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A Brief Talk on the First Diagnosis and Treatment of Adult Hematuria

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A Brief Talk on the First Diagnosis and Treatment of Adult Hematuria

*QIN Hongli, REN Jingjing**

【Abstract】 Hematuria is a common clinical symptom, especially asymptomatic microhematuria (AMH), which is more common in the first diagnosis in general practice clinics or primary health institutions. In this paper, we summarized the characteristics and evaluation contents of adults with hematuria by reviewing the relevant literatures. We conclude that the etiological treatment is fundamental, and it is important to follow-up for those whose cause is unknown. Hopefully, this paper can provide reference for the general practitioners to deal with adult hematuria.

【Key words】 Hematuria; Asymptomatic microhematuria; Gross hematuria; First diagnosis; Standardized diagnosis and treatment

【Chinese Library Classification Number】 R 696.8 **【Document Identification Code】** A

With the enhancement of people's health awareness, more and more people begin to pay attention to health examination. Patients who accidentally found positive urine occult blood or microscopic hematuria during health examination were often admitted to the general practice clinic. This paper aims to summarize the characteristics and treatment suggestions of adult hematuria by reviewing relevant literatures at home and abroad and combining with clinical experience, so as to provide reference for the standardized diagnosis and treatment of adult hematuria by the general practitioners. According to the severity of hematuria, it can be divided into asymptomatic microscopic hematuria and gross hematuria. Asymptomatic microscopic hematuria was defined as fresh urine samples collected appropriately, with at least 3 red blood cells in each high magnification field^[1]. At this point, if the amount of blood loss is small, the patient's urine color is normal. When each liter of urine contains more than 1 ml of blood, the urine color becomes obviously red, which is termed as gross hematuria^[2], with more than 50 red blood cells under each high magnification field^[3]. The color of gross hematuria varies according to the amount of blood loss and the difference of uric acid alkalinity.

In addition, positive urine occult blood is also a common problem in general practice clinic. Due to the high false-positive rate of occult blood detected by automated urine routine analyzer, studies have shown that at least 20% of patients with occult blood could not find red blood cells on subsequent microscopic examination^[4], and both hemoglobinuria and myoglobinuria could show positive reactions. Therefore, positive urine occult blood is not necessarily hematuria, and the microscopic examination results of fresh midstream urine must be used as the standard to determine whether there is hematuria^[5].

1 Comprehensive Assessment

1.1 To determine whether it is hematuria, the initial physician should distinguish whether it is true hematuria.

1.1.1 Positive urine occult blood If the microscopic examination results indicate that there are less than 3 red blood cells under each high magnification field, it is called pseudohematuria. Possible causes include hemoglobin produced by intravascular hemolysis or myoglobin produced by muscle injury filtered into urine, which can be ruled out by combining with blood routine, liver function and myoenzyme profile. In addition, urine contamination, semen, and high alkaline urine (pH >9) can also lead to positive occult blood in urine^[6].

1.1.2 Visible "Hematuria" It is necessary to exclude the interference factors that make the urine appear red. Certain foods, such as beets, and certain drugs and their metabolites, such as rifamox, can cause red urine. Microscopic examination of urine sediment does not find red blood cells can be distinguished from it. In addition, it is also necessary to pay attention to whether the urethra dripping blood.

1.1.3 Other If the patient's microscopic examination suggests that there are more than 3 red blood cells under each high magnification field, pseudo-hematuria caused by menstrual, vaginal or rectal bleeding contaminated urine should also be excluded, and urine examination should be performed again after the end of menstruation or after the vulva is rinsed. In addition, normal people after vigorous exercise, urine red blood cells can also transiently increase.

1.2 Finding the Cause There are many causes of hematuria, most of which are caused by diseases of the urinary system, common in infection, non-infectious inflammation, stones and tumors, etc. Systemic diseases and diseases of adjacent organs of the urinary system can also cause hematuria. Therefore, detailed medical history, physical examination and targeted auxiliary examination are required, and the obtained clinical data are comprehensively analyzed to find out the cause of hematuria. The procedure for diagnosis and treatment of adult

hematuria is shown in Figure 1.

1.2.1 Key points for medical history collection First of all, ask about the consumption history of special food (such as beets), drug use history, being in menstrual phase, history of hemorrhoids, recent strenuous exercise, etc., to rule out pseudo-hematurine.

