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Original Research Article

A Study of Unilateral Hydronephrosis (A Clinico-Radiological-Pathological Correlation) In 100 Consecutive Cases

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ABSTRACT

Introduction: The term hydronephrosis is generally defined as dilatation of the renal pelvis and calyces resulting from intermittent and incomplete obstruction to the flow of urine. A unilateral hydronephrosis occurs when the obstruction is above the level of the bladder.. Diagnostic workup depends on the age of the patient, Laboratory tests such as kidney function test, urinalysis. Imaging studies such as Ultrasonography, X Ray KUB, intravenous urogram (IVU), CT or MRI are also important investigations in determining the presence and/ or cause of hydronephrosis.
Material and Methods: All patients of Unilateral Hydronephrosis from Surgical OPD and/or patients admitted in surgical wards of hospital. Inclusion criteria**:** Patients with Clinical, pathological and radiological confirmation which is suggestive of Unilateral Hydronephrosis. Exclusion criteria: Bilateral Hydronephrosis, Concomitant morbidity.
Results: In our study maximum cases were between age of 21 to 40 i.e. 55%. and were males. 80% had chief complaint of pain. In 86% patients calculi was visualized on plain X-ray KUB. On Ultrasound KUB maximum cases (57%) had obstruction on the right side. Grade of hydronephrosis on ultrasound were maximally of the category of mild hydronephrosis (48%). On IVP, maximum patient had Grade 1 hydronephrosis (48%). Out of total of 100 cases maximum number of patients in our study was diagnosed as Ureteric calculi (70%), renal calculi (18%), Congenital PUJ obstruction in 11% cases, ureteric stricture in 1%. Most common intervention which was done was URS with DJ stenting in 51% cases.
Keywords: Unilateral Hydronephrosis, Ureteric calculi, PUJ Obstruction

INTRODUCTION

The term hydronephrosis is derived from hydro (from the Greek hydor, “water”), Nephros (Greek “kidney”), and osis (“condition”) and is generally defined as dilatation of the renal pelvis and calyces resulting from intermittent and incomplete obstruction to the flow of urine. Hydronephrosis should be used as a descriptive term referring simply to the presence of dilatation of the pelvis and calyces and not to the cause of that dilatation.

Obstructive uropathy is used to described the architectural changes in the urinary tract that impairs outflow of urine such that proximal pressure must be raised to transmit the usually flow through the point of narrowing. Such changes may or not be associated with renal parenchyma

damage. Proximal to the site of obstruction dilation occurs. The term hydronephrosis is used to describe this dilatation. (Walsh PC, Campbell's urology, 2002) [1]

Depending on the site of obstruction to the urinary flow the hydronephrosis may be unilateral or bilateral. A unilateral hydronephrosis occurs when the obstruction is above the level of the bladder. Causes may be present either outside the ureter, in the wall of the ureter or lumen of the ureter. Ureteral obstruction with subsequent hydronephrosis is a common clinical occurrence. The incidence of hydronephrosis was found in general autopsy to be 3.1% among patients ranging in an age from birth to 80 years. The female to male ratio of unilateral hydronephrosis most commonly caused by idiopathic pelviureteric junction obstruction or calculus is 2:1 the right side is more commonly affected. Causes of unilateral hydronephrosis can be extramural obstruction, intramural obstruction and intraluminal obstruction. (Fowler CG, Bailey and love's short practice of surgery 2004). [2]

Functional dysfunction at UPJ due to failure of peristalsis transmission at UPJ level essentially in functional obstruction is most common cause of hydronephrosis in paediatrics. It may results from abnormal development of smooth muscle at UPJ. (Kim Hl, Schwartz's principles of surgery, 2005). [3] Although repeated to be congenital uretropelvic junction (UPJ) obstruction also can be secondary infection. Extrinsic compression or more commonly intrinsic scar in congenital causes are likewise either extrinsic are intrinsic. The intrinsic causes are thought to be abnormal muscles fibres at the UPJ or mucosal folds. Whereas the extrinsic causes include retroperitoneal bands, Kinks and occasionally aberrant vessel. (Arthur D. Current urologic therapy, 1994) [4]

