JUSINDO, Vol. 8 No. 1, January-July 2026
p-ISSN: 2303-288X, e-ISSN: 2541-7207

Transient Gross Hematuria Following Urethral Catheterization in a Patient with Severe Intravesical Prostatic Protrusion: A Case Report from a Resource-Limited Setting

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ABSTRACT

Background: Gross hematuria in elderly men frequently raises suspicion of urological malignancy. However, benign anatomical conditions such as severe intravesical prostatic protrusion (IPP) may predispose patients to procedure-related bleeding, particularly following urethral catheterization. Objective: To describe transient gross hematuria following urethral catheterization in a patient with severe intravesical prostatic protrusion and to emphasize the importance of chronological clinical assessment in differentiating benign procedure-related bleeding from possible malignancy. Methods: This study is a descriptive single-patient case report. An 85-year-old man presented with acute urinary retention complicated by septic shock and acute kidney injury. Gross hematuria occurred immediately after urethral catheterization. Clinical evaluation included laboratory investigations and transabdominal ultrasonography. Results: Ultrasonography revealed severe benign prostatic enlargement (estimated volume 176 mL) with grade 3 IPP measuring 2.04 cm. The hematuria resolved spontaneously within 24 hours without clot formation or recurrence. No intravesical mass or hydronephrosis was identified. Conclusion: Severe IPP may predispose elderly patients to transient catheter-induced hematuria due to anatomical distortion and increased mucosal vulnerability. Recognition of this self-limiting presentation is particularly important in resource-limited settings to avoid unnecessary invasive investigations while maintaining appropriate oncologic vigilance.

Keywords: *Gross hematuria; intravesical prostatic protrusion; urethral catheterization; benign prostatic hyperplasia; case report*

INTRODUCTION

Gross hematuria in elderly men is a clinically significant finding and represents the predominant presenting symptom of bladder cancer, prompting timely urological evaluation due to its association with advanced disease stage and grade (Jakus et al., 2023; Yildiz et al., 2024). However, a substantial proportion of patients undergoing investigation for hematuria are ultimately found to have benign etiologies, highlighting the importance of careful diagnostic interpretation (Yildiz et al., 2024).

Benign prostatic hyperplasia (BPH) is one of the most prevalent benign conditions affecting aging men and is a major cause of lower urinary tract symptoms, bladder outlet obstruction, and acute urinary retention (Hamza et al., 2021). As the prostate enlarges, morphological changes may result in intravesical prostatic protrusion (IPP), characterized by protrusion of the prostatic median lobe into the bladder lumen (Hamza et al., 2021). Ultrasonographic assessment of IPP provides a reliable and non-invasive method for evaluating the severity of bladder outlet obstruction and correlates with symptom burden and post-void residual urine volume (Hamza et al., 2021).

Importantly, IPP—particularly when severe—may appear as a mass-like lesion at the bladder neck on ultrasonography or computed tomography, potentially mimicking bladder

carcinoma and complicating diagnostic evaluation (Ngowi et al., 2024; Şenel et al., 2020; Yildiz et al., 2024).

Urethral catheterization is frequently required in elderly patients presenting with acute urinary retention or sepsis; however, in the presence of severe IPP and distorted bladder-neck anatomy, urethral instrumentation may predispose to local mucosal trauma (Ngowi et al., 2024; Şenel et al., 2020). Although gross hematuria warrants exclusion of malignancy, it may also arise from benign prostatic pathology and follow a self-limiting course (Biswas 2025; Mathabe 2020; Szymkiewicz 2025).

This case report aims to describe transient gross hematuria following urethral catheterization in a patient with severe intravesical prostatic protrusion and to highlight the importance of chronological clinical assessment in differentiating benign procedure-related bleeding from possible malignancy, particularly in resource-limited settings (Hamza et al., 2021; Ngowi et al., 2024; Şenel et al., 2020; Vasdev et al., 2012; Yildiz et al., 2024). To our knowledge, reports specifically linking high-grade intravesical prostatic protrusion to transient, immediate post-catheterization gross hematuria in resource-limited settings remain limited in the contemporary literature.

RESEARCH METHOD

This study was prepared as a descriptive single-patient case report conducted in a secondary-level referral hospital in a resource-limited setting. The report focuses on the clinical presentation, diagnostic evaluation, management, and short-term outcome of transient gross hematuria following urethral catheterization in a patient with severe intravesical prostatic protrusion.

