Case Report: Post Aff Dj Stent Recurrent Urosepsis with Chronic Kidney Failure and Ventilator Acquired Pneumonia

Ismawati Irwan*1, Faisal Muchtar2, Imtihanah Amri3, Salsiah4

1Study Program of Intensive Care Consultant, Faculty of Medicine, Hasanudin University, Indonesia
2Departement of Anesthesiology and Reanimation Wahidin Sudirohusodo Hospital, Makassar, Indonesia
3Faculty of Medicine, Tadulako University, Palu, Indonesia
4Departement of Anesthesiology and Reanimation Undata Hospital, Palu, Indonesia

Email: ismairwan92@gmail.com

Abstract

Urosepsis is a type of sepsis associated with obstruction of urine flow, metabolic disorders, or immune deficiency. The prevalence of urosepsis ranges from 20-30% of all sepsis. The incidence of nosocomial infections caused by urinary tract infections (NAUTI) reached 3.55 per 1000 patients, and 31.9% of these patients developed into sepsis, 0.3% had septic shock, and at 1.7% multiple organ failure occurs. This case report discusses a 46-year-old male patient who was consulted for treatment in the ICU due to a loss of consciousness preceded by a fever two days before entering the hospital. The patient had a history of aff stent DJ surgery three days before. The patient was diagnosed with acute respiratory failure due to septic shock, which appeared as a complication of urosepsis, chronic renal failure, ventilator acquired pneumonia, impaired physiological coagulation/coagulopathy, and anemia. Patients received mechanical ventilation, vasopressors, installation of invasive monitors, conservative fluid therapy, hemodialysis, Packed Red Cells transfusion, sedation, diuretics, antibiotics according to the results of sensitivity culture, and symptomatic therapy. The patient was treated for 44 days in the ICU with recurrent urosepsis several times. The success of therapy was primarily determined by identification, evaluation, and early intervention. Recurrence was determined mainly by the ability of the host in bacterial clearance and the virulence factor of the causative germ.

Keywords: Aff DJ Stent, Chronic Kidney Failure, Sepsis Shock, Recurrent Urosepsis, Ventilator Acquired Pneumonia


Introduction

Urinary tract infection (UTI) may manifest in various forms of clinical variation, ranging from bacteriuria with or without signs (asymptomatic) and limited clinical symptoms to severe disorders such as sepsis or septic shock[1], [2]. Urosepsis occurs in 20-30% of all sepsis and is a development of complicated UTIs, such as urothelial infections associated with obstruction of urine flow, metabolic disorders, or immune deficiency[1].

In 2000, ESGNI-004 reported a nosocomial incident caused by UTI (NAUTI) of around 3.55 per 1000 patients and 51.5% of these patients had the febrile disease, 31.9% developed into sepsis, 2% had severe sepsis, 0.3% septic shock, and 1.7% having multiple organ failure[1][3]. Microbial agents that cause urosepsis have not been widely reported. According to research reports conducted by Pan European Prevalence (PEP) and Pan EuroAsian Prevalence (PEAP), it was found that the most common pathogen was E. Coli (31%), followed by Pseudomonas spp (13%), Enterococcus spp (10%), Klebsiella spp (10%), Enterobacter (6%), Proteus spp (6%), and Candida spp (4%)[1].

Sepsis and septic shock are major health problems that affected millions of people worldwide and are the fourth most killer. Septic shock is part of sepsis that is accompanied by circulatory and cellular/metabolic dysfunction with a higher mortality rate. In severe urosepsis, the mortality rate reaches 20-40%, as well as
polytrauma, acute myocardial infarction, or stroke. Early identification and appropriate management in the initial phase after sepsis may improve the outcomes[4]–[6].

**Case Report**

A 46-year-old male patient (Mr. R) entered the ICU from the non-surgical Emergency Department (IRD) as one referral of the private hospitals in Makassar. The patient had decreased consciousness since two days ago, before being admitted to the Hospital (MRS) of Wahidin Sudirohusodo (WS). History of the operation of the DJ stent aff two days before. The patient had a fever, and finally, a loss of consciousness was then referred. The patient was admitted to a non-surgical IRD and later admitted to the ICU.