Obstructive uropathy with hydronephrosis has a bimodal distribution in humans. It is common in childhood as a consequence of congenital anomalies of the urinary tract. Obstructive uropathy with hydronephrosis is the most common cause of an abdominal mass in neonatal period. The incidence of clinical hydronephrosis in children is highest in the first 6 years of life. It declines with age and continues to decline after age 15. In adults the incidence of obstructive uropathy was found to be between 3.5% and 3.8% (Walsh PC, Campbell's urology, 2002) [1]

An autopsy series of 59,064 subjects ranging in age from neonates to geriatric persons reported hydronephrosis in 3.1%. [1] At age 20-60 years, hydronephrosis was more common in women, which was suggested to be due to pregnancy and gynaecologic malignancy. In men, prostatic diseases were indicated as the cause of the rise in prevalence after age 60 years. Autopsy studies also indicate that hydronephrosis is present in 2-2.5% of children. The prevalence is slightly increased in boys, most of whom in the study were younger than 1 year. In women gynaecologic cancers and pregnancy are common causes. Younger patients (aged 20-60 y): the frequency of hydronephrosis is higher in women than in men. In young adults: calculi are the most common causes of hydroureter and hydronephrosis. In children ureteropelvic junction obstruction is the most common cause. Old age malignancies are the most common cause (Walsh, Campbell's urology, Philadelphia, 2002) [1]

Diagnostic workup depends on the age of the patient, as well as whether the hydronephrosis was detected incidentally or prenatally or is associated with other symptoms.

Laboratory tests (such measurement of kidney function) are typically indicated, though they must be interpreted cautiously. Even in cases of severe unilateral hydronephrosis, the overall kidney function may remain normal since the unaffected kidney will compensate for the obstructed kidney.

Urinalysis is usually performed to determine the presence of blood (which is

typical for kidney stones) or signs of infection (such as a positive leukocyte esterase or nitrite). Impaired concentrating ability or elevated urine pH (distal renal tubular acidosis) are also commonly found due to tubular stress and injury.

Imaging studies - such as an intravenous urogram (IVU), ultrasound, CT or MRI - are also important investigations in determining the presence and/ or cause of hydronephrosis. Whilst ultrasound allows for visualisation of the ureters and kidneys (and determine the presence of hydronephrosis and / or hydroureter), an IVU is useful for assessing the anatomical location of the obstruction. Ante grade or retrograde pyelography will show similar findings to an IVU but offer a therapeutic option as well.

The choice of imaging depends on the clinical presentation (history, symptoms and examination findings). In the case of renal colic (one sided loin pain usually accompanied by a trace of blood in the urine) the initial investigation is usually a spiral or helical CT scan. This has the advantage of showing whether there is any obstruction of flow of urine causing hydronephrosis as well as demonstrating the function of the other kidney. Many stones are not visible on plain X-ray or IVU but 99% of stones are visible on CT and therefore CT is becoming a common choice of initial investigation. CT is not used however, when there is a reason to avoid radiation exposure, e.g. in pregnancy.

For incidentally detected prenatal hydronephrosis, the first study to obtain is a postnatal renal ultrasound, since as noted, many cases of prenatal hydronephrosis resolve spontaneously. This is generally done within the first few days after birth, although there is some risk that obtaining an imaging study this early may miss some cases of mild hydronephrosis due to the relative oliguria of a newborn. Thus, some experts recommend obtaining a follow up ultrasound at 4–6 weeks to reduce the false-negative rate of the initial ultrasound (Anderson JC. London, 1963). [5] A voiding cystourethrogram (VCUG) is also typically obtained to exclude the possibility of vesicoureteral reflux or anatomical abnormalities such as posterior urethral valves. Finally, if hydronephrosis is significant and obstruction is suspected, such as ureteropelvic junction (UPJ) or ureterovesical junction (UVJ) obstruction, a nuclear imaging study such as a MAG-3 scan is warranted.

