

# TYPE IV RENAL TUBULAR ACIDOSIS IN TYPE 2 DIABETES: CASE REPORT OF 4 PATIENTS

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## Introduction

Type IV Renal Tubular Acidosis (Type 4 RTA) is an underdiagnosed condition known to be more frequent in Diabetes Mellitus patients with moderate renal impairment. It is thought to be very common, with an incidence of 3.8% of hospital admissions in some series, being an increasing problem among the elderly and aggravated by polypharmacy.

## METHODS

The authors describe 4 consecutive cases of Type 4 RTA associated with type 2 Diabetes diagnosed and followed in the Endocrinology department of Hospital de Egas Moniz.

## RESULTS

The patient sample had an average age of 67 years, mean Diabetes duration of 8 years and all had arterial hypertension and hypercholesterolemia. All patients were on insulin therapy and suffered from chronic renal disease. None suffered from coronary artery disease and only one had cerebrovascular disease. 75% had full microvascular burden (nephropathy, retinopathy and neuropathy). Mean time from hyperkalemia onset and type 4 RTA diagnosis was 17.25 months. Mean glycated hemoglobin during follow up was 8.7%. Mean glomerular filtration (CKD-EPI) rate at diagnosis was 40.3mL/min/1.73m<sup>2</sup>. The average number of hospital admissions was 5. Only one patient required therapy with fludrocortisone.

Pt	Age	Gender	Years of DM	Mean A1c
1	48	Male	7	12,9
2	79		11	6,5
3	83		16	7,5
4	58		2	7,7

Pt	CKD stage	Retinopathy	Neuropathy	CAD	PAD	Cerebrovascular disease	Inulin	Arterial Hypertension	Hyperlipidemia
1	2A3	+	+	-	-	-	+	+	+
2	3bA3	-	-	-	-	+	+	+	+
3	3aA3	+	+	-	+	-	+	+	+
4	3bA3	+	+	-	+	-	+	+	+

Pt	Entry GFR (CKD-EPI)	Entry Albuminuria	Months of HyperK before dg
1	63mL/min	1640mg/g	26
2	31mL/min	716mg/g	3
3	52mL/min	1333mg/g	41
4	40mL/min	2439mg/g	1

Pt	TTKG	pH	HCO <sub>3</sub>	Dg K (mmol/L)	Urinary pH	Aldosterone (pg/mL)	Renin (pg/mL)
1	1,56	7,31	20	6,2	5,5	17	1,5
2	3,95	7,37	20,8	5,5	6	19,4	5,7
3	6,5	7,31	19,1	6,3	5	12	4
4	2,99	7,35	21,2	6,2	5,5	2,2	2,8

Pt	GFR decline	Hospital admissions	Follow up (years)
1	28mL/min/y	10	2
2	14mL/min/y	2	1
3	1mL/min/y	6	2
4	11mL/min/y	3	2

Pt	TTKG	Dg K (mmol/L)	Therapy
1	1,56	6,2	Fludrocortisone 0,2mg/d
2	3,95	5,4	Sodium Polystyrene Sulfonate
3	6,5	6,3	
4	2,99	6,2	

TTKG – Transtubular potassium gradient ; Dg K – Potassium levels at diagnosis

## DISCUSSION

75% of the patients had acceptable glycemic and lipid profile control, while blood pressure control was only obtained in 50% of the cases. Despite heavy proteinuria (A3) being present in all patients, the presence of type 4 RTA precluded therapy with ACE inhibitors/ARBs. This group of patients is at an increased risk of hospital admissions and rapidly progressive renal failure. Therapies targeting hyperkalemia management reduce the risk of cardiac arrhythmias but may leave the patient unprotected from micro and macrovascular disease and even accelerate its progression. The patient on fludrocortisone had the fastest progression to renal failure and higher number of hospital admissions. Novel therapeutic approaches targeting beyond traditional cardiovascular risk factors, possibly modulating subclinical inflammation may offer clinical benefits to this high risk patients. The patients on pentoxifylline had the less severe aggravation of renal function, possibly suggesting a such a protective role.

## CONCLUSIONS

Type IV RTA is often a late diagnosis in type 2 Diabetes. In our small series we documented a high microvascular complication burden. The associated hyperkalemia poses a significant threat to the affected patients, which often have a limited cardiovascular reserve. Therefore timely diagnosis and adequate treatment are essential for optimizing patient care.

## References

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