



A rare case on Rheumatic Heart Disease with Urosepsis and Septic shock

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ABSTRACT

Rheumatic heart disease (RHD) is an inflammatory disease that mostly occurs in children of 5-15 years old. The major complications of RHD include arrhythmias, especially atrial fibrillation, stroke, infective endocarditis, cardiac failure, and also noted that problems increased in pregnancy. This is a rare case of RHD and urosepsis in a 67-year-old patient with a known history of cerebrovascular accident, pulmonary Arteriovenous (AV) malformation, acute renal failure, and hyponatremia presented to the emergency department with complaints of fever, severe breathlessness, and cough. The patient initially showed clinical manifestations of elevated inflammatory markers, neutrophilic leucocytosis, and hyponatremia, indicating septic shock. Our patient had been empirically treated with Piperacillin-Tazobactam because of the clinical features of urosepsis with septic shock. Based on Bronchoalveolar lavage (BAL) culture with non-fermenter Presumptive *Acinetobacter* and *Klebsiella* species and culture sensitivity report antibiotics were changed to Colistin and meropenem. The presence of carbapenem-resistant *Klebsiella pneumoniae* (CR Kp) entails stopping meropenem and adding tigecycline. Further creatinine clearance declined, and the drug Colistin was changed to Polymixin B. Meropenem was readministered based on the culture reports with scanty growth of multidrug-resistant *Proteus mirabilis*. Rational use of antibiotics along with the appropriate supportive measures is a meaningful measure in treating a rare and complicated condition of RHD with urosepsis.

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INTRODUCTION

Rheumatic heart disease (RHD) has been notably less widespread in advanced nations during the

20th century. But RHD still represents a vital health problem around the world. This case report delineates the exceptional case of RHD with urosepsis and also the complications of RHD. Urosepsis is a common deteriorating infection in elderly requiring enough attention. Pneumonia due to aspiration is seen in post-operative patients. Aspiration pneumonia and urosepsis are two vital causes leading to septic shock. Septic shock combined with rheumatic heart disease is a daunting situation for the clinicians in selecting appropriate antibiotic of choice and providing better care. The right preference for antibiotics is necessary for the prevention of RHD. It is clinically relevant to know the presentations of this once ubiquitous disease. Here we present a similar case of that type.

CASE REPORT

This study describes a 67-year-old woman who is a known case of Rheumatic heart disease with moderate multiple sclerosis, Atrial fibrillation, Cerebrovascular accident with right hemiplegia, pulmonary AV malformation, acute renal failure, hyponatremia presented to emergency medicine department with severe breathlessness of grade 2, desaturation, intermittent fever and occasional cough with sputum. She was admitted to the Intensive care unit with a provisional diagnosis of urosepsis, aspiration pneumonia, Dyselectrolytemia, septic shock. On examination, she had a saturation of 82% in room air and hypotension, and she was put on mechanical ventilation. Initial laboratory investigations revealed elevated inflammatory markers, neutrophilic leucocytosis, and hyponatremia. So she was started on Piperacillin-tazobactam. BAL culture showed moderate growth of non-fermenter Presumptive *Acinetobacter* and *Klebsiella* species. Her antibiotics were escalated to Colistin and meropenem according to culture sensitivity. The ventilator was gradually tapered off and started on oxygen support. Hence meropenem was stopped and started with tigecycline. Her serial counts and serum creatinine were rising in trend, so Colistin was stopped and started on polymyxins. Midodrine was also started as she had persistent hypotension with IV steroids because of raised cortisol. Her repeated cultures showed scanty growth of *Proteus mirabilis*, and antibiotics were changed to meropenem. The patient was planned for a palliative line of management because of the guarded prognosis with GCS of E4VTM6, RT tube, and Foleys catheter in situ.

DISCUSSION

Rheumatic heart disease is an inflammatory disease that is a complication of rheumatic fever and involves skin, heart, joints, and brain. Revised Jones criteria are used for the diagnosis of RHD. The children of 5-15 years old are mostly affected by this disease (Jayasudha *et al.*, 2019). New studies have provided insights into RHD being more common among children in community settings and adults (Gemechu *et al.*, 2017; Nascimento *et al.*, 2018). A study estimated the prevalence data from 59 countries which stated that 0.4% (33 million) of the population globally live with RHD (Watkins *et al.*, 1990). The primary complications associated with RHD are heart failure, atrial fibrillation, stroke, complications in pregnancy, arrhythmia, and endocarditis. Rheumatic heart disease itself or atrial fibrillation as a complication developed may be a contribut-

ing factor for the conditions of shortness of breath and stroke in our patient. A study evaluated the occurrence of RHD complication, heart failure followed by stroke occurred most frequently. Atrial fibrillation is related to a 40% increased mortality, and the risk of stroke escalates two-fold and 1 in 3 persons are affected with symptomatic RHD (Zühlke *et al.*, 2015, 2016). The management of rheumatic heart disease involves primary prevention and secondary prevention. Identification and treatment of streptococcal infection are associated with primary prevention, and secondary prevention involves the treatment to stop the recurrence of RHD with continuous antibiotic chemoprophylaxis (Karthikeyan and Mayosi, 2009).

Aspiration pneumonia is a condition in which there is an atypical inflow of liquids into the lower respiratory tract. This infection occurs when there is normal oropharyngeal flora in the aspirate. The treatment of this infection depends on the type of whether it is community-acquired or hospital-acquired. In this case, the patient had hospital-acquired aspiration pneumonia. A vancomycin and piperacillin-tazobactam combinations are extensively given for hospital-acquired aspiration pneumonia (Son *et al.*, 2017).

