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Chronic Renal Disease and Endocrinopathies

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Abstract | **Original Research Article**

Chronic renal disease (CRD) gradually leads to metabolic alterations and numerous nutritional and hormonal dysfunctions. In the long term, these alterations are at the origin of complications such as disturbances of phosphocalcium metabolism and hypothalamic-hypophyseal abnormalities which are at the origin of complex disturbances of thyroid secretions, adrenal prolactinin...We carried out a retrospective study in 24 patients followed at the Avicenne military hospital in Marrekech, these are patients with chronic renal insufficiency in whom a hydro-electrolyte and hormonal assessment was carried out. Our objective was to highlight the endocrine disturbances associated with chronic renal disease. The average age of our patients was 57 years +/- 22 years. Men represented 75% of the study population, compared to 25% of women with a sex ratio of 0.3). Renal disease was stage 3 in 16% of cases, stage 4 in 25% of cases, and stage 5 in 59% of cases. Hypocalcemia was found in 71% of cases, hyperphosphoremia in 33% of cases and elevated alkaline phosphatase in 12.5% of cases. Hyperparathormonaemia was observed in 75% of cases, with an average PTH level 9 times normal. In 89% of the cases the patients were in vitamin D insufficiency and in 22% of the cases the patients were in deficiency. A disturbance of the thyroid balance was noted in 13% of cases. Hyperprolactinaemia was observed in 8% of men and 4% of women. Regarding cortisol, the elevation in a single case was moderate representing 4% of cases.

Keywords: Chronic Renal Disease (CRD), Endocrinopathies, Hyperparathormonaemia, Phosphocalcium Metabolism, Thyroid Secretions.

INTRODUCTION

Chronic renal disease is responsible for various endocrine dysfunction affecting several parameters: the deficiency of endocrine secretion of the kidney such as the lack of activation of vitamin D which is the cause of secondary hyperparathyroidism. Hypothalamic-pituitary abnormalities cause complex hormone disturbances (thyroid, cortisol, prolactinin, etc.)

MATERIALS AND METHODS

We conducted a retrospective study of 24 chronic hemodialysis patients followed at the AVICENNE military hospital in MARRAKECH to determine their endocrine profile. Patients on treatment that could interfere with thyroid function (antithyroid drugs, lithium, amiodarone, rifampicin) were excluded from the study.

RESULTS

They are 06 women and 18 men, with an average age of 57 ± 22 years. The average seniority in hemodialysis was 102 months +/- 58 months. The initial nephropathy was indeterminate in 42% of cases. Kidney failure was stage 3 in 16% of cases, stage 4 in 25% of cases, and stage 5 in 59% of cases. A disturbance of the thyroid balance was noted in 13% of cases, with low LT3 in 9% of cases, high TSH in 3% of cases, and low T4 in 1% of cases. The thyroid hormone assay revealed that 75% of patients had a normal TSHus with decreased T3 without clinical signs defining subclinical hypothyroidism. An isolated decrease in FT4l was noted in 41% of patients. Kidney failure is also responsible for a metabolic disorder calcium phosphate, particularly from stage 3, including changes in serum calcium, phosphate levels, circulating parathormone levels, and 1,25-dihydroxy-vitamin D.

In our patients the disturbances of the phosphocalcic balance were as follows:

- Hypocalcemia was found in 71% of cases, with severe hypocalcemia in 4% of cases
- Hyperphosphatemia has been observed in 33% of cases
- Alkaline phosphatases were elevated in 12.5% of cases.
- Hyperparathormonemia was observed in 75% of cases, with an average PTH level of 620ng/ml (that is 9 times normal), the maximum PTH value in our patients was 2000ng/ml (that is 31 times normal) found in a patient with end-stage renal failure.
- In 89% of cases the patients were in vitamin D insufficiency and in 22% of cases the patients were deficient, the minimum level of vitamin D in our patients was 12 ng/ml.

In our patients, no elevation was noted. Plasma cortisol secretion with the exception of a single case where the elevation was moderate representing 4% of cases. Hyperprolactinemia was observed in 12% of cases. This hyperprolactinemia was noted in 8% of cases in men and in 4% of cases in women. The highest prolactin level was 520µIU/ml found in a 64-year-old patient.

DISCUSSION

The kidneys perform three functions of waste excretion, regulation of water and electrolyte balance, and synthesis of hormones, all of which are affected in chronic kidney disease. Chronic renal disease leads to metabolic alterations, nutritional dysfunctions and modification of plasma levels of several hormones. With the decline of renal function, and in particular from stage 3, phosphocalcic metabolism disorders appear including changes in calcemia, phosphatemia, circulating levels of parathyroid hormone, 1,25-dihydroxy-vitamin D. The lack of calcitriol production is at the origin of a tendency to hypocalcemia and deficiency osteomalacia since it leads to a decrease in the intestinal absorption of calcium, which is at the origin of chronic hypocalcemia. responsible for hypersecretion of parathyroid hormone [1]. Thus, impaired renal excretory function leads to an accumulation of phosphorus which also leads to the development of hyperparathyroidism. CRD also affects the hypothalamic pituitary thyroid axis and peripheral thyroid hormone metabolism [2]. There is a particular hormonal profile during CRD. Low T3 is the most common disorder [3] and subclinical hypothyroidism can also be found during CRF [4]. The T4 concentration may be normal or slightly reduced. Concerning the impact of CRD on prolactinemia, there is hyperprolactininemia observed in both sexes with a prevalence that varies from 30% to 65% [5]. Hyperprolactinemia is generally moderate, which only exceptionally leads to galactorrhea, but participates in hypothalamic-pituitary functional disturbances [6]. For the HPA axis and during CRD, the half-life of cortisol is prolonged and its binding to cortisol binding globulin (CBG) is reduced [6]. Negative feedback is altered, but the circadian rhythm of cortisol is preserved. There would be a peripheral resistance to cortisol explaining the absence of clinical abnormality in the presence of slightly increased concentrations of free cortisol in the plasma [7]. Cortisol gradually increases as kidney function declines.

CONCLUSION

Disturbances in hormonal balance are common in patients with chronic renal failure. The early biological diagnosis of these disturbances makes it possible to establish an adequate treatment which is the best weapon to fight against the complications of the CRF.

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