STRONG CHILDREN'S RESEARCH CENTER

Summer 2021 Research Scholar

Name: Journey Monegain

School: University of Michigan – Ann Arbor

Mentor: Dr. Erin Rademacher

Pediatric Renal Biopsy Trends 2007-2021

Background: Many children in America live with kidney conditions that require a specific plan for treatment. In order to provide a patient with a treatment plan, the fundamental cause of the kidney disease must be known. In many cases, the underlying cause of kidney dysfunction cannot be determined solely by blood and urine tests. A renal biopsy is often essential to determining the reason for kidney dysfunction. There is evidence from previous publications that the incidence of different renal diseases in children has changed over the past few decades, however, there is no published data examining this issue in children from the United States.

Methods: Retrospective chart review of patients from the pediatric nephrology division at URMC who underwent native renal biopsies from 2007-2021. Variables extracted included biopsy indications (nephrotic syndrome, proteinuria, glomerulonephritis, acute kidney injury (AKI), isolated hematuria, and chronic kidney disease (CKD)), demographic variables, clinical variables (creatinine, cystatin C, albumin, TP/Cr ratios, and presence of hypertension), biopsy complications (gross hematuria, hematoma, AV fistula, need for packed RBC's, and surgical intervention), and pathology diagnoses. ADI [area deprivation index] was calculated via rankings of neighborhoods by socioeconomic disadvantage on a national level provided by the Neighborhood Atlas. Creatinine eGFR was calculated using the CKiD U25 equation. Pathology diagnoses were classified into 5 groups: glomerular, systemic, inherited, tubulointerstitial nephritis (TIN), and mild/no pathology/other. Results were analyzed across three time periods: 2021-2017, n= 50; 2016-2012, n = 53; and 2011-2007, n=55. ANOVA, chi-square, or Fisher's exact tests were used as appropriate.

Results: There was no significant difference in any demographic variable (age/race/ethnicity/gender) between eras ($p > 0.05$). Age differs by renal biopsy indication ($p= 0.04$) and by pathology category ($p = 0.02$) while the other demographic variables do not. The 3 most common pathology diagnoses shifted from IgA, FSGS, and SLE in the earliest 2 eras to IgA, TIN, and MCD in the current era. There was an effect of era on pathology group ($p=0.004$) likely driven by the rise in TIN. The top two pathology categories for renal biopsy are glomerular and systemic disease in each era but TIN became more common in 2017-2021. Biopsy complications of gross hematuria and pRBC's differed by pathology category ($p = 0.04$) and hematomas post biopsy were related to the service provider (Pediatric Nephrology or Interventional Radiology, $p = 0.0006$). There is no statistical difference in biopsy complication by era nor biopsy complication by indication. There is no relationship between ADI and pathology category or ADI and indication for biopsy.

Conclusion Over the three eras, we see a shift in the top 3 diagnoses. SLE and FSGS have become less common while TIN and MCD seems more common. The demographics of patients undergoing biopsy have not changed. Biopsy complications may relate the underlying pathology. The difference in hematomas by service would need to be further investigated. It may reflect differences in reporting hematomas between pediatric radiologists versus interventional radiologists.

Implications: TIN has become more common in pediatrics and should be considered on the differential of pediatric patients with renal dysfunction.