FLUDROCORTISONE IS THE SALVAGE TREATMENT IN CASES WITH CALCINEURIN INHIBITOR RELATED HYPERKALEMIA

Y UNSAL[1], D BALTU[2], N GONC[1], B GULHAN[2], A DUZOVA[2], R TOPALOGLU[2], A OZON[1].
1. Hacettepe University Faculty of Medicine, Department of Pediatrics, Division of Pediatric Endocrinology, Ankara, Turkey.
2. Hacettepe University Faculty of Medicine, Department of Pediatrics, Division of Pediatric Nephrology, Ankara, Turkey.

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INTRODUCTION

Calcineurin inhibitors (CNIs)

Bone marrow transplantation / solid organ transplantation

- Immunosuppression
- Prevention of graft rejection
- Prophylaxis and treatment of graft versus host disease

CNI related Hyperkalemia (10-45%)

- Distal renal tubular acidosis ?
- Aldosterone resistance in mineralocorticoid receptors on distal tubules
- Direct effect of CNIs on Na/K ATPase on cortical collecting tubule cells and indirect opening of ATP-sensitive K channels

Underlying pathogenetic mechanism is not well elucidated, thus CNIs vital to transplantation is discontinued.

AIM

Two cases with CNI-induced hyperkalemia due to hyporeninemic hypoaldosteronism, successfully treated with fludrocortisone were described.

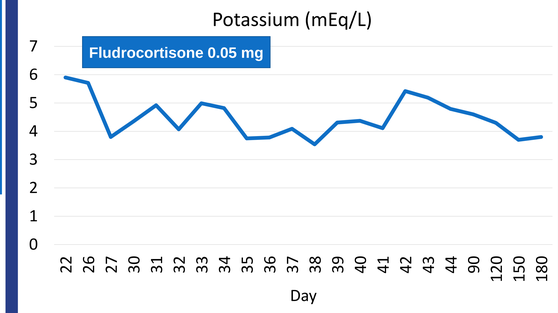
CASE 1

- 15-month-old boy
  - AML → BFM-2013 protocol
- 22 months old
  - Remission

ALLOGENIC BONE MARROW TRANSPLANTATION

- Day -1
  - Cyclosporine (CsA) (3 mg/kg/day)
- Day +22
  - **Hyperkalemia (5.9 mEq/L)**
  - **Hyponatremia (133 mEq/L)**

The patient was normotensive, hemolysis was ruled out.

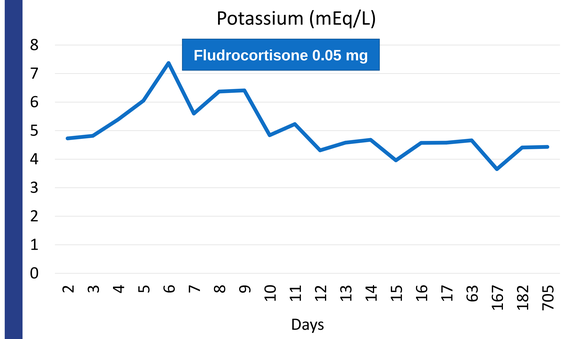


CASE 2

- 3-year-old girl
- Agenesis of the left kidney and cystic right kidney
  - HNF1 beta mutation

CADAVER DONOR RENAL TRANSPLANTATION

- Mycophenolate mofetil, prednisolone and CsA
  - CsA was switched to tacrolimus due to hypertrichosis.
- 5 years-old
  - **Hyperkalemia (7,37 mEq/L)**
  - **Hyponatremia (128 mEq/L)**



	Case 1	Case 2	Range
Na (serum, mEq/L)	133	128	136-146
K (serum, mEq/L)	5,11	7.37	3.4-4.7
Na (Urine, mEq/L)	50.6	52.8	25-301
K (Urine, mEq/L)	6.3	13.89	11-80
BUN (mg/dl)	23.2	30	5-18
Creatinine (mg/dl)	0.5	0.67	0,26-0,77
pH	7.36	7.38	7.35-7.45
$cHCO_3$	19.5	18.6	22.5-26.9
Renin (pg/ml)	1.3	1.18	1.3-13.8
Aldosterone (pg/ml)	71	47	35-300
ACTH	28.7		
Cortisol (mcg/dl)	28		

CsA related Hyporeninemic Hypoaldosteronism

Fludrocortisone 0.05 mg/day

- **Case 1**
  - **CsA was used for 6 months**
    - **Fludrocortisone was tempered and ceased following CsA cessation**
  - **Electrolyte imbalance was not observed.**
- **Case 2**
  - **Fludrocortisone is continued without dose adjustment for three years**
  - **Electrolyte imbalance was not observed**

CONCLUSIONS

- **Isolated hyperkalemia in bone marrow and solid organ transplant recipients may be due to hyporeninemic hypoaldosteronism related to CNIs (CsA and tacrolimus).**
- **If hyperkalemia is observed in cases using CNI, renin and aldosterone should be measured.**
- **Fludrocortisone is a safe and effective treatment in CNI-induced hyperkalemia in pediatric transplant patients.**
- **Fludrocortisone provides maintaining CNIs fundamental treatment for pediatric transplantation.**

CONTACT INFORMATION

Yagmur Unsal, MD
Department of Pediatrics
Division of Pediatric Endocrinology
Hacettepe University Faculty of Medicine, Ankara, 06230, TURKEY
Phone: +905367950760
Email: yagmurunsal@yahoo.com