NU Rounds

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Dear Doctor,

Greetings from Micro Labs limited. We are happy to bring you "NU Rounds" which contains latest and interesting news in the field of Nephrology and Urology.

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Best Regards,

Medical Team, Micro Labs Ltd

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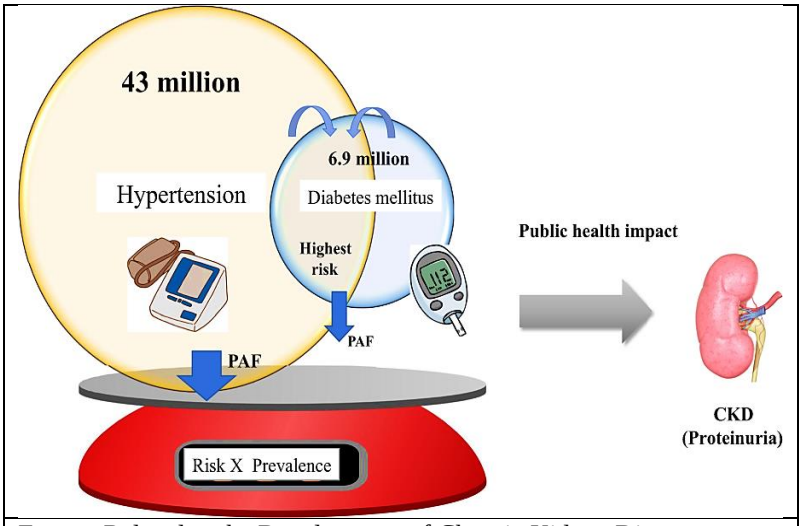
1. Determination of the risk factors associated with the development of chronic kidney disease in adults with arterial hypertension

Introduction: Chronic kidney disease (CKD) is the major cause of morbidity and mortality among patients worldwide. The estimated global prevalence of chronic kidney disease (CKD) is 8–16%. Two important risk factors for the onset of CKD are diabetes and hypertension. In the general population, the risk of chronic kidney disease (CKD) is doubled by hypertension, and in the elderly population, the risk ratio has been found to reach 3.9. The chance of getting CKD can be decreased by controlling hypertension.[1] One of the primary causes of chronic kidney disease (CKD) is arterial hypertension (AHT), which is defined as a continuous increase in systemic arterial pressure with values ≥140/90 mm Hg. It was reported that albuminuria predominates in 7% of patients who have recently received an AHT diagnosis. Studies have shown that uncontrolled diabetes mellitus, hypertension, and chronic renal disease are more common in men, as are other comorbidities, including obesity and anemia. There has been no studies on the risk factors and clinical characteristics of CKD patients treated in hospitals at the primary level of care.[2] So, this investigation was to identify the risk variables linked to the development of chronic kidney disease in people with arterial hypertension.



Factors Related to the Development of Chronic Kidney Disease

Methods: In this observational retrospective study, there are 455 hypertension patients receiving treatment at a primary care hospital who are included. Medical records and test results were evaluated to determine the diagnosis and stage of chronic renal disease. AHT-diagnosed patients, regardless of gender, who were 40 years of age or older, had proteinuria results, a proteinuria/creatinuria ratio, and their glomerular filtration rate calculated using the MDRD 4 algorithm were included. Medical records of patients with cardiovascular disease sequelae, glomerulonephritis, renal hypoplasia or monorenal disease, metabolic diseases other than diabetes or obesity, and dialysis patients were excluded. Logistic regression analysis was used to identify risk variables for the development of chronic renal disease.

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Results: About 63.7% were female and 36.3% male. The average age was 69.79 ± 9.03, with over 50% of patients having managed hypertension and diabetes mellitus. The most common form of nephroprotection that year was Losartan (53%). Male sex (OR 1.68), age 60 years or older (OR 6.38), and anemia (OR 1.71) were shown to be risk factors ($p < 0.05$) for the development of chronic kidney disease, while managed diabetes mellitus (OR: 0.18) and nephroprotection (OR 0.39) were found to be protective variables ($p < 0.05$). Table 1 revealed that anemia and diabetes remained at similar rates throughout the study period, but obesity decreased. There was a significant difference ($p < 0.05$) in the percentages of managed AHT and nephroprotection between 2015 and 2017. The prevalence of chronic kidney disease was 19% and 45%, with category G2 predominating.