Clinical data were obtained through direct patient assessment and review of inpatient medical records. Information collected included medical history, physical examination findings, laboratory investigations, and imaging results. Laboratory evaluation consisted of complete blood count and renal function tests. Transabdominal ultrasonography was performed to assess prostate size, determine the degree of intravesical prostatic protrusion (IPP), and evaluate for possible upper urinary tract abnormalities. IPP was measured in the sagittal plane as the vertical distance from the bladder neck to the tip of the protruding prostate into the bladder lumen. IPP was measured during routine clinical ultrasonographic evaluation in the setting of acute urinary retention. Bladder volume was not deliberately standardized due to the emergent clinical context; however, measurement was performed under real-world conditions reflective of routine practice in resource-limited settings.

The sequence of clinical events—from admission and urinary retention to catheterization, onset of hematuria, therapeutic intervention, and subsequent resolution—was documented chronologically to ensure accurate clinical interpretation.

Case Presentation

An 85-year-old man was admitted to the emergency department with generalized weakness and inability to void for the past three days. Prior to this episode, he had experienced progressively worsening lower urinary tract symptoms, including urinary frequency and a sensation of incomplete bladder emptying. He denied any history of gross hematuria before admission.

On arrival, the patient appeared clinically unstable. On examination, he was alert with a Glasgow Coma Scale score of 15. He was hypotensive, with an initial blood pressure of 71/42 mmHg, which improved to 83/46 mmHg after initial fluid resuscitation. His heart rate was 90 beats per minute, respiratory rate 22 breaths per minute, temperature 36.8°C, and oxygen saturation 99% on room air.

Laboratory investigations demonstrated marked leukocytosis (33,000/µL), elevated blood urea nitrogen (99 mg/dL), and a serum creatinine level of 2.6 mg/dL, consistent with acute kidney injury. Septic shock was clinically suspected based on persistent hypotension despite fluid resuscitation and a presumed urinary source of infection.

Digital rectal examination demonstrated a markedly enlarged prostate with a smooth surface and elastic consistency, without palpable nodules. No blood was noted on the examining glove.

Transabdominal ultrasonography was performed to evaluate the urinary tract. The examination revealed severe benign prostatic enlargement with an estimated prostate volume of approximately 176 mL. A grade 3 intravesical prostatic protrusion measuring approximately 2.04 cm into the bladder lumen was identified. No intravesical mass or hydronephrosis was detected.

Figure 1. Ultrasonographic image demonstrating severe benign prostatic hyperplasia with an estimated prostate volume of approximately 176 mL and grade 3 intravesical prostatic protrusion indenting the posterior bladder wall.

Urethral catheterization was performed under aseptic technique to relieve urinary retention. Immediately after catheter insertion, gross hematuria without clot formation was observed in the drainage bag. The patient was managed with intravenous fluid resuscitation, empiric broad-spectrum antibiotics, and alpha-adrenergic blocker therapy for bladder outlet obstruction, and tranexamic acid as supportive therapy for hematuria.

Based on the clinical findings and imaging results, the patient was managed for presumed septic shock secondary to urinary tract infection in the setting of acute urinary retention caused by severe benign prostatic hyperplasia with grade 3 intravesical prostatic protrusion. The

episode of hematuria was considered most consistent with catheter-related mucosal trauma at the bladder neck.

The hematuria resolved spontaneously within 24 hours without recurrence during hospitalization.

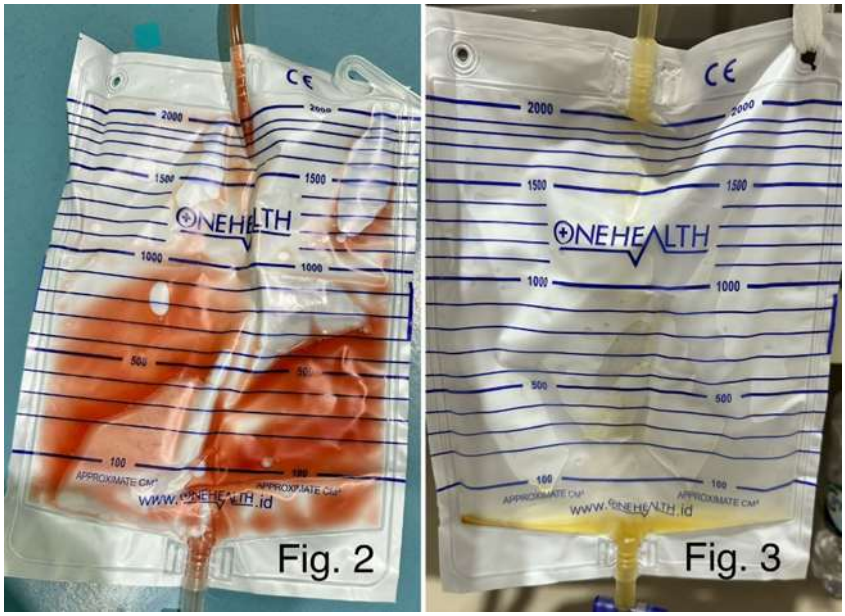

Figure 2. Gross hematuria observed immediately after urethral catheterization, without clot formation in the urinary drainage bag.

