Effect of Age on the Clinical Presentation of Incident Symptomatic Urolithiasis in the General Population

Amy E. Krambeck,* John C. Lieske, Xujian Li, Eric J. Bergstralh, L. Joseph Melton, III and Andrew D. Rule

From the Department of Urology (AEK), Division of Nephrology and Hypertension (JCL, ADR), Division of Biomedical Statistics and Informatics (XL, EJB), and Division of Epidemiology (LJM, ADR), School of Medicine, Mayo Clinic, Rochester, Minnesota

Abbreviations and Acronyms

COD = calcium oxalate dihydrate

COM = calcium oxalate monohydrate

CT = computerized tomography

KUB = plain x-ray of the kidneys, ureters and bladder

PCNL = percutaneous nephrolithotomy

SWL = shock wave lithotripsy

US = ultrasound

UTI = urinary tract infection

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* Correspondence: Department of Urology, Mayo Clinic, 200 1st SW, Rochester, Minnesota 55905 (telephone: 507-284-9983; FAX: 507-284-4951; e-mail: Krambeck.amy@mayo.edu).

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Purpose: We characterized variation in the clinical presentation between older and younger first time symptomatic stone formers in the general population.

Materials and Methods: We studied a random sample of Olmsted County, Minnesota residents with their first diagnostic code for urolithiasis between 1984 and 2003. Chart validated symptomatic stone formers had a confirmed stone by imaging or stone passage. Clinical presentation characteristics were compared between age groups.

Results: Among the 3,473 charts reviewed there were 1,590 validated incident symptomatic stone formers (mean age 43 years, range 18 to 96). Older individuals were more likely to present with atypical or no pain, fever, diarrhea, pyuria, urinary tract infections and bacteremia ($p < 0.001$). Stone size and location did not differ by patient age. Calcium phosphate stone disease was associated with younger age, while uric acid stone and atypical stone composition was associated with older age ($p < 0.001$). Older individuals were less likely to pass the stone spontaneously and were more likely to require surgical intervention ($p < 0.001$). Surgical intervention was required in 516 (32.5%) individuals. Younger individuals were more likely to undergo ureteroscopy while older individuals were more likely to undergo shock wave lithotripsy, temporizing stent placement and percutaneous nephrolithotomy.

Conclusions: The detection of stone disease in older individuals can be challenging due to atypical pain or absence of pain, as well as the presence of other comorbid conditions such as urinary tract infections and diarrhea. A higher index of suspicion for urolithiasis may be needed in the elderly for a more timely diagnosis and intervention to prevent morbidity.

Key Words: urolithiasis, age factors, epidemiology, urinary tract infections

Urolithiasis is a common disorder affecting all age groups. Studies from the United States and other countries indicate that the incidence of upper tract stone disease has increased steadily during the last 5 decades.[1–5] With improvements in medical care and overall life expectancy, stone disease could become more common in the geriatric population. However, little is known about the effect of age on urolithiasis and existing data on geriatric stone disease are inconsistent. Payne et al found that urinary stone disease was more likely to develop in elderly patients,[6] while others found geriatric stone disease to be uncommon and not related to age.[7,8] More recent studies have demonstrated that geriatric patients compromise 10% to 12% of all

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patients referred to tertiary care centers for treatment of urolithiasis.[9,10]

Population based studies confirm an increase in urinary stone disease in the elderly. The NHANES II (National Health and Nutrition Examination Survey) showed increasing rates of stone disease in men up to age 65 years and in women to age 70 years.[11] A population based epidemiological study focusing on Olmsted County, Minnesota found that incident stone disease peaked for men age 60 to 69 years, and 2 peaks were noted for women at ages 30 to 39 and 60 to 69 years.[1] Finally, another study focusing on Wisconsin residents showed an increase in stone incidence in the age 60 to 64 and age 80 to 84 cohorts.[5] Given this evidence that stone disease has a significant impact on the aging population, in this study we characterize age differences in the clinical presentation and management of incident stone disease in a community setting.

