

## Special Article - Nephrology and Dialysis

# Acute Kidney Injury Requiring Haemodialysis due to Sepsis Complicating Transrectal Ultrasound Guided Needle Biopsy of the Prostate

Kyei MY<sup>1\*</sup>, Mensah JE<sup>1</sup>, Okyere P<sup>2</sup>, Osafo C<sup>2</sup>, Djabletey R<sup>3</sup> and Klufio GO<sup>1</sup>

<sup>1</sup>Department of Surgery and Urology, School of Medicine and Dentistry, College of Health Sciences, University of Ghana, Accra

<sup>2</sup>Department of Medicine and Therapeutics, School of Medicine and Dentistry, College of Health Sciences, University of Ghana, Accra

<sup>3</sup>Department of Anaesthesia, Korle Bu Teaching Hospital, Accra

\*Corresponding author: Mathew Y. Kyei, School of Medicine and Dentistry, College of Health Sciences, University of Ghana, P.O.Box 4236, Accra, Email: matkyei@yahoo.com

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## Abstract

Transrectal ultrasound guided needle biopsy of the prostate is deemed a routine procedure however life threatening complications can result. Sepsis after transrectal ultrasound guided prostate biopsy is considered a serious complication and when it occurs it has been treated aggressively with the use of parenteral antibiotics such as meropenem with success. Though septic shock from sepsis post transrectal ultrasound needle biopsy of the prostate has potential for causing renal dysfunction, an overt severe acute kidney injury requiring haemodialysis is uncommon.

This case report is that of a 60 year old man with a history of diabetic mellitus and hypertension who developed severe acute kidney injury requiring seventeen sessions of haemodialysis due to septic shock after transrectal ultrasound guided needle biopsy of the prostate. The histology revealed no evidence of malignancy. Transrectal ultrasound guided biopsy of the prostate when complicated by sepsis in patients with diabetes mellitus and hypertension, the possibility of a persistent and severe acute kidney injury should be anticipated and aggressive resuscitation including early commencement of haemodialysis instituted to salvage the situation.

**Keywords:** Prostate; Biopsy; Sepsis; Acute kidney injury; Haemodialysis

## Introduction

Transrectal ultrasound guided needle biopsy of the prostate for the histological diagnosis of prostate cancer is deemed a routine procedure. However life threatening complications can result. The infectious complications of transrectal needle biopsy of the prostate include UTI, prostatitis, prostatic abscess and bacteraemia with the risk of sepsis post transrectal biopsy occurring in 0.1-0.3% of cases [1, 2]. Other rare infectious complications reported include meningitis, epidural abscess, ischio-rectal abscess and acute endocarditis [3, 4, 5, 6]. Sepsis after transrectal ultrasound guided prostate biopsy is considered a serious complication and when it occurs, it has been treated aggressively with the use of parenteral antibiotics such as meropenem with success [7] as most often the bacteria involved are fluoroquinolone resistant [8, 9].

Though septic shock from sepsis post transrectal ultrasound needle biopsy of the prostate has the potential for causing renal dysfunction, an overt acute kidney injury (AKI) requiring haemodialysis is uncommon. This report looks at an unusual case of severe AKI requiring haemodialysis due to sepsis after transrectal ultrasound guided needle biopsy of the prostate, the course and the challenges of management.

## Case History/Examination

A 60 year old male with a history of type 2 diabetes mellitus and hypertension presented with lower urinary tract symptoms with an International prostate symptoms score of 12. The prostate specific antigen (PSA) was 8.6ng/ml (0-4.0ng/ml). The finding at digital rectal

examination was a 40g prostate that felt benign. Even though he had 10 year history of hypertension and diabetes mellitus, his renal function was normal with no evidence of diabetic nephropathy. He had no prior proteinuria or microalbuminuria. There was no history of smoking or use of alcohol. He underwent a template 12 core transrectal ultrasound guided needle biopsy of the prostate with a periprostatic local Anaesthetic block using xylocaine 2%. He had a three day prophylactic antibiotics using oral levofloxacin 500 mg which he started the night before the Prostate biopsy and continued the morning of the procedure with an additional intra procedure injection of gentamicin 160 mg. The procedure was uneventful and the patient resumed his normal activities of daily living the day after the procedure.

The patient however developed a fever and malaise on post procedure day two and latter that day became unresponsive. There was no history of significant rectal bleeding or haematuria. At presentation at the emergency unit of the Korle Bu Teaching Hospital, he had an elevated temperature of 38.8 degrees Celsius, a low systolic blood pressure of 72/52mmHg, a raised pulse rate of 92beats/min and a Glasgow coma scale of 10/15. His oxygen saturation was 95% in room air with a normal random blood sugar of 6.7mmol/l (3.9-6.9). The patient was admitted to the intensive care unit with a diagnosis of septic shock post transrectal ultrasound guided needle biopsy of the prostate.