Obstruction of the urinary tract is a common and potentially reversible cause of acute and chronic renal failure. Although the clinical features of obstructive nephropathy have been generally recognized for many years, recently our understanding of the pathophysiology of the disturbed renal function has been enhanced by the detailed study of experimental models of this disorder. The effects of urinary tract obstruction on renal function must be considered both during and after relief of obstruction and are greatly influenced by whether the obstruction is unilateral or bilateral, acute or chronic, partial or complete. Striking changes in renal function occur during the first 24 hours of complete unilateral (UUO) or bilateral ureteral obstruction (BUO) in experimental animals. After relief of BUO, there is marked increase in sodium and water excretion despite the severe reduction in glomerular filtration rate (GFR), a natriuretic state referred to as post obstructive diuresis (POD). After relief of UUO, in contrast, there is no absolute increase in sodium and water excretion, although fractional excretion is greater from the post-obstructive kidney. Acute partial ureteral obstruction causes a decrease, not an increase, in sodium and water excretion, but the characteristic functional change in chronic hydronephrosis is an inability to conserve sodium and water. The purpose of this review is to examine the experimental data that clarifies selected aspects of the pathophysiology of obstructive nephropathy. (Douglas R Wilson, 1980) [6]

In the present series of 100 consecutive cases, we have tried to make a

clinico, radiological and pathological correlation of our experiences of patient attending our institute. Wherever indicated patient have been operated and biopsies were taken of the obstructing ureter, send for histopathology for correlation.

MATERIAL AND METHODS

Source of data

Cases of Unilateral Hydronephrosis from Surgical OPD and/or patients admitted in surgical wards of hospital.

Inclusion criteria:

1) Patients with Clinical, pathological and radiological confirmation which is suggestive of Unilateral Hydronephrosis.

Exclusion criteria:

1) Bilateral Hydronephrosis.
2) Concomitant morbidity.

METHODS FOR CLINICAL ASSESSMENT

SYMPTOMS AND SIGNS

1) Attacks of acute renal colic may occur with no palpable swelling.
2) Palpable mass
3) Nausea and vomiting
4) Urinary tract infection
5) Fever

METHODS FOR CHEMICAL PATHOLOGICAL ASSESSMENT

INVESTIGATION:

A. BLOOD:

1) CBC
2) Serum Electrolyte
3) Serum Creatinine
4) Blood urea

B. URINE:

1) URINE ROUTINE & MICROSCOPY
   a) Crystals in urine
   b) Blood cells in urine
   c) Pus cells in urine
2) URINE CULTURE & SENSITIVITY

C. STONE ANALYSIS

METHODS FOR RADIOLOGICAL ASSESMENT

1) **X-ray KUB:** To detect size and site of stone.
2) **USG KUB:** To show the size of the kidney & swelling (Hydronephrosis) of the kidney in obstructive uropathy. It will also show ureters if they are dilated. However, it does not give information about the function of the kidney.
3) **INTRAVENOUS PYELOGRAPHY:** This is the specialized test where series of X- ray are taken after injecting the dye/Contrast, which has radiopaque property. The kidneys excrete these contrasts and kidneys are out lined on X-rays and serial films are taken. This is a very useful test. It gives lot of information including size and shape of kidneys, function of kidney – comparative and individual, presence of obstructive uropathy, delineates the anatomy of kidney, ureter & bladder etc.
4) **NCCT KUB:** Patient in which the findings on X-ray KUB and subsequent IVP will be ambiguous.
5) **DTPA SCAN:** To know the function of kidney, if indicated.

OBSERVATION AND RESULTS

In a study of 100 patients most of the patients were male, age between 21- 40 years i.e. 55%. Mean age was 11.11. Out of 100 patients, 80 complaints of pain.

Table 1 Distribution of Type of Pain (80 cases) in present study

Type of Pain	Total number of Patient	Percentage
Ureteric Colic	53	66%
Dull aching flank pain	27	34%

Table 2 Distribution of site of pain radiation (16 cases) in present study

Site of radiation of Pain	Total number	Percentage
Loin to Umblicus	3	19%
Loin to testis	2	12%
Loin to Lower Quadrant	1	6%
Loin to Inner aspect of thigh	10	63%

Table 3 Incidence of presence of calculus on Plain X-ray (KUB)