Figure 3. Resolution of hematuria 24 hours after catheterization. The urine in the collection bag appears clear and yellowish, indicating spontaneous resolution without specific urological intervention.

The patient's hemodynamic status gradually stabilized, renal function improved, and he was discharged in stable condition with an indwelling urinary catheter and scheduled outpatient follow-up. The patient was followed for 10 days after discharge without recurrence of hematuria. Further cystoscopic evaluation was not performed due to limited diagnostic resources and patient preference.

RESULT AND DISCUSSION

This case highlights the clinical relevance of severe intravesical prostatic protrusion (IPP) in an elderly patient with benign prostatic hyperplasia presenting with acute urinary retention and septic shock. IPP has been consistently identified as a reliable anatomical marker of bladder outlet obstruction severity and correlates with increased post-void residual urine, reduced urinary flow rate, and worsening lower urinary tract symptoms (Hamza et al., 2021). Recent studies have further demonstrated a significant negative correlation between IPP and maximum urinary flow rate, reinforcing its role as an objective indicator of bladder outlet obstruction (Billah et al., 2024; Gezmiş et al., 2026).

Intravesical prostatic protrusion has been described as producing a "ball-valve" type obstruction at the bladder neck, leading to distortion of the prostatic urethra and altered urinary flow dynamics (Okedere et al., 2023). Higher grades of IPP have also been associated with distinct anatomical configurations of the bladder outlet, which may influence urinary function and increase susceptibility to procedural manipulation (Billah et al., 2024). In patients with

marked prostatic enlargement, hyperplastic tissue may exhibit prominent vascularity, potentially increasing susceptibility to bleeding during urethral instrumentation (Oyibo et al., 2023). In the present case, the combination of severe prostate enlargement and grade 3 IPP likely contributed to localized mucosal vulnerability during catheter insertion.

High-grade IPP reflects marked distortion of the bladder neck and intravesical anatomy, which may complicate urinary drainage and increase susceptibility to procedural difficulties during urethral catheterization (Ngowi et al., 2024; Vasdev et al., 2012). Several reports have demonstrated that severe or giant IPP may appear as a mass-like lesion within the bladder on ultrasonography or computed tomography, frequently leading to diagnostic confusion with bladder carcinoma, particularly in elderly men presenting with hematuria (Ngowi et al., 2024; Şenel et al., 2020; Yildiz et al., 2024).

In the present case, gross hematuria occurred immediately following urethral catheterization and resolved spontaneously within 24 hours without clot formation or recurrence. The clear temporal association with urethral instrumentation strongly supports a procedure-related etiology. Catheter-related urethral injuries are commonly partial and may resolve after a short period of bladder drainage (Harrison et al., 2024). Recent large-cohort data demonstrate that gross hematuria occurs in approximately 50% of traumatic urethral catheterization cases, with a minority progressing to catheter-associated urinary tract infection or sepsis, highlighting the potential morbidity associated with iatrogenic injury (Lawton et al., 2024). Contemporary multi-institutional data report an overall incidence of traumatic urethral catheterization of approximately 6 per 1,000 catheterizations, with a substantial proportion of affected patients requiring urological intervention and a subset necessitating suprapubic diversion, underscoring the clinical burden of iatrogenic injury (Croghan et al., 2022; Lawton et al., 2024; O'Connor et al., 2023). Integrative evidence further indicates that gradual bladder decompression does not significantly reduce the incidence of post-catheterization hematuria compared with rapid decompression, and a recent systematic review and meta-analysis similarly found no increased risk of hematuria with rapid decompression in patients with urinary retention (Wu et al., 2022; Meira et al., 2024). Hematuria following bladder decompression has been attributed to a sudden reduction in intravesical pressure leading to mucosal hyperemia and venous rupture, a mechanism historically described as decompressive or "ex vacuo" hematuria (Meira et al., 2024).

Visible hematuria remains the most common presenting symptom of bladder cancer and has been associated with higher tumor stage and grade (Jakus et al., 2023; Yildiz et al., 2024). Hematuria may also arise from benign prostatic conditions and requires careful clinical correlation (Vasdev et al., 2012). In this patient, the absence of persistence or recurrence, together with benign imaging findings, favors a transient and procedure-related cause.

