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Role of Biochemical Parameters and GFR as Prognostification Factors in PUV Patients.

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ABSTRACT

Background: Posterior urethral valves (PUV) are the most common cause of lower urinary tract obstruction in the male child with broad spectrum of clinical presentation, disease severity and associated sequelae. **Methods:** Baseline investigations included pre fulguration blood renal profile, radiological (DTPA) investigation followed by post fulguration blood renal profile and radiological investigation. The outcome has been studied by the analysis of the biochemical markers & GFR & statistical tests shall be applied where ever necessary Improvement in quality of life in terms of dribbling, enuresis, pant wetting, school dropouts, growth & development. **Results:** The mean urea, Hb and creatinine level at different interval was non- significant (P> 0.05). The most common case of USG was B/l HDN (5) and B/L hydronephrosis (5). **Conclusion:** Aggressive surgical treatment is better policy to treat the patients with PUV. Urine cultures should be done in the follow up of PUV patients to prevent the recurrent UTI as it adversely effects the kidneys.

Keywords: kidneys, urethral, valves.

INTRODUCTION

Posterior urethral valves (PUV) are the most common cause of lower urinary tractobstruction in the male child with broad spectrum of clinical presentation, disease severity and associated sequelae.[1] Posterior urethral valves are found in male children and no parallel anomalies are found in female children The success in preserving renal function is limited to a large extent by the degree of renal dysplasia. The incidence of PUV is around 1 in 5000 to 1 in 8000 male births.[2] Gunn et al put the incidence of PUV as 1 in every 1250 fetal ultrasound study. The wide spread use of fetal ultrasound has now provided the opportunity of early diagnosis to many patients with valves well before birth. It is now clear that bladder outlet obstruction due to PUV also affects the development and function urinary bladder. Effect on the upper tracts is dependent on the mode of primary valve fulgration.

Langenbeck in 1802 is credited with the first description of such valves. Dr.H.hampton young is generally given credit for the first clear description and classification of posterior urethral valves (Young et al 1919) where he recognised three distinct varieties of congenital PUV and classified these as Type I, II, III (Young HH, Frontz WA et al1919).[3] Stephens suggested the existence of an additional type of PUV which he termed as Type IV valves(Stephens FD et al 1983).4The present study was conducted to determine the role of biochemical parameters and GFR as prognostification factors in PUV patients.

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MATERIALS AND METHODS

The present study was conducted in the department of Pediatric surgery at IPGME&R & SSKM Hospital, Kolkata. It comprised of 26 patients with PUV admitted in pediatric surgery ward & antenatally detected & followed after birth from January 2013 to December 2013 along with the patients treated since 2012. All were infored regarding the study and written consent was obtained. Ethical clearance was obtained prior to the study.

Data such as name, age, gender etc. was recorded. Base line investigation such as urea, creatnine & GFR (DTPA scan) & USG of whole abdomen was obtained. Post fulguration urea, creatinine & USG of abdomen was also obtained. After 3 months urea, creatnine & GFR (DTPA scan). After 6 months urea, creatnine, GFR, USG & MCU was taken.

The outcome has been studied by the analysis of the biochemical markers & GFR,& statistical tests shall be applied where ever necessary. Improvement in quality of life in terms of dribbling, enuresis, pant

wetting, school dropouts, growth & development. Progression of ERDS such as recurrent febrile UTI's, persistence of VUR and appearance of rickets, malnutrition, anaemia following valve ablation. Resuklt were tabulated and subjected to statistical analysis. t-test was used to compare the means. Percentage (%) was calculated for different factors. P value less than 0.05 was considered signficicant.

RESULTS

Table 1: Mean urea pre-op and F/U of all patients

Duration	Mean urea	Mean Hb	Mean Creatinine
pre-op	51.9231	9.5192	1.0654
3 Month	43.0769	9.7923	.9769
6 Month	38.7692	10.0769	.9192
1 year	33.5200	10.3480	.7640
P-value	0.01	0.01	0.01

[Table 1] shows that the mean urea, Hb and creatinine level at different interval was non-significant (P> 0.05).

Table 2: Distribution of USG all pre-op patients

USG pre-op	Frequency	Percent
B/l HDN	5	19.2%
B/l HDN with Hydroureter	1	3.8%
B/L Hydronephrosis	5	19.2%
B/L Hydronephrosis B/lhydroureter	1	3.8%
B/lhydronephrosis with Lt hudroureter	1	3.8%
Lft. Hydronephrosis	2	7.7%
Lt side HDN	2	7.7%
NAD	9	34.6%
Total	26	100.0%

[Table 2] shows that most common case of USG was B/l HDN (5) and B/L Hydronephrosis (5).

Table 3: Distribution of USG all 3months F/U patients

USG	3 months	6 months	1 year
B/l HDN	15	13	9
B/l HDN with hydroureter	1	4	1
Lt HDN	4	3	2
Lt mild	0	0	1
mild HDN	1	5	1
NAD	5	1	7
ND	0	0	1
Dilated bladder with Lt HDN	0	0	1

[Table 3] shows that USG all 3months F/U patients, maximum cases were of B/l HDN (9) followed by NAD (7).

Table 4: Distribution of VUR of all patients

VUR	Frequency	Percent
B/l VUR	2	7.7%
Crenated bladder margins	10	38.5%
Dilated bladder	7	26.9%
Dialated post urethra	4	15.4%
Lt side VUR	2	7.7%
ND	1	3.8%
Total	26	100.0%

[Table 4] shows that there were crenated bladder margins in 10 followed by dilated bladder in 7.

Table 5: Distribution of Dribbling & Enuresis of all patients

Response	Dribbling	Enuresis
Decreased	4	1
ND	1	1
No	15	8
Yes	6	16
P value	0.01	0.01

[Table 5] shows that dribling was seen in 6 and enuresis in 16 cases.

