

A Tertiary Care Hospital's Comparison of Hydronephrosis in an Adult and a Rare Cause

^{1:} Dr. Alina Liaqat
MBBS FCPS Surgery (Training Registrar) Unit A Kth Pesh

^{2:} Dr. Muhammad Usman
MBBS FCPS (Training Registrar Urology) Lrh Pesh

^{3:} Dr. Farhat Rehman
MBBS M-Phil Physiology Hod BKMC-MMC

^{4:} Dr. Alamzeb Jadoon
MBBS M-Phill (Phy), FCPS-II (Phy) Asspciate Proff
Physiology Department NMC-MTI

^{5:} Dr. Saad Ali
MBBD FCPS-II Training Registrar Cmh Noswhere

^{6:} Dr. Irsa Hidayat
MBBSFCPS-II Training Registrar Clinical Hematology BMTC
CMH Rawalpindi

^{7:} Dr. Ammad Ali
MBBS D-Derm, D-Aesthtic Medicine KMU

CORRESPONDING AUTHOR

Name: Dr. Farhat Rehman

Designation: MBBS M-Phill Physiology Chairperson Department Physiology BKMC-MMC

Abstract:-

OBJECTIVE: The goal of the study was to examine the demographic makeup and clinical manifestations of hydronephrosis with uncommon etiology. Examine the anatomical features that affect the distribution of hydronephrosis. Investigate corresponding pathologies in hydronephrosis instances. Analyze the connection between hydronephrosis, weight, and age.

METHODOLOGY: A cross-sectional study was carried out from January 2021 to January 2022 after receiving ethical approval. Patients with recently diagnosed kidney stones ranged in age from 21 to 68. Individuals with cancer, renal malformation, diabetes, hypertension, heart failure, or serum creatinine > 1.3 mg/dL were excluded from baseline examinations. Chi-square analysis and SPSS version 24 were used to analyze the data, which were gathered using a questionnaire.

RESULT: The study included 178 patients, with a median age of 38 years and 61% females. Both macroscopic hematuria (5%) and incomplete hydronephrosis (74%) were common presentations. Anatomical distribution in unilateral/bilateral cases (31%/69%) and left/right distribution (62%/38%) revealed significant differences. Bladder tumors (2%) and ureteral strictures (11%) were associated diseases. Age-weight ratios showed distinct trends.

CONCLUSION: Rare causes of hydronephrosis display distinctive clinical and demographic traits. Macroscopic hematuria and incomplete hydronephrosis are telltale signs. Anatomical differences affect presentation, emphasizing the necessity for individualized care. It is critical to recognize related disorders. The study informs clinical practice and advances the diagnosis and treatment of this distinct subset of hydronephrosis sufferers.

Keywords:- Adult, Hydronephrosis, Causes, Obstruction, Surgery, Weight.

I. INTRODUCTION

Dilatation of renal pelvis or calyces is termed as hydronephrosis while dilatation of ureter is called hydrourteronephrosis and is classified according to site and level of obstruction. HN can lead to impaired kidney function and failure, functional or anatomical obstruction causes back flow into kidney causing accumulation, pelvicalyceal distention and nephropathy¹. No effect of pre operati ve stress on patient blood pressure with hydronephrosis was reported by study². Size and site depends on treatment for surgical or non-surgical for obstruction in hydronephrosis³. Base line investigations like ultrasound, computed tomography scan are important to rule out the hydronephrosis quickly to relive patients. Recent study has documented that

patients with hydronephrosis has increased plasmin levels in urine⁴. Pathological evolution and diagnosis of hydronephrosis is not complete but need more clinical research⁵. Retinoid-binding protein and album in urine can be used as indicator for renal dysfunction in hydronephrosis⁶⁻⁷. Kidney stones occur when organic and inorganic components—such as crystalline salts and urine macromolecules—deposit inside the renal parenchyma or pelvicalyceal system. Nearly everywhere in the world, kidney stone disease (KSD), also known as nephrolithiasis or urolithiasis, is common, and its prevalence is rising in some places⁸⁻¹⁰. In the adult population of the US, studies have shown that KSD is more common in men than in women and affects people of all ages, including children, adolescents, and adults¹¹. The best method of preventing KSD is thought to be lowering its etiologies and/or risk factors. For the prevention of KSD, numerous recommendations or rules have been put forth to date¹²⁻¹⁴.

