Differences in Renal Tubular Toxicity of High- and Low-Osmolality Contrast Media

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Dear Sir,

We read with great interest the article 'Nephrotoxicity of High- and Low-Osmolality Contrast Media, [1]. In this article, Jevnikar et al. reported that no significant change in glomerular filtration rate was found in any type of contrast media (CM) so the significance of the enzymuria remained uncertain and, therefore, no evidence that the newer CM were less nephrotoxic than the high-osmolality variety could be found. We have also investigated nephrotoxicity including tubular dysfunction of highland low-osmolality CM. Our results were almost similar to those of Jevnikar et al. In addition to urinary excretion of enzyme as an index of tubular injury, urinary excretion of low molecular weight protein, β_2 -microglobulin (β_2 -MG), was determined to evaluate tubular function in our study. Our subjects, methods and results were as follows (all results are expressed as mean $\pm$ SE).

Thirty-five patients admitted to our hospital for the purpose of undergoing cardiac angiography were randomized into two groups receiving iopamidol (800 mosm/kg H₂O) or diatrizoate (2,070 mosm/kg H₂O). As shown in table 1, there were no significant differences in age and loaded dose of iodine between the two groups. On both the days before and after cardiac angiography, blood sampling and 24-hour urine collecting were performed. Values for creatinine and electrolytes in blood and urine samples were determined by routine method. Serum and urine concentration of β_2 -MG were determined by radioimmunoassay, and urinary N-acetyl- β -D-glucosaminidase (NAG) activity was determined by a spectrophotometric method [2]. In this study, there were no significant changes in both serum creatinine and creatinine clearance following the administration of any of the CM [data not shown, $p > 0.05$].

Table I. CM description

analyzed by paired t test]. On the other hand, fractional excretion of β_2 -MG tended to increase after the administration of only diatrizoate, although NAG index (urinary NAG excretion corrected by urinary creatinine concentration) rose after the administration of both types of CM (fig. i).

During the last 2 decades, β_2 -MG has been the very valuable index for renal function [3]. It is now recognized that serum concentration of β_2 -MG indicates glomerular filtration rate and urinary concentration of that indicates tubular capacity to reabsorb low-molecular-weight

proteins. Recently, fractional excretion of β_2 -MG was reported to reflect tubulointerstitial lesions more sensitively than the urinary β_2 -MG concentration [4]. Our results may suggest that high-osmolality CM has more severe renal tubular toxicity expressed as significant tubular proteinuria than low-osmolality CM, although both high- and low-osmolality CM have renal tubular toxicity expressed as significant enzymuria. Significant enzymuria without tubular proteinuria after the administration of low-osmolality CM would be interpreted as mild renal tubular damage. Therefore, we believe that low-osmolality CM has less nephrotoxicity than high-osmolality CM.

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IOPAMIDOL
DIATRIZOATE
References

10.0-
3 5.0
^ 10
-X,

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0.5-
ff⁷/₈ λ t⁷/₈ λ
BEFORE AFTER
BEFORE AFTER

Fig. 1. NAG index and fractional excretion (FE) β_2 -MG on the days before and after angiography. * $p < 0.1$; ** $p < 0.01$, versus the data before angiography (analyzed by paired t test).