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Prevalence and Management of Nephroptosis: A 13-Year Retrospective Study in Kyrgyzstan

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Abstract: Nephroptosis (NP) is characterized by abnormal downward displacement of the kidney, predominantly affecting young working women aged 20–45 years. This retrospective observational study aimed to investigate the epidemiology, clinical manifestations, and treatment outcomes of NP in the Kyrgyz Republic between 2010 and 2023. Data from 1824 patients diagnosed with NP in various healthcare institutions were analyzed. NP occurred more frequently in women (79.6%) than in men (20.4%), with Bishkek showing the highest occurrence at 51.4%. Between 2020-2023, the NP incidence increased by 2.8%, and the most common associated conditions were LN (18.5%), hypertension (17.9%), and dyslipidemia (15.7%). In 205 patients with NP and LN, immunosuppressant treatment with prednisone and cyclophosphamide improved kidney function (eGFR increased from 65.8 ± 9.2 to 81.1 ± 7.4 mL/min/1.73 m^2; $p < 0.01$) and reduced proteinuria (from 2.9 ± 1.3 to 0.8 ± 0.4 g/day; $p < 0.001$) over 12 months. However, 17.5% of patients required surgical nephropexy due to ongoing symptoms. The rising incidence of NPs in Kyrgyzstan emphasizes the need for enhanced diagnostic methods and clinical awareness. The common occurrence of NP with LN highlights the need for multidisciplinary management. While immunosuppressive therapy is effective for NP with LN, some patients benefit from surgical nephropexy. Future studies are needed to assess outcomes and improve treatment strategies, especially in patients with autoimmune diseases.

Keywords: Nephroptosis; Prevalence; Nephropexy; Lupus Nephritis; Epidemiology; Immunosuppressive Therapy; Prednisone; Cyclophosphamide

1. Introduction

Nephroptosis (NP), or a floating kidney, involves an unusual downward shift of the kidney, particularly when standing. This condition is significant because of its occurrence among young working individuals, notably women aged 20–45 years. It affects up to 1.54% of women compared to 0.12% of men within the 20–40-year age bracket. This sex difference is linked to anatomical and physiological factors, such as the broader pelvis in women and alterations in abdominal wall tone due to multiple pregnancies and extended labor [1, 2].

NP often manifests as flank pain, hematuria, and occasionally digestive or neurological symptoms. Misdiagnosis can occur if positional diagnostics are not properly employed [3]. Advances include imaging methods such as Tc-99m glucoheptonate renal imaging, which can identify NP by revealing the kidney's descent when the patient is upright [1].

Treatment has progressed, and surgical intervention is necessary for symptom relief. Nephropexy, particularly minimally invasive retroperitoneoscopic techniques, has proven to be effective in reducing symptoms. Retroperitoneoscopic nephropexy with 2-point renal fixation is noted as safe and effective, significantly reducing pain and enhancing **the** quality of life [2, 4]. Tissue adhesives, such as enbucrilate (Histoacryl), have been successfully used in adhesive nephropexy, providing a swift surgical treatment option [5].

Laparoscopic nephropexy has become increasingly popular because of its success in providing enduring symptom relief and enhancing patient quality of life. Introduced in 1993, laparoscopic nephropexy marked a new chapter in surgical treatment [6]. This method allows precise anatomical repositioning of the kidney, which may reduce the risk of recurrence of symptoms [7]. The introduction of laparoscopic surgery has renewed interest in treating NP, which is characterized by abnormal kidney movement [8]. Laparoscopic techniques have transformed NP management by providing less invasive solutions [9].

NP is clinically important because of its prevalence among young working women and its potential impact on their quality of life and work performance. A thorough approach involving accurate diagnostic methods and effective surgical treatment is essential for managing this condition [9, 10].

NP is associated with comorbidities that affect the quality of life and often cause position-dependent flank pain. Additionally, Ureteral kinking can lead to hydronephrosis and urinary stasis, increasing the risk of UTI. Renovascular hypertension may develop due to renal artery kinking during positional changes [11, 12]. Hematuria is common, possibly due to kidney movement [12]. Symptomatic NP is linked to Loin Pain Hematuria Syndrome, characterized by intense flank pain and hematuria [12, 13]. Orthostatic proteinuria contributes to renal dysfunction [13]. Surgical methods, such as nephropexy, are used to treat symptomatic NP [9, 14]. Minimally invasive techniques, such as retroperitoneoscopic and laparoscopic nephropexy, alleviate pain and enhance the quality of life [4, 11]. The tissue adhesive enbucrilate shows promise for stabilizing ptotic kidneys [5]. Posture-related issues occur in unilateral NP cases [15].