Sepsis is a significant reason for the higher rate of morbidity and mortality worldwide, if not timely identified and treated. The incidence, morbidity, and mortality associated with sepsis increases with age, with 58-65% of the sepsis patients are elderly. The incidence in the elderly was found to be 100 times, and mortality increased from 10% in children to 26% in adults 60-64 years old (Angus *et al.*, 2001).

Septic shock is a very pivotal deteriorating condition attributing to a mortality rate of 28.3% to 41.1%. The most common causes of septic shock are pneumonia (45%), urinary tract infections (9-31%), based on the geographic area of infection, and abdominal site infections (Levy *et al.*, 2012). A higher number of cases of sepsis with drug resistance have been reported in hospitalized as well as patients in long-term care facilities (Kalra, 2009). Hypothermia and leukopenia are the two important reasons for septic shock.

Signs and symptoms of tissue hypoperfusion vary from multi-organ damages like acute renal failure, respiratory failure with adult respiratory distress syndrome, hepatic insufficiency, and consumptive coagulopathy to cold extremities, renal angle tenderness, ureteric or renal calculi, mottled skin above the knees.

Obstructive diseases of the urinary tract, including ureteral calculi, stenosis or tumour, and other

anomalies and interventions in the urogenital tract like intrarenal surgery or transrectal prostate biopsy are the persistent reasons for urosepsis. The prevalence of urosepsis in nosocomial Urinary tract infections (UTI) treated patients in urological and other specialities are 12% and 2% respectively, whereas septic shock due to nosocomial UTI in departments other than urology is only 0.3% (Johansen *et al.*, 2007).

Besides microorganisms being the primary offending reason for infections, the host defence mechanism as well play a vital role in the development of urosepsis. The vulnerable group for urosepsis includes patients with lower immunity such as those with chronic metabolic diseases (diabetes mellitus and chronic kidney diseases), geriatric population, immunosuppression due to transplantation, AIDS, or with continuing steroid use or with patients with neutropenia following chemotherapy; which may develop a complicated UTI before urosepsis. Fever, urinary retention, nausea, vomiting, flank, prostatic/scrotal pain, stinky urine, dysuria, hematuria, and tenderness are the common clinical manifestations seen in UTI. In contrast, in the initial phases of urosepsis there will be high cardiac output, systemic vasodilation, with a downturn in the systemic vascular resistance and thereby a striking loss of intravascular volume accompanied by tachycardia, varying pulses, raised circulatory flow with warm skin, fever and flushed appearance. Even though a compensatory mechanism releases catecholamines to increase the cardiac output and myocardial contractility, it is found to be inadequate to maintain the BP resulting in a lack of cellular energy and lactic acid production due to hypotension and hypoperfusion to the tissues. This state is usually faced in conditions of septic shock and severe lactic acidosis, which is found to be irreversible with systemic vasoconstriction and severe tissue hypoperfusion.

Gram-negative bacilli, with *Escherichia coli* (50%) are the most common organisms in urosepsis along with *Proteus spp.* (15%), *Enterobacter* and *Klebsiella* (15%), and *Pseudomonas aeruginosa* (5%), while Gram-positive organisms are less likely involved (Kalra, 2009). Antibiotics need to be personalized based on the local pathogen susceptibility and resistant pathogens. A combination of beta-lactam/beta-lactamase inhibitor or carbapenem is the best option to avert adverse events due to antimicrobial resistance in complicated UTI (Hsueh *et al.*, 2011).

Based on the culture sensitivity reports the antibiotics were changed to Colistin and meropenem as meropenem in addition to the colistin monotherapy

had a reduction in the 30 day mortality than Colistin alone in the treatment of Carbapenem-resistant *Acinetobacter*, a the common nosocomial pathogen in intensive care units (Katip *et al.*, 2020). Hospital stays as well as mortality rate showed a spike from 40% to 72% in patients with carbapenem-resistant *Klebsiella pneumoniae* (CR Kp) infections. This is treated with tigecycline and polymyxin (combined or as monotherapy) with carbapenems, aminoglycosides, and other agents (Kalpoe *et al.*, 2012). Hence, we started on with tigecycline for our patient. Polymyxin B is found to be pharmacokinetically more effective and is less nephrotoxic as compared to Colistin (Phe *et al.*, 2014) and because of the reduction in the creatine clearance as well as an acute renal failure we had discontinued colistin therapy, and polymyxin B was initiated for our patient. Meropenem, β -lactam- β -lactamase inhibitor combinations, and amikacin are found to be effective in the treatment of multidrug-resistant *Proteus mirabilis*. Hence, meropenem has been restarted for our patient. Supportive treatment using midodrine, an alpha 1 adrenergic agonist has been used to treat hypotension and hypoperfusion associated with septic shock. Rheumatic heart disease with urosepsis and septic shock is a very alarming condition where appropriate usage of the antibiotics, as well as supportive measures, are necessary to prevent multidrug-resistant organisms, reduce the hospital stay, cost of treatment as well as improving the quality of life of the patient.

CONCLUSION

Rheumatic heart disease, an inflammatory disease caused secondary to rheumatic fever is not often dealt with in patients above 60 years of age. This is a critical disease state that can cause a stroke or permanent heart damage if left untreated. Septic shock, common in elderly and long-term hospitalized patients, is a life-threatening condition, requiring immediate medical treatment. Arising number of multidrug bacterial species, especially gram-negative organisms like *Klebsiella pneumoniae* has led to a daunting situation, for the clinicians and caregivers in the treatment and management of severe infections like sepsis, rheumatic heart disease and pneumonia.

Conflict of Interest

The authors declare that they have no conflict of interest for this study.

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