Delayed Analysis of Urine

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Women often present to their primary care physician with the complaint of dysuria. Although the exact cause of dysuria may not be readily apparent, there are various management strategies in the literature to guide primary care physicians in their office evaluation of women with dysuria.[1,2] A more complicated situation is the female patient who calls after office hours complaining of dysuria. This common clinical scenario is a frequently neglected topic in recent reviews of urinary tract infections.[3–5] There are no published data on physician management of dysuria by telephone.

One strategy of some family physicians is to ask their patients with dysuria to collect a urine specimen at home before starting antibiotics for a presumed urinary tract infection. This specimen is subsequently brought to the office during regular hours to be analyzed by urinalysis or culture to confirm the diagnosis. Again, there are no published data from an office-based practice to support this approach. A study was undertaken to determine whether delayed urine analysis is valid and reliable.

METHODS

Consecutive patients attending a university-based family practice center in 1987 were enrolled in the study if they were women aged 18 to 50 years with symptoms of dysuria or frequency. Urine was obtained in the office by the patient using the clean-catch technique and immediately analyzed by laboratory technicians using dipstick, microscopic analysis of the spun sediment, and culture as described in a standard office laboratory manual.[6] The remaining urine samples were then blinded and stored at 4°C overnight. The following morning, these blinded specimens were reanalyzed using the same techniques for dipstick, microscopic examination, and culture. Results were reported in the standard fashion for office laboratories. If a range was given for the number of cells, this range was translated to the average of the two numbers (eg, 3 to 5 white blood cells equals 4 white blood cells). The range of values on the dipstick for glucose, protein, ketones, and hemoglobin include negative, trace, 1+, 2+, 3+, and 4+, and were quantitated to equal 0, 0.5, 1.0, 2.0, 3.0, and 4.0, respectively. The values for leukocyte esterase of negative, trace, and 1+ were translated to 0, 0.5, and 1.0, respectively.

Cultures were plated on sheep blood and MacConkey agar and read at 24 and 48 hours. Cultures were regarded as positive if they had 100 or greater organisms per milliliter and contaminated if they had two or more colonies of different form or structure without a clear predominance of one type.

Comparisons were made between immediate and delayed results for several variables including specific gravity, pH, protein, glucose, ketones, hemoglobin, presence of nitrate and leukocyte esterase, white and red blood cell count, squamous epithelial cell count, and number and type of organisms on culture. These comparisons were analyzed with dependent t tests. Statistical significance was defined as $P \leq .05$.

RESULTS

Fifty-seven symptomatic women were included in the study. The average time from micturition to initial analysis was less than 20 minutes. The average time between immediate and delayed analysis for each specimen was 19 hours with a minimum of 16 and a maximum of 25 hours.

Comparison of dipstick results showed no change in specific gravity or pH between the delayed specimens and the initial specimens. Eighteen urine samples were initially positive for hemoglobin and nine were positive for leukocyte esterase. There were no significant differences in the results of the respective delayed specimens for these two variables. The mean value for hemoglobin changed from 1.1 (slightly more than 1+) to 1.2, and the mean value for leukocyte esterase stayed the same at 0.9

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for the nine specimens. The rest of the dipstick variables had an insufficient number of values to assess reliability.

Forty-two of the 57 specimens exhibited white blood cells, with an average of 10.9 white blood cells per high power field. There were 2.6 fewer white blood cells on the delayed analysis for the respective samples. This finding is not statistically significant.

Twenty specimens showed microscopic evidence of hematuria initially with an average of nearly six cells in each specimen. Delayed microscopic examination revealed an average of 2.3 fewer red blood cells when compared with immediate analysis for each individual urine specimen. This difference is also not statistically significant, nor was the difference in epithelial cell counts. The average difference between epithelial cell counts was about one half of a cell.

There were 15 initially positive cultures with an average of 69,000 organisms per milliliter. The urine cultured after sitting in the refrigerator overnight had approximately 6000 more colonies than the initial culture. Thirteen of the 15 specimens with pure growth initially had identical colony types and similar counts on the delayed culture. The remaining two initially positive specimens had bacterial overgrowth or contamination on the delayed analysis of the same specimen.

DISCUSSION

The results of the dipstick urinalysis remain fairly constant after an average refrigerated delay of 19 hours, although several measurements did not have enough cases to draw any conclusion. The microscopic and culture results were also fairly similar between the immediate and delayed specimens. The present study shows that there is some lysis of white blood cells with time, but not nearly as much as previous studies in experimental laboratories or large hospitals have indicated.[7,8] These studies were either done at room temperature or had significant delays from micturition to refrigeration. The lack of significant change in cell counts in this study may be attributable to prompt refrigeration. Prompt refrigeration is easier to do in a small office laboratory than a large hospital because of the shorter transit time delivering the specimen to the laboratory and shorter processing time.

Thirteen of the 15 cultures yielded similar results on delayed analysis, which indicates that merely checking a culture of refrigerated urine may be clinically useful.

There are several limitations to this study. The sample size was small, as only 15 specimens indicated infection. It was important in this study, however, to include all symptomatic patients and not just those with urinary tract infections to simulate the after-hours situation in clinical care. Specimens were collected by clean-catch technique, which may not simulate actual patient technique after hours at home. Further study is needed to confirm the clinical utility of delayed urine analysis in a primary care setting. Patient and provider acceptance of delayed urine analysis, along with the cost effectiveness of this management, needs to be studied.

This study shows that delayed urinalysis does confirm the immediate results in most cases. Delayed analysis of urine may be a tool by which physicians can treat women over the telephone after hours and not have to rely solely on the history, thus potentially saving on after-hours visits and increasing the accuracy of after-hours telephone diagnosis of dysuria.

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