Diagnostic challenges arise from the reliance on supine imaging, and upright imaging is essential for an accurate diagnosis. Understanding NP comorbidities and customizing diagnostic and treatment approaches are vital, given their potential to escalate to serious complications [13, 16].

Immunosuppressive treatment with prednisone and cyclophosphamide is a recognized strategy for LN, a severe form of systemic lupus erythematosus (SLE) that causes kidney damage. In patients with NP and LN, LN management is prioritized. Treatment starts with high doses of prednisone and cyclophosphamide, as research shows that this combination is more effective than steroids alone in improving kidney outcomes. Studies have indicated that this therapy reduces kidney relapse rates and preserves function, enhancing survival and kidney health in LN [17, 18].

Despite the growing recognition of the clinical impactions of NP, there is a paucity of information on its epidemiological patterns, comorbidities, and long-term management results, particularly in Central Asian conntries like Kyrgyzstan. Differences in diagnostic methods, healthcare availability, and socioeconomic conditions across regions affect NP detection and treatment. This underscores the need for localized data to guide public health initiatives and enhance clinical care. A thorough assessment of the demographic spread, clinical characteristics, and treatment outcomes of NP is necessary to fill this gap. Such knowledge is crucial for creating standardized diagnostic procedures, evidence-based treatment plans and effective policies.

This study investigated NP epidemiology in the Kyrgyz Republic from 2010 to 2023 by examining the demographic distribution, clinical characteristics, and treatment results across healthcare facilities. This study aimed to identify sex-based differences in NP incidence and assess the effectiveness of medical and surgical treatments in improving outcomes.

2. Methods

This retrospective descriptive study primarily aimed to evaluate the epidemiology, clinical features, and outcomes of NP across healthcare environments rather than to introduce a new surgical procedure.

This study included 1824 patients diagnosed with NP between 2010 and 2023 in the Kyrgyz Republic. Data were gathered from healthcare facilities in Bishkek, Osh city, Jalal-Abad region, Issyk-Kul region, Talas region, Naryn city, and the Republican Center for Electronic Healthcare, under the Ministry of Health. The study was conducted from January 12, 2023, to September 09, 2023.

This study included patients diagnosed with NP based on imaging results or clinical symptoms. Participants were required to be ≥16 years of age with symptomatic or asymptomatic NP. The exclusion criteria were as follows: structural renal abnormalities unrelated to NP, incomplete medical records, and other urological disorders that caused similar symptoms.

Patient information was extracted from the medical records. The collected data included demographic details and clinical data covering presenting symptoms, symptom severity, and associated comorbidities. The diagnostic data focused on imaging findings that confirmed NP. Treatment information included medical and surgical interventions. The outcome measures included symptom resolution, changes in renal function, and post-treatment complications.

Statistical analyses were performed using the Statistical Package for the Social Sciences version 11.5. Categorical variables are reported as n (%) and continuous variables are reported as mean ± standard deviation. The chi-square test was used for categorical data and the Student's *t*-test for continuous data. Statistical significance was set at $p < 0.05$.

This study was approved by the Bioethical Committee of the Kyrgyz-Russian Slavic University named after B. N. Yeltsin (Protocol No. 17 dated 12/01/2023). All the participants provided informed consent. This study adhered to the principles of the Declaration of Helsinki.

3. Results

This study examined NP case trends across various healthcare institutions with different ownership types from 2010 to 2023. In the Kyrgyz Republic, 1824 NP cases were identified, including 1452 (79.6%) women and 372 (20.4%) men. Bishkek city had the highest number of patients, totaling 939 (51.4%). The Osh region reported 116 (6.4%) cases, Jalal-Abad 111 (6.1%), Issyk-Kul 84 (4.7%), Talas 59 (18.6%), and Naryn 24 (1.3%) cases. The Republican Center for Electronic Healthcare under the Ministry of Health of the Kyrgyz Republic documented 491 (26.9%) cases from 2020 to 2023. Table 1 shows the distribution of nephroptosis cases across different regions of the Kyrgyz Republic from 2010 to 2023.