Clinical factors	YEARS	CKD YES (%)	NO (%)
Anemia	2015 2017	32.3 31.9	67.7 68.1
Obesity	2015 2017	25.3 22.0	74.7 78.0
Nephroprotection	2015 2017	90.8 94.9	9.2 5.1
Controlled arterial pressure	2015 2017	51.0 65.1	49.0 3.9
Controlled diabetes mellitus	2015 2017	50.3 52.3	49.7 47.7

Table 1. Clinical variables associated with the development of chronic kidney disease in patients with hypertension.

Discussion: In the current study, male sex and age 60 years and older are risk factors for the development of chronic kidney disease (CKD). Preventive measures against its development include nephroprotection, managed diabetic mellitus, and patient monitoring.[2] According to Lin HB et al., there was a high incidence of diabetes and chronic renal disease noted in their study. The most significant risk factors for CKD were age and the co-morbidity of hypertension, indicating that screening for CKD should be focused on individuals with diabetes. Particularly important were blood pressure and cholesterol control to avoid chronic kidney disease (CKD) in adults with diabetes.[3]

Conclusion: This study concluded that male sex, age 60 or older, and biological variables are risk factors for the development of chronic kidney disease (CKD). Clinical variables that increase the possibility of developing chronic kidney disease (CKD) include anemia and uncontrolled diabetes mellitus. Nephroprotection with ACE inhibitors, or ARBs, is a protective factor for CKD.

Anemia and uncontrolled diabetes mellitus are the clinical variables that increase the chance of developing chronic kidney disease (CKD). One preventive factor against CKD is nephroprotection achieved with an ACE inhibitor or ARB therapy.

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2. Ability of plasma proenkephalin (p-PENK) and plasma neutrophil gelatinase-associated lipocalin (p-NGAL) in predicting 28-day mortality in Acute kidney injury

Introduction: Acute kidney injury (AKI) is a significant clinical problem for critically ill patients, and a high rates of hospital re-admission and mortality along with financial impact.[1] Further, predicting patient outcomes based on AKI grade is sometimes difficult because the majority of patients admitted to the ICU have complex diseases and unknown baseline renal function. In order to meet unmet medical needs, novel biomarkers with high sensitivity and specificity that are independent of a patient's underlying renal function and present disease complexity must be identified. Nephron structures release a stable, long-half-life endogenous opioid peptide called proenkephalin (PENK) in response to injury. It has been shown to have a substantial negative connection with the estimated glomerular filtration rate (eGFR) and to be detrimental to renal function. NGAL, or neutrophil gelatinase-associated lipocalin, is a biomarker for AKI prediction that has been extensively researched. Distal tubular cells respond to injury by producing NGAL, which mixes with iron to generate siderophores. By increasing heme oxygenase-1, it prevents tubular epithelial cells from dying. Renal progenitors are transformed into epithelial tubules by this complex. According to studies on animals, NGAL prevents AKI by promoting autophagy and preventing apoptosis. Reliable prognostic indicators are needed to help with the early diagnosis and treatment of AKI in order to lower the high rate of short-term death.[2] Therefore, this study was conducted to evaluate the predictive power of plasma proenkephalin (p-PENK) and plasma neutrophil gelatinase-associated lipocalin (p-NGAL) in AKI patients receiving intensive care for 28 days.

Methods: This prospective study included 150 patients (100 males) with AKI. Laboratory test findings, 28-day mortality rates, and patient medical histories were all examined. After the patients were diagnosed with AKI and brought to the ICU, all samples were taken there within a day. Blood samples were also collected from the patients. Following a centrifugation of each blood sample, the separated plasma was promptly kept at -80 °C. The concentration of P-PENK was ascertained using the enzyme-linked immunosorbent assay (ELISA). ELISA was also utilized to measure P-NGAL levels. The main outcome of the study was 28-day all-cause mortality. After making direct contact with the patient, the vital statuses of the follow-up patients were confirmed.

