

APPROACH TO HYPERKALEMIA (> 5.0 mEq/l)

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Causes (Fig.1)

The main causes of hyperkalemia are reduced renal K⁺ excretion and increased K⁺ release from cells. It is rare that increased K⁺ intake only develops hyperkalemia. In addition, pseudohyperkalemia occurs. When or after we take blood samples, K⁺ can move out of cells because of tourniquet, leukocytosis and thrombocytosis.

type 4 RTA(renal tubular acidosis) is an absolute or relative aldosterone deficiency, which includes lack of aldosterone(e.g. Addison disease), hyporeninemia (e.g. diabetic nephropathy, interstitial nephritis) and pseudohypoaldosterone.

Diagnosis (Fig.2)

When we see asymptomatic patients, we should exclude pseudohyperkalemia at first. We need to repeat the measurement of K⁺ with proper technique. Medications should be checked such as β-blocker, ACE-I, ARB, NSAIDs, heparine, cyclosporine, spironolactone, trimethoprim, pentamidine.

Oliguric renal failure should be excluded.

For assessment of K⁺ secretion, TTKG is measured. TTKG(transtubular K⁺ gradient) is calculated by the following formula.

$$TTKG = ([K+u]/[Osm u]) / ([K+p]/[Osm pl])$$

Urine osmolality change with ADH readily. This formula revise the effect. TTKG < 10 implies impaired K⁺ excretion. Then, serum rennin and aldosterone level should measured after the administration of loop diuretics or three hours in the upright position in order to increase rennin and aldosterone. Compared renin to aldosterone, a focus will be revealed.

References

Harrison's Principles of Internal
Medicine (17th edition)
Up to date.

Fig.1 : Major causes of hyperkalemia

Reduced renal K ⁺ excretion
Renal failure
Decreased effective circulating volume
Hypoaldosteronism; primary& Secondary : hyporeninemia, type 4 RTA, drugs(ACE-I, ARB, NSAIDs, heparin)
Drugs(cyclosporine, spironolactone, trimethoprim, pentamidine)
Increased K ⁺ release from cells
Metabolic acidosis
Insulin deficiency, hyperglycemia
Drugs(β-blocker, digitalis)
Tissue collapse
Pseudohyperkalemia
Increased K ⁺ intake

Fig.2 : Algorithm for diagnosis