X-ray	Total number	Percentage
Visualized	86	86%
Not Visualized	14	14%

Table 4 Hydronephrosis on USG in present study

Hydronephrosis on Ultrasound	Total number	Percentage
Mild	48	48%
Moderate	37	37%
Severe	15	15%

Table 5 Location 0f Obstruction on USG in present study		
Location 0f Obstruction on Ultrasound	**Total number**	**Percentage**
Kidney	27	27%
Pelvi-Ureteric Junction	6	6%
Upper Ureter	16	16%
Mid Ureter	7	7%
Low Ureter	24	24%
Vesico-Ureteric Junction	11	11%
Not Seen	9	9%

Table 6 Side of Obstruction on USG in present study		
Side of Obstruction	**Total number**	**Percentage**
Left	39	39%
Right	51	51%
Not Seen	10	10%

Table 7 Distribution of side of Obstruction on USG (90 cases) in present study		
Side of Obstruction	**Total number**	**Percentage**
Left	39	43%
Right	51	57%

Table 8 Distribution of Grading of IVP		
IVP	**Total number**	**Percentage**
Flattening with Hydroureteronephrosis	31	31%
Flattening with Hydronephrosis	17	17%
Clubbing with Hydroureteronephrosis	30	30%
Clubbing with Hydronephrosis	7	7%
Broadening with Hydroureteronephrosis	7	7%
Broadening with Hydronephrosis	8	8%

Table 9 Incidence of Calculus as seen on NCCT in present study		
NCCT	**Total number**	**Percentage**
Seen	38	38%
Not Seen	62	62%

Table 10 DTPA scan in present study (6 patients)		
DTPA	**Total number**	**Percentage**
<10%	2	2%
11-30%	2	2%
31-50%	0	0%
>50%	1	1%
Non functioning	1	1%
Not required	94	94%

Table 11 Incidence of causative lesion in Unilateral HDN in present study		
Aetiology	**Total number of Patient**	**Percentage**
Right Ureteric Calculi	38	38%
Left Ureteric Calculi	32	32%
Right Renal Calculi	11	11%
Left Renal calculi	7	7%
Left PUJ Obstruction	5	5%
Right PUJ Obstruction	6	6%
Right Ureteric Stricture	1	1%
Left Ureteric Stricture	0	0%

Table 12	Incidence of Type of Surgical procedures conducted in present study	
Surgery	**Total number**	**Percentage**
Right URS with DJ Stenting	30	30%
Left URS with DJ Stenting	21	21%
Anderson-HynePyeloplastywith DJ Stenting	5	5%
Foley Y-V Pyeloplasty	5	5%
Right Pyelolithotomy with DJ Stenting	6	6%
Left Pyelolithotomy with DJ Stenting	4	4%
Right DJ Stenting	4	4%
Left DJ Stenting	6	6%
Right Nephrectomy	2	2%
Left Nephrectomy	0	0%
Right URS without DJ Stenting	2	2%
Left URS without DJ Stenting	2	2%
Right PCNL	2	2%
Left PCNL	1	1%
Right Percutaneous Nephrostomy	1	1%
Left Percutaneous Nephrostomy	0	0%
Conservative Management	9	9%

DISCUSSION

The present study of unilateral hydronephrosis (a clinico-radiological-pathological correlation) was undertaken in patients attending Surgical OPD and/or patients admitted in surgical wards. Hundred (100) cases of unilateral hydronephrosis were studied. Accordingly the study was undertaken over the period of 2 years (July 2017 and June 2019) and specific focus was laid on the clinical profile of these patients and attempted correlation with radiological and pathological findings was established.

The study encompasses 100 consecutive cases of Unilateral Hydronephrosis. The formatting of the discussion shall be categorized into subheadings as follows:

Age:

According to JC Anderson in 1963 [5] a 17 years review of 172 patients of Hydronephrosis incidence was most commonly seen in third and fourth decade.