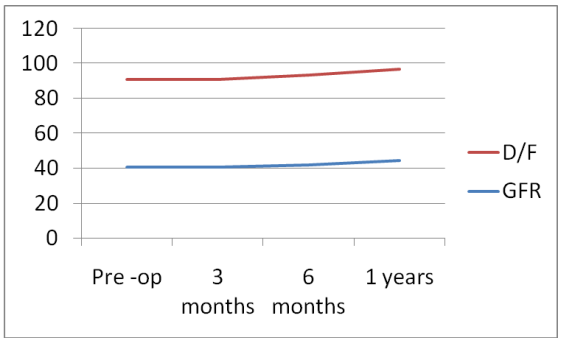

Figure 1: Comparative illustration of d/f and gfr in a period of 1yr(f/u)

[Figure 1] shows that there was significant difference in d/f and gfr in a period of 1yr(f/u) at different period (P< 0.05).

DISCUSSION

Posterior urethral valve is the commonest structural cause of urinary outflow obstruction in boys. It is also the most common type of obstructive uropathy leading to childhood renal failure.Patients with the most severe form of the disease often die immediately after birth due to respiratory failure and pulmonary dysplasia and do not present for treatment.[5,6]

In our study carried out from January 2012 to December 2014 we have studied the different aspects of the disease and tried to frame certain criteria which may help us to define prognosis and help us to carry out early and required surgical intervention. All the patients underwent thorough clinical examination and investigations. All these investigations were repeated after 3 months, 6 months and 1 year (at the follow up).

PUV is diagnosed by visualization of the valve leaflets, by indirect evidence of negative shadows in the MCU film, crenated bladder margins, dilated or elongated posterior urethra, and hypertrophied bladder neck. Voiding cystourethrogram (VCUG) is still the gold-standard imaging modality for documenting PUVs.[7] Ultrasound scan may demonstrate enlarged/thick walled bladder, dilated urethra, dilated kidneys and ureters, bladder

diverticulae. Urinary ascites/urinoma may be seen on USG Scan.

We in our study found that most of the patients with diagnosis of PUV had high urea and creatnine values.Urea and creatinine are nitrogenous end products of metabolism. Urea is the primary metabolite derived from dietary protein and tissue protein turnover. Creatinine is the product of muscle creatine catabolism.[8]

All the patients in our study had undergone DTPA renal scan prior to the surgical management to know the GFR and differential function of the kidneys and later after surgical intervention DTPA scan was repeated at 3 months, 6 months and 1 year to know the improvement of kidney function after the surgical intervention. Contrary to the usual prartice we have done ureterostomy in a patient with grade III VUR as against usually done in grade V VUR. Vesicostomy was done in 2 patients. All the patients except 1 did undergo cystoscopy and valve fulgration in the very first attempt and ureterostomy and vesicostomy as per requirement was also done along with.[9]

In our study we noticed a significant improvement in the general condition of the patient after the surgery. We found that creatnine is specially useful in determining the prognosis and helps in close follow up of the patients. In our study the mean creatnine value pre operatively was 1.0654 which reduced to 0.7640 at the end of 1year. Urea as already said decreased steadly after surgical intervention , but cannot be relied upon as a prognostic factor since it is affected by many factors apart from only renal such as dehydration etc.[9] In our series there was a statistically significant decrease in urea values and remained so if the other external and internal factors affecting urea were controlled .

There was a steady increase in the haemoglobin of the patients with time and that too was statistically significant. This can be attributed to improvement in renal function which also allows for erythropoietin secretion and haemoglobin built up in the body.[10]

The association between renal failure and linear growth retardation has been well recognised. Acidosis, abnormal metabolism of calcium and phosphorus, vitamin D resistance, and caloric insufficiency have all been implicated in growth retardation.[11] We also took in our account that if there were any school dropouts due to inadvertent effects of PUV, but we had maximum patients below school going age hence we are not in the position to comment upon this. Out of our 26 patients series we noticed a steady gain in weight of 23 patients which is statistically very significant.

Renal functions in our study were monitored by serial DTPA renal scan. These were done in the pre-operative period and then after 3 months of surgery,6 months after surgery and after 1 year of surgery. We noticed improvement in the renal functions after the surgery. A statistically significant improvement in the GFR and split function can be seen in the treated patients at the end of one year. GFR at the initial period (i.e. mean GFR of 26 patients) was nearly 40ml/min (combined for both kidneys for statistical purpose), which increase to 46ml/min at the end of 1 year and this is statistically significant. Similarly split function of the more affected kidney that is the left kidney was 50 (mean) which increased to 53 at the end of one year, and for right kidney it increased from 49 to 52 in one year. All these carry statistical significance and are very important observations. Enuresis continued in 61% of the patients even after 1 year of surgery. This may be attributed to dialated posterior urethra which was persistent after 1 year of surgery. However the dilation had decreased in the serial MCU but the finding were not significant and requires more patients and more follow up to strongly comment upon.

It could be stated that there is significant improvement in the compliance of bladder after surgery because there was only 1 patient with the complaint of dribbling of urine after 1 year of surgery. To assess and prognosticate as well as direct the management towards right direction, but still due to limitation of time we did lag at many places. Hence this study requires more follow up and more research at molecular level which we shall be continuing with.

CONCLUSION

Aggressive surgical treatment is better policy to treat the patients with PUV. Creatnine is a better progostfication factor to assess and follow up the patients with PUV. It is not only simple and cost effective method but also specifically gives the renal status at the time of monitoring since it is not affected by internal factors. Urine cultures should be done in the follow up of PUV patients to prevent the recurrent UTI as it adversely effects the kidneys.

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