MATERIALS AND METHODS

After institutional review board approval, data on individuals diagnosed with stone disease in Olmsted County, Minnesota were obtained through the REP (Rochester Epidemiology Project). This resource contains the linked medical records of all medical care providers for all residents of Olmsted County. Diagnostic codes dating back to 1935 are indexed.[12] The REP has been used to study the incidence of nephrolithiasis over time.[1] Residents with urolithiasis events between 1984 and 2003 were identified using ICD-9 codes 592, 594 and 274.11. The first stone event documented in Olmsted County in the 1984 to 2003 period was identified. Residents who did not have Minnesota Research Authorization[13] and those with documented urolithiasis episodes before 1984 were excluded from study. Charts of 3,473 of the remaining patients were reviewed by a dedicated nurse abstractor who collected all data analyzed in this study under the supervision of 2 nephrologists (ADR, JCL) and a urologist (AEK). Criteria for a validated incident symptomatic stone were 1) documented imaging of a stone in the ureter or renal pelvis consistent with obstruction or intermittent obstruction, or 2) documentation of stone recovery after passage or removal. A stone was considered symptomatic if the patient presented for clinical care of gross hematuria or pain. Pain could be typical renal colic or atypical, defined as vague, nonlocalized abdominal, pelvic or back pain. A symptomatic UTI with a urease splitting organism (urinary pH greater than 7.0) from an infected kidney stone (struvite composition) was also considered a criterion for a symptomatic stone. Only imaging studies (CT, excretory urogram, KUB and US) obtained to evaluate presenting symptoms consistent with an obstructing or infected stone were used for validation. Patients with incidental asymptomatic stones (even if located in the ureter or subsequently removed by surgery), bladder stones, or those suspected of having stones but with inadequate confirmation by imaging or documented passage were excluded from study. Stone composition was based on the predominant component. Only those patients with a positive documented urine culture with more than 10^5 cfu were considered to have a UTI.

In terms of statistical analysis, age group associations were tested using chi-square and ANOVA tests. Stone composition and primary treatments were required to have been documented within 90 days after the first stone event. For continuous and binary characteristics, tests of trend with age group were also evaluated using rank correlations and the rank sum test. A statistically significant trend test was also reported when the chi-square or ANOVA test was not statistically significant. Logistic regression analysis was used to identify the risk of UTI or surgical intervention. All reported p values were 2-sided with $p < 0.05$ considered statistically significant. Statistical analyses were performed using SAS® software, version 9.1.

RESULTS

Of the 1,633 individuals who met the incident symptomatic stone criteria, 1,590 were 18 years old or older and were included in the study. Figure 1 shows the age distribution of the 1,590 patients. Presenting symptoms by age group are summarized in table 1. With increasing age, individuals were more likely to present with atypical pain or no pain, fever, gastro-

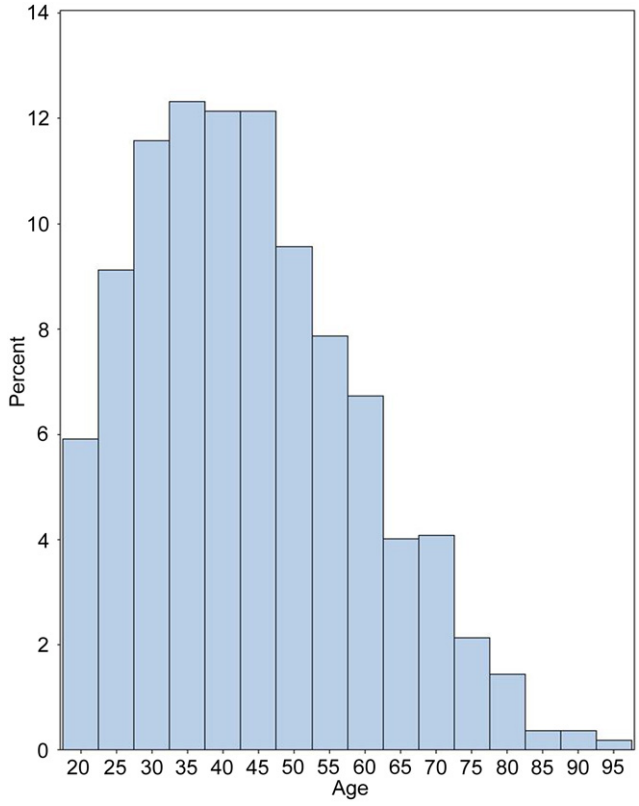

Figure 1. Age distribution of 1,590 valid incident stone formers in Olmsted County, Minnesota, 1984 to 2003.