Physical examination revealed a respiratory rate of 32 beats per minute, rough wet crackles in both lung fields, no wheezing. Chest radiographs suggest cardiomegaly with pulmonary edema and dextra pneumonia. Endotracheal intubation was performed and was immediately transferred to the ICU. When entering the ICU room, the physical examination showed that the patient breath control with oxygen via Jackson Reese 10 liters per minute, 100% SpO2, ronchi (+/+) wheezing (-/-), blood pressure 80/55 mmHg, pulse 102 times per minute regular no lift, CRT <2 °, GCS sedated, isochronous round pupils, light reflexes (+/+), temperature 36.5 °C, urine via a catheter, clear yellow, peristalsis decreases, and no edema-limb was found.

Laboratory examination results 10.2 g/dl Hb, 11,570/mm³ leukocytes, 214,000/mm³ platelets, 83.9% neutrophils, 6.4% lymphocytes, PT of 41.3 seconds (INR of 4.16), APTT of 62 seconds, 143 g/dl GDS, 97 mg/dl ureum, 4.38 mg/dl creatinine, 39 U/L SGOT, 15 U/L SGPT, 0.60 mg/dl total bilirubin, 0.89 direct bilirubin, D-Dimer of 4.96, 142 mmol/l sodium, 3.5 mmol/l potassium, 117 mmol/l chloride, 10.39 procalcitonin. Results of blood gas analysis (pH 7.35, 165.5 mmHg PO₂, 28.3 mmHg PaCO₂, 159 HCO₃⁻, BE of -7.8, 50% FiO₂, P/F ratio of 246.6, 2.9 mmol/l lactate levels, 74% ScvO₂, PCO₂ of gap 6). The patient was diagnosed as acute respiratory failure ec septic shock ec urosepsis + CKD + VAP + impaired physiology coagulation + anemia. In this patient, the APACHE Score about 25, a mortality rate of 51%, while SOFA Score was 9 with a mortality rate of 37%.

The initial actions and evaluation in the ICU are mechanical ventilation (VM) with pulmonary protection strategies, SIMV (synchronized intermittent mandatory ventilation) mode, target tidal volume 360-420 ml, pressure support (PS) 8-12, positive end-expiratory pressure (PEEP) 5, respiratory rate (RR) 14, inspired oxygen fraction (FiO₂) 100% titrated up to 40%. Mechanical ventilation was given with the target of preventing hypoxemia (PaO₂> 60 mmHg or SpO₂> 90%) and maintaining PaCO₂ within the normal range of 35-45 mmHg. An invasive monitor was installed; central venous catheter (CVC) and obtained central venous pressure (CVP) 6 mmHg, and arterial lines obtained blood pressure 126/75 mmHg MAP 142 with pulse 104 times per minute regular lift strength with hemodynamic support using norepinephrine 0.15 mcg/KgBW/min and dobutamine 5mcg/KgBW/i. After that, a fluid challenge test with 250cc crystalloid fluid was carried out, and a CVP of 8 mmHg was achieved. From the IVC evaluation, 10% distensibility was obtained. Pharmacological therapy with sedation with fentanyl i.v 50-100 mcg/hour and midazolam i.v 2.5 mg/hour.

On the first day of treatment, additional supportive therapy in the form of broad-spectrum antibiotics, injection of meropenem 750 mg/8 hours/IV while waiting for the results of culture and sensitivity tests. In addition, 40 mg/24 hour omeprazole was also given, furosemide 5 mg/hour/SP, norepinephrine 0.15 mcg/KgBW/i and dobutamine 5 mcg/KgBW/i.
The results of treatment follow up on the first day were improvements, namely the MAP value tends to >70 mmHg, lactate levels decreased to 1.8 mmol/l, and body temperature tends to be below 38 °C as can be seen in Table 1. On the second day of treatment, culture and sensitivity measurements of aerobic and nonaerobic cultures of the sputum samples were carried out. The results obtained by aerobic bacteria were Gram-negative bacilli MDR Acinetobacter baumanii, which were still sensitive to amikacin and polymyxin B. The therapy was continued as before and given additional antibiotic therapy according to the culture results was amikacin 500 mg/48 hours/IV. On day 3, the patient was still in a sedated condition with clinical improvement. The therapy was the same as before but with the change in oxygenation therapy from ETT on ventilator mode 450 cc SIMV TV, RR 14x/minute, PEEP 5, PS 8, 50% FiO₂ to CPAP mode PEEP 5, PS 8, RR 16x/minute, TV 480-400 cc.