Results: The total 28-day mortality rate was 28.7%. The median values of p-NGAL and p-PENK were 223.70 ng/mL and 0.24 ng/µL, respectively. To assess the predictive power of two biomarkers, the 28-day mortality's AUCs were calculated. Overall, p-PENK and p-NGAL had good predictive values (AUCs of 0.785 and 0.700, respectively) for 28-day mortality. In critically ill patients with AKI, this connection was significant for mortality. The Kaplan-Meier curves for 28-day mortality were displayed in Figure 1 for the p-NGAL > 230.30 ng/mL and p-NGAL, as well as for the p-PENK > 0.36 ng/µL and p-PENK < 0.36 ng/µL groups. Baseline p-NGAL (230.30 ng/mL) and p-PENK (0.36 ng/µL) levels, along with their corresponding cut-off values, demonstrated clinical utility in predicting 28-day mortality.

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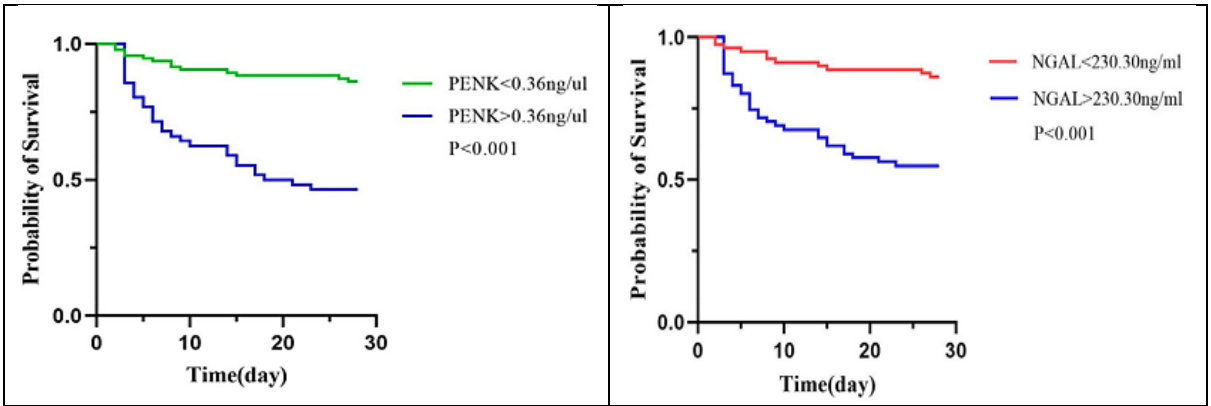

Figure 1. Kaplan-Meier curves for the p-PENK and p-NAGL 28-day mortality

Discussion: According to this study, patients with AKI in the ICU had a 28-day death rate predicted by high p-PENK levels, with a predictive value of 0.36 ng/µL. A prognostic value of 230.30 ng/mL for 28-day death in these patients was also associated with high p-NGAL levels. Furthermore, in patients with AKI in the ICU, a combination of the two was even more effective at predicting 28-day mortality.[2] According to Jäntti T et al., in individuals experiencing cardiogenic shock, elevated baseline levels of P-PENK and P-NGAL were independently correlated with AKI. Higher 90-day all-cause mortality remained independently correlated with high levels of P-PENK and P-NGAL at 24 hours. P-PENK and P-NGAL appear to be valuable biomarkers for the early prediction of outcomes in populations experiencing cardiogenic shock, and they might also play a part in AKI prediction.[3]

Conclusion: This study concluded that serum levels of NGAL and PENK in ICU patients with AKI revealed clinical significance for 28-day mortality prediction, with cut-off values of 230.30 ng/mL and 0.36 ng/µL, respectively. The accuracy of predicting 28-day mortality in ICU patients with AKI was further enhanced by combining p-PENK and p-NGAL while maintaining sensitivity and specificity.

Combining predictive power of plasma proenkephalin (p-PENK) and plasma neutrophil gelatinase-associated lipocalin (p-NGAL) enhanced the accuracy of predicting 28-day death in ICU patients with acute kidney injury (AKI).