The rapid resolution of hematuria in this patient, despite concurrent septic shock and acute kidney injury, suggests that systemic infection or renal dysfunction was unlikely to be the primary source of bleeding (Vasdev et al., 2012). Severe IPP likely acted as a predisposing anatomical factor by altering the alignment of the bladder neck and prostatic urethra, thereby increasing vulnerability to focal mucosal injury during catheter insertion (Ngowi et al., 2024; Şenel et al., 2020). The most plausible source of bleeding in this scenario is the bladder neck or prostatic urethra, where hyperplastic and potentially hypervascular prostatic tissue may be particularly susceptible to mechanical trauma (Ngowi et al., 2024; Vasdev et al., 2012).

Although tranexamic acid was administered, the immediate onset and self-limiting nature of the hematuria support a localized mechanical cause rather than a systemic coagulopathy (Vasdev et al., 2012). Integrative analyses have also shown that most post-catheterization hematuria episodes are transient and self-limited; however, rare cases may require transfusion or hemodynamic support, particularly in elderly patients with BPH-related urinary retention (Meira et al., 2024).

Nevertheless, gross hematuria in elderly patients should always prompt consideration of underlying urological malignancy. Updated AUA/SUFU hematuria guidelines and contemporary European Association of Urology recommendations emphasize risk-stratified evaluation, including cystoscopy and appropriate upper-tract imaging, to exclude urothelial carcinoma in patients presenting with visible hematuria (Barocas et al., 2025; European Association of Urology, 2025; Sandhu et al., 2024). The AUA risk-stratified framework further demonstrates that bladder cancer incidence increases substantially in high-risk patients, reaching over 6% in contemporary validation cohorts, thereby justifying thorough evaluation in elderly patients presenting with visible hematuria (Woldu et al., 2021). Definitive exclusion generally requires cystoscopic and histopathological evaluation (Jakus et al., 2023; Yildiz et al., 2024). In the present case, further invasive evaluation was not feasible due to limited diagnostic resources and patient preference, underscoring the importance of careful clinical reasoning and chronological assessment of symptoms in real-world practice (Ngowi et al., 2024; Yildiz et al., 2024).

Accordingly, the diagnosis of catheter-related hematuria in this patient represents a diagnosis of exclusion, supported by the temporal relationship to urethral instrumentation, benign imaging findings, and spontaneous resolution (Ngowi et al., 2024; Vasdev et al., 2012; Yildiz et al., 2024). However, long-term surveillance is required to definitively exclude occult malignancy. Recognition of severe intravesical prostatic protrusion as a potential contributor to transient, procedure-related hematuria may assist clinicians in contextualizing post-catheterization bleeding and avoiding unnecessary invasive investigations in selected patients, while maintaining appropriate vigilance for occult malignancy.

CONCLUSION

In patients with severe intravesical prostatic protrusion (IPP), gross hematuria occurring immediately after urethral catheterization may represent a transient and self-limiting event rather than an indication of underlying malignancy. In this case, the close temporal relationship between catheter insertion and bleeding, together with spontaneous resolution and supportive imaging findings, suggested a procedure-related cause. Recognizing this possibility is particularly important in resource-limited settings, where access to advanced diagnostic tools may be limited. Nonetheless, clinicians should remain cautious and consider further evaluation when clinically indicated. Future studies are needed to better understand the frequency of, and preventive strategies for, catheter-related hematuria in patients with significant intravesical prostatic protrusion.

This case report has several limitations. First, cystoscopic and histopathological evaluations were not performed, limiting the ability to definitively exclude underlying urological malignancy. Although the clinical course, imaging findings, and spontaneous resolution of hematuria strongly suggested a benign procedure-related etiology, occult

malignancy cannot be ruled out with absolute certainty. Second, ultrasonography was the only imaging modality available; more sensitive diagnostic tools such as computed tomography urography or cystoscopy were not feasible due to limited resources. Third, as a single-patient case report, causality cannot be established, and the findings may not be generalizable to all patients with benign prostatic hyperplasia or severe IPP. Nevertheless, the report highlights a clinically relevant scenario frequently encountered in resource-limited settings.

Written informed consent was obtained from the patient (or the patient's legal representative) for publication of this case report and accompanying clinical images. The patient's identity was anonymized to ensure confidentiality. All procedures performed were in accordance with institutional clinical standards and the ethical principles outlined in the Declaration of Helsinki. Ethical approval was waived in accordance with local institutional regulations for single case reports.

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