After confirming true hematuria, ask the patient: (1) when gross hematuria occurs and its duration; (2) whether there is aggravation of hematuria at the beginning, middle or end of urination and whether there is blood clot in urine; (3) Recent history of abdominal or waist trauma, urinary tract instrument examination, and upper respiratory tract infection; (4) Aggravating and alleviating factors, such as hematuria in lanky patients after prolonged upright position and nutcracker phenomenon (caused by left renal vein being squeezed by abdominal aorta and superior mesenteric artery, left renal vein reflux obstructed, varicose renal vein extravasation); (5) Whether it is accompanied by fever, urinary tract irritation symptoms, pain, bleeding in other parts, rash, etc.; (6) General conditions such as changes in body mass; (7) Previous medical history, such as chronic diseases such as hypertension or diabetes, radiotherapy history, etc.; (8) Personal history, such as smoking and occupational exposure; (9) Family history of kidney disease, hematuria, deafness and polycystic kidney disease.

1.2.2 Comprehensive physical examination Vital signs, coarse hearing (loss need to rule out any hereditary nephritis), skin mucous membrane (if there is a pale, rash or bleeder), heart and lung auscultation (presence of pleural effusion, heart murmur, arrhythmia), abdominal examination (palpation of the kidney position and enlargement, ureteral tenderness point, bladder ureter area or costal ridge corner with or without tenderness and kidney area percussion pain), joint (whether there is joint pain, interphalangeal joint deformity), lower limb edema, anal digital anal diagnosis whether there is prostate hypertrophy.

1.2.3 Laboratory examination Urine protein found in urine routine and tubular pattern found in urine sediment often indicate the source of glomerulus. If more than 70% of the erythrocytes in urine phase difference microscopy are abnormal, indicating the source of glomerulus^[7]; Urine erythrocyte volume distribution curve: If the mean volume of urine erythrocyte is less than 72 fl and the distribution curve is small cell, indicating that hematuria mostly originates from glomeruli. At this time, it is also necessary to complete the examination of blood creatinine (Scr), urea nitrogen (BUN), endogenous creatinine clearance (Ccr), plasma protein, lipid level, urine protein quantification and so on. If necessary, improve the immunological examination, plasma protein electrophoresis and

so on. If it is non-glomerular hematuria, it is more common in urinary tract lesions, such as infection, stones, tuberculosis, tumors, vascular malformations and so on. Urine bacteria/tuberculosis culture, tuberculin test (PPD test), blood routine, C-reactive protein, serum prostate specific antigen (PSA) and other tests can be completed in target. If the cause of systemic disease is considered, the examination can be tailored according to the history and physical examination.

1.2.4 The following supplementary tests may be selected as appropriate based on the history and physical examination

Abdominal X-ray examination: Approximately 90% of urinary calculi are not penetrated by X-ray, the shape, size and position of the kidney can be understood at the same time. Urological ultrasonography: It has diagnostic value for substantial and cystic renal mass, calculus, renal pelvis effusion, perirenal abscess or hematoma. In addition, the presence of diffuse enhanced renal parenchymal echo may indicate renal parenchymal disease. At the same time, ultrasound examination of ureter, bladder and prostate (male) was performed to detect related diseases.

2 Clinical characteristics of common causes of non-glomerular hematuria

2.1 Urinary tract infection Inflammation involves the urinary mucosa, leading to congestion, edema, and often accompanied by hematuria in the presence of urinary tract irritation. Such as acute cystitis, in addition to frequent urination, urgent urination, urination pain, urethra burning sensation, but also common terminal hematuria, sometimes for the whole hematuria, and even blood clots discharge.

2.2 Urinary calculi Direct stimulation of the stone itself can lead to congestion, edema, and even erosion or abrasion of the urinary tract mucosa, resulting in hematuria. Kidney stones are mainly characterized by waist pain, and sometimes hematuria is the only symptom. Hematuria is generally slight, manifested as microscopic hematuria, and a few are gross hematuria. Ureteral calculi are mostly colic, and downward abdominal and perineal radiation, sometimes accompanied by nausea and vomiting, mostly microscopic hematuria, gross hematuria is rare, occasionally complete ureteral obstruction without hematuria. Bladder and urethral stones only account for less than 5% of urinary calculi, there are dysuria and interruption of urination, often accompanied by frequent urination, urgent urination symptoms, hematuria is mostly terminal hematuria.