Table 1. Follow-up on Treatment on the First Day at the ICU

<table>
<thead>
<tr>
<th>TTV</th>
<th>Subjective</th>
<th>Objectives</th>
<th>Assessment</th>
<th>Planning</th>
</tr>
</thead>
<tbody>
<tr>
<td>(06.00)</td>
<td>BP 120/70 mmHg, HR 78, SB 37.6, Mode SIMV MAP/CVP = 77/9</td>
<td>S: on sedation</td>
<td>11/4/2018 AGD (A)</td>
<td>Conservative fluid therapy</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B1: O2 via ETT on ventilatormode SIMV , TV 450cc, RR 14x/i, PEEP 6, PS8, FiO2 50%-- MV 7.3 TV 460-550, SpO2 100%</td>
<td></td>
<td>Kidney replacement therapy</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B2: BP120/70mmHg(MAP87),N110x/i, regular, weak, CRT&lt;2&quot; B3:sedated, pupil isochoricin D 2.5mm, RC (+) T 36.5°C</td>
<td>Decreased consciousness ec septic shock + urosepsis + CKD + VAP + impaired coagulation physiology</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>AGD (V) PH 7.32 PCO32 PO143 HCO16 BE-5 SAT 99</td>
<td>Management of broadspectrum antibiotic infections IVFD NaCl 0.9% + 250 cc nephrosteril</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Lactat 1.8 PCO2gap 5</td>
<td>F: Afentanyl 30mcg j/SP</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Daily fluid balance</td>
<td>Input : 1140 cc Output : 2448 cc Deficit : 1308 cc Excess : Cumulative fluid balance: deficit -1158 cc</td>
<td>S: Midazolam 3 mg/h/SP T: H: Head up 30° U: OMZ 40 mg/24 h</td>
</tr>
<tr>
<td>(12.00)</td>
<td>BP 80/60 mmHg, HR 62, SB 38.5, Mode SIMV MAP/CVP = 56/8</td>
<td></td>
<td>11/4/2018 AGD (A)</td>
<td>G: GDS target 130-180 mg/dl Meropenem 750 mg/8h/IV Furosemide 5 mg/j/SP</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>B4 : urine per catheter 102cc/hour</td>
<td>Norepinephrine 0.15mcg/KgBW/i</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>B5: flat stomach, supel, normal peristalsis, H/Lttb</td>
<td>Dobutamine 5 mcg/KgBW/i</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>B6 : fracture, edema absent</td>
<td></td>
</tr>
<tr>
<td>(18.00)</td>
<td>BP 105/75 mmHg, HR 74, SB 37.7, Mode SIMV MAP/CVP = 80/8</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(24.00)</td>
<td>BP 140/90 mmHg, HR 88, SB 37.7, Mode SIMV MAP/CVP = 90/9</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

On the 5th day, additional therapy was given, namely metoclopramide 10 mg/8 hours/IV and vitamin K 10 mg/12 hours/IV. Inotropic dobutamine support was stopped by continuing to support vasopressor norepinephrine dose titration. This change in therapy was continued until the 8th day of treatment.

On the 8th day, the consultation was carried out to the internal department, and routine hemodialysis was
planned one to two times a week. There were no clinical changes, and therapy continued until the eleventh day. Additional therapy of 25% albumin 100 cc/24 hours for correction of hypoalbuminemia patients. Whereas on the twelfth day, there was a change in meropenem antibiotics to polymyxin B 5000U/12 hours/IV.