Walsh PC et al in 2002 [1] stated that hydronephrosis in autopsy patient range in the age from birth to 80 years. Joshi KS et al in 2014 [19] concluded that average age of presentation was *33.4* years; youngest was 7 years old and oldest was 85 years. Song Y1 et al in 2015 [6] study 248 consecutive patients presenting with ureteral colic and diagnosed with unilateral Hydronephrosis, mean patient age was *47.0* years. Ingale AV et al in 2015 [11] study on 30 cases of clinical profile of unilateral hydronephrosis stated that 11 out of 20 of ureteric calculi, 4 out of 7 of PUJ calculi were in the 3rd and 4th decade of life, youngest was 1 year old and oldest was 75 years of age.

In the present study the incidence of Unilateral Hydronephrosis is maximum between 21 years to 40 years i.e. *55%*. The youngest person affected was 1 year old and the oldest person was 84 year old.

Accordingly our findings are in agreement with those of the available literature in terms of communality of the age incidence in 3rd and 4thdecade.

Pain:

Margaret M. Platis et al in 1963 [12] done a study on renal function in patient with unilateral hydronephrosis. 8 females and 4 females were investigated, *9 (75%)* of these 12 patients presented with pain. Kim CA et al in 2000 [7] suggested that recurrent flank pain seems to be the best indication for the need of surgery. Jeng-Daw Tsai et al in 2006 [8] stated that all 18 patient in his study had sharp pain that began acutely and typically lasted for <2 days. Prasana L.C in 2013 [23] concluded that all 30 patients presented with pain abdomen either localized to lumbar region or radiating to loin while *45%* cases had frequency. Joshi KS et al in 2014 [19] concluded that *53.6%* had mild pain, *46.4%* had severe pain. Kasabe P et al in 2014 [9] done a study about the incidence of pain in cases of unilateral hydronephrosis. He concluded that pain is the most common *(62%)* presenting symptom followed by frequency. Ingale AV et al in 2015 [11] study on 30 cases of clinical profile of unilateral hydronephrosis stated that all 30 patients presented with pain abdomen. In PUJ obstruction pain was dull aching and localized to lumbar region, in ureteric stone pain was situated in the lumbar region radiating to loin.

In present study *80%* patient complaint of pain and *20%* had no pain. Out of these 80 patient 53 had ureteric colicky and 27 had dull aching flank pain. 16 patients had radiation of pain to loin i.e. classical loin to groin pain.

The higher incidence of pain as presenting symptom in our series can be attributed to the fact that in most of the patient in our present series had stone as the presenting cause which would cause obstruction of the ureter and hence pain due to back pressure as perhaps lesser pain threshold in our subjects.

X-Ray KUB:

Kundu AK1 et al in 1996 [15] concluded that x-ray KUB detected stones in *50 (86.2%)* patients. Levine JA et al in 1997 [16] concluded that x-ray KUB detected *45%* Ureteric calculi. Sensitivity was *50-60%* with a specificity of *70%*. Ingale AV et al in 2015 [11] study on 30 cases of clinical profile of unilateral hydronephrosis stated that stones were visualized in *75-80%* of patient on x-ray KUB.

In the present study X-ray KUB detected Calculi in *86%* of cases.

Hence the incidence in our series is in confirmatory with that of the available literature.

Ultrasound KUB (Incidence):

Erwin BC et al in 1984 [14] done a study on 21 cases with urinary tract calculi diagnosed on ultrasound and in all cases stone was proven by surgery, spontaneous passage. Kundu et al in 1996 [15] concluded that ultrasound KUB detected calculi in *55 (94.8%)* cases and unilateral hydronephrosis in *20 (34.48%)* cases. Levine J et al in 1997 [16] concluded that sensitivity was *22%*, specificity was *100%*. Joshi KS et al in 2014 [19] stated that sensitivity of USG *87.98%* and specificity was *93.07%*.In *80.6%* cases mild hydronephrosis was present, *14.7%* had moderate hydronephrosis, *4.5%* had

severe hydronephrosis. Song Y1 et al in 2015 [6] concluded that out of 194 cases in his study, *70.6%* had mild hydronephrosis, *27.8%* had moderate hydronephrosis, *1.5%* had severe hydronephrosis. He also stated that Ultrasound KUB had lower diagnostic accuracy when compared to CT scan. Pawar A et al in 2015 [20] concluded that out of 296 patient 291 had urolethiasis conformed by USG and remaining 5 were confirmed by CT scan.