2.3 Urological tumors The most common age of kidney cancer is 50~60 years old, most asymptomatic, "kidney cancer triad" (hematuria, lumbago, abdominal mass) is less than 10%, sometimes hematuria is the only symptom, but 60% of patients can present no hematuria^[8-9]. Patients with renal pelvis and ureter tumors are mostly

intermittent and painless gross hematuria. If repeated urine tests are carried out, most patients have microscopic hematuria. Bladder tumor is the most common tumor of the urinary system, the most common symptom is the whole segment painless gross hematuria, can also be manifested as initial or terminal hematuria, often intermittent attack, serious hematuria often have blood clots, or discharge meat washing water urine and decomposed meat tissue. The early stage of prostate cancer is usually asymptomatic. When the mass increases and obstructs the urethra, it can cause dysuria, interrupted urine flow and other symptoms, but hematuria is uncommon.

2.4 Tuberculosis of urinary system Painless frequent urination is the most prominent symptom of urinary tuberculosis, early renal tuberculosis that has microscopic hematuria, gross hematuria for the late symptoms, the degree of hematuria is mild or heavy, but rarely massive haemorrhage. The source of hematuria can be the kidney, but mostly urinary the bladder, which is caused by bleeding from tuberculosis ulcer during bladder contraction and manifested as terminal hematuria.

3 Principles for the management of the first visit

3.1 Etiology treatment Etiology treatment is fundamental for patients with clear diagnosis and clear etiology. Antibiotic treatment is given in the event of urinary infection, and timely referral should be conducted when urinary tumors are considered.

3.2 Health education

3.2.1 For transient microscopic hematuria such as exercise hematuria^[10], it often disappears automatically after the trigger is removed, and no special treatment is required. In this case, the patient should be explained to avoid unnecessary tension or anxiety.

3.2.2 If the disease is considered benign, the patient should be advised to drink more water and be monitored regularly under the guidance of the doctor.

3.2.3 For asymptomatic hematuria patients who have no specific treatment before the etiology is determined, regular clinical observation and follow-up should be conducted to monitor the changes of urinary sediment, urinary protein, renal function and blood pressure.

3.2.4 If it is a special type of hematuria such as orthostatic hematuria, the common cause is nutcracker phenomenon^[11]. If the symptoms are mild, the patient can be advised to increase body weight, etc., and be followed

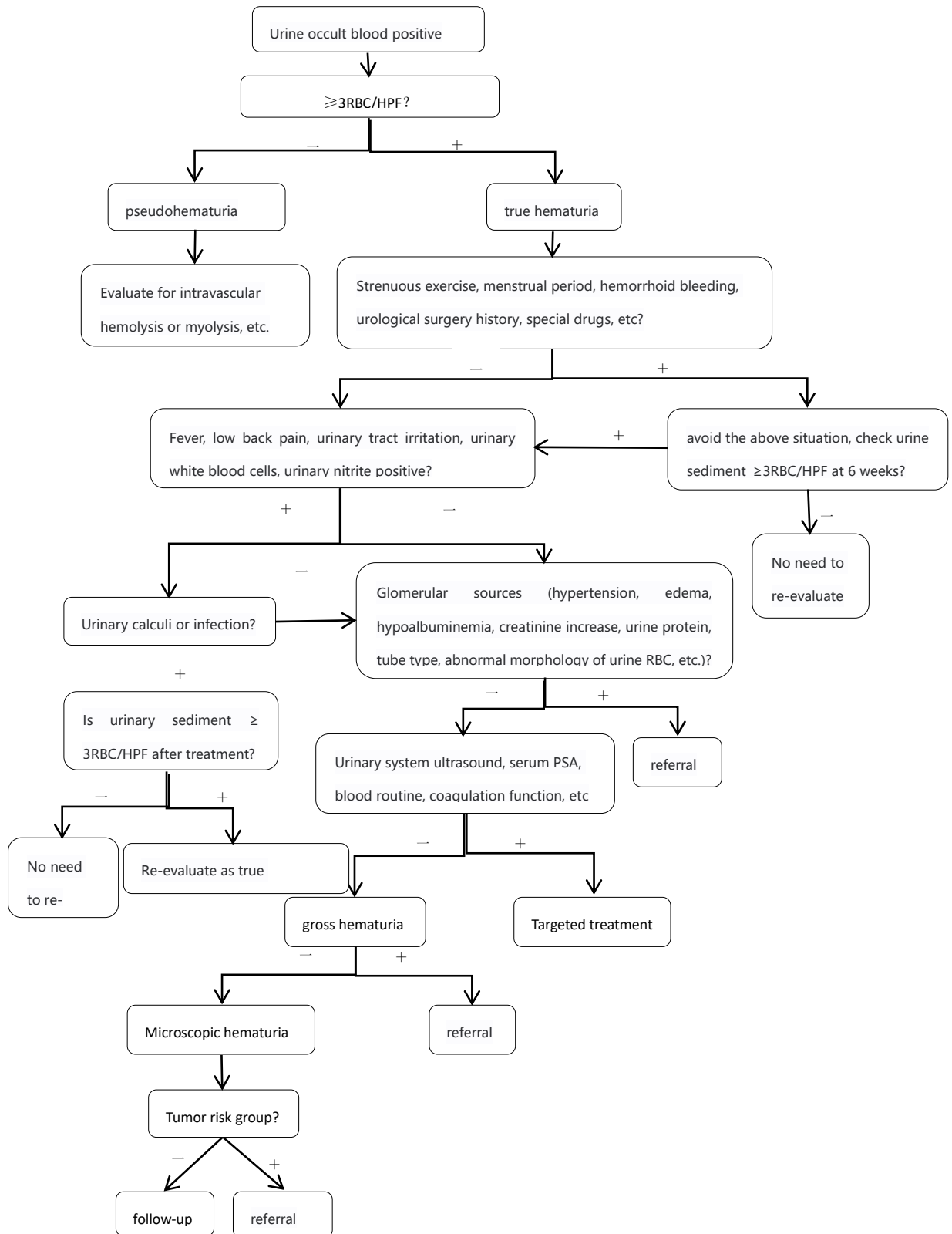
up regularly.