During treatment on the first day until the 12th day, the MAP of the patient tends to be stable between 65-110. So on the 13th day, the patient did not have vasopressor support, but a ventilator was still attached. The next day on the 14th day, the patient was extubated, and oxygenation was replaced with a 20-40 lpm High Flow Nasal Canule (HFNC). On the 15th day, the patient received a 400 cc PRC transfusion caused by suspicion of acute blood loss marked by a drastic reduction in hemoglobin levels, which was previously 9.8 on the 10th day of treatment to 8.0-8.4 on the 12th day to the 14th day.

On the 19th day, norepinephrine vasopressor support was 0.05 mcg/KgBW/min, and vasopressin 0.03 mcg/KgBW/minute was titrated. On the 24th day, a sputum specimen culture and sensitivity were examined again with the same results as before.

These results changed the antibiotic regimen for subsequent treatment to micamine 100 mg/IV, further 50 mg/12 hours/IV, polymyxin B 500000 U/12 hours/IV, and vancomycin 300 mg/24 hours/IV. Also, 80 mg/24 hour/IV methylprednisolone therapy was added.

Vasopressor support was discontinued on day 28, considering MAP was relatively stable during the nine days of follow-up. On the 31st day, the patient's MAP tends to increase between 113-120, so that an additional antihypertensive amlodipine 10 mg/24 hours PO and bisoprolol 2.5 mg/24 hours PO.

The patient's condition was stable from 32nd days to the next week. Then on the 39th day, there was a sudden deterioration in which there was a decrease in consciousness, an increase in body temperature, a reduction in MAP, pulsation of weakened pulses, and rhonchi was found in both lung fields. AGD examination was performed, arterial AGD results were obtained (pH 7.26, pCO2 61.7, pO2 55.2, SpO2 82.4%, HCO3 28, BE 0.7, and Lactate 7.2) and AGD mix vein (pH 7.25, pCO2 60.3, pO2 56.7, SpO2 83.2%, HCO3 26.7, BE -0.8, and pCO2 gap 1.4). Other laboratory examination results were Hb 9.8, Leukocytes 36,590, Platelets 162,000, Neutrophils 94.1%, Lymphocytes 2.2%, Immunoserology PCT >200, Ureum 147, Creatinine 3.10, Sodium 146, Potassium 4.6, Chloride 104, Calcium 9.9, Magnesium 2.17, and Albumin 2.0.

Patients diagnosed as respiratory failure ec decreased consciousness ec septic shock + CKD + VAP + Hypoalbuminemia + Anemia + Electrolyte Rewards. Intubation was performed again with the support of 350 cc SIMV TV ventilator mode, RR 14x/minute, PEEP 8, PS 15, FiO2 80-100%. Supported by 5 mcg/KgBW/i/SP vasopressor dopamine and 0.05 mcg/KgBW/i/SP epinephrine. Chronotropic dobutamine 5 mcg/KgBW/i/SP support was also provided. Additional broad-spectrum antibiotic cefoperazone therapy was given 750 mg/12 hours/IV and levofloxacin 750 mg/24 hours/IV.

Other supporting therapies given were paracetamol 1 g/8 hours/IV and omeprazole 40 mg/24 hours/IV. Until the end of the follow-up on the 44th day, the patient's condition was still intubated with GCS, which was decreasing (from 10 times intubated to 8 times intubated).

Discussion

The risk factors for urosepsis outside the context of infection can be categorized as related to the host, environment, or intervention and are often a combination of various factors that lead to an infection[3]. A quick diagnosis of urosepsis is very crucial. Effective therapy aims to eliminate the focus of infection and improve
organ perfusion. Therapy consists of 4 basic strategies, such as supportive therapy, antimicrobial therapy, control and elimination of complications factors, and specific treatment of sepsis[3].

In this patient, there was a history of undergoing aff DJ stent surgery 3 days before urosepsis occurred. On CT scans, left nephrolithiasis was obtained, and on USG bilateral medullary sponge kidney was suspected. Various literature states that the criteria for sepsis must be accompanied by signs of clinical infection and organ dysfunction by recommending SOFA scores as a tool to evaluate organ dysfunction (SOFA points ≥2 for diagnosis in ICU)[7]. SOFA scores of patients at the initial ICU admission were 9 with a mortality rate of 37% and an APACHE score of 25 with a mortality rate of 51%. A chest radiograph was performed to confirm pulmonary causes of respiratory failure as well as the alleged source of infection, causing other sepsis and obtained right lung pneumonia. Based on the patient's risk factors, the risk factors of previous interventions and supporting examinations achieved a CPIS score of 7 at the initial treatment in the ICU.

