

EVALUATION OF RENAL FUNCTION BY SERUM CYSTATIN C FOR THE PATIENT WITH NEUROGENIC BLADDER HAVING A CENTRAL NERVE SYSTEM DISORDER

Hypothesis / aims of study

Many patients with central nerve system (CNS) disorder usually accompany neurogenic bladder (NGB) and muscular atrophy. Unless the urinary management is done adequately, these patients lead to renal dysfunction. In case we evaluate the renal function by serum creatinine (S-Cr) for the patient with CNS disorder having muscular atrophy, we might make an error of evaluating the renal function because S-Cr value is influenced by quantity of muscle. On the other hand, the evaluation of renal function by serum cystatin C (Cys-C) is not influenced by quantity of muscle, gender, and age. Therefore, Cys-C is beneficial parameter so that we avoid the error of evaluating renal function for the patient with muscular atrophy because Cys-C value is unaffected by quantity of muscle. The aim of this study was to investigate the usefulness of Cys-C to evaluate the renal function for the patient with NGB having CNS disorder.

Study design, materials and methods

Eighty-three patients with NGB (47 male and 36 female) aged 62 years (mean; aged from 22 to 89 years) were included. The primary disease was as follows, 27 patients had myelopathy associated with HTLV-1, 13 patients had spinal cord injury, 17 patients had cerebrovascular accident, 4 patients had Parkinson's disease, 4 patients had multiple sclerosis, 2 patients had spina bifida and 16 patients had other disease. Of all, 3 patients had hypertension and 2 patients had diabetes. We divided 83 patients into two groups based on Activities of Daily living (ADL), which were walking group (41 patients and including walking with crutch) and wheelchair group (42 patients). The estimates of GFR (eGFR) with Cys-C and S-Cr values were calculated using formulas below respectively in the both groups.

$$eGFR_{Cys-C} = 66.8 \times Cys-C^{-1.30} : (1)$$

$$eGFR_{S-Cr} = 194 \times S-Cr^{-1.094} \times Age^{-0.287} (x 0.739 \text{ for female}) : (2)$$

We investigated whether there were significant differences between $eGFR_{Cys-C}$ and $eGFR_{S-Cr}$ in the two groups. Furthermore, whether the difference between $eGFR_{Cys-C}$ and $eGFR_{S-Cr}$ had correlated with the urinary management (void, clean intermittent self-catheterization or urethral catheterization) and the duration of disease was investigated in wheelchair group. Statistical analyses were performed by t-test.

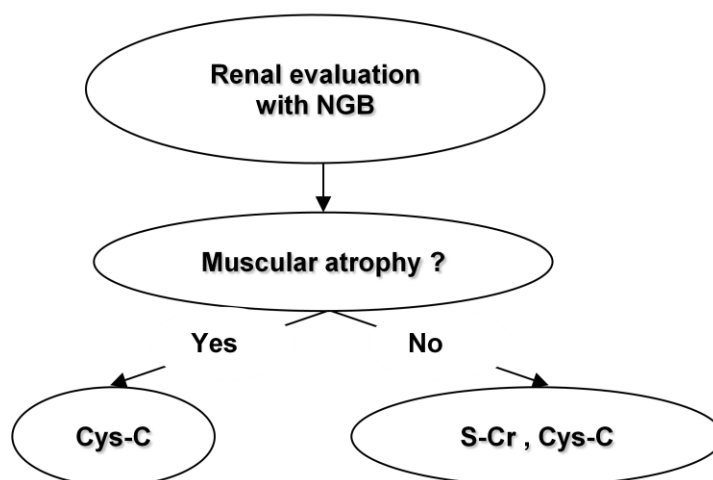
Results

The mean $eGFR_{Cys-C}$ and $eGFR_{S-Cr}$ in wheelchair group were 70.0 ml/min and 99.0 ml/min respectively, and a significant difference was detected ($p < 0.01$). On the other hand, those of the walking group were 80.4 ml/min and 76.7 ml/min respectively, and a significant difference was not detected. In wheelchair group, patients under urethral catheterization had a significant difference between the mean $eGFR_{Cys-C}$ (52.1 ml/min) and $eGFR_{S-Cr}$ (116.7 ml/min) ($p < 0.01$). Furthermore, a significant difference between the both eGFRs could be detected in case the duration of disease was more than 10 years ($P = 0.01$).

Interpretation of results

In case of patient with whom the degree of CNS disorder is severe, such as patients using the wheelchair or under the urethral catheterization, the $eGFR_{S-Cr}$ is calculated significantly higher than $eGFR_{Cys-C}$. Furthermore, in the patient with CNS disorder for a long time, the $eGFR_{S-Cr}$ is calculated significantly higher than $eGFR_{Cys-C}$. It is suggested that the disuse muscular atrophy with severe CNS disorder influences the $eGFR_{S-Cr}$ because S-Cr value is influenced by quantity of muscle. In case patients had CNS disorder, the evaluating of renal function by Cys-C should be done because these patients usually have muscular atrophy.

Figure showing concluding message.



Concluding message

Serum Cys-C is a more convenient GFR marker than S-Cr in patients with NGB having muscular atrophy.

References

1. The Japanese Society of Nephrology, 2008
2. Kidney Int. 2006 Jan;69(2):399-405

<i>Is this a clinical trial?</i>	Yes
<i>Is this study registered in a public clinical trials registry?</i>	No
<i>What were the subjects in the study?</i>	HUMAN
<i>Was this study approved by an ethics committee?</i>	Yes
<i>Specify Name of Ethics Committee</i>	Nagasaki medical university ethics committee
<i>Was the Declaration of Helsinki followed?</i>	Yes
<i>Was informed consent obtained from the patients?</i>	Yes