Table 1. Regional Distribution of Nephroptosis Cases in the Kyrgyz Republic (2010–2023).

	Region/Institution	n (%)
1.	Bishkek City	939 (51.4%)
2.	Osh Region	116 (6.4%)
3.	Jalal-Abad Region	111 (6.1%)
4.	Issyk-Kul Region	84 (4.7%)
5.	Talas Region	59 (3.2%)
6.	Naryn Region	24 (1.3%)
7.	Republican Center (2020–2023)	491 (26.9%)
Total	1824 (100%)	

Data presented as n (%), n = No. of patients.

In 2020, 57 (11.6 ± 1.4) patients were identified, followed by 125 (25.5 ± 1.9) in 2021, 147 (29.9 ± 2.0) in 2022, with 115 (78.2 ± 3.3) women and 32 (21.8 ± 3.3) men. In 2023, 162 (33.0 ± 2.2) patients were identified, comprising 130 (80.3 ± 3.1) women and 32 (19.8 ± 3.1) men.

Tables 2 and 3 present the annual distribution and incidence of NP cases in Bishkek and nationwide from 2010 to 2023. Both tables indicate a predominance of female patients with NP, with women accounting for approximately 80% of all cases. The incidence rate per 100,000 individuals increased significantly over the study period, peaking in 2023. Bishkek consistently reported the highest number of cases, reflecting the accessibility of urban diagnostic facilities and population concentration. The overall trend suggests increasing awareness and detection of NP across the country.

Table 2. Incidence of NP in intensive indicators in Bishkek for the period 2010–2023 (n = 1824).

	Years	Women	Men	Total Cases
1.	2010	3 (75%)	1 (25%)	4 (0.4%)
2.	2011	5 (83.3%)	1 (16.7%)	6 (0.7%)
3.	2012	7 (77.8%)	2 (22.2%)	9 (0.9%)
4.	2013	8 (80%)	2 (20.0%)	10 (1.1%)
5.	2014	15 (79%)	4 (21.0%)	19 (2.0%)
6.	2015	19 (79.2%)	5 (20.8%)	24 (2.6%)
7.	2016	22 (78.6%)	6 (21.4%)	28 (3.0%)
8.	2017	30 (85.7%)	5 (14.3%)	35 (3.7%)
9.	2018	103 (82.4%)	22 (17.6%)	125 (13.3%)
10.	2019	39 (79.6%)	10 (20.4%)	49 (5.2%)
11.	2020	105 (79.6%)	27 (20.4%)	132 (14.1%)
12.	2021	118 (81.4%)	27 (18.6%)	145 (15.4%)
13.	2022	132 (79.0%)	35 (21.0%)	167 (17.8%)
14.	2023	154 (82.8%)	32 (17.2%)	186 (19.8%)
Total		760 (80.9%)	179 (19.1%)	939 (100%)

Data presented as n (%), n = No. of patients.

Table 3. Incidence of NP in intensive indicators per 100,000 population in the Kyrgyz Republic for the period 2010–2023.

	Years	Female	Male	Total Cases
1.	2010	3 (75%)	1 (25%)	4 (0.2%)
2.	2011	5 (83.3%)	1 (16.7%)	6 (0.3%)
3.	2012	7 (77.8%)	2 (22.2%)	9 (0.5%)
4.	2013	8 (80%)	2 (20.0%)	10 (0.7%)
5.	2014	15 (79%)	4 (21.0%)	19 (1.0%)
6.	2015	19 (79.2%)	5 (20.8%)	24 (1.3%)
7.	2016	22 (78.6%)	6 (21.4%)	28 (1.5%)
8.	2017	30 (85.7%)	5 (16.1%)	35 (1.9%)
9.	2018	149 (82.0%)	33 (18%)	182 (10.0%)
10.	2019	58 (82.6%)	15 (17.4%)	73 (4.0%)
11.	2020	196 (80.0%)	51 (20.0%)	247 (13.5%)
12.	2021	272 (43.4%)	76 (41.5%)	348 (19.1%)
13.	2022	310 (42.9%)	88 (41.8%)	398 (21.8%)
14.	2023	358 (82.8%)	83 (17.2%)	441 (24.2%)
Total		1452 (79.6%)	372 (20.4%)	1824 (100%)

Data presented as n (%), n = No. of patients.

