Effects of thyroxine replacement on serum creatinine and cystatin C in patients with primary and central hypothyroidism

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BACKGROUND: Serum cystatin C (CysC) is a marker for kidney function, possibly superior to serum creatinine (Cr). Cr is increased and CysC decreased in primary hypothyroidism; these changes are reversed upon thyroxine (T4) replacement therapy. This (pilot) study was performed to see whether these opposing changes of CysC and Cr could be confirmed in patients with central hypothyroidism.

METHODS: Prospective case series of consecutively referred patients with primary and central hypothyroidism. CysC and Cr were determined at the time of diagnosis and following T4 replacement therapy.

RESULTS: 32 patients with newly diagnosed hypothyroidism were included. In 16 patients with primary hypothyroidism, mean fT4 was 4.4 +/- 2.5 pmol/l (normal range 12 to 22) at diagnosis and increased to 20.1 +/- 5.2 pmol/l (p <0.001) following T4 replacement. CysC increased from 0.79 +/- 0.27 mg/l (normal range 0.63 to 1.33) to 1.03 +/- 0.42 mg/l (p = 0.007) whereas Cr declined from 104 +/- 21 micromol/l to 90 +/- 19 micromol/l (p <0.001). In 16 patients with central hypothyroidism, mean fT4 was 6.5 +/- 1.6 pmol/l at diagnosis and increased to 15.7 +/- 3.3 pmol/l (p <0.001) following T4 replacement. CysC increased from 0.74 +/- 0.27 mg/l to 0.83 +/- 0.30 mg/l (p = 0.01) whereas Cr was not elevated at baseline (83 +/- 11 micromol/l) and did not decrease following treatment (84 +/- 10 micromol/l).

CONCLUSIONS: CysC was low at diagnosis of hypothyroidism and significantly increased following T4 replacement in patients with primary as well as central hypothyroidism. T4 replacement decreased Cr levels in patients with primary hypothyroidism whereas Cr remained unchanged in patients with central hypothyroidism. CysC may not accurately reflect kidney function in patients with primary and central thyroid dysfunction.

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