## Investigation and Treatment

The patient was started on intravenous fluids and meropenem 1g

hourly empirically. The patient needed inotropes to maintain the systolic blood pressure above 100 mmHg achieving a blood pressure of 110/58mmHg five hours after admission with the Glasgow coma scale returning to 15/15. The laboratory results at presentation revealed a haemoglobin level of 14.1g/dl (13.0-18.0g/dl) and white cell count of  $10.54 \times 10^9$  ( $2.5-8.5 \times 10^9$ ) with a relative neutrophilia of 88.7%. The Serum parameters were; Na<sup>+</sup> 140mmol/l (135-150), K<sup>+</sup> 3.1mmol/l (3.5-5.1), Urea 13.5mmol/l (2.9-8.2) and Creatinine 381μmol/l (80-115). The urine output remained less than 10mls / 24 hours despite infusion of furosemide with associated rise in the serum urea and creatinine levels. An aerobic culture of his blood samples and that of urine (satisfactory sample got on post admission day three due to the anuria) did not isolate any bacteria. Haemodialysis was commenced three days after admission with the blood electrolytes, urea and creatinine at the initiation being Na<sup>+</sup> 145mmol/l (135-150), K<sup>+</sup> 3.6 mmol/l (3.5-5.1), urea 17.7mmol/l (2.9-8.2) and creatinine 744μmol/l (80-115). The patient's blood pressure returned to 170/90mmHg six days after admission to the intensive care unit without the need for further inotropes he was therefore transferred from the intensive care unit and admitted to the renal unit. The kidney showed signs of recovery with the urine output getting to 1400mls/24hours by the 33rd day of admission with a corresponding improvement of the blood urea and creatinine levels without further haemodialysis support. The patient was discharged after 34 days of admission with the serum parameters being; Na<sup>+</sup> 135mmol/ml (135-150), K<sup>+</sup> 3.8mmol/l (3.5-5.1), urea 5.6 mmol/l (2.9-8.2) and creatinine 149μmol/ml (80-115). The patient had in total 17 sections of haemodialysis and was transfused two units of blood.

### Follow-Up

The patient is scheduled to have a long term follow up on account of his risk of progressing to chronic kidney disease (CKD) considering his advanced age, the duration and severity of the AKI and his medical history of hypertension and diabetes mellitus.

### Discussion

Prostate biopsy is one of the common day care procedures in urology practice considered routine. With the increasing use of PSA for screening for prostate cancer, many more transrectal ultrasound guided needle biopsy of the prostate is being performed. It however has inherent risks including catastrophic septic complications and haemorrhage [7] and mortalities have been reported [5]. In order to reduce the incidence of bacteraemia and sepsis resulting from transrectal ultrasound guided prostate biopsy, antibiotic prophylaxis using oral fluoroquinolone which have a good penetration of prostatic tissues is universally accepted and noted to reduce the infection rate post transrectal prostate biopsy [9,10]. The addition of intramuscular injection of gentamicin has been reported to improve the efficacy of the antibiotic prophylaxis [11]. In this case presented, the patient received both traditional three day oral fluoroquinolone (levofloxacin 500mg daily) with an additional injection of gentamicin however the procedure was still complicated by sepsis. His diabetes mellitus status was a potential risk factor for the development of the severe sepsis after the transrectal ultrasound guided needle biopsy of the prostate biopsy. Other risk factors such as previous hospital admission and prior fluoroquinolone use were absent [10].

Most of the sepsis post transrectal needle biopsy of the prostate has

been attributed to multi drug resistant or fluoroquinolone resistant bacteria such as levofloxacin resistant *Escherichia coli* [7,8]. However aerobic blood cultures and a urine culture (urine sample obtained after three days of meropenem administration) done in this case did not identify any organism with the support for the diagnosis based on the fever with a temperature of 38.8 degrees Celsius, a pulse rate above 90beats/min after a transrectal needle biopsy of the prostate and the temperature returning to normal after the administration of intravenous meropenem; which together with carbapenem are considered antibiotics of choice in other reports [7,8]. Though anaerobic cultures were not done, the response to meropenem suggest the possibility of anaerobic organisms being a possible cause of the sepsis as an anaerobic organism was the cause of a fatal sepsis after transrectal Ultrasound biopsy of the prostate [5].

The kidney is a commonly affected organ during sepsis and with its involvement carrying a high risk of mortality. [12]. The pathophysiology of AKI after sepsis has been described as complex and multifactorial involving intrarenal haemodynamic changes, endothelial dysfunction, infiltration of inflammatory cells in the renal parenchyma, intraglomerular thrombosis, and obstruction of tubules with necrotic cells and debris, [13] leading to impaired renal function.

AKI after transrectal ultrasound guided needle biopsy of the prostate has been observed after sepsis complicating the procedure however most of these complications have improved with adequate and aggressive resuscitation [7]. Acute renal failure precipitated by disseminated intravascular coagulation after transrectal ultrasound guided needle biopsy of the prostate has been reported and is attributed to release of pro coagulant and fibrinolytic materials into circulation in patients with prostate cancer [14]. There was no evidence of disseminated intravascular coagulopathy in this patient whose histology revealed no evidence of malignancy.

The indication for initiating haemodialysis in this patient was the rising levels of urea and creatinine with persistent anuria (Stage 3 AKI). The recovery of renal function in this patient with dialysis support was 33 days after presenting. This had a significant negative impact on the patients finances and the health facility resources in a rather resource poor environment.

The long term prognosis in terms of the risk of the patient developing CKD or end stage renal disease (ESRD) from the complication of the transrectal ultrasound guided needle biopsy of the prostate is of concern. This is because the patient has known risk factors such as a black African, advanced age, diabetes mellitus and hypertension which increases the risk of a patient with AKI progressing to CKD [15,16]. The patient is hence scheduled for periodic assessment of the renal function and the urinary albumin-to-creatinine ratio in order to determine any deterioration in the renal function [16] to allow for appropriate intervention.

### Conclusion

Transrectal ultrasound guided biopsy of the prostate can be associated with life threatening sepsis. When this is complicated by severe AKI, aggressive resuscitation is required including the need for haemodialysis. Patients with diabetes mellitus and hypertension who develop sepsis after transrectal ultrasound guided biopsy of the prostate need to be carefully observed for any resultant AKI which

might be severe and persistent to warrant haemodialysis.

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