In the present study Mild unilateral hydronephrosis was seen in *48%* cases, Moderate in *37%* cases and severe in *15%* cases.

The discrepancy in the incidence of our cases in comparison to the literature is explainable on the basis of late presentation of their ailment in present series.

Ultrasound KUB (Location of Obstruction):

Joshi KS et al in 2014 [19] concluded that in *7.4%* cases calculi was at Pelviureteric junction. *25.1%* in proximal ureter, *49.21%* in distal ureter, *2.3%* at iliac crossing, *15.7%* at vesicoureteric junction. Song Y1 et al in 2015 [6] concluded that in unilateral hydronephrosis, obstruction was seen at Ureteropelvic junction in *4.1%* cases, proximal ureter in *21%* cases, distal ureter in *24.9%* and Ureterovesical junction in *47.1%* cases. Pawar A et al in 2015 [20] concluded that *38.7%* cases had calculi at ureterovesical junction, *30.7%* at proximal ureter, *22%* at distal ureter and *6.7%* at ureteropelvic junction.

In present study location of obstruction was at Kidney in *27%* cases, Pelviureteric junction in *6%* cases, upper ureter in *16%* cases, mid ureter in *7%* cases, distal ureter in *24%*, Vesicoureteric junction in *11%* cases, in *9%* cases no location was detected.

The findings in our series are marginally different from the available literature perhaps due to individual performance level of the sinologist concerned.

Ultrasound (Side of obstruction):

Fowler CG et al in 2004 [2] concluded that right side is the most common side affected. Prasana LC et al in 2013 [23] stated that right side was affected in *57%* cases. Kasabe p et al in 2014 [9] concluded that both side were affected equally. Ingale AV et al in 2015 [10] study on 30 cases of clinical profile of unilateral hydronephrosis stated that both sides were equally affected. Pawar A et al in 2015 [20] concluded that in *44.2%* patient obstruction was on left side and *54%* had on the right side.

In present study *57%* cases were affected on the right side.

This is in agreement with the findings available in the literature.

Intra venous pyelography:

H.N.Whitefield in 1999 [17] concluded that sensitivity of IVP in evaluating acute flank pain was *52-87%*. Zampieri N et al in 2009 [22] concluded that grading of hydronephrosis was grade 0 in *3%* cases, grade I in *25%* cases, grade II in *41%* cases. Grade IV in *31%* cases. Pawar A et al in 2015 [20] concluded that in *91 (31.2%)* patient it was grade 0, in *45 (15.4%)*it was grade 1, in *115 (39.51%)*it was grade 2and in*40 (13.7%)* it was grade 3.

In present study *31%* cases had Flattening with Hydroureteronephrosis (Grade 1), *17%* had Flattening with Hydronephrosis (Grade 1), *30%* had Clubbing with Hydroureteronephrosis (Grade 2), *7%* had Clubbing with Hydronephrosis (Grade 2), *7%* had Broadening with Hydroureteronephrosis (Grade 3), and *8%* had Broadening with Hydronephrosis (Grade 3).

This is generally in agreement with the findings in literature with exception of Grade 1, which shows higher incidence of 48% in our series perhaps due to individual perception of concerned radiologist in reporting.

NCCT Scan:

Levine J et al in 1997 [16] concluded that out of 52 patients, 40 ureteric stone were detected on NCCT thus prevalence is 77%. Location of calculi was vesicoureteric junction in 47%, proximal ureter in 30%, mid ureter in 5%, distal ureter in 18%.

Pawar A et al in 2015 [20] concluded that out of 296 patients, in *5 (1.6%)* patient locations of calculi was not confirmed by USG, so it was confirmed by CT scan. In 1 patient it was at left proximal ureter, in 1 patient at right vesicoureteric junction, in 1 patient at right distal ureter.

In the present study CT scan was done in *38%* patients whose IVP findings were ambiguous and not helpful in establishing the underlying pathology. Accordingly the NCCT scan showed the pathology more clearly.

Our findings are in agreement with the available literature. Further in our study NCCT was done in more cases then those reported in the literature.

