery disease with medication at a local clinic. He suffered from fever, urgency and dysuria one week ago and acute bacterial prostatitis was diagnosed with oral antibiotics. However, sudden onset of consciousness disturbance was found by his family, so he was sent to our emergency

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Peer review under responsibility of Hainan Medical University.

department. On arrival, E3V1M5 of Glasgow Coma Scale and rapid regular heart beats were noted on physical examination. Digital rectal examination showed a palpable and tender prostate. Significant laboratory investigations showed white blood cells (WBCs) of 32 200 counts/mm^3 (normal value: 4 000–11 000 counts/mm^3) with band forms of 7% and segmented neutrophils of 90%, hemoglobin of 13.0 g/dL (normal value: 12.0–16.0 g/dL), platelet of 118 × 10^3 counts/mm^3 (normal value: 140–400 × 10^3 counts/mm^3), high-sensitivity C-reactive protein of 26.06 mg/dL (normal value: <0.3 mg/dL), lactate of 46.6 mg/dL (normal value: 8–12 mg/dL), blood urea nitrogen of 53 mg/dL (normal value: 7–21 mg/dL), creatinine of 1.3 mg/dL (normal value: 0.7–1.4 mg/dL), sodium of 137 mEq/L (normal value: 137–153 mEq/L), potassium of 5.3 mEq/L (normal value: 3.5–5.3 mEq/dL), blood glucose of 728 mg/dL (normal value: 70–110 mg/dL), presence of ketone bodies, HbA1C of 10.2% (normal value: 4%–6%), albumin of 2.9 g/dL (normal value: 3.5–5.0 mg/dL), and alkaline phosphatase of 205 mg/dL (normal value: <190 mg/dL). Arterial blood gas analysis showed a pH of 7.357, P_aCO_2 of 30.5 mmHg, P_aO_2 of 80.6 mmHg, BEB of −7.4, and HCO_3^- of 16.7 mmol/L. Spot urine revealed pyuria. No significant lesion was found on initial chest X-ray. Computed tomographic (CT) scan of brain demonstrated no focal lesion and swelling, but meningitis could not be excluded. Lumbar puncture was conducted after informed consent of patient's adult son. Opening pressure was 22 cm H_2O and closing pressure was 15 cm H_2O. Turbid cerebrospinal fluid (CSF) of 10 mL was collected for analysis and it revealed WBCs of 10 771/mm^3 with segmented neutrophils of 99%, glucose of <10 mg/dL, protein of 1 025 mg/dL, and lactate of 101.7 mg/dL. Gram stain of CSF showed few gram-negative bacilli. Chest X-ray (Figure 1) showed multiple lesions over both lower lungs, especially in the right lower lung, after intubation of endotracheal tube and setup of central venous line. CT scan of the lung, abdomen, and pelvis showed lobulated prostatic abscess and multiple cavitations near pleural bases of both lower lungs disclosing septic pulmonary emboli with lung abscesses (Figure 2). Two-dimensional echocardiography demonstrated general hypokinesia of left ventricle with ejection fraction of 38% and no vegetation was visible. Early goal-directed therapy with intravenous fluid replacement, strict control of blood glucose with regular insulin, and antibiotics with ceftriaxone (2 g once daily) and vancomycin (1 g twice daily) were administrated, but rapid progression with acute respiratory distress syndrome occurred. Surgical drainage had not been carried out due to disseminated intravascular coagulopathy with severe thrombocytopenia (platelet counts of 6 × 10^3/mm^3), prothrombin time of 15.1 s and activated partial

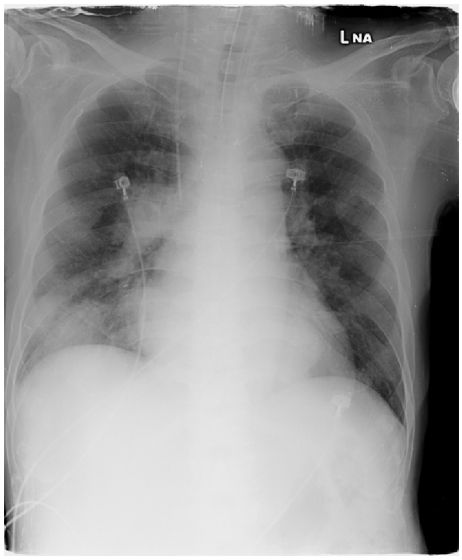

Figure 1. The chest X-ray which showed multiple lesions over both lung fields, especially in the right lower lung, endotracheal tube and central venous line.