Based on the Surviving Sepsis Campaign (SSC) 2018 guidelines, measure against these patients focus on treatment practices within the first hour of lactate level measurement, blood culture before administration of antibiotics, administration of broad-spectrum antibiotics, rapid administration of crystalloid fluids, and administration of vaspressors[4].

Serum lactate levels in these patients were 2.9 mmol/l (>2 mmol/l), so it should be repeated measurements in 2-4 hours as a resuscitation guide for lactate normalization. This patient received broad-spectrum antibiotic therapy that is meropenem for 6 days while waiting for the results of culture and sensitivity. Empirical antimicrobial therapy is narrowed when MDR Acinetobacter baumannii has been identified and its sensitivity to amikacin and polymyxin B. In addition, rapid administration of 30 ml/hour crystalloid fluid to stabilize tissue hypoperfusion is induced by sepsis or septic shock.

In this case, septic shock accompanied with end-stage renal disease (ESRD) and hemodialysis as well as the presence of pulmonary edema, so the liquids do with strict monitoring of oxygenation. The final stage is the administration of a vasopressor if the patient is hypotensive during or after fluid resuscitation to maintain MAP ≥ 65 mmHg[4], [8], [9]. The indicators of the success of early resuscitation in sepsis patients, in general, include Mean arterial pressure (MAP), lactate levels, and CO₂ gap.[4], [10] The initial recommended MAP target is 65 mmHg. In this patient, the MAP target was achieved by giving norepinephrine vasopressors.

Another indicator of the success of early resuscitation is a decrease in lactate levels, which at the initial ICU entry level is 2.9 mmol/l to 1.8 mmol/l. Besides the reduction in CO₂ gap is also an indicator of success that is not measured in this patient. Pv-aCO₂ is closely related to decreased cardiac output because P (v-a) CO₂ increases in hypoxic-ischemic states and not in hypoxic-hypoxic states.

In this case, there are no complete data on blood gas analysis levels, but at the beginning of admission to the ICU, lactate levels were 2.9 mmol/l before resuscitation. After initial resuscitation, PCO₂ gap 6 and 74% ScvO₂. At the end of the treatment, deterioration was marked by an escalation of catecholamine support and mechanical ventilation found lactate 7.2 ml/l, PCO₂ gap -1.4, ΔPCO₂/ΔContO₂ 0.93 with procalcitonin >200.

Ensuring adequate oxygen is carried out by administering oxygen per nasal cannula to intubation for mechanical ventilation by carrying out a lung-protective strategy. Patients with ARDS induced by sepsis are advised to receive a tidal volume of 6 cc/KgBW predicted body weight (PBW) with a target plateau of 30 cm H₂O. Head elevation of 30- 45° to prevent aspiration and VAP. Spontaneous breathing trial (SBT), including
low-pressure support, CPAP, or using a T-piece, should be done before weaning the ventilator[10][11].

In this case, the initial administration of oxygen via ETT/mechanical ventilation was done with a SIMV mode lung protection strategy, followed by the use of high flow nasal canula oxygen (HFNC). When there is a worsening of the patient's clinical condition, which is marked by recurrent shock and severe hypoxemia with a P/F ratio of 153, it is necessary to escalate the support of PCV mode mechanical ventilation support.

HFNC, in this case, was used for 21 days. HFNC appears to be effective for mild-moderate hypoxemia caused by CAP and sepsis. This is possible because the HFNC can maintain adequate oxygenation to enable proper management of FiO$_2$ and PEEP[12]–[14].

Antibiotic therapy is an essential part of urosepsis case management. Early and adequate antibiotic administration is critical. This must be done after taking urine, blood, and other sources of infection specimens. However, to obtain specimens for the culture, it should not slow the initial antibiotic administration by more than 45 minutes[15], [16].