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3. Outcomes of localized prostate cancer treated with irreversible electroporation from a multi-center prospective registry

Introduction: Prostate cancer (PCa) is becoming more prevalent worldwide, with an estimated 1.1 million new cases in 2012. Conventional PCa treatments, such as radiation therapy (RT) or radical prostatectomy (RPE), target the prostate as a whole. This approach has modest survival benefits over active surveillance and is associated with side effects like incontinence, impotence, and possible damage to the bladder and rectum. Recent research indicates that the largest PCa lesion with the highest tumor grade mostly controls the disease's course, indicating that treating this index lesion alone could have a significant positive impact. Focal thermal therapies, including radiofrequency ablation (RFA), high-intensity focal ultrasound (HIFU), and cryosurgery, have become increasingly popular as less intrusive substitutes for traditional therapy.[1] Tumor ablation using pulsed high-voltage low-energy direct electric current is achieved through the innovative approach known as irreversible electroporation (IRE). Due to its non-thermal energy platform nature, IRE can preserve nearby functioning tissues such as connective tissue and blood vessels. Histopathological results following IRE provide a clear separation of ablated from non-ablated tissue, while thermal ablation techniques reveal a transitional zone of partially injured tissue because the temperatures are not high enough for complete ablation.[2] So, this study aimed to report the results of a multi-center prospective registry on the side effects, quality of life, and oncological control of IRE ablation therapy for patients with localized prostate cancer in a short- to mid-term follow-up.

Methods: In this multi-center prospective observational study, 116 male patients had repeat prostate biopsies 12–18 months following internal radiotherapy. IRE was intended for men whose prostate cancer has been histologically confirmed to be malignant. A prostate biopsy was suggested for each patient one year after the IRE ablation. Patients were monitored every three months for the first two years, every six months for the third year, and then every twelve months for the remaining sixty months following IRE. All relevant data, including adverse event reports, procedure records, and questionnaires, was collected. The main result was the prostate cancer recurrence rate after a year. One year after IRE ablation, a prostate biopsy was recommended for the patients. Persistent prostate cancer seen in the repeat biopsy was considered a recurrence. Both the International Prostate Symptom Score (IPSS) and the International Index of Erectile Function (IIEF-5) questionnaires were used to measure the functional results. By using the Common Terminology Criteria for Adverse Events (CTCAE), treatment-related adverse events (AEs) were used to grade the safety of IRE.

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Results: Twenty-four months was the median follow-up period. Among the patients, 24.1% (28/116) had clinically severe prostate cancer (Gleason ≥ 3 + 4), while 59.5% (69/116) had any-grade prostate malignancies. The PSA value decreased dramatically by 96.2% in the following three months after it had increased noticeably in the first twenty-four hours following surgery. The readings remained equable afterward and were below the baseline level (Figure 1). Positive biopsy patients had a substantially higher PSA level than negative biopsy patients ($p < 0.01$). After three months, the IPSS score significantly increased to 8.2 ($p = 0.015$), but at six months, it dropped to 6.1 ($p = 0.017$). Following that, the IPSS level held steady during the follow-up. After three months, the IIEF-5 score decreased from 16.0 to 12.1 ($p < 0.001$) and remained stable after that. At three months, the rate of adverse events (AEs) was 1.8%; at six months, it had decreased to less than 1%, and it stayed steady until 48 months following IRE. Grade 3 or higher major adverse events were uncommon.

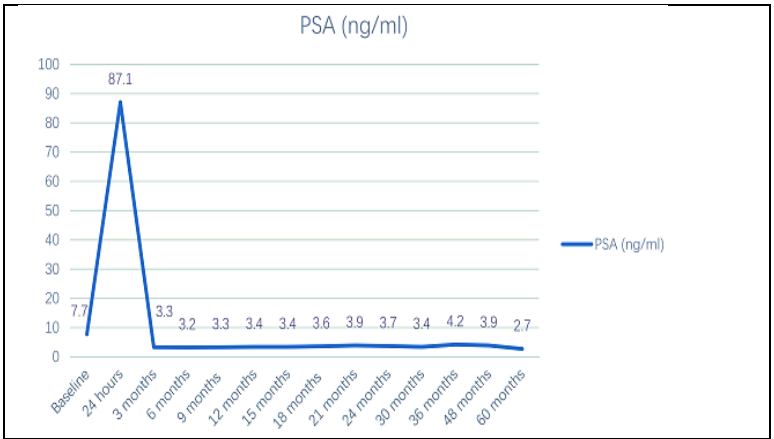

Figure 1. Change in PSA levels. The PSA readings at each follow-up point, the baseline, and 24 hours after surgery.

