

CASE REPORT

The Importance of Urine Sediment Analysis

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SUMMARY

Background: Urinary sediment is an important part of routine urine test, which plays an irreplaceable role in the diagnosis of diseases, monitoring of treatment effect, and prognosis judgment [1].

Methods: Through the results of urine dry chemistry and microscopic examination of urinary sediment, we interpreted and analyzed the clinical significance of urinary casts in urinary sediment.

Results: In patients with new urinary system diseases abnormal urine results appear earlier than changes in serum renal function indicators, especially when the urine sediment shows typical casts, which can provide an important basis for clinical diagnosis.

Conclusions: Clinical laboratory personnel should attach great importance to the morphological examination of urinary sediment and master the diagnostic significance of the formed components of urinary sediment for various diseases, so as to better assist clinical disease diagnosis.

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KEYWORDS

urinary sediment, urinary system, urinary casts, early diagnosis

INTRODUCTION

As the most basic test item in clinical laboratory, urine sediment examination has the advantages of being non-invasive, rapid, accurate, and ease of repeated sampling. During the microscopic examination of urine sediment, because urine contains more tangible components, the probability of effectively detecting abnormal morphology is significantly increased [2]. As one of the visible components in urine sediment, casts are closely related to kidney disease and are of great value in determining kidney damage [3]. This paper analyzes the importance of urinary sediment in diagnosis of urinary system diseases with a case study.

CASE PRESENTATION

The patient, male, 18 years old, came to see the doctor with chief complaint: the physical examination found that urine routine was abnormal for 1 week and urine

Table 1. The results of urine dry chemistry before and after the clinician’s consultation.

| Parameter | Before | After | Normal reference ranges |
|-----------------------------|--------|--------|-------------------------|
| Urine Leukocyte esterase | normal | normal | normal |
| Urobilinogen | + 1 | normal | normal |
| Urinary protein | + 1 | + 1 | normal |
| Urine hemoglobin peroxidase | + 2 | + 2 | normal |
| Urinary bilirubin | normal | normal | normal |
| Urine specific gravity | 1.032 | 1.031 | 1.003 - 1.030 |
| Urinary vitamin C | normal | + 1 | normal |
| Urinary ketone | ± | ± | normal |
| Urine pH | 6.00 | 7.00 | 4.50 - 8.00 |
| Urinary nitrite | normal | normal | normal |
| Urine glucose | normal | normal | normal |

Note: Judgment of qualitative results of urine dry chemistry: normal, ±, + 1, + 2,+ 3, + 4 (Indicates that positivity gradually increases).

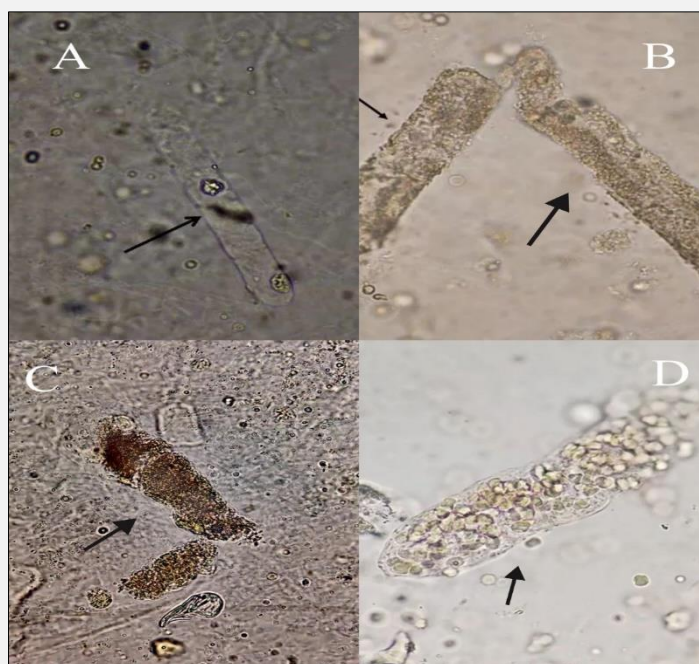


Figure 1. Urinary sediment casts of the patient under different microscope fields.