II. METHODOLOGY

A cross-sectional study was carried out at the surgical ward of the Mardan Medical Complex between January 2021 and January 2022 after receiving ethical approval from the appropriate committee. Patients got standard baseline examinations and a full evaluation during this time. Participants were chosen based on a set of criteria that excluded those with cancer, renal malformations, diabetes,

hypertension, heart failure, or serum creatinine levels more than 1.3 mg/dL. Patients with symptoms such flank pain, problems with the lower urinary tract, hematuria, and weight loss were thought to be eligible for inclusion. The study's main focus was on individuals who had just received an ultrasonography diagnosis of renal stones. Participants in the study were required to be between the ages of 21 and 68. Before participating in the trial, all eligible patients provided written informed permission. To evaluate variations in the distribution of independent variables based on questionnaire responses, chi-square analysis was used. Data collection involved a non-probability sampling strategy. The SPSS version 24 programme was then used to analyze the data that had been obtained. Statistical significance was determined by a p-value lower than 0.05. Overall, the study's design made sure to thoroughly examine the chosen patient population, using stringent criteria for participant inclusion and a strong statistical analysis method to extract valuable information from the data gathered.

III. RESULTS

Median age was 38 range 21-68 years for both gender. Out of 178 female were 109 with highest number and percentage 61%. Incomplete hydro nephrosis was 132 (74%) out of 178 cases while macroscopic hematuria was seen in 10 (5%) patients.

Table:1 details of variations

NUMBER OF PATIENTS	178
MEDIAN AGE	38
GENDER (FEMALE/MALE)	109/69 (61%/39%)
UNI LAT / LATERAL	56/122 (31%/69%) p<0.02
LEFT/RIGHT	112/66 (62%/38%) p<0.03
HYDRONEPHROSIS (COMPLETE/INCOMPLETE)	132/46 (74%/26%) p<0.01
INTERNAL / EXTERNAL	120/58 (67%/33%) p<0.02
MACROSCOPIC HEMATURIA	10 (5%)

➤ Other Pathology

Out of 178 patients four patients 2% presented with bladder tumor biopsy were taken from one patient and other were already on treatment, 19 (11%) patients presented with ureteral stricture. There was retroperitoneal fibrosis seen while invasion was seen in one patient only.

Table:2 pathology with variations

OTHER PATHOLOGY	TOTAL
BLADER TUMOR	4 (2%)
URETHAL STRICTURE	12 (7%)
CYSTOCELE	0
INVASION	0
RETROPERITONIAL FIBROSIS	0

Highest ratio of weight was seen in age group 71-80 with 61 females while in males 60 patients were seen in age group 81-90. Lowest ratio for number and percentages were seen in age group 81-90 for female and for males In age group 91-above.

Table:3 weight with variations

WEIGHT	GENDER (female/male) with percentages
60-70	33/48 (18%/26%)
71-80	61/52 (34%/29%)
81-90	39/60 (22%/33%)
91-above	45/18 (26%/12%)

IV. DISCUSSION

According to the study, the median age for both sexes with hydronephrosis was 38 years old, demonstrating a very youthful population with uncommon etiology. This distribution may be explained by the particular underlying causes of hydronephrosis in these particular patients. The higher percentage of females (61%) among the study participants may point to a gender-specific sensitivity to hydronephrosis in women or to other potential contributing factors. Hydronephrosis is one of the common diseases in urology department. Obstruction in any part of urinary tract can cause hydronephrosis¹⁵. The most common appearance in the research, accounting for 74% of patients, was incomplete hydronephrosis. This data might imply that the uncommon causes of hydronephrosis have a propensity to partially block the renal collecting system or may include processes that do not fully dilate the renal collecting system. Additionally, the fact that 5% of patients have macroscopic hematuria highlights the importance of understanding this symptom as a possible signal of hydronephrosis with uncommon etiologies. There is no consensus on management of asymptomatic hydronephrosis as it can improve on its own without intervention⁹. Presenting symptoms in our study was similarly resented by other study¹⁶⁻¹⁷. Mean age was 38 in our study which was similar to other study¹⁸. The large disparities between unilateral and bilateral cases, as well as between cases on the left and right side, emphasizes the significance of taking anatomical variations and their possible influence on hydronephrosis into account. Due to particular disease mechanisms or early identification, patients with these uncommon causes may present with milder types of blockage, according to the increased prevalence of incomplete hydronephrosis compared to total hydronephrosis. Left sided 122(62%) was affected more than right side 66(38%) which was also reported by study of Morse and Resnick¹⁹. Ratio female 109(61%) was higher than male 69(39%) in our study which was also reported by other study²⁰. A careful evaluation of these disorders is required in cases of hydronephrosis because bladder tumors and ureteral strictures are present in a small percentage of individuals. The rarity of invasion and lack of retroperitoneal fibrosis may indicate that aggressive tissue invasion or widespread fibrotic processes are not the main causes of hydronephrosis in our study. Increase weight was seen higher in females 61(34%) to male 52(29%) in our study which suggest hydronephrosis is directly related to obesity similarly it was also reported by another study²¹. Hydronephrosis is always caused by obstruction of any part which affects all age genders. Other pathology diseases ratio was higher in ureteral stricture 12(7%) while bladder tumor

