The Outcome of Two Modes of Treatments in Patients with Posterior Urethral Valve

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ABSTRACT:

BACKGROUND:

The obstructive effect of the posterior urethral valve (PUV) can manifest along a spectrum of severity, ranging from disease incompatible with postnatal life to conditions that have such minimal impact that they may not manifest until later in life.

OBJECTIVE::

To compare the outcome of patients with PUV underwent both techniques of PUV incision and primary urinary diversion (with a delayed PUV incision).

PATIENTS AND METHODS:

A prospective and retrospective study of twenty-eight children with posterior urethral valve was conducted. Details of age, presenting symptoms, serum creatinine, ultrasound and Voiding cystographic (VCUG) findings, the presence or absence of vesicoureteric reflux and the type of surgical interventions done were recorded. On the follow-up between 1- 2 year period, the patients were assessed by progression of the clinical state, biochemical analysis and ultrasound of the abdomen. Outcomes of surgery and further surgical intervention also assessed in addition to the assessment of the bladder function for older children.

RESULT:

The primary treatment of the PUV was with incision of the PUV in 13 cases (46.4%) while the primary treatment with urinary diversion and delayed incision of the PUV was performed in 15 cases (53.3%). A posterior urethral valve incision was cured in 46% of patients, while the primary diversion and the delayed incision operation was cured in 26.6%; Most of the patients (60.7%) still needed further urological intervention. There was no statistical significance between the results of both surgical procedures. Renal impairment and poor bladder function were more common with diversion operation.

CONCLUSION:

There is no convincing evidence to support any procedure as a way of improving long-term renal function or long-term bladder function. Therefore, urinary diversion is to be considered in selected cases with clear goals and endpoints in mind as it has an important place in the management of boys with PUV.

KEYWORDS: posterior urethral valve, posterior urethral valve incision, vesicostomy, uretero stomy.

INTRODUCTION:

There are no recent studies about boys with posterior urethral valves (PUV) in Iraq. Consequently, our treatment plan depended on endoscopic diagnosis of posterior urethral valve and excluded other causes of bladder outlet obstruction and subsequently performing vesicostomy or suprapubic diversion. With the availability of small pediatric endoscopic instruments with electrosurgical units, we changed our treatment plan toward incision or ablation of the valves when it is possible. The prevalence of this congenital abnormality is about one in every 8000 live births [(1)]. The mortality rate secondary to PUV ranges from 24- 54 % [(2)]. However, the actual incidence and mortality in Iraq is still unknown. Recurrent UTI, vesicoureteric reflux, voiding dysfunction, and late onset renal failure are the long-term major problems in those children [(3)].

The obstructive effect of the PUV can manifest along a spectrum of severity, ranging from disease incompatible with postnatal life to conditions that have such minimal impact that they may not manifest until later in life. [(4,5)]. Treatment of PUVs

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remains a clinical challenge, requiring long-term management from early infancy into adulthood in order to avoid progressive bladder dysfunction and deterioration of both the upper and lower urinary tracts. Primary valve ablation and temporary vesicostomy with delayed valve ablation are the initial management procedures in neonates and infants with PUV. [6, 7].

The aim of this study is to compare the outcome of patients with PUV, who underwent both techniques of PUV incision and primary urinary diversion with delayed PUV incision.

MATERIALS AND METHODS:

This is both a prospective and retrospective study which was conducted at the Surgical Specialties Hospital and nursing home hospital (Medical City Complex), Baghdad, Iraq, between February 2012 and July 2014. Twenty- eight children, with posterior urethral valve, were included in this study.

Age, presenting symptoms, serum creatinine, ultrasound and VCUG findings, presence, or absence of vesicoureteric reflux and the type of surgical interventions were recorded.

Primary valve incision, which is the procedure of choice, was performed once the baby is stable from a medical point of view. At induction of anesthesia, a dose of intravenous antibiotic was given. The patient was placed in the lithotomy position. With a 7F 0° lens, diagnostic cystoscopy was performed. The posterior urethra was carefully inspected, and the valve configuration noted. The configuration of the bladder neck and appearances of the bladder and ureteric orifices was also noted. Pediatric resectoscope was assembled with either the cold/sickle blade or bug bee electrode and valve incision was performed at the 5 and 7 positions. Well-placed incisions can disrupt their integrity and allow the valves to lie freely along the walls of the urethra when the child voids. The catheter was placed for 24 hours after incision.

For the performance of cutaneous vesicostomy, we used Blocksom technique. After filling the bladder, a transverse incision was made at the upper limit of the filled bladder and near the midpoint between the pubis and umbilicus. A transverse incision was made in the rectus fascia. The bladder was mobilized with a stay stitch and blunt dissection to free the peritoneum away from the bladder dome. A transverse incision was made into the bladder. Finally the bladder was sewn to the rectus fascia, placing the sutures 1 cm away from the edge of the bladder incision. The bladder wall was sewn flush to the skin.

