Effect of Nifedipine on Urinary Calcium and Oxalate Excretion in Renal Stone Formers

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Dear Sir,

Some time ago we had the occasion to observe a hypercalciuric renal stone former who was taking nifedipine for a cardiac problem. In this patient, hypercalciuria was corrected following nifedipine therapy. This observation prompted us to investigate the possible effect of nifedipine on urinary calcium.

To date, we have tested the drug in 12 'idiopathic' renal stone formers, of whom 7 were hypercalciuric (> 300 mg/day), and 5 hyperoxaluric (> 33 mg/day), and in 2 primary hyperparathyroid patients. The patients were given a standard diet, and 20 mg/day nifedipine were administered for 1 week. Urinary oxalate (by an enzymatic method Sigma kit), calcium, phosphate and citrate [1] levels were determined before and after 1 week of nifedipine treatment. Compared to baseline values, we observed a significant fall in both calcium and oxalate excretion, and no modifications in urine phosphate and citrate in the stone formers (table I). Furthermore, nifedipine exerted a well defined hypocalciuric effect also in the 2 hyperparathyroid patients (from 600 to 362 mg and from 455 to 160 mg, respectively). The hypocalciuric and hypooxaluric effect cannot be attributed to changes in urine output, since no correlation was found between delta urine volume and delta oxalate and calcium excretion ($r = 0.030$ and $r = 0.014$, respectively). The magnitude of the decrease in both calcium and oxalate showed a significant correlation with basal values of the 2 ions ($r = -0.79$; $p < 0.01$ for calcium, and $r = -0.61$; $p < 0.05$ for oxalate).

In a previous study, we reported the existence of an anomalous oxalate self-exchange in red blood cell of renal stone formers [2], and since nifedipine seems capable of lowering oxalate urinary excretion, we also investigated the effect of the drug on red blood cell oxalate self-exchange. We observed that after 1 week of treatment, the flux constant K fell from $1.37 \pm 0.58\text{SD} \times 10^{-2}$ to $0.30 \pm 0.15\text{SD} \times 10^{-2} \text{ min}^{-1}$ ($t = 6.06$; $p < 0.001$).

At the moment we cannot explain the mechanism(s) by which nifedipine lowers calcium and oxalate urinary

Table I. Urinary calcium and oxalate excretion

NS = Not significant.

excretion, but in view of the demonstrated possibility of the drug to interfere with transmembrane oxalate fluxes, a direct action on the cellular ion transport cannot be ruled out. Whatever the underlying mechanism, it seems important that nifedipine has been shown capable of lowering both urine calcium and oxalate, the 2 most important stone constituents, while citrate, an important stone inhibitor, was left unaltered. If these data find confirmation in a larger patient series, nifedipine will occupy a well defined position among the limited number of drugs able to prevent renal stone formation. The calciuria reduction observed in hyperparathyroid patients under nifedipine therapy also seems extremely interesting and worthy of further study.

References

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