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Assessing the Safety of Omitting Routine Preoperative Urine Cultures in Asymptomatic Patients Undergoing Urological Surgery

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ABSTRACT

Background: Urinary stone disease is a prevalent clinical concern, with incidence varying across regions. Minimally invasive procedures—shockwave lithotripsy (SWL), ureteroscopy (URS), and percutaneous nephrolithotomy (PCNL)—are commonly used but carry a risk of postoperative infection. The necessity of routine preoperative urine cultures in asymptomatic patients remains uncertain, especially when dipstick testing shows no evidence of infection.

Objective: This study examined whether omitting preoperative urine cultures in asymptomatic patients with negative nitrite dipstick results affects infection rates following SWL, URS, or PCNL.

Methods: We retrospectively analyzed 268 patients treated between July 2023 and June 2024. All had negative nitrite results on preoperative dipstick testing and no recent history of urinary tract infection. Patients underwent SWL (n=80), URS (n=113), or PCNL (n=75). We reviewed

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https://ghsjournal.com/

postoperative records for UTIs, febrile episodes, and related outcomes. **Results:** No infections or fevers occurred in the SWL group. Among URS patients, 1.8% developed UTIs after stent removal. In the PCNL group, 8.0% experienced postoperative fevers, though none had confirmed bacteremia or bacteriuria. The overall incidence of UTIs and febrile episodes was 0.7% and 2.2%, respectively.

Conclusion: For patients without urinary symptoms and negative nitrite dipstick results, routine preoperative urine cultures may be unnecessary. Adopting a selective approach could help reduce antibiotic overuse and unnecessary testing, aligning with antimicrobial stewardship goals.

Keywords: Urolithiasis; Asymptomatic Bacteriuria; Preoperative Screening; Postoperative Infection; Antimicrobial Stewardship; Endourology

INTRODUCTION

Urinary stone disease, or urolithiasis, is a significant global health concern with varying prevalence across different regions. In the United States, the lifetime incidence is approximately 10% in men and 7% in women.[1] In the Indian subcontinent, particularly in regions like northern India and parts of Pakistan, the prevalence is notably higher, with certain areas identified as "stone belts" due to elevated incidence rates.[2–4] Factors contributing to this increased prevalence include high ambient temperatures, dietary practices rich in oxalates and low in fluids, and suboptimal water quality.[2,5,6] A number of studies, including systematic reviews from our region have highlighted the significant burden of urolithiasis, identifying both environmental and genetic predispositions as primary risk factors in addition to the substantial variations in stone composition and prevalence across urban and rural populations.[7–9]

Management of urolithiasis often involves minimally invasive surgical interventions such as shockwave lithotripsy (SWL), ureteroscopy (URS), and percutaneous nephrolithotomy (PCNL). While these procedures are effective in stone removal, they are associated with potential postoperative complications, notably urinary tract infections (UTIs) and sepsis.[10–12] The incidence of postoperative UTIs varies by procedure, with reported rates ranging from 9%-67% for for URS and as 10.2%-58% for PCNL.[13] These complications not only increase patient morbidity but also prolong hospital stays and escalate healthcare costs.

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https://ghsjournal.com/

To mitigate the risk of postoperative infections, preoperative urine cultures are routinely performed to detect and treat asymptomatic bacteriuria (ASB), defined as the presence of bacteria in urine without clinical symptoms of a UTI.[12]

Asymptomatic bacteriuria is relatively rare among younger women, with a prevalence of 2.7% in those aged 15 to 24 years. However, its frequency increases with age, affecting 20% to 50% of women aged 80 and older. Among men, the condition is less common but follows a similar pattern, rising from 6% to 20% in those over 80 years of age. In long-term care facilities, asymptomatic bacteriuria is particularly prevalent, with rates reported between 25% and 50% among residents.

Asymptomatic bacteriuria shows age- and sex-related variation in prevalence. In women aged 15 to 24 years, it affects approximately 2.7%, but this figure increases dramatically to 20%–50% in women over the age of 80. In men, the prevalence is lower overall but still rises with age, ranging from 6% to 20% in those older than 80. This condition is especially common among individuals in long-term care settings, where 25%–50% of residents are affected.[14]

Screening for and treating ASB before urological procedures assumes that eliminating bacteriuria reduces the risk of postoperative infectious complications. However, the necessity of routine preoperative urine cultures in patients without a history of UTIs or symptoms is increasingly questioned.[15–17] Current guidelines, including those from the American Urological Association (AUA), recommend preoperative urine cultures only for patients with positive urinalysis findings or a history of recurrent UTIs.[18] Additionally, the Infectious Diseases Society of America (IDSA) advises against screening for ASB in most populations, including premenopausal women and patients undergoing non-invasive urological procedures.[19] Although preoperative urine cultures are widely used to screen for infection risk, their benefit in asymptomatic patients is increasingly debated. Several studies have found no meaningful difference in postoperative infection rates between those who had urine cultures before surgery and those who did not [20–22]. These findings suggest that routine screening in this context may offer limited benefit and, in some cases, introduce delays or unnecessary antibiotic use [20].

There is also concern that treating bacteriuria without symptoms contributes to antimicrobial resistance—an issue the World Health Organization has classified as a global threat [23,24]. Prescribing antibiotics without clear indications can promote resistant strains, complicating infection management. In response, clinical guidelines now emphasize targeted antibiotic use and discourage routine treatment of asymptomatic bacteriuria in low-risk patients [23].

GLOBAL HEALTH & MEDICINE
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https://ghsjournal.com/

In areas with limited health infrastructure—such as parts of the Indian subcontinent—tailored approaches are especially important. Local studies highlight the need for practical, cost-conscious strategies that maintain patient safety without overusing resources [25–29].

This study examines the frequency of postoperative infections in patients undergoing SWL, URS, or PCNL who had negative preoperative nitrite tests and did not receive urine cultures. Our aim is to evaluate whether urine cultures can be safely omitted in such cases. The findings may inform more targeted preoperative workflows, especially in resource-limited settings where urolithiasis is common and antimicrobial stewardship is a growing priority.

MATERIAL & METHODS

We conducted a retrospective cohort study at Sami Medical Center in Abbottabad to assess infection outcomes in patients undergoing SWL, URS, or PCNL. Our focus was on asymptomatic individuals who had negative results on preoperative nitrite dipstick tests and did not undergo urine cultures.

The study included adults treated for urinary stones between July 2023 and June 2024. Patients were excluded if they had a UTI within the past month, a history of recurrent infections, struvite stones, or recent urological surgery. We also excluded those scheduled for staged or repeat procedures during the study period.

All procedures were performed by a single urologist using standardized techniques. Antibiotic prophylaxis was administered based on AUA guidelines and tailored to procedure type. Outcomes included febrile episodes and UTIs confirmed by clinical symptoms and culture. We also recorded readmissions and positive blood cultures. Data were analyzed using descriptive and comparative statistics, with significance set at $p < 0.05$.

RESULTS

A total of 268 patients were included in the study. Among them, 154 (57.5%) were male and 114 (42.5%) were female, with ages ranging from 28 to 55 years (mean: 41.6 years). The distribution of patients across the three procedures was as follows:

- **SWL:** 80 patients (29.9%)

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https://ghsjournal.com/

- **SWL Group:** None of the 80 patients in this group experienced postoperative UTIs or febrile episodes. This underscores the low-risk profile of SWL, which avoids direct urinary tract instrumentation

- **URS:** 113 patients (42.2%)
  - Two patients (1.8%) out of 113 developed UTIs postoperatively. Both presented with fever and dysuria after stent removal, requiring readmission for intravenous antibiotic therapy. Urosepsis was confirmed in both cases, but the patients recovered without further complications.
- **PCNL:** 75 patients (28.0%)
  - Six patients (8.0%) experienced febrile episodes following surgery. None of these cases were associated with bacteremia or bacteriuria, as confirmed by negative blood and urine cultures. These fevers were attributed to systemic inflammatory responses and resolved with supportive care.

Overall Outcomes

The overall incidence of postoperative UTIs was 0.7% (2 out of 268 patients), and febrile episodes occurred in 2.24% (6 out of 268 patients). Statistical analysis revealed no significant association between procedure type and UTI rates ($p = 0.24$). However, febrile episodes were significantly more frequent in PCNL patients compared to SWL and URS groups ($p = 0.006$).

Discussion

This study demonstrates that routine preoperative urine cultures can be safely omitted in asymptomatic patients undergoing SWL, URS, or PCNL when preoperative nitrite dipstick tests are negative. The findings contribute to a growing body of evidence suggesting that selective preoperative screening based on risk stratification can optimize patient care and resource utilization.

Postoperative complications varied by procedure type, consistent with their respective degrees of invasiveness. SWL, the least invasive approach, resulted in no UTIs or febrile episodes. This aligns with its extracorporeal nature, which avoids direct urinary tract manipulation. In contrast, URS patients experienced a low but notable rate of UTIs (1.8%). These infections likely stem from the procedural use of ureteroscopic instruments and stents, underscoring the importance of perioperative antibiotic coverage and careful postoperative monitoring.

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PCNL patients exhibited the highest rate of febrile episodes (8.0%), a finding consistent with prior studies linking this procedure to systemic inflammatory responses. Importantly, none of the observed febrile episodes were linked to bacteremia, indicating a likely inflammatory rather than infectious cause. Distinguishing between sterile inflammation and true infection is essential in guiding clinical management and avoiding unwarranted antibiotic use.

These outcomes are in line with earlier studies showing that asymptomatic bacteriuria (ASB) does not play a major role in postoperative infections following minimally invasive urologic procedures [15–17,20–22]. Prior evidence suggests that treating ASB does not meaningfully lower infection rates after surgery and may, in fact, contribute to unnecessary antibiotic use and resistance [17,20,23]. Our findings reinforce the case for a selective approach to preoperative urine screening, guided by patient-specific risk factors.

By focusing on asymptomatic individuals without a history of UTIs, this study supports a more judicious use of preoperative urine cultures. Reducing routine screening in such cases may lower costs, improve procedural efficiency, and help curb inappropriate antibiotic prescribing—goals that align closely with antimicrobial stewardship initiatives. This approach is also consistent with international recommendations that advocate for individualized preoperative assessment rather than uniform testing.

Study Limitations

This retrospective, single-center study may limit generalizability. The small number of patients who developed infections also restricts the ability to detect rarer complications. Additionally, outcomes were limited to the early postoperative period, and longer-term risks were not evaluated.

Future Directions

Prospective multicenter research is needed to confirm these findings across broader populations. Incorporating molecular diagnostics may improve risk stratification. Longer follow-up would help clarify the impact on delayed infections and overall patient outcomes.

Conclusion

Our results suggest that omitting routine preoperative urine cultures in asymptomatic patients undergoing minimally invasive urological procedures is both safe and clinically appropriate. This targeted strategy supports better resource use and strengthens antimicrobial stewardship efforts.

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