In 2022 and 2023, NP incidence rose by 5.5 and 6.1 times, respectively, compared to 2019. As shown in Table 1, Bishkek reported the highest number of NP cases, with 939 patients (51.4%), including 807 women (85.9 ± 2.9) and 132 men (14.1 ± 2.9). This data pertains to the age range of 939 patients examined in Bishkek (Table 4).

Between 16–20 years, there were 59 patients (6.3 ± 1.9): 46 women (5.7 ± 2.0) and 13 men (22.2 ± 13.8). Ages 20–30 had 265 people (28.2 ± 3.7): 232 women (28.7 ± 4.0) and 33 men (12.5 ± 5.2). For ages 30–40, total 291 (31.0 ± 3.8): 251 women (31.2 ± 4.1) and 40 men (13.7 ± 5.1). Ages 40–50, 158 (16.9 ± 3.1): 138 women (17.2 ± 3.4) and 20 men (12.7 ± 6.7). Ages 50–60, 106 patients (11.3 ± 2.6): 93 women (11.5 ± 2.8) and 13 men (12.3 ± 8.2). Over 60 years, 60 patients (6.3 ± 2.0): 47 women (5.7 ± 2.0) and 14 men (22.2 ± 6.7) (Table 4). Our findings indicate that NP is more frequently diagnosed in women, with rates ranging from 77.8% to 87.5%, whereas in men, the rates vary from 12.5% to 22.2% (Table 4).

Table 4. Age distribution of NP incidence for the period 2010–2023 in Bishkek (n = 939).

	Age Group (Years)	Women (n, %)	Men (n, %)	Total (n, %)
1	16–20 years old	46 (5.7 ± 2.0)	13 (22.2 ± 6.7)	59 (6.3 ± 1.9)
2	20–30 years old	232 (28.7 ± 4.0)	33 (12.5 ± 9.6)	265 (28.2 ± 3.7)
3	30–40 years old	251 (31.2 ± 4.1)	40 (13.7 ± 10.2)	291 (31.0 ± 3.8)
4	40–50 years old	138 (17.2 ± 3.4)	20 (12.7 ± 7.9)	158 (16.9 ± 3.1)
5	50–60 years old	93 (11.5 ± 2.8)	13 (12.3 ± 6.7)	106 (11.3 ± 2.6)
6	>60 years old	47 (5.7 ± 2.0)	14 (22.2 ± 6.7)	60 (6.3 ± 2.0)
Total		807 (100%)	132 (100%)	939 (100%)

Data presented as n = Number of patients, % = Percentage of patients within each sex group, Mean ± Standard deviation.

Among the 807 women surveyed (85.9 ± 2.9), most were aged 20–40. Specifically, 483 women (59.8 ± 4.4) fell into this category, with 232 (28.7 ± 4.0) aged 20–30 and 251 (31.2 ± 4.1) aged 30–40. Additionally, 278 women (34.5 ± 4.3) were over 40, up to 60 years and beyond. Of these, 138 (17.2 ± 3.4) were 40–50, 93 (11.5 ± 2.8) were 50-60, 47 (5.7 ± 2.0) were over 60, and 46 (5.7 ± 2.0) were 16-20 years old (Figure 1).

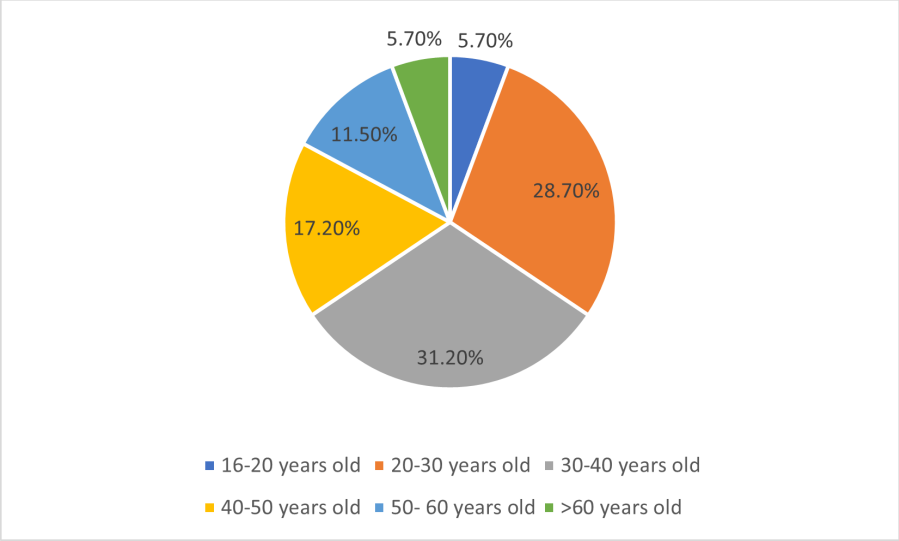

Figure 1. Incidence of NP among women in Bishkek (n = 122).

The number of NP cases increased 5.3 times in 2018 compared with 2017. However, in 2019, the incidence dropped to 2.6 times per 100,000 people compared to 2018 because of the coronavirus pandemic. In 2022 and 2023, the overall incidence surged by 5.5 and 6.1 times, respectively, compared to that in 2019. Factors contributing to the rise in NP cases in the Kyrgyz Republic include shifts in social status, economic downturns, healthcare system decline, unemployment, and out-migration. These factors lead to greater physical strain, weakening of the anterior abdominal wall, weight loss, and decreased muscle tone. Advancements in the detection and diagnosis of NP have also played a crucial role.

Among the patients, 61.2% (1115 individuals) had coexisting conditions, such as lupus nephritis (LN) (18.5%), hypertension (17.9%), dyslipidemia (15.7%), obesity (14.9%), diabetes mellitus (14.2%), renal stone disease (10.8%), urinary tract infections (10.8%), and bowel obstruction (3.4%). The significant prevalence of LNs in patients with NP suggests an autoimmune aspect, highlighting the need for further research on the immune-related mechanisms affecting kidney mobility.

All 205 patients with NP and LN were treated with immunosuppressive drugs, prednisone, and cyclophosphamide. Prednisone was prescribed at a median daily dose of 30 mg and reduced over six months. Cyclophosphamide was administered intravenously at 500 mg/m^2 every four weeks for six months, followed by maintenance. Patient outcomes were evaluated at 12 months, focusing on kidney function, alleviation of NP symptoms, and related complications. The study group was 82.7% female, with an average age of 35.2 ± 8.9 years. Right-sided kidney

displacement was the most frequent condition, occurring in 72.4% of the cases.

The mechanisms of NP and LN involve immune-driven glomerular damage and kidney displacement, which worsen dysfunction. Immunosuppressants, such as prednisone and cyclophosphamide, reduce inflammation and maintain kidney health. Prednisone suppresses pro-inflammatory cytokines and autoantibody production, decreasing immune-related glomerular damage, whereas cyclophosphamide prevents T- and B-cell proliferation, stopping immune complex deposition. These actions are crucial for managing LN progression and enhancing kidney outcomes in patients with NP, highlighting the need for personalized treatment plans to balance effectiveness with immunosuppression risks.

Following treatment, kidney function improved, with the estimated glomerular filtration rate rising from 65.8 ± 9.2 to 81.1 ± 7.4 mL/min/1.73 m^2 over 12 months ($p < 0.01$). Proteinuria decreased from 2.9 ± 1.3 to 0.8 ± 0.4 g/day ($p < 0.001$). Symptoms improved in 65.4% of patients (n = 134), but 22.6% (n = 46) required additional management, including NSAIDs and postural therapy. Despite treatment, 17.5% (n = 36) had persistent NP symptoms, needing surgical nephropexy. Patients with moderate-to-severe LN (n = 79, 38.5%) were more likely to have ongoing NP symptoms ($p < 0.05$). Treatment side effects were common but manageable in this study. Corticosteroid-related reactions occurred in 64.9% (n = 133), with weight gain (42.3%), hyperglycemia (24.6%), and hypertension (18.1%) being the most frequent. Cyclophosphamide side effects included nausea (21.0%), leukopenia (14.5%), and temporary liver enzyme elevation (12.7%), which were managed through dose adjustments and supportive care. No severe drug-related toxicities caused treatment discontinuation.

4. Discussion

The analysis of NP trends in the Kyrgyz Republic from 2010 to 2023 revealed significant sex and regional differences, with an increase in the number of cases. This aligns with the literature indicating higher symptomatic NP in women due to anatomical and hormonal factors [4, 11]. Although this study does not introduce novel surgical techniques, it provides significant insights into the practical outcomes of minimally invasive nephropexy procedures, particularly for patients with LN, a demographic that is underrepresented in the existing research.

Bishkek city accounted for 51.4% of cases, indicating a link between urban healthcare access and diagnosis rates [9]. Other regions showed fewer cases due to variations in healthcare accessibility. The data showcases increased 2.8 times from 2020 to 2023, coinciding with improved diagnostics and NP awareness [6, 10]. Minimally invasive treatments, including laparoscopic and retroperitoneal nephropexy, have gained popularity [10, 11]. Laparoscopic nephropexy provides lasting symptom resolution with low morbidity [4, 9, 11].

Challenges include the requirement for imaging in both the supine and upright positions for diagnosis. The increase in NP cases likely stems from improved diagnostics and healthcare access, reflecting global trends [15, 19]. Ongoing research on minimally invasive treatments may improve outcomes. The occurrence of LN and NP suggests an autoimmune aspect, with an 18.5% prevalence of LN among patients with NP, indicating that immune mechanisms may affect kidney mobility. This is supported by studies on immunological processes in LN relevant to NP.

LN involves immune complex formation and antibody-driven activation of autoimmune pathways, such as those involving anti-dsDNA antibodies, causing kidney inflammation and damage [20]. This process may lead to structural abnormalities affecting the kidney position, such as NP. Macrophage metabolic reprogramming, which is common in LN, suggests that changes in immune cell metabolism can drive proinflammatory states, altering renal structures and functions [21]. Further investigation into the connection between LN and NP could examine the role of antibodies in kidney mobility and local immune response dysregulation in patients with NP. Studies have shown that immune-mediated renal injury and adaptive immune responses are vital in LN progression [22, 23], suggesting that similar mechanisms may impact NP through immune-related structural changes or inflammation. Considering co-occurring conditions, such as hypertension and diabetes, which are common in LN patients [24, 25], it is important to explore their contributions to NP.

This study, which involved 205 patients with NP and LN treated with prednisone and cyclophosphamide, provided significant insights. Prednisone was initiated at a median daily dose of 30 mg and tapered over six months, whereas cyclophosphamide was administered intravenously at 500 mg/m^2 every four weeks, followed by maintenance therapy. These drugs are crucial for treating LN, focusing on controlling kidney inflammation and preserving renal function.

Evidence supports the combination of corticosteroids and cyclophosphamide to decrease disease activity and sustain remission in patients with LN [18, 20]. The cohort, mostly female (82.7%) with an average age of 35.2 years, mirrors the demographics of patients with SLE [26]. Right-sided kidney displacement was common in 72.4% of cases, indicating a frequent anatomical variation or diagnostic pattern [4, 11]. The 12-month evaluation assessed kidney function, NP symptom relief, and treatment-related complications. Renal function assessment typically includes serum creatinine and proteinuria, which are key indicators of LN activity and treatment response [17]. Prednisone and cyclophosphamide have significant safety concerns, such as the risk of infection [27]. Careful monitoring is crucial for managing adverse effects.

The Euro-Lupus Nephritis Trial showed that both low and high doses of cyclophosphamide with corticosteroids decreased proteinuria and kidney inflammation [28, 29]. Sustained remission is correlated with lower flare rates and extended kidney survival. This combination helps resolve macrophage metabolic changes that promote pro-inflammatory cytokines, IL-1β secretion, and kidney damage in LN [20, 30]. For coexisting NP, immunological stability through corticosteroid-cyclophosphamide treatment is essential before surgery. Active LN increases the risk of surgical complications due to tissue damage and immunosuppression [21, 28, 31]. Once inflammation is controlled, laparoscopic nephropexy can alleviate NP symptoms [31]. Stable LN remission must be monitored before surgery, as LN-related changes can affect postoperative outcomes [20, 32]. While no direct evidence exists on the interaction between LN treatment and NP surgical correction, data support a multidisciplinary approach.

Disease markers such as anti-dsDNA levels complement consumption, and proteinuria determines nephropexy readiness. Patients may transition to maintenance therapy with mycophenolate mofetil or azathioprine, which have fewer side effects than prolonged cyclophosphamide therapy [17, 21, 28]. Corticosteroids and cyclophosphamide provide effective LN induction therapy for safe NP surgery in patients.