DTPA Scan:

Jay. Gillenwater 1 et al in 1975 [13] study on renal function after release of obstruction and concluded that the previously obstructed kidney exhibits abnormalities in a number of physiological indexes. Gandolpho .L. et al in 2001 [18] studied 47 patients of unilateral hydronephrosis by DTPA and revealed functional deficit in 68% patients. After relief of obstruction there is improvement in renal function from 25+/- 12% to 29+/- 12%. Ingale AV et al in 2015 [11] study on 30 cases of clinical profile of unilateral hydronephrosis stated that DTPA was done in all 3 cases of congenital unilateral hydronephrosis.

In the present study it was done in 6 patients as indicated, in those kidneys which were not visualized on IVP or where diagnosis was ambiguous on NCCT scan. Accordingly the results of DTPA revealed that, one patient had renal function of 9%, another had 10% and remaining one each had 20.66%, 24%, 59%. Lastly one patient had complete non-functioning kidney. It was not required in 94 patients. The above findings proved it once again that DTPA scan is the ultimate diagnostic of renal function.

Diagnosis:

Prasana LC et al in 2013 [23] stated that 60% cases had ureteric calculi, 30% had pelviureteric junction obstruction. Joshi KS et al in 2014 [19] concluded that in *7.4%* cases calculi was at Pelviureteric junction. *25.1%* in proximal ureter, *49.21%* in distal ureter, *2.3%* at iliac crossing, *15.7%* at vesicoureteric junction. Ingale AV et al in 2015 [11] study on 30 cases of clinical profile of unilateral hydronephrosis stated that *20 (67%)* were of ureteric calculi, *7 (23%)* of PUJ junction calculi, *3 (10%)* of congenital PUJ obstruction. Song Y1 et al in 2015 [6] stated the location of stone in unilateral hydronephrosis as 4.1% at ureteropelvic junction, proximal ureter in 21%, distal ureter in 24.9% and ureteropelvic junction in 47.1%.

In the present study *70%* patients were of Ureteric Calculi, *18%* cases were of Renal Calculi, *11%* of PUJ obstruction, *1%* of Right Ureteric Stricture. Thus maximum cases were of Ureteric Calculi i.e. *70%*.

These findings are more or less in agreement with those found in the literature.

Treatment:

Margaret M. Platis et al in 1963 [12] done a study on renal function in patient with unilateral hydronephrosis. 8 females and 4 females were investigated. 10 out of 12 had obstruction at pelviureteric junction which was managed by Anderson-Hynes pyeloplasty. Gotoh M1 et al in 1993 [21] stated that flank pain disappeared in 91% patient postoperatively. Buisson et al in 2003 stated that postoperatively in all patient drainage is improved, hydronephrosis decreased but renal function did not improve significantly. Prasana LC et al in 2013 [23] concluded that 14 cases were treated by open surgical procedure and 16 by endoscopic procedure. In cases of PUJ obstruction *(47%)*, Anderson Hyne's Dismembered Pyeloplasty was done and in remaining *53%* endoscopic procedure was done. Kasabe P et al in 2014 [9] concluded that in his study *70%* cases were treated surgically (*25.71%* by Anderson Hyne's pyeloplasty, *20%* by Nephrectomy) and *30%* cases were treated conservatively. Ingale AV et al in 2015 [11] study on 30 cases of clinical profile of unilateral

hydronephrosis stated that 6 patient were managed conservatively and 24 surgically, ureterolithotomy for ureteric calculus and pyelolithotomy for PUJ calculus was done in *71%* cases. Pawar A et al in 2015 [20] concluded that out of 296 patient 123 were managed by ureterorenoscopy, 88 by conservative management.

In the present study 51(51%)patient were managed by URS with DJ Stenting, 5 (5%) by Anderson Hyne's Pyeloplasty with DJ Stenting, 5 (5%) by Foley Y-V Pyeloplasty, 10 (10%) by Pyelolithotomy with DJ Stenting, 10 (10%) by DJ Stenting, 2 (2%) by Right Nephrectomy, 4 (4%) by URS without DJ Stenting, 3 (3%) by PCNL, 1 (1%) by Right Percutaneous Nephrostomy and in 9 (9%) patient No procedure was done.