Upper tract diversion with Ureterostomy was performed with loop ureterostomy through small, low transverse muscle splitting incision, the ureter brought to the skin level, two 4-0 polyglactin sutures were placed in the ureter approximately 5mm from each other, using a scalpel a 2cm vertical ureterostomy is created, the abdominal musculature is closed on either side and behind the loop of the ureter, the incised ureteral margins are sewn to the skin using interrupted 4-0 polyglactin sutures. The final product was a double barreled ureteral stoma.

On the follow-up between 1- 2 year period, the patients were assessed by progression of the clinical state, Biochemical analysis and ultrasound of the abdomen. Outcomes of surgery and further surgical intervention were also assessed in addition to the assessment of the bladder function for older children.

RESULTS:

The most common age group was between 1-5 years, and the most common presentation was recurrent UTI, Table (1).

Table 1: Some of the characteristics of sample of patients with posterior urethral valve.

Parameter		No.	%
Age group	<6 months	6	21.4
	6 month -1 year	5	17.9
	1-5 year	12	42.9
	>5 year	5	17.9
Presentation	Sepsis	6	21.4
	Uremia	9	32.1
	Recurrent UTI	11	39.3
	Difficulty with micturition, etc.	2	7.1

The mistreating cystouretherography (MCUG) was diagnostic for the presence of PUV in 20 cases (71.4%), Table (2).

Table 2: Findings of the MCUG.

Finding	NO.	%
PUV only	11	39.3
PUV + Bladder trabeculation	4	14.3
PUV+ Vesicoureteral reflux	1	3.6
PUV +VUR +bladder trabeculation	9	32.1
No clear evidence of PUV	3	10.7

The primary treatment of the PUV was with incision of the PUV in 13 cases (46.4%) while the primary treatment with urinary diversion and delayed incision of the PUV was performed in 15 cases (53.3%). (Table 3).

Table 3: Primary treatment for PUV.

Treatment Type		NO.	%
Incision of PUV		13	46.4
Urinary Diversion	Vesicostomy	12	42.8
	Ureterostomy	3	10.8

A posterior urethral valve incision was cured in 46% of patients, while the primary diversion and the delayed incision operation was cured in 26.6%. There was no statistical significance between both surgical procedures. However, renal impairment and poor bladder function are more common with diversion operation. (Table 4).

Table 4: Relationship of study sample and treatment options results.

		Treatment option		Total
		Incision operation	Diversion operation	
Prognostic Factors	Resolution of symptoms	6	4	10
	Recurrent UTI	4	2	6
	Stable but renal impairment	2	5	7
	Poor bladder function , etc.	1	3	4
	CRF& Dialysis	0	1	1
Total		13	15	28
Fisher's Exact Test= 5.857, p=.195 Linear-by-Linear Association = 3.858, p=.058				

About 60.7% of patients required further urological procedures, (Table 5); show the most common urological procedures required during follow up period of patients after valve ablation surgery. Diversion surgery required more surgical procedures than incision procedure.

Table 5: Further surgical procedure required after the primary treatment options.

		Treatment option		Total
		Incision operation	Diversion operation	
Further surgical procedure	Vesicostomy closure after incision of PUV	0	9	9
	Redo incision of PUV operation	2	0	2
	Augmentation cystoplasty	1	1	2
	Permanent vesicostomy	0	2	2
	Reimplantation &bladder augmentation	0	2	2
Total		3	14	17
Fisher's Exact Test= , p= .400				

DISCUSSION:

With posterior urethral valve, the decision to perform specific treatment may depend on many factors like age of the patient, bladder status, renal status, and availability of pediatric endoscopic instruments.

Although it is difficult to diagnose the type of the posterior urethral valve, yet there are many patients with PUV diagnosed to have type I according to the Young's classification, which was first, described by Hugh Hampton in 1919.Young's type I valves make up 95% of all posterior urethral obstructions, there is a ridge lying on the floor of the urethra, continuous with the verumontanum, which takes an anterior course and divides into two forklike processes in the region of the bulbomembranous junction[8].

The nature of the renal injury in patients with posterior urethral valves is complex and appears to have two distinct components. Some damage, described as obstructive uropathy, is caused by persistent high pressure. It is ongoing and can be progressive, but it is potentially reversible with relief of high pressures. Other damage, termed renal dysplasia, may be due to either increased pressure during the development of the kidney or abnormal embryologic development. Renal dysplasia is not reversible, and therefore the degree of dysplasia is critical in determining eventual renal function in valve patients. [9-11]. Prenatal surgery has been reported in patients with PUV with improvement in prenatal ultrasonography . The hope was that early intervention with vesicoamniotic shunting would improve postnatal renal function. This procedure carries a considerable risk to the fetus, with a fetal mortality rate of 43%. This procedure is not performed in Iraq [12,13]. Cutaneous vesicostomy performed as a temporary measure for infants and children who are medically unstable or too small to instrument safely for valve ablation. The vesicostomy has proven to be a safe and efficient treatment with long-term results in preserving renal function and somatic growth. [14-16]. The primary valve ablation was the preferred approach in many centers for the stable patