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Cost-benefit of renal ultrasound in low back pain presenting to a urology outpatient clinic: A retrospective study of 126 cases

Rharmili Y*, Issam Benali, Mohamed Belaghzal, Youssef Retal, Zakaria Bakali Issaoui and Abdelhak Khallouk

Department of Urology, Mohammed VI University Hospital, Tangier, Morocco.

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Abstract

Background: Low back pain is a frequent complaint in urology outpatient consultations. While renal ultrasonography is widely used as a first-line imaging modality, its systematic application regardless of clinical context raises questions of cost-effectiveness. The actual proportion of urological causes among all low back pain presentations remains poorly documented in North African settings.

Methods: A retrospective single-center observational study was conducted at the Department of Urology, Mohammed VI University Hospital, Tangier, Morocco, between January 2020 and March 2022. All consecutive patients consulting for low back pain were included. Demographic data, associated symptoms, laterality, and ultrasonographic findings were collected and analyzed.

Results: A total of 126 patients were included. The sex-ratio was 0.8 (female predominance, 55.6%). The mean age was 49 years. Right-sided pain predominated (43.6%), followed by bilateral (29.3%) and left-sided pain (26.9%). Associated urinary symptoms were the most frequent finding (24.6%), ahead of digestive (6.3%), neurological (7.9%), and osteoarticular causes (3.9%). Renal ultrasound was performed in all patients and was clinically significant in 34.9% of cases.

Conclusion: Urological causes account for only one-third of low back pain presentations in a urology outpatient setting. Systematic renal ultrasonography without prior clinical selection yields a low diagnostic return (34.9%) and may be reserved for patients with associated urinary symptoms. A thorough history and physical examination remain the cornerstone for selecting patients who will benefit from imaging.

Keywords: Low back pain; Renal ultrasound; Urology outpatient; Diagnostic yield; Cost-benefit; Etiological workup

1. Introduction

Low back pain is one of the most common musculoskeletal complaints worldwide and represents a frequent reason for consultation across multiple medical specialties, including urology [1]. In the urology outpatient setting, low back pain may be a presenting symptom of a wide variety of conditions, ranging from urinary tract obstruction and nephrolithiasis to non-urological causes such as lumbar disc disease, functional gastrointestinal disorders, and musculoskeletal pathology.

The diagnostic approach to low back pain in urology typically involves clinical assessment supplemented by imaging, with renal ultrasonography representing the most accessible and widely used modality. However, several studies have demonstrated that the utilization of diagnostic imaging in patients with low back pain is significantly higher than recommended by clinical guidelines [1,2]. This "over-use" of ultrasound may be driven by patient expectations, medicolegal concerns, and the availability of the technology, rather than by strict clinical indications [3].

* Corresponding author: Rharmili Y

Renal ultrasonography, while non-invasive and radiation-free, carries indirect costs — including examination time, patient anxiety, and the risk of incidental findings requiring further workup — that are often underestimated [3,4]. Furthermore, early or indiscriminate imaging has been shown to have a negative impact on the quality of life of patients with non-specific low back pain by reinforcing a biomedical illness narrative [4,5].

Despite the frequent use of ultrasonography in this context, data on its actual diagnostic yield and cost-benefit profile in the urology outpatient setting remain limited, particularly in North African countries where imaging resources are not uniformly distributed. The present study aimed to evaluate the prevalence of urological causes among patients presenting with low back pain to a urology outpatient clinic, to characterize the etiological spectrum, and to assess the diagnostic yield of systematic renal ultrasonography, with the goal of informing a more selective imaging strategy based on clinical history.

2. Material and Methods

2.1. Study design and setting

This was a retrospective single-center observational study conducted at the Department of Urology, Mohammed VI University Hospital, Tangier, Morocco. The study period spanned from January 2020 to March 2022 (26 months).

2.2. Patients

All consecutive patients presenting to the urology outpatient clinic with a chief complaint of low back pain during the study period were eligible for inclusion. There were no exclusion criteria based on age, sex, or comorbidities. Patients referred for a known urological condition without low back pain as a primary complaint were excluded.

2.3. Data collection

Data were retrospectively extracted from medical records using a standardized case report form. The following variables were collected:

- Demographic data: age, sex.
- Pain characteristics: laterality (right, left, bilateral).
- Associated symptoms: urinary (dysuria, pollakiuria, urgency, hematuria, spontaneous passage of calculi), digestive (nausea, vomiting, functional colopathy), neurological (sciatica, disc herniation), and osteoarticular (arthralgia, bone pain).
- Ultrasonographic findings: all patients underwent renal ultrasonography. Results were classified as "significant" when they revealed a clinically relevant urological abnormality (hydronephrosis, renal or ureteral calculi, renal mass, or other obstructive uropathy) warranting further investigation or treatment.

2.4. Statistical analysis

Descriptive statistics were used to summarize data. Categorical variables were expressed as frequencies and percentages. Continuous variables were expressed as mean \pm standard deviation. Statistical analysis was performed using IBM SPSS Statistics software, version 25 (IBM Corp., Armonk, NY, USA). A p-value < 0.05 was considered statistically significant.

2.5. Ethical considerations

This study was conducted in accordance with the Declaration of Helsinki. Given its retrospective observational design with anonymized data, individual informed consent was waived by the institutional ethics committee.

3. Results

3.1. Demographic characteristics

A total of 126 patients were included in the study. The mean age was 49 years (range: 18–80 years). Female patients represented the majority of the cohort, accounting for 55.6% (n=70), with a sex-ratio of 0.8 (Table 1).

Table 1 Demographic characteristics of the study population (n=126)

Variable	n (%)
Total patients	126 (100%)
Sex — Female	70 (55.6%)
Sex — Male	56 (44.4%)
Sex-ratio (M/F)	0.8
Mean age (years)	49 (range: 18–80)

3.2. Pain laterality

Right-sided low back pain was the most frequent presentation, accounting for 43.6% of cases (n=55), followed by bilateral pain in 29.3% (n=37), and left-sided pain in 26.9% (n=34) of patients (Table 2).

Table 2 Distribution of pain laterality (n=126)

Laterality	n (%)
Right-sided	55 (43.6%)
Bilateral	37 (29.3%)
Left-sided	34 (26.9%)

3.3. Associated symptoms and etiological spectrum

Associated symptoms were identified in a significant proportion of patients, allowing clinical orientation toward a probable etiology. Urinary symptoms (dysuria, pollakiuria, urgency, hematuria, spontaneous calculus passage) were the most frequently associated findings, present in 31 patients (24.6%). Neurological manifestations (sciatica, disc herniation) were identified in 10 patients (7.9%), while digestive symptoms (nausea, vomiting, functional colopathy) were found in 8 patients (6.3%). Osteoarticular causes (arthralgia, bone pain) were identified in 5 patients (3.9%) (Table 3).

Table 3 Etiological spectrum of low back pain based on associated symptoms (n=126)

Etiology	Associated symptoms	n (%)
Urological	Dysuria, pollakiuria, urgency, hematuria, spontaneous calculus passage	31 (24.6%)
Neurological	Sciatica, disc herniation	10 (7.9%)
Digestive	Nausea, vomiting, functional colopathy	8 (6.3%)
Osteoarticular	Arthralgia, bone pain	5 (3.9%)
Non-specific / other	No associated symptoms identified	72 (57.1%)

3.4. Diagnostic yield of renal ultrasonography

All 126 patients underwent renal ultrasonography as part of their initial workup. Ultrasonographic findings were considered clinically significant — revealing a relevant urological abnormality warranting further management — in 44 patients, corresponding to a diagnostic yield of 34.9%. In the remaining 65.1% of patients, no urologically significant abnormality was detected on ultrasound (Table 4).

Table 4 Diagnostic yield of renal ultrasonography in low back pain (n=126)

Ultrasonographic result	n (%)
Significant finding (urological abnormality)	44 (34.9%)
Non-significant / normal	82 (65.1%)
Total	126 (100%)

4. Discussion

The present study evaluated the diagnostic yield of systematic renal ultrasonography in patients presenting with low back pain to a urology outpatient clinic. Our findings demonstrate that urological causes account for approximately one-third of all low back pain presentations in this setting (34.9%), while the majority of cases are attributable to non-urological or non-specific etiologies. These results raise important questions regarding the appropriateness of systematic imaging and highlight the central role of clinical history in guiding the diagnostic workup.

Several studies have demonstrated that the use of diagnostic imaging for patients with low back pain is substantially higher than what would be recommended if clinical guidelines were strictly followed [1,2]. This "over-use" is driven by multiple factors, including patient expectations, medicolegal concerns, and the perceived accessibility of ultrasound technology. However, as our results suggest, performing renal ultrasound without prior clinical selection leads to a low diagnostic return in a large proportion of patients.

The predominance of female patients in our cohort (55.6%) and the mean age of 49 years are consistent with the general epidemiology of low back pain, which disproportionately affects working-age adults and shows no strong sex predilection across most series. The predominance of right-sided pain (43.6%) may reflect the anatomical position of the right kidney and right ureter, which are more commonly implicated in symptomatic nephrolithiasis — the leading urological cause of acute loin pain.

Urinary symptoms were the most frequently associated finding (24.6%), confirming that clinical symptoms remain the most reliable indicator of an underlying urological etiology. Patients presenting with classic features such as hematuria, dysuria, pollakiuria, or spontaneous calculus passage should be systematically investigated with ultrasonography. By contrast, patients with purely musculoskeletal, neurological, or non-specific presentations are less likely to benefit from early renal imaging.

This observation is in line with the literature. Hollingworth et al. demonstrated that primary care referrals for lumbar spine radiography had a low diagnostic yield when performed without a specific clinical hypothesis [3]. Similarly, Balagué and Cedraschi emphasized that indiscriminate imaging may cause anxiety and labeling effects that negatively impact patient recovery [2]. Bedson et al. further showed that labeling patients with non-specific pain syndromes following "incidental" imaging findings may paradoxically worsen long-term outcomes [4].

Our data suggest that a well-structured clinical history is the key step in distinguishing urological from non-urological low back pain, and that ultrasonography should be reserved for patients with a plausible urological hypothesis. This selective approach would reduce unnecessary costs, patient anxiety associated with false-positive incidental findings, and the overall burden on imaging facilities — a particularly relevant consideration in resource-limited healthcare settings such as those found in Morocco and across North Africa.

Several limitations should be acknowledged. The retrospective design may have introduced selection and information biases. The study was conducted at a single tertiary referral center, which may not be representative of primary care or non-specialist settings. Furthermore, the classification of ultrasound results as "significant" or "non-significant" was based on chart review rather than prospective standardized criteria. The absence of a structured clinical prediction score to guide ultrasound use limits the generalizability of our recommendations. Future prospective studies incorporating validated clinical prediction tools are warranted to define the optimal indications for renal ultrasound in this patient population.

5. Conclusion

Low back pain is a frequent reason for consultation in urology outpatient clinics, with urological causes accounting for only 34.9% of presentations. Systematic renal ultrasonography without prior clinical selection yields a limited diagnostic return and may be avoided in patients without associated urinary symptoms. A thorough clinical history and

physical examination remain the cornerstone of the etiological workup and should guide selective use of ultrasonography. These findings support a more rational and cost-effective imaging strategy in the management of low back pain in urology.

Compliance with ethical standards

Disclosure of conflict of interest

The authors declare no competing interests.

Statement of ethical approval

This study was conducted in accordance with the Declaration of Helsinki. Ethics committee approval was obtained from Mohammed VI University Hospital.

Statement of informed consent

Individual informed consent was waived given the retrospective anonymized design.

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