#833: The Role of Microhematuria (MH) in the Detection of Urinary Tract Cancer in Urogynecology Patients

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Hypothesis / aims of study

Hematuria, the presence of red blood cells in urine, can be classified as microscopic (MH) or macroscopic. While often benign, it may indicate urinary tract malignancies, especially bladder cancer. MH is found in up to 18% of adults and presents a diagnostic challenge due to the low probability (0.5-5%) of underlying cancer [1]. This study investigates the correlation between MH and urinary tract cancer in women at a urogynecology clinic.
While the evaluation of hematuria has been extensively studied in older adults and individuals with known risk factors for urinary tract cancer (smoking history, exposure to certain chemicals, or a family history of urinary tract cancers), it is particularly relevant in urogynecologic patients. This subpopulation often presents with benign conditions such as pelvic organ prolapse, urinary incontinence, and previous pelvic surgeries, all of which can increase the prevalence of MH.
Additionally, women face a 3- to 4-fold higher risk of bladder cancer and a 1.5- to 2-fold higher risk of renal cancer compared to men, making the diagnostic workup and management of hematuria even more complex in this group [2]. Investigating the correlation between MH and urinary tract cancer in women attending urogynecology outpatient clinics can provide valuable insights into improving the diagnostic pathways and addressing the unique risks in this patient population. By refining the evaluation process, this research aims to enhance patient outcomes and reduce the burden of urinary tract malignancies in urogynecologic care.

Study design, materials and methods

A retrospective cohort study was conducted. All 3324 patients (6239 visits) who attended the urogynecology outpatient clinic at the University Hospital of Vienna between April 2013 and March 2023 were included. Demographic and clinical data, including results from dipstick urine analyses, were extracted from electronic patient records using the Research Documentation and Analysis (RDA©) software. All data were manually checked for plausibility, and additional information was retrieved from patient files when necessary. Urine analysis results were categorized as either positive for hematuria (MH-positive), negative for hematuria (MH-negative), or not documented (MH-not documented). In patients with multiple urine analyses, the first MH-positive finding and the last MH-negative finding were defined as index points.
The primary outcome of interest was the diagnosis of urinary tract malignancies, which included cancers of the kidneys, ureters, bladder, and urethra (ICD-10 codes C64-68).
These diagnoses were cross-referenced with data from the Austrian national cancer registry through Gesundheit Österreich GmbH (GÖG). All cancer cases diagnosed in Austria are logged in this registry. Matching attributes were used to link the patient records with the cancer registry. Once matches were confirmed, additional records related to hospital stays and outpatient visits were retrieved for further verification, with a specific focus on identifying relevant ICD-10 diagnoses. This process resulted in a final sample of 2621 patients out of the original 3324.
Statistical analyses included calculating the frequency of MH findings and urinary tract cancers. Sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV) were calculated to evaluate the diagnostic accuracy of dipstick hematuria in detecting urinary tract malignancies. For the association between MH and cancer diagnosis, Fisher's exact test was performed, and the significance level was set at 0.05. All statistical analyses were conducted using the R programming language (version 4.2.2).

age in years, mean (SD)	57.8 (15.5)
patients aged <60 years, n (%)	1765 (53.1)
parity, median (IQR)	2 (2)
nicotine consumption, n (%)	
no	1521 (45.8)
yes	389 (11.7)
NA	1414 (42.5)
urinary incontinence, n (%)	
no	892 (26.8)
yes	2000 (60.2)
NA	432 (13)

Table 1. Baseline characteristics

Results and interpretation

The study analyzed a total of 3324 patients who visited the urogynecology outpatient clinic during the study period. The baseline characteristics are summarized in Table 1. Mean age of the patients was 57.8 years (SD: 15.5), with 53.1% under the age of 60. The median parity was two, and 45.8% of the patients were non-smokers. A significant proportion (60.2%) had a history of urinary incontinence, while 26.8% did not report any urinary incontinence. Out of the 3324 patients, 267 (8.0%) had positive MH findings, 2014 (60.6%) had negative findings, and 1043 (31.4%) had undocumented results.

