Case Report

HEALTHY AGING RESEARCH

OPEN

Acute kidney injury presentation with recurrent hypoglycemia: A detailed case report of high-risk patients

Hamed E*

Acute kidney injury (AKI) and hypoglycemia are independent risk factors for morbidity and mortality with a strong association. We present a case report of AKI associated with hypoglycemia in a diabetic patient. Following standard AKI treatment protocol, kidney functions recovered, and the patient had no further hypoglycemic attacks.

AKI in diabetic patients could be multifactorial, but we suggest the presenting symptom to the primary care centre in our case was the recurrent hypoglycemic attacks that might have been overlooked by clinicians.

While the association is well established in hospital settings, presentation in primary care settings with hypoglycemia is often overlooked. This case report aims to highlight the risk for AKI in diabetic and elderly patients with multiple risk factors for AKI and the strategies for prevention including highlighting those at risk, close monitoring and lower threshold of suspicion for the presentation.

Keywords: Case report, Hypoglycaemia, Acute kidney injury, Diabetes

Introduction

Acute Kidney injury (AKI) is an abrupt reduction in renal functions presenting with the deterioration of one marker or more of the urea, creatinine, or urine output. The term encompasses an entire spectrum from minor injuries to end-stage renal disease.

Prerenal disease alone accounts for up to 75% of the presentations while renal and post-renal diseases cause the rest.

The prerenal term refers to a decrease in renal perfusion that could be caused by volume depletion, oedematous states, selective renal ischemia, or medications. The severe prerenal disease could lead to acute tubular necrosis (ATN). ATN term encompasses other pathological necrotic manifestations like endothelial dysfunction, coagulation abnormalities, systemic inflammation, and oxidative stress.

Urinalysis and recovery period may help distinguish between prerenal disease and more severe form of ATN injury. The urinalysis is normal or near normal in the former, whereas in ATN it shows muddy brown granular, epithelial cell casts, and free renal cells.

Sponsorships or competing interests that may be relevant to content are disclosed at the end of this article.

Department of Family Medicine, Primary Health Care Corporation, Doha, Qatar

**Corresponding Author. Address: Department of Family Medicine, Primary Health Care Corporation, Doha, Qatar. Tel: +0097477908850. Email address: Ehab@hotmail.co.uk (Hamed E).*

Healthy Aging Research (2018) 7:14

Received 10 November 2018; Accepted 20 November 2018

Published online 27 November 2018

DOI: 10.12715/har.2018.7.14

Recovery of the serum creatinine to baseline occurs within 24 to 72 hours following fluid replacement with the prerenal causes; longer recovery is more suggestive of ATN. Both prerenal and ATN presentations could overlap and coexist in an intermediate syndrome [1].

Case Presentation

66 years-old Asian female presented with numerous hypoglycemic attacks and persistent fatigue following various medication regime changes. Three weeks prior, she was started on losartan 50 mg once daily, and glimepiride dose was increased from 2 to 6 mg to control her raised HBA1c 10.1% and raised blood pressure.

She continued to present with documented symptomatic hypoglycemia even after reinstating her previous dose of glimepiride, 2 mg on the 14th of May. The rest of her vital signs were normal on all attendances. Her blood investigations had an incidental finding of significantly raised urea and creatinine suggestive of AKI (**Figure 1**).

Past medical history includes diabetes mellitus, dyslipidaemia, arthritis; she had no history of kidney disease. Her medicines list included sitagliptin, metformin, glimepiride, pioglitazone and rosuvastatin. Occasionally, she attended the orthopaedic department with arthritic knee pain where she was prescribed celecoxib 200 mg bd on different occasions.

After admission to the hospital, AKI management protocol commenced; the team stopped celecoxib, losartan and metformin, started intravenous fluids and investigations. Patient blood test results confirmed raised Ur 20.01 mmol/l and Cr 287 umol/l with ESR of 34 and CRP less than 5. The urine sample was clear colour and negative for protein, leucocytes and blood. The renal ultrasound scan showed no signs of obstruction (**Figure 2**).

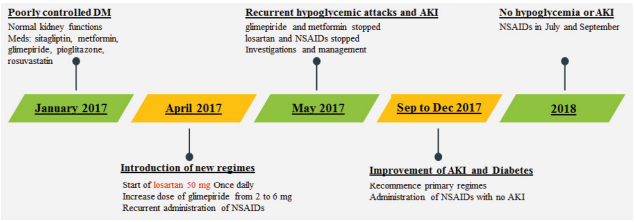

Figure 1. AKI and hypoglycemia case report timeline.