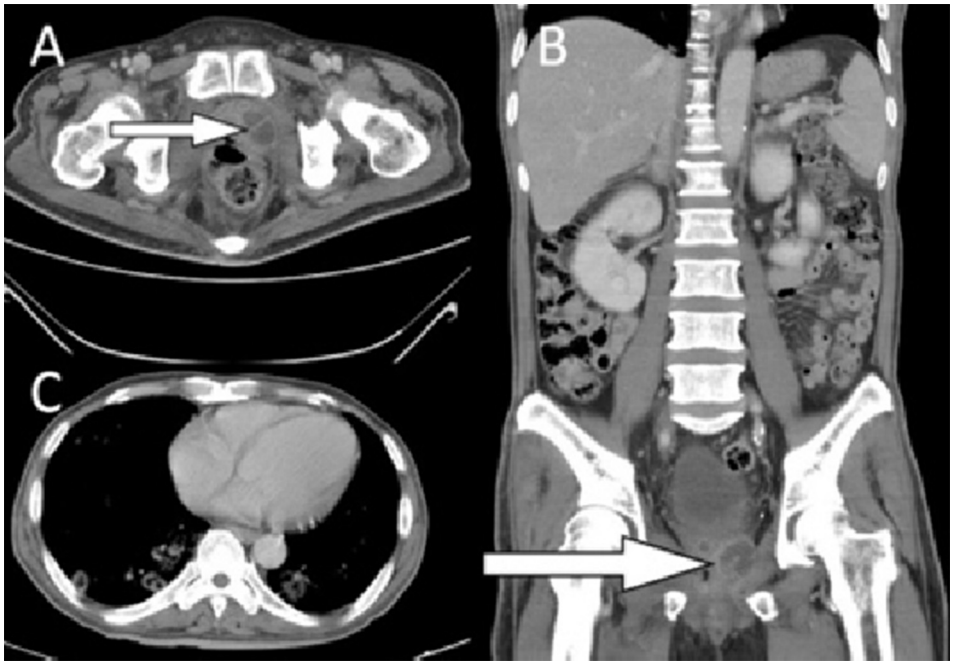

Figure 2. The contrast-enhanced CT scan of the abdomen, pelvis and lung.
The axial view demonstrated that lobulated lesion of heterogeneous hypodensity (arrow in A). The coronal view demonstrated lobulated lesion of heterogeneous hypodensity (arrow in B) and no focal lesions within the parenchyma of liver, spleen, kidney and iliopsoas muscle. The axial view of CT scan the lung depicted multiple ring-enhanced lesions near bilateral pleural base with central cavitations consistent with septic pulmonary emboli complicating lung abscess (Panel C).

prothrombin time of 52.2 s in the following laboratory analysis. He died on the 4th hospital day because of multiorgan failure. The cultures of blood, CSF and sputum yielded *K. pneumoniae*. The final diagnosis of disseminated *K. pneumoniae* of prostatic abscess complicating septic pulmonary emboli and meningitis were confirmed via clinical presentation, radiological image and cultures of blood, sputum, and CSF.

3. Discussion

The primary PA with underlying lower genitourinary tract disease and gram-negative bacterial infection is common in patients during the fifth and sixth decades of life with predisposing factors such as DM, infravesical obstruction, and bladder catheterization [1–4]. Gram-negative bacillus associated with urinary tract infection is dominant at present [3]. The secondary PA is a septic focus elsewhere to the prostate. This group is characterized by gram-positive bacterial infection, often caused by *Staphylococcus aureus* [5]. The incidence of developing a PA from acute bacterial prostatitis is 1.6%–2.7% in two serial studies [6,7]. If no improvement or deterioration with initial antibiotic therapy in patients with acute bacterial prostatitis and/or a fluctuant mass in the prostate are noticed, PA should be considered [2,4,6,7]. *K. pneumoniae* is the most common pathogen of PA in Taiwan, especially in the diabetic patients [8–13].

In 1940, Batson pointed out that the vertebral venous plexuses anastomose with the sacral, pelvic and prostatic venous plexus. The vertebral venous plexuses are named as Batson's plexus since then. Batson's plexus is a system of venous networks within and alongside the spinal canal and can provide direct communication between the peritoneum, lower body and superior vena cava to the cranial cavity and spinal canal. It provides a route for the spread of tumors, infection or emboli to spinal canal, brain, lung and abdomen [14–17]. In our present patient, he had a recent history of prostatitis with evolution to PA and Batson's plexus could explain the mechanism of infection with metastatic septic emboli to lung, spinal canal and brain from PA.

CT scan of the abdomen and pelvis is the best imaging modality to detect extraprostatic penetration, the extent of inflammatory process, and other possible infectious foci in the evaluation and diagnosis of PA patients with sepsis. Early and empiric antibiotics with third cephalosporin and vancomycin plus adequate drainage, including open surgery, ultrasound-guided aspiration through transrectal or transurethral approach, is recommended for effective treatment of PA [1–5,8–13]. Elshal AM *et al.* propose an algorithm for the treatment of PA according to the patient's age (younger or older than 40 years), prostatic size (volume fewer or more 80 mL), and numbers of abscess (solitary or multifocal) [18].

A rare case of *K. pneumoniae* of PA complicating septic pulmonary emboli with lung abscess and meningitis in a diabetic patient was reported to highlight that the metastatic septic emboli from PA through Batson's plexus complicating meningitis and lung abscess should be considered in a patient of acute bacterial prostatitis which had rapid clinical deterioration or no response to clinical treatment.

4. Conclusions

Prostatic abscess is an evolution of acute bacterial prostatitis with inadequate treatment or deterioration of clinical condition. Microorganisms of prostatic abscess may disseminate to lung and brain through Batson's plexus, so primary physicians must keep in mind the possibility of meningitis and septic pulmonary emboli originating from prostatic abscess. CT scan has been considered an innovative approach in the management of prostatic abscess which present single or multiple lobulated lesions of heterogenous hypodensity and even with emphysematous change on radiological image, especially in diabetic patients with infection of *K. pneumoniae*. The management of prostatic abscess includes empiric antibiotics for gram-negative, gram-positive and anaerobic microorganisms with adequate drainage through surgical or percutaneous approach.

Conflict of interest statement

The authors declare that they have no conflicts of interest.

Authors' contributions

The work presented here was carried out as collaboration among all the authors. Liu J-W, Chang Y-T, Lin T-C, and Hu S-Y were clinical responsible. Hu S-Y and Liu J-W defined the research theme. Liu J-W, Tsai C-A, and Hu S-Y analyzed the data, interpreted the results and wrote the paper. Lin T-C and Chang Y-T worked together on data collection and interpretation. Hu S-Y and Tsai C-A co-designed the study and discussed the analysis, interpretation, and presentation. All authors have read and approved the final version of the manuscript.

Acknowledgements

Thanks for efforts of Emergency Resuscitation Team, Radiological technicians and Division of Infection in clinical diagnosis and management of this patient.

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