was seen in 4(2%) patients. Interesting patterns can be seen in the distribution of age and weight. The high weight ratio in the 71–80 age groups for females and the 81–90 age groups for males may indicate that aging-related alterations and physiological factors may have an impact on hydronephrosis. The lowest ratio for both sexes in the 81–90 age range may point to particular difficulties or protective factors in this age bracket. Similarly same study has also reported hydronephrosis with renal anomalies' obstructions and causes²². Hydronephrosis internally was seen in 120(67%) patient's ratio higher than external obstruction 58(31%).in our study patients having ureteral stricture were 7(12%) which includes variables such as stone burden and impaction, operative time, double j stunt placement studied by darwish et al²³. The higher incidence of renal stones in males could be contributed due to the presence of testosterone²⁴.Pakistan is very populated country where majority people lives under the line of poverty which has created burden on public hospitals out door patient department. The diagnosis and treatment of hydronephrosis with uncommon origins might be affected clinically by knowing its characteristics. Clinical professionals should take incomplete hydronephrosis and macroscopic hematuria into consideration as potential signs of these uncommon etiologies. The anatomical distribution highlights the need for individualized treatment plans based on the obstruction's location. Additionally, the connection to ureteral strictures and bladder tumors emphasizes the significance of a thorough examination to address all underlying causes.

V. CONCLUSION

With information on demographics, clinical manifestations, and related pathologies, this study illuminates the distinctive characteristics of hydronephrosis with uncommon origins. The results highlight the significance of identifying these traits for precise diagnosis and efficient care, ultimately resulting in improved patient outcomes. Additional study in this field may improve therapeutic treatment strategies for this subset of hydronephrosis cases and extend our understanding of the underlying mechanisms.

REFERENCES

- [1]. Yamamichi F, Shigemura K, Kitagawa K, Fujisawa M. Comparison between non-septic and septic cases in stone-related obstructive acute pyelonephritis and risk factors for septic shock: A multi-center retrospective study. *J. Infect. Chemother.* 2018;**24**:902–906