Discussion: Guenther E. et al. showed that IRE was as effective as a typical radical prostatectomy in terms of 5-year recurrence rates and superior urogenital function preservation, demonstrating the safety and appropriateness of IRE for the treatment of PCa.[1] In this investigation, IRE produced promising oncological and satisfactory functional outcomes. After worsening at three months, the IPSS score returned to baseline at six months. After worsening for three months, the IIEF-5 score stabilized. Clinically relevant prostate cancer was found in 24.1% of the individuals in the repeat biopsy performed 12–18 months after IRE.[2] According to the Wang H et al., 117 patients received IRE; the median IPSS was 9.0 at baseline and 4.5 at 6 months; and the median IIEF-5 was 2.0 at baseline and 2.0 at 6 months.[3]

Conclusion: This study concluded that IRE may produce satisfactory oncological results and favourable results for sexual and urinary function in males with localized prostate cancer. The IPSS initially worsened but returned to baseline levels after 6 months. After getting worse after three months, the IIEF-5 remained steady. IRE achieved a reasonable oncological result. In the repeat biopsy performed during a 12- to 18-month period, 24.1% of cases had clinically serious prostate cancer.

Prostate imaging advancements through the use of radiomics, artificial intelligence, and other modalities like positron emission tomography could be beneficial for irreversible electroporation (IRE).

References:

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4. Case Report on Renal Lymphangiectasia

Introduction: Lymphangiectasia, which is often referred to as lymphangioma or lymphangiomatosis, is a condition in which there is an abnormal dilatation of the lymphatic vessels due to a communication error between them. An uncommon condition known as renal lymphangiectasia can impact the intrarenal, peripelvic, and/or perirenal lymphatic veins.[1] characterized by a lymphatic channel drainage abnormality that results in cystic infiltration into the perirenal and parapelvic regions. Computed tomography (CT), magnetic resonance imaging (MRI), and ultrasound are the mainstays of diagnosis. However, inadequate awareness of this illness can often lead to misidentification, especially when combined with other cystic kidney diseases such as polycystic kidney disease.[2] This case report described a child who has been diagnosed with renal lymphangiectasia.

Case presentation: A 2-year-old girl, born into a consanguineous marriage, was brought to the hospital for a check-up due to ongoing stomach distension that had persisted for more than a year. A clinical examination revealed delayed growth in weight and stature, but no noteworthy family or prenatal history existed. An examination of the abdomen revealed distension with fluctuating dullness, although the blood pressure fell within normal ranges based on reference curves. Acute renal failure was biologically seen in conjunction with non-nephrotic proteinuria. Radiological evidence supported the diagnosis of renal lymphangiectasia: abdominal ultrasonography showed intracortical microcysts and a collection of delicate-walled perirenal cystic lesions with anechoic content (Figure 1). CT scans revealed several bilateral intracortical renal cysts that coalesced and distorted the kidney outlines but remained unaffected after contrast. A substantial intra-peritoneal fluid effusion was caused by several cysts that had burst into the perirenal region, resulting in true bilateral perirenal collections.

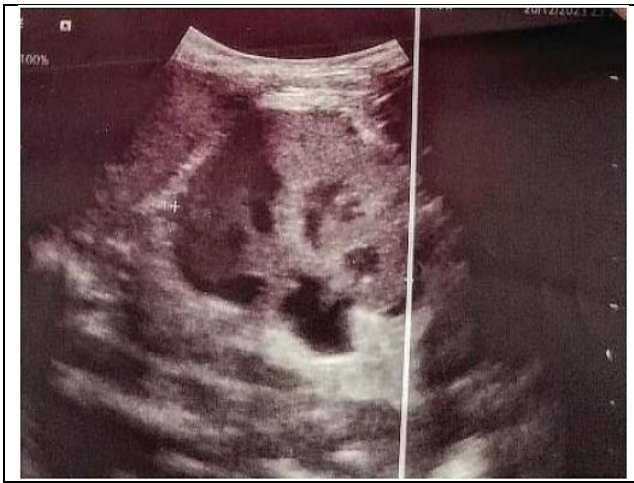

Figure 1. Contiguous perirenal cystic lesions with thin walls and anechoic material, surrounded by a crown of intracortical microcysts.