3.2.5 Pay attention to prevention (1)Smoking is the most important carcinogen of bladder cancer^[12], so smokers should be informed to quit smoking. (2)Measures should be taken in daily life to avoid various factors that may cause or aggravate kidney injury, such as proper drinking water, avoid holding urine, prevent infection, avoid overwork, especially avoid the use of drugs with kidney damage; once infection occurs, nephrotoxic drugs should also be avoided during active treatment. (3) Avoid long-term exposure to industrial chemical products.

3.3 Return visit or follow-up visit Studies have found that microscopic hematuria may be an early warning signal of bladder cancer^[13]. Persistent asymptomatic simple microscopic hematuria is associated with a significantly increased risk of end-stage renal disease (ESRD) in 16-25 year olds^[14].Due to the high risk of malignant tumors in males, long-term smokers and those older than 35 years old, attention should be paid to this group, and cystoscopy and other examinations should be further improved if necessary^[3];Urine analysis should be performed once a year for patients with persistent microscopic hematuria who are negative on all tests. If the results were negative for 2 consecutive years, no further urinalysis was required. If there is still persistent or recurrent asymptomatic microscopic hematuria, the patient should be considered for a comprehensive evaluation in 3-5 years^[1,15].

Patients are advised to seek timely medical treatment in case of increased urine blood volume (such as gross hematuria or dark urine color, blood clots, etc.) or increased frequency of blood in urine or other new symptoms during follow-up.

3.4 Referral If the etiology of hematuria cannot be determined at first visit, especially for patients over 35 years of age [1], the patient should be referred to the Department of nephrology or urology or a superior hospital for further examination: Intravenous pyelography (IVP), retrograde pyelography or ureteroscopy, CT scan, cystoscopy, renal arteriography, urine cytology, 24 h urine calcium test, renal cytology and histology, etc. Referral should also be considered for patients with persistent microscopic hematuria, urine erythrocyte malformation, elevated Scr, or elevated urinary albumin/creatinine ratio, especially those with a family history of nephropathy^[16].As the risk of malignant tumor in patients with gross hematuria is 10% to 40%, urological consultation or referral is recommended for all patients with gross hematuria^[3,17] (FIG. 1).



Note: RBC= Red Blood Cell , HPF=High Power Field, PSA= Prostate Specific Antigen; + means Yes, - means

No

Figure 1 Flow chart of adult hematuria diagnosis and treatment

To sum up, for general practitioners, especially those in primary health institutions, it is recommended to conduct comprehensive assessment based on medical history, physical examination and auxiliary examination, identify serious or special diseases, find the cause, make preliminary diagnosis and explanation, and invite patients to participate in the development of a set of feasible and personalized diagnosis and treatment plan. For patients with hematuria of unknown cause, especially those with asymptomatic microscopic hematuria, necessary follow-up plans should be made for the patients according to their conditions, so as to detect potential lesions in time. General practitioners should help patients in need of referral contact specialist, make timely referrals, and fully play the role of a coordinator.

Author contribution: Qin Hongli put forward the idea of writing the paper, collected and sorted out the literature, and wrote the paper; Ren Jing Jing was responsible for the quality control and review of the article, as well as the overall supervision of the article.

There is no conflict of interest in this article.

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