

# Diagnosis and Management of Hematuria



Gabriella J. Avellino, MD, Sanchita Bose, MD, David S. Wang, MD\*

## KEYWORDS

- Hematuria • Trauma • Malignancy • Infection • Urolithiasis • Workup
- Clot retention • CBI

## KEY POINTS

- Hematuria can be caused by a variety of etiologies, found along the entire genitourinary tract, including urolithiasis, urinary tract infection, malignancy, iatrogenic causes and trauma.
- The most important aspects of triaging and initial management of a patient with hematuria are assessing hemodynamic stability, determining the underlying cause of hematuria, and ensuring urinary tract drainage.
- Hematuria workup should be pursued in all patients presenting with hematuria in whom benign causes of bleeding have been ruled out.

## INTRODUCTION

Hematuria is a complex condition with a multitude of causes and treatments. It can be a daunting situation when an otherwise nonurologic surgical patient has this condition. This article provides an overview of the many aspects of this condition and provides guidelines for treatment. In general, collaboration with the urology, and occasionally nephrology, services is recommended in treating the general surgery patient with hematuria. After reading this article, the reader will gain knowledge on common etiologies, diagnosis, treatment, outcomes, and follow-up of the surgical patient with hematuria to provide the best possible patient care.

Hematuria is commonly encountered in the inpatient setting where it accounts for 4% to 20% of inpatient urology consults and hospitalizations.<sup>1</sup> *Hematuria* is the presence of blood cells in the urine. Gross hematuria is when blood is visible in the urine. Microscopic hematuria is defined as 3 or more red blood cells per high-powered field in a properly collected urine sample.

The initial evaluation of patients presenting with gross hematuria is 3-fold: assess hemodynamic stability, determine the underlying cause of hematuria, and ensure urinary drainage. The most important consideration in the initial evaluation of a patient

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Department of Urology, Boston Medical Center, Boston University School of Medicine, 725 Albany Street, Suite 3B, Boston, MA 02118, USA

\* Corresponding author.

*E-mail address:* [DavidS.Wang@bmc.org](mailto:DavidS.Wang@bmc.org)

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with hematuria is hemodynamic stability with assessment of vital signs, physical examination, and hemoglobin/hematocrit, because an unstable patient must be treated emergently. Examples of etiologies of hematuria that may cause emergent bleeding include, but are not limited to, trauma such as intraperitoneal bladder rupture, ureteroarterial fistula, and hemorrhagic cystitis. By contrast, painless gross hematuria without hemodynamic compromise is a condition that is generally worked up on an outpatient basis. For this reason, it is extremely important to ensure that these patients have outpatient urologic follow-up scheduled.

The best approach to treating a patient with hematuria is to identify the underlying cause of hematuria, because the etiologies are diverse and often have very different treatments. Common etiologies of hematuria in the surgical inpatient include urinary tract infection (UTI), urolithiasis, malignancy, and trauma or iatrogenic causes (eg, traumatic urethral catheter placement or anticoagulation).

There are several medications (such as phenazopyridine, nitrofurantoin, phenytoin, and warfarin) that can cause or give the appearance of hematuria. Thus, inpatient medications should be evaluated. Additionally, patients may be anticoagulated, which may cause hematuria from a variety of sources such as benign prostatic hyperplasia (BPH) or undiagnosed urinary tract malignancies.

Gross hematuria should always be considered significant, because it is a sign of malignancy until proven otherwise. Roughly 4% of patients with microscopic hematuria and up to 40% of patients with gross hematuria could be harboring a malignancy.<sup>2</sup>

## RELEVANT ANATOMY AND PATHOPHYSIOLOGY

The etiology of hematuria can originate from anywhere along the urinary tract, including the kidneys, ureters, bladder, prostate, and urethra (**Table 1**).

### *Kidney and Ureter*

Specifically from the kidney, hematuria can be of glomerular origin, including medical renal disease, and nonglomerular origin, which includes urologic disorders. Urologic sources of hematuria from the kidney and ureter may include masses, both benign and malignant, infection, urolithiasis, arteriovenous malformation, and trauma.

Kidney masses may represent metastasis or be primary renal tumors. Although infrequent, the most common malignancies to metastasize to the kidneys include lung, colorectal, head and neck, breast, and gastrointestinal tumors.<sup>3</sup> Renal tumors can be intraparenchymal or urothelial. Upper tract urothelial tumors can be found anywhere along the ureters and in the renal pelvis.

<b>Kidney/Ureter</b>	<b>Bladder</b>	<b>Prostate</b>	<b>Urethra</b>
<ul style="list-style-type: none"> <li>• Glomerular</li> <li>• Tumor               <ul style="list-style-type: none"> <li>◦ Parenchymal</li> <li>◦ Urothelial</li> </ul> </li> <li>• Infection               <ul style="list-style-type: none"> <li>◦ Pyelonephritis</li> <li>◦ Calculi</li> </ul> </li> <li>• Trauma</li> <li>• Ureterooarterial fistula</li> </ul>	<ul style="list-style-type: none"> <li>• Uncomplicated cystitis</li> <li>• Radiation/hemorrhagic cystitis</li> <li>• Tumor</li> <li>• Trauma/rupture</li> </ul>	<ul style="list-style-type: none"> <li>• BPH</li> <li>• Prostate cancer</li> <li>• Prostatitis</li> </ul>	<ul style="list-style-type: none"> <li>• Urethritis</li> <li>• Trauma               <ul style="list-style-type: none"> <li>◦ Disruption</li> <li>◦ Traumatic Foley removal/placement</li> </ul> </li> <li>• Urethral mass</li> <li>• Urethral caruncle</li> <li>• Urethral stricture</li> </ul>

*Abbreviation:* BPH, benign prostatic hyperplasia.

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