- [2]. Al-Mashhadi A, Checa A, Wahlin N, Neveus T, Fossum M, Wheelock CE, et al.. Changes in arterial pressure and markers of nitric oxide homeostasis and oxidative stress following surgical correction of hydronephrosis in children. *Pediatr Nephrol.* 2018;33:639–49
- [3]. Weitz M, Schmidt M, Laube G. Primary non-surgical management of unilateral ureteropelvic junction obstruction in children: a systematic review. *Pediatr Nephrol.* 2017;32:2203–13
- [4]. Zachar R, Al-Mashhadi A, Dimke H, Svenningsen P, Jensen BL, Carlstrom M. Hydronephrosis is associated with elevated plasmin in urine in pediatric patients and rats and changes in NCC and gamma-ENaC abundance in rat kidney. *Am J Physiol Renal Physiol.* 2018;315:F547–57
- [5]. Melvin JE, Ost MC, Marin JR. Hydronephrosis from ureteropelvic junction obstruction discovered on point-of-care ultrasound in patients with trauma. *Pediatr Emerg Care.* 2018;34:365–367
- [6]. Sobotka R, Čapoun O, Kalousová M, Hanuš T, Zima T, Košťířová M, Soukup V. Prognostic importance of vitamins A, E and retinol-binding protein 4 in renal cell carcinoma patients. *Anticancer Res.* 2017;37:3801–3806
- [7]. Fan J, Yan P, Wang Y, Shen B, Ding F, Liu Y. Prevalence and clinical significance of low T3 syndrome in non-dialysis patients with chronic kidney disease. *Med Sci Monit.* 2016;22:1171–1179. doi: 10.12659/MSM.895953
- [8]. Chewcharat A, Curhan G. Trends in the prevalence of kidney stones in the United States from 2007 to 2016. *Urolithiasis.* 2021 Feb;49(1):27-39.
- [9]. Wang Q, Wang Y, Yang C, Wang J, Shi Y, Wang H, Zhang L, Zhao MH. Trends of urolithiasis in China: a national study based on hospitalized patients from 2013 to 2018. *Kidney Diseases.* 2023 Jan 31;9(1):49-57.
- [10]. Gadzhiev N, Prosyannikov M, Malkhasyan V, Akopyan G, Somani B, Sivkov A, Apolikhin O, Kaprin A. Urolithiasis prevalence in the Russian Federation: analysis of trends over a 15-year period. *World Journal of Urology.* 2021 Oct;39(10):3939-44.
- [11]. Abufaraj M, Xu T, Cao C, Waldhoer T, Seitz C, D'andrea D, Siyam A, Tarawneh R, Fajkovic H, Schernhammer E, Yang L. Prevalence and trends in kidney stone among adults in the USA: analyses of national health and nutrition examination survey 2007–2018 data. *European urology focus.* 2021 Nov 1;7(6):1468-75.
- [12]. Peerapen P, Thongboonkerd V. Kidney stone prevention. *Advances in Nutrition.* 2023 Mar 9.
- [13]. Bhojani N, Bjazevic J, Wallace B, Lee L, Kaler KS, Dion M, Cowan A, Sultan N, Chew BH, Razvi H. UPDATE–Canadian Urological Association guideline: Evaluation and medical management of kidney stones. *Canadian Urological Association Journal.* 2022 Jun;16(6):175.
- [14]. Taguchi K, Cho SY, Ng AC, Usawachintachit M, Tan YK, Deng YL, Shen CH, Gyawali P, Alenezi H, Basiri A, Bou S. The Urological Association of Asia clinical guideline for urinary stone disease. *International Journal of Urology.* 2019 Jul;26(7):688-709.
- [15]. Wong MCY, Piaggio G, Damasio MB, Molinelli C, Ferretti SM, Pistorio A, Ghiggeri G, Degl'Innocenti ML, Canepa A, Incarbone V, et al. Hydronephrosis and crossing vessels in children: Optimization of diagnostic-therapeutic pathway and analysis of color Doppler ultrasound and magnetic resonance urography diagnostic accuracy. *J Pediatr Urol.* 2018;14:68.e1–68.e6. doi: 10.1016/j.jpuro.2017.09.019
- [16]. Kohno M, Ogawa T, Kojima Y, et al. Pediatric congenital hydronephrosis (ureteropelvic junction obstruction): Medical management guide. *Int J Urol* 2020;27:369-76. 10.1111/iju.14207
- [17]. Gouru VR, Pogula VR, Vaddi SP, Manne V, Byram R, Kadiyala LS. Metabolic evaluation of children with urolithiasis. *Urol Ann* 2018;10:94-9
- [18]. Rajma J, Arun AC, Ganesapillai M. Clinical profile of urolithiasis among hospitalized children-A single center study. *Pediatric Review: Int J Pediatr Res* 2017;4:343-9. https://ejmcm.com/article_19063_2c5ec2f382d46a74b5f8dd8772b63333.pdf
- [19]. Ried M Morse, Martin I Resnick. Jr *Urol.* 1991;145:263-265.
- [20]. Yattara, H., Coulibaly, N., Diallo, D., Sanogo, M., Sy, S., Samiza, P., Tanagra, M., Touré, A., Samaké, M., Coulibaly, S.D.B., Fofana, A.S., Kodio, A. and Fongoro, S. (2021) First Consultation in Nephrology: Case of the Point G University Hospital (Bamako-Mali). *Open Journal of Nephrology,* 11, 412-421. <https://doi.org/10.4236/ojneph.2021.113034>
- [21]. Delgado, M.F.; Lisboa, I.N.D.; Fernandes, M.I.D.C.D.; Carino, A.C.C.; Fernandes, R.M.; Lira, A.L.B.D.C. Risk factors and knowledge of the elderly people about chronic kidney disease. *Rev. Rede Enferm. Nord.* 2017, 18, 361–367
- [22]. Hwang G, Hwang I, Choo SH, Kim HG, Pai KS. A Case of Giant Hydronephrosis Hidden by Obesity in an 11-year-old Boy. *Childhood Kidney Diseases.* 2017;21(2):147-51.
- [23]. Darwish AE, Gadelmoula MM, Abdelkawi IF, Abdellatif AM, Abdel-Moneim AM, Hammouda HM. Ureteral stricture after ureteroscopy for stones: a prospective study for the incidence and risk factors. *Urol Ann.* 2019;11(3):276–281. doi: 10.4103/UA.UA_110_18