Laparoscopic nephropexy secures the kidney to the abdominal wall using a minimally invasive method. The procedure uses small incisions for camera and instrument insertion to fix the kidney in its normal position. The benefits include reduced pain, shorter hospital stays, and faster recovery [33]. Minimally invasive techniques, including laparoscopic and retroperitoneoscopic methods, effectively treat symptomatic NP in adults. The transperitoneal approach retrieves the kidney through a small port [34], whereas the retroperitoneal approach uses balloon dissection and CO_2 inflation for faster recovery [35].

Retroperitoneoscopic nephropexy using two-point renal fixation has shown favorable outcomes in women [4]. Laparoscopic nephropexy provides an expanded surgical field view for precise kidney repositioning while minimizing vessel and ureter damage. Small incisions reduce tissue trauma, enabling faster recovery and better cosmetic outcomes, whereas sutures anchor the kidney to the surrounding tissues to prevent NP recurrence.

Laparoscopic nephropexy offers benefits such as surgical accuracy, visualization, reduced blood loss, and fewer postoperative complications. Advancements in laparoscopic techniques have expanded their use in patients with complex anatomies. While nephropexy has evolved with minimally invasive methods, redo laparoscopic pyeloplasty remains more effective than endourological techniques [36]. Laparoscopic nephropexy is an effective alternative to open surgery for treating symptomatic NP in adults. The joint management of NP and LN requires a multidisciplinary strategy because of their distinct mechanisms. Nephropexy effectively relieves NP symptoms, such as flank pain and hydronephrosis, through minimally invasive methods. Individualized planning is essential for patients with NP and LN, as LN is an immune-mediated disorder with systemic inflammation.

LN arises from immune dysregulation in SLE and is characterized by immune complex accumulation and inflammatory pathways that activate macrophages and renal cells, causing tissue damage [20, 21, 28]. Research shows that LN development involves metabolic reprogramming of macrophages towards glycolysis through Fcγ receptor activation. Blocking these changes reduces pro-inflammatory cytokine levels and kidney damage in experimental models [20]. Additionally, molecules such as CD11b influence leukocyte migration and tissue adhesion in kidney pathology, highlighting the importance of immunological modulation in LN treatment [21].

Nephropexy alone cannot address immune-mediated damage in LN and requires concurrent pharmacological treatment. Primary treatments include corticosteroids, mycophenolate mofetil, and calcineurin inhibitors, such as voclosporin, whereas biologics, such as belimumab, effectively reduce disease activity [30, 37, 38]. Managing systemic disease activity and reducing immune damage are crucial before nephropexy, as active LN increases surgical risks through compromised healing and inflammation.

Disease timing and stabilization are crucial factors. In patients with controlled LN, nephropexy can enhance

renal blood flow and reduce NP symptoms, potentially improving kidney function. However, overlapping fibrotic processes in the LN and NP may affect outcomes. Tubulointerstitial inflammation and scarring from LN, worsened by tertiary lymphoid structures in the kidneys, are linked to poorer outcomes and increased risk of renal damage, raising questions about NP pathology interactions [20, 32].

The retrospective design limits the capacity to establish causal relationships and may be subject to biases from variations in diagnostic procedures, data completeness, and differences in nephropexy practices between institutions.

The optimal management of patients with NP and LN should integrate immunomodulatory treatments and surgical interventions. A personalized approach considering disease status, surgery timing, and perioperative immunosuppression can improve outcomes. Future research should clarify the pathophysiological mechanisms and long-term results of combined treatments, providing insight into NP-LN interactions and improving guidelines.

The gender gap in NP prevalence requires an exploration of the anatomical and hormonal factors affecting women. Hormonal changes during menstruation, pregnancy, and menopause may affect the abdominal wall tone and renal ligament support, increasing kidney mobility. Examining the impact of estrogen and relaxin on connective tissues may reveal sex-specific vulnerabilities. NP must be viewed as both a structural anomaly and a condition with systemic implications, particularly regarding LN. Collaborative efforts across institutions can help identify treatment gaps. Progress in precision medicine may lead to targeted treatments for patients with NP and LN, thereby improving outcomes.