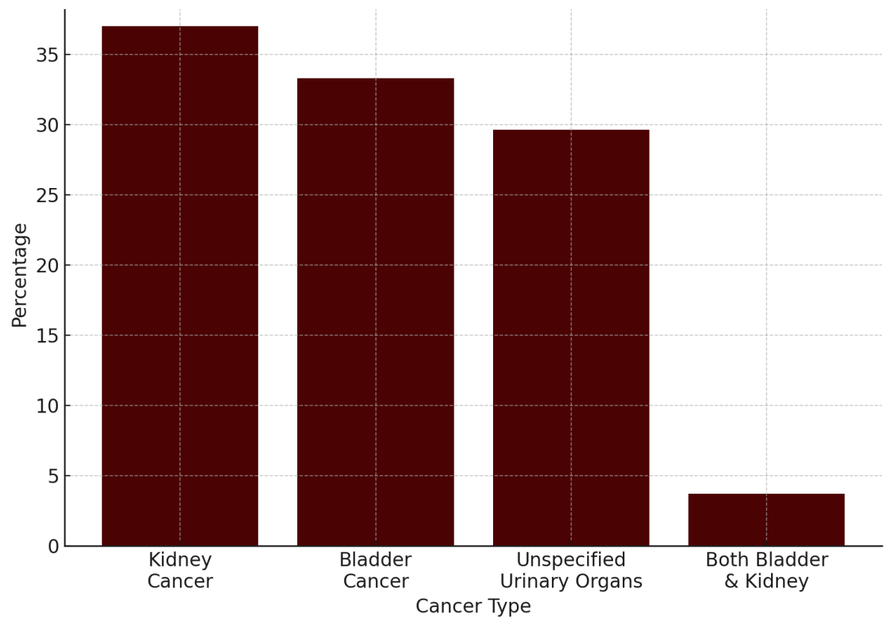
Cross-referencing the patient data with the national cancer registry identified 27 cases of urinary tract cancer (0.8%) during the study period. Among these, five patients (1.9%) had positive MH results, seven (0.4%) had negative findings, and 15 (1.4%) had undocumented results. The correlation between MH findings and cancer diagnosis is presented Table 3.

	MH finding			
urinary tract cancer	**positive** n (%) 95% CI	**negative** n (%) 95% CI	**not documented** n (%) 95% CI	total
No	262 (98.1%) CI: 96.9 - 99.4	2007 (99.7%) CI: 99.4 - 99.9	1028 (98.6%) CI: 97.6 - 99.6	3297
Yes	5 (1.9%) CI: 0.6 - 3.1	7 (0.4%) CI: 0.1 - 0.6	15 (1.4%) CI: 0.4 - 2.4	27
Total	267	2014	1043	3324

Table 3. Absolute and percentage frequencies of urinary tract cancer and MH findings

Further analysis revealed that the majority of the detected cancers were kidney cancer (37.04%) and bladder cancer (33.33%), while 29.63% were classified as malignant neoplasms of unspecified urinary organs (Figure1). One patient had both bladder and kidney cancer. The median time between a positive MH finding and urinary tract cancer diagnosis was 169 days.

Figure 1. Distribution of Urinary Cancer Types



The diagnostic accuracy of hematuria on dipstick for detecting urinary tract malignancies was evaluated (Table 3). The sensitivity of the test was found to be 41.7%, while the specificity was 88.5%. The positive predictive value (PPV) was 1.9%, indicating that a positive MH result corresponded to a cancer diagnosis in fewer than 2% of cases. However, the negative predictive value (NPV) was 99.7%, suggesting that a negative MH result reliably ruled out urinary tract cancer.

Diagnostic Metric	**Value (%)**
Sensitivity	41.7
Specificity	88.5
Positive Predictive Value (PPV)	1.9
Negative Predictive Value (NPV)	99.7

Table 4. Diagnostic metrics of hematuria test on diagnosing urinary tract cancer

Conclusions

Positive MH was significantly associated with urinary tract cancer (p=0.008), but the low positive predictive value (1.9%) suggests limited utility of MH screening for cancer detection in this population. However, the high NPV (99.7%) indicates that a negative test is highly reliable for ruling out cancer. Further research should focus on risk stratification to optimize diagnostic efficiency.

References

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