Empiric antibiotic diagnosis and therapy should be given if culture results are available, and urinalysis must be done before the administration of antibiotics[5]. However, these patients had been given empiric antibiotics at the hospital before which were known to cause cultures that were less sensitive to identify bacteria and may cause non-bacterial sepsis such as fungi that cause about 5% of sepsis in the ICU.

Besides that, only 30% of blood cultures in patients with positive urosepsis are suspected[5]. Middle-portion urine culture findings are limited to obstructive pyelonephritis because urine with the heaviest infection is often above obstruction (sensitivity 30.2%, specificity 73%)[5]. Urosepsis can also be diagnosed using an inflammatory biomarker, procalcitonin (PCT). This examination is recommended to confirm or rule out the presence of severe sepsis. A PCT level >2ng/ml is very likely to be severe sepsis or septic shock. Then performed an ultrasound or computed tomography (CT)[5].

Early empirical antibiotics in urosepsis are recommended combinations because the most common pathogen is multidrug-resistant[15]. Blood and urine cultures were negative in this case, but sputum obtained MDR aerobic culture Acinetobacter baumannii, which was sensitive to amikacin and polymyxin B. Acinetobacter baumannii was one of the resistant Gram-negative bacilli which were very difficult to control and be treated with antimicrobials. The use of both antibiotics becomes difficult in this case because of changes in the distribution volume considering both are hydrophilic antibiotics, in addition to the presence of CKD with hemodialysis, it is necessary to adjust the dosage of both[17], [18].

Albumin concentrations ≤25 g/dl are also associated with an increase in distribution volume, and hypoalbuminemia can contribute to the initial target concentration but fail to maintain adequate drug concentrations at all intervals of administration, so shorter dosing intervals are needed[17]. Another element influencing urosepsis therapy with CKD is the ability of uropathogenic to produce biofilms so that they are several times less susceptible to antibiotics than planktonic, and only high-dose drugs can penetrate[1], [19].

Isolation from two episodes of bacteremic infection, in this case, revealed a positive culture of aerobic culture of MDR Acinetobacter baumannii. The pathogenesis of recurrent bacteremia may also involve host female factors in bacterial clearance such as abnormalities in local or systemic factors[20]. Recurrence of urosepsis to septic shock occurs after 2 days of termination of the amikacin antibiotic and only given a single antibiotic polymyxin B (treatment day 19) is characterized by a rapid decline in the patient's condition and
oxygen administration through HFNC with a flow of 30 lpm and 50% FiO\textsubscript{2} to avoid the reintubated patient.

Hemodynamic support using norepinephrine 0.15 mcg/KgBW and vasopressin 0.03 mcg/KgBW. Then meropenem, polymyxin B, and vancomycin are combined antibiotics. The patient’s condition improved, catecholamines were stopped after 6 days (treatment days 19-25). Day 33 treatment for PCT 0.86 µg/l and polymyxin B antibiotics were stopped, meropenem and vancomycin were continued. Four days later (treatment day 37), there was recurring worsening to septic shock and respiratory failure so that it was intubated and received ventilator support and hemodynamic support with norepinephrine, epinephrine, and dopamine.

**Conclusion**

Intensive care management had been reported in cases of recurrent urosepsis with complications from chronic kidney failure and ventilator acquired pneumonia. The success of therapy was primarily determined by identification, evaluation, and early intervention. The recurrence was determined mainly by the ability of the host in bacterial clearance and the virulence factor of the causative bacteria.

**References**


*Annals of Tropical Medicine & Public Health*  
http://doi.org/10.36295/ASRO.2020.231327
Irwan et al (2020: Case report of urosepsis September 2020 Vol. 23 Issue 13A


[48] Saggu S., Sakaran M.I., Zidan N., Tousson E., Mohan A., Rehan H. (2014) .Ameliorating effect of chicory (Chichorium intybus L.) fruit extract against 4-tert-octylphenol induced liver injury and oxidative stress in male rats .Food and Chemical Toxicology ,72( ) ,138-146