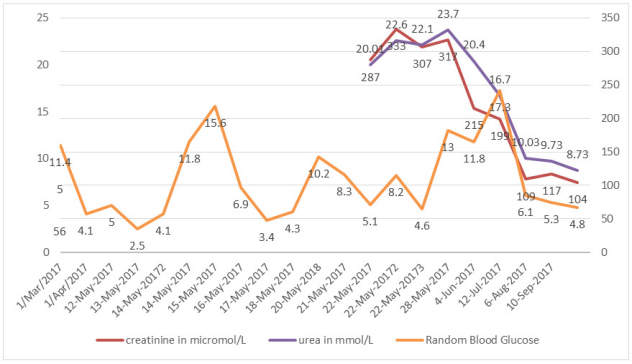

Figure 2. Recurrent hypoglycemia preceding AKI findings.

Patient's kidney functions stabilized after two weeks, and she attended the outpatient department and achieved a remarkable recovery after ten months. Patient attended healthcare services for various reasons over the next year but had no further hypoglycemic attacks. Of interest, she presented with back and joint pains and was prescribed NSAIDs on other multiple occasions with no effect on kidney functions.

Discussion

The patient had multiple risk factors for AKI that includes DM, NSAIDs and ARB (losartan). Of note, she had NSAIDs on multiple occasions and continues to have glimepiride with no effect of both on her kidney functions and her glycaemic control. ARB (losartan) induced AKI explains the episode; an alternative explanation would be the simultaneous administration of the three medications.

The kidney functions recovered over ten months which is more suggestive of ATN. The urine sample was clear throughout, that is more suggestive of decreased renal perfusion. Our patient showed a picture that is conflicting and renal injury might have been that of intermediate syndrome.

Medications cause AKI through different mechanisms and injury tends to happen 7 to 10 days after starting. NSAIDs and losartan could affect the glomerular hemodynamic and/or kidney functions. NSAIDs decrease the afferent arteriolar dilatation, and ACE/ARB is suggested to cause efferent arteriolar constriction. The effect of NSAIDs happens mainly in patients with true volume depletion. ACE/ARB causes raised Cr in patients with renal artery stenosis but could do in patients with true volume depletion as well [1]. Though volume depletion is a possible culprit in both mechanisms, no guidelines advise adequate hydration or increase oral fluid intake.

AKI was found to be a risk factor for hypoglycaemia in the post-discharge period and critically ill patients [2]. Hypoglycaemia may occur due to decreased clearance of insulin and the decrease of renal gluconeogenesis; the risk is ten times greater than in those without AKI [3].

On the other hand, DM increases the risk of AKI and may worsen the morbidity and mortality outcomes [4]. In our case, we hypothesise that AKI presented with the recurrent hypoglycemic episodes.

Both AKI and Hypoglycaemia are associated with higher morbidity and mortality rates [5,6]. Of interest, the possibility of kidney vascular injury secondary to hypoglycemia is under researched though hypoglycemia is implicated in ischemic cardiovascular and stroke events. In our case, severe recurrent hypoglycemia might have contributed to the AKI injury.

AKI preventative measures may include identification and close monitoring of high-risk patients, advising adequate hydration and single initiation of medicine at one to two weeks intervals in the population with high risk of AKI.

In recurrent documented hypoglycaemic attacks in primary care settings, it is essential to consider and investigate causes other than drug-induced hypoglycaemia. Further research is required to explain a complex multifactorial relationship between both conditions especially the effect of severe and persistent hypoglycemia on kidney functions.

Learning points

- Hypoglycaemia is strongly associated with AKI and could be a presenting symptom, and recurrent attacks warrant investigations of causes other than medications dose changes.
- AKI prevention strategies include developing risk register, close monitoring, starting medicine at one to two weeks intervals, advising adequate hydration and early suspicion in high-risk patients.

Conflict of Interest

The author declares no conflict of interest with regard to the content of this article.

Consent

Patient shared consent for publishing.

References

[1] Erdbruegger U, Okusa DM. Etiology and diagnosis of prerenal disease and acute tubular necrosis in acute kidney injury in adults. Waltham, Massachusetts 2018.

[2] Hung AM, Siew ED, Wilson OD, *et al.* Risk of hypoglycemia following hospital discharge in patients with diabetes and acute kidney injury. Diabetes Care. 2018;41:503-512.

[3] Mahmoodpoor A, Hamishehkar H, Beigmohammadi M, *et al.* Predisposing factors for hypoglycemia and its relation with mortality in critically ill patients undergoing insulin therapy in an intensive care unit. Anesthesiol Pain Med 2016;6:e33849.

[4] Patschan D, Muller GA. Acute kidney injury in diabetes mellitus. Int J Nephrol 2016;2016:1-7.

[5] Kidney disease: Improving global outcomes (KDIGO) acute kidney injury work group. KDIGO clinical practice guideline for acute kidney injury. Kidney Int Suppl 2012;2:1.

[6] Yeh JS, Sung SH, Huang HM, *et al.* Hypoglycemia and risk of vascular events and mortality: a systematic review and meta-analysis. Acta Diabetol 2016;53:377-392.