An MRI scan demonstrated a large number of adjacent cortical microcysts with T2 hyperintensity and T1 hypointensity grouped in a bilateral perirenal cluster (Figures 2, 3). These cysts had a significant amount of encapsulating ascites along with thin walls that improved upon contrast. In addition, the liver appeared to be typical size, with regular outlines and homogeneous signals. Nephroprotective therapy and diuretics were administered to the patient as part of their treatment. Surgery was necessary due to the cysts' massive size, bilaterality, and compressive nature. This required multiple draining attempts, which were unsuccessful and required the insertion of a percutaneous drain in addition to marsupialization with cyst rupture and coagulation. Following surgery, ascites was found to have phases of remission and recurrence, which led to a brief worsening of renal function before it returned to normal irrespective of the episode, with moderate renal insufficiency.

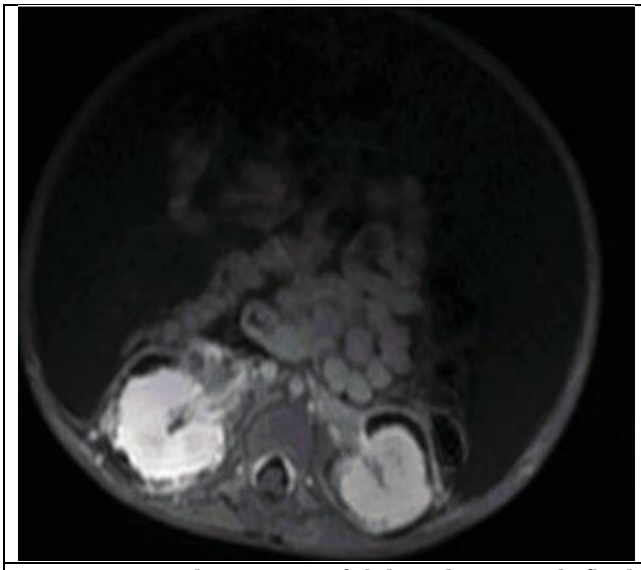

Figure 2. Axial segment of bilateral perirenal fluid accumulation, compared and mentalized, manifesting as T1 hypointensity on MRI.

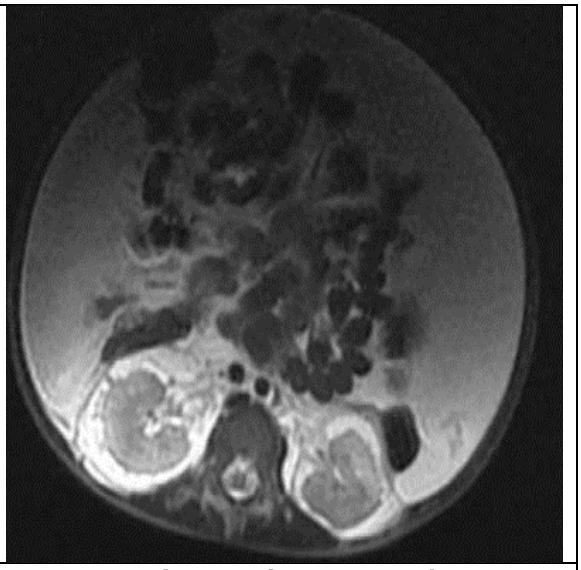

Figure 3. Axial section demonstrating the existence of numerous bilateral cortical cysts with T2 hyperintensity on MRI.

Discussion: Renal lymphangiectasia is an extremely uncommon illness. It is particularly difficult to manage if it is bilateral. It is appropriate to closely monitor blood pressure and renal function while managing asymptomatic patients. Patients with symptoms should be treated conservatively with frequent drainage and sclerotherapy sessions; nephrectomy should only be considered in extreme cases or when sclerotherapy fails, particularly when the illness is unilateral.[1] Renal lymphangiectasia is a benign long-term course with minimal and modest sequelae in some people, despite the enormous size of cysts and bilateral involvement of the kidneys.[3]

Conclusion: Renal lymphangiectasia is a challenging condition that requires very careful management and can lead to chronic renal failure in certain individuals. For symptomatic patients, surgical treatment options, including percutaneous drainage combined with sclerotherapy or marsupialization, may be considered.

The reduction in the risk of developing chronic renal failure and the increase in overall survival rates are dependent on early identification and appropriate treatment.

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