1) A cast shape characteristics: The shape is cylindrical, with parallel sides and blunt ends. It is colorless and translucent, indicating smoothness with a few particles.
 2) B cast shape characteristics: The shape is similar to the A cast, but it contains particles of varying sizes, occupying the entire tube volume.
 3) C cast shape characteristics: The cast contains a variety of complex granulocytes, and the amount of cell accumulation accounts for more than 2/3 of the tubular type. The cells in the tubular type can be arranged loosely or tightly, and the complex granulocytes are filled with a large number of particles, and the nucleus is not easily seen.
 4) D cast shape characteristics: Red blood cells occupy more than 1/3 of the cast. There are many red blood cells and are often inseparable, and complete red blood cells are often seen at the edge of the cast.
 The four types of urine casts observed by centrifugation microscopy were hyaline casts (A), granular casts (B), complex granulocyte casts (C), and erythrocyte casts (D). Based on these casts of morphological characteristics [4,5], we considered that the patient had kidney lesions. The clinician was informed of this result and other auxiliary tests for related kidney disease were taken. The patient was finally diagnosed with nephritis.

volume was low. The clinician passed the following physical examination: no percussion pain in the kidney area, no external genital tract deformity, no redness and swelling at the urethral opening, no gross hematuria, no dysuria, no frequent urination, and no other abnormalities. Next the serum renal function indicators and B-ultrasound imaging examinations of the patient were normal. We set up Table 1 for the urine routine results before and after the clinician's consultation. However, this time we performed microscopic examination of the urine sediment, and the microscopic examination showed that the following types of casts were formed (Figure 1).

DISCUSSION

The urine sediment test mainly detects visible components such as inorganic salts, ions and shed cells deposited in the urine. When the body experiences inflammatory reactions or organ disease, it can lead to changes in urine components. For example, the presence of pathological casts or other tangible components can provide a large amount of information about the patient's physical condition [6]. Casts refer to cylindrical protein aggregates formed by solidification of proteins, cells, and their disintegration products in renal tubules and collecting ducts. They are the most valuable components in urine sediment. Therefore, detecting urine sediment can diagnose related diseases early. In addition, urine sediment assessment can also be used as an indication for renal biopsy to assist in determining whether the body has kidney disease, which has important clinical reference value [7].

The serum renal function examination and kidney B-ultrasound imaging examination of the patient were normal, and only the dry chemical results of routine urine were abnormal. So, we immediately conducted a microscopic examination of urinary sediment, detected pathological duct type, suspected kidney lesions, and provided auxiliary diagnosis for the clinic in time. Therefore, abnormal urine specimens must be examined in the laboratory by trained staff to identify important abnormal tangible components. Since urine microscopy is still an operator-dependent process, it cannot be used as the sole basis for diagnosis or decision-making, but the observation of urinary sediment, especially the pathological cast pattern, is clearly of importance. Pathological cast is highly specific for the diagnosis of renal disease. When the probability of renal disease is suspected to be high, it is of great value to find the casts with typical characteristics related to renal disease for diagnostic decision.

Finally, urine sediment examination is an important teaching tool for students to understand the physiology of kidney disease, especially pathological cast is a very important part of urine sediment examination and is the main indicator to judge whether there is pathological substantive injury of the kidney. With the updating and

iteration of urine testing instruments, test results are becoming more and more accurate, but urine sediment analysis has stood the test of time and should be a valuable resource for diagnosing kidney disease in the long run. As laboratory testing physicians, we must encourage continued training and maintain the capacity for urine sediment testing, and at the same time, make early and clear diagnoses ensuring timely treatment of patients.

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Declaration of Interest:

All authors declare that they have no competing interests.

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