Our findings and methodology chosen for offering the treatment modality depend upon the patient choice of treatment, institutional norms, economic factors and surgeon's personal preference. Hence there is a variation in the treatment modality of our patient in comparison to the existing literature. Further DJ stenting was considered to be the preliminary modality of the treatment as a minimally invasive technique in the conservative management in our cases.

Stone analysis:

Gray D et al in 1982 [24] concluded that in *17%* cases uric acid stone were present, *80%* had calcium oxalate, struvite were very low. Baker PW et al in 1993 [25] studied that calcium oxalate was most common *(68%)*, uric acid was *(17%)*.

In present study stone analysis was done in 61 cases out of the total 88 cases of calculus disease found in the series. The result of the analysis concluded that in the present study calcium oxalate stone was present in *66%* cases, *28%* had struvite stone and *6%* had uric acid.

However the literature showed calcium oxalate in *80%* and *68%*, uric acid in *17%*. Accordingly our findings are not different that of the findings in the available literature.

CONCLUSION

The present series was done with a view to evaluate Unilateral hydronephrosis in 100 consecutive cases over the period of 2 years (July 2017 and June 2019) and specific focus was laid on the clinical profile of these patients and attempted correlation with radiological and pathological findings was established.

- Accordingly on evaluation and management protocol was formulated by master chart and the outcome was documented.
- Based on the result of our research project over a period of 2 years, we concluded as follows:-
- In our study maximum cases were between age of 21 to 40 i.e. 55%. Maximum numbers of cases were males i.e.61%.
- Out of the total of 100 cases maximum number of patients (80%) had chief complaint of pain followed by fever/burning micturition/irritative LUTS in 48%. Pain was of ureteric colic type in 66% and dull aching flank pain in 34%. 16 patients had radiation of pain to lower abdomen or groin.
- On urine analysis, haematuria was seen in 40% cases, pyuria was seen in 52% cases. The most common organism was Escherichia coli in 46% cases and in 35% cases Klebsiella, in 19% pseudomonas was reported respectively on urine culture and sensitivity.
- Out of total of 100 cases maximum number of patient in present study had Hb between 10.1-14 gm/dl i.e. 65% and TLC between 4001- 12000/mm^3 i.e. 67%.
- In our study deranged KFT (Raised Blood urea and serum Creatinine) was present in 32% and 24% respectively.
- X-ray KUB was done in all cases however in only 86% patients calculi were visualized on plain X-ray KUB.
- On Ultrasound KUB maximum cases (57%) had obstruction on the right side. Grade of hydronephrosis on ultrasound were maximally of the category of mild

hydronephrosis (48%) followed by moderate hydronephrosis (37%). The location of obstruction was maximum at kidney level (27%) followed by low ureter (24%).

- In our study on IVP, maximum patient had Grade 1 hydronephrosis (48%) followed by grade 2 in 37% cases.
- In 38% cases NCCT was done where diagnosis were ambiguous on ultrasound and IVP and it was found to be a useful diagnostic tool in the armamentarium of diagnostics in hydronephrosis.
- DTPA scan was done in 6 cases (as indicated) wherein IVP showed non visualization of kidney. The findings of these cases on DTPA scan were as follows: one patient had renal function of 9%, another had 10% and remaining one each had 20.66%, 24%, 59%. Lastly one patient had complete non-functioning kidney. Thus it was concluded that DTPA scan continues to be the most important modality of investigation in delineating the functional status of the kidney.
- Out of total of 100 cases maximum number of patients in our study were diagnosed as Ureteric calculi (70%), renal calculi (18%), Congenital PUJ obstruction was seen in 11% cases, ureteric stricture in 1%.
- Most common intervention which was done was URS with DJ stenting in 51% cases followed by pyelolithotomy with DJ stenting in 10%, Anderson-Hynes pyeloplasty in 5%, Foley's YV pyeloplasty in 5% cases, DJ stenting alone in 10%, PCNL in 3%, Nephrectomy in 2%.
- Stone analysis was done in 61 cases, out of which maximum were calcium oxalate in 66% followed by struvite in 28% and uric acid in 6%. These findings were in confirmatory with the data available in literature.

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