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STONE DISEASE

Renal Stone Epidemiology in Rochester, Minnesota: An Update

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Studies in Western countries have suggested an increasing incidence of nephrolithiasis (NL) in the latter part of the 20th century. Therefore, we updated NL epidemiology data for the Rochester population over the years 1970-2000. All Rochester residents with any diagnostic code that could be linked to NL in the years of 1970, 1980, 1990, and 2000 were identified, and the records reviewed to determine if they met the criteria for a symptomatic kidney stone as defined in a previous Rochester, MN study. Age-adjusted incidence (+/-s.e.) of new onset symptomatic stone disease for men was 155.1 (+/-28.5) and 105.0 (+/-16.8) per 100,000 per year in 1970 and 2000, respectively. For women, the corresponding rates were 43.2 (+/-14.0) and 68.4 (+/-12.3) per 100,000 per year, respectively. On average, rates for women increased by about 1.9% per year (P=0.064), whereas rates for men declined by 1.7% per year (P=0.019). The overall man to woman ratio decreased from 3.1 to 1.3 during the 30 years (P=0.006). Incident stone rates were highest for men aged 60-69 years, whereas for women, they plateaued after age 30. Therefore, since 1970 overall NL incidence rates in Rochester have remained relatively flat. However, NL rates for men have declined, whereas rates for women appear to be increasing. The reasons remain to be determined.

Editorial Comment

Though most recent studies suggest an increase in the incidence of nephrolithiasis, attributed to dietary and lifestyle changes, this interesting study suggests the contrary. An increase in incidence in females is balanced by a decrease in incidence in males, leading to a flat incidence rate when compared to 30 years ago.

The authors note that affluence and dietary factors associated with higher socioeconomic status have been implicated as risk factors for stone disease. It would be important therefore to evaluate any changes in the socioeconomic status of their study group; for example has the average income, unemployment rate, average education etc. remained stable during this time period? The intriguing question remains what has changed in men from 1980 onwards that has dramatically decreased the incidence of stone disease? What has changed in women from 1970 onwards that has resulted in a dramatic increase in stone disease? Is it dietary, hormonal, environmental, iatrogenic (increased use of oral contraceptives, calcium supplements, or other agents)? The authors reported only the incidence of symptomatic stones, though they did extract all stones including those detected incidentally by high-resolution imaging technologies. It would be interesting for the investigators to report these numbers also, so as to predict the increased volume of patients being referred for prophylactic surgical and medical therapy.

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Type 2 Diabetes Increases the Risk for Uric Acid Stones

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An increased prevalence of nephrolithiasis has been reported in patients with diabetes. Because insulin resistance, characteristic of the metabolic syndrome and type 2 diabetes, results in lower urine pH through impaired kidney ammoniogenesis and because a low urine pH is the main factor of uric acid (UA) stone formation, it was hypothesized that type 2 diabetes should favor the formation of UA stones. Therefore, the distribution of the main stone components was analyzed in a series of 2464 calculi from 272 (11%) patients with type 2 diabetes and 2192 without type 2 diabetes. The proportion of UA stones was 35.7% in patients with type 2 diabetes and 11.3% in patients without type 2 diabetes ($P < 0.0001$). Reciprocally, the proportion of patients with type 2 diabetes was significantly higher among UA than among calcium stone formers (27.8 versus 6.9%; $P < 0.0001$). Stepwise regression analysis identified type 2 diabetes as the strongest factor that was independently associated with the risk for UA stones (odds ratio 6.9; 95% confidence interval 5.5 to 8.8). The proper influence of type 2 diabetes was the most apparent in women and in patients in the lowest age and body mass index classes. In conclusion, in view of the strong association between type 2 diabetes and UA stone formation, it is proposed that UA nephrolithiasis may be added to the conditions that potentially are associated with insulin resistance. Accordingly, it is suggested that patients with UA stones, especially if overweight, should be screened for the presence of type 2 diabetes or components of the metabolic syndrome.

Editorial Comment

As obesity, the metabolic syndrome and type 2 diabetes increase in prevalence in the Western world, newly recognized associated morbidities continue to increase the impact on patients and healthcare. This article demonstrates a strong link between uric acid urolithiasis and type 2 diabetes. The hypothesis rests in the lower urine pH noted in type 2 diabetes predisposing to uric acid stone formation. The authors combined calcium oxalate and calcium phosphate stones into one group: "calcium-stones", though calcium oxalate stones are predisposed to formation in more acidic urine while calcium phosphate stones are predisposed to formation in more alkaline urine. A repeat analysis separating these two stone compositions may be of benefit. In the small group of patients (25) with type 2 diabetes who underwent urinary evaluations, the urine pH was comparable to patients without diabetes who formed uric acid stones, raising questions regarding the validity of the hypothesis proposed. Though the pathophysiology may not be clear, the 7-fold risk of a uric acid stone composition in type 2 diabetes suggests a strong link, and supports the recommendation that uric acid stone formers be screened for the metabolic syndrome.

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