5. Limitations

This study had some key limitations. As a retrospective descriptive study, our analysis was limited by the availability and precision of medical records, potentially causing data inconsistencies. The diagnostic criteria varied among institutions. Although upright and supine imaging are ideal, their consistent use across different centers is uncertain. Data from institutions with different protocols may have affected the reliability of the results. The study, which was conducted only in the Kyrgyz Republic, may not apply to populations with different demographics. Regional factors also affected disease detection. Although the study included 12-month follow-up data for patients treated with immunosuppressive therapy for NP associated with LN, this period may not fully assess long-term effectiveness. This study focused on symptom relief, proteinuria reduction, and eGFR improvement, whereas quality-of-life assessments post-nephropexy were not reported. The impact of lifestyle factors and comorbidities complicates the attribution of clinical changes. This study focused on NP cases linked to LN without examining NP treatment without autoimmune comorbidities.

6. Clinical Implications

This study provides clinical insights into the diagnosis and management of NP in resource-limited settings, such as Kyrgyzstan. The high NP prevalence among women aged 20–45 requires increased awareness. Symptoms such as positional flank pain, hematuria, and orthostatic proteinuria should prompt NP consideration in primary care. The association between NP and autoimmune disorders, particularly LN, requires comprehensive care. Patients with SLE who exhibit renal symptoms should be assessed for NP development. Immunosuppressive treatments have proven effective in patients with NP and LN, requiring careful monitoring. Surgical nephropexy is a treatment for severe NP when conservative measures fail. The rising incidence of NP in urban areas suggests the need for improved diagnostic protocols. The socioeconomic impact of untreated NP emphasizes the importance of early detection, including preventive exercises. This study supports a personalized approach to managing NP with autoimmune comorbidities, incorporating routine assessments to improve outcomes.

7. Recommendations

Healthcare facilities should implement standardized protocols for supine and upright imaging to detect NP. Training radiologists to identify changes in kidney position is crucial for reducing misdiagnoses. Women aged 20–40 with unexplained flank pain or urinary symptoms should undergo NP screening using dynamic imaging to enable earlier intervention. A multidisciplinary approach with specialists is needed to manage coexisting conditions, particularly LN, hypertension, and dyslipidemia. Treatment plans should balance immunosuppressive agents against

side effects, with monitoring for remission included. Surgical nephropexy should be considered when symptoms persist despite conservative treatment. Counseling should raise awareness of NP risk factors among women of reproductive age and promote abdominal exercises. A centralized registry across the Kyrgyz Republic would enhance our understanding of the disease. Further research is needed to investigate the association between NP and autoimmune diseases, particularly LN. Long-term follow-up beyond 12 months is required to monitor treatment durability. Resource allocation in imaging infrastructure across rural and urban healthcare settings is necessary to address regional disparities in NP detection.

8. Conclusions

This retrospective study spanning 13 years provides insights into the epidemiology, clinical features, and management outcomes of NP in the Kyrgyz Republic. The findings show a predominance of females aged 20 to 45 years and an increasing NP incidence, particularly in urban areas such as Bishkek. The increase in cases may be attributed to enhanced diagnostic capabilities and increased clinical awareness. Comorbidities, notably LN, were common among patients with NP, suggesting a potential immunological role. Treatment with immunosuppressive drugs, such as prednisone and cyclophosphamide, improved kidney function and reduced proteinuria in patients with NP and LN, although some patients required surgical nephropexy. These results highlight the need for standardized diagnostic protocols, multidisciplinary treatment strategies, and long-term monitoring. The coexistence of NP with autoimmune and metabolic disorders underscores the need for personalized care. Future prospective studies should evaluate the long-term effectiveness and safety of laparoscopic nephropexy in patients with NP, especially those with autoimmune conditions, such as LN. These studies should investigate potential advancements in surgical techniques for this subgroup.

Author Contributions

Conceptualization, C.I.; methodology, G.S.; software, T.T.; validation, C.I., and G.S.; formal analysis, T.T.; investigation, C.I., G.S., R.A., M.B., and A.M.; data curation, R.A.; writing—original draft preparation, M.B., and A.M.; writing—review and editing, T.T. All authors have read and agreed to the published version of the manuscript.

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Institutional Review Board Statement

The study was conducted in accordance with the Declaration of Helsinki, and approved by the Bioethical Committee of the Kyrgyz-Russian Slavic University named after B. N. Yeltsin (Protocol No. 17 dated 12/01/2023).

Informed Consent Statement

Informed consent was obtained from all subjects involved in the study.

Data Availability Statement

Data are available from the corresponding author upon reasonable request.

Conflicts of Interest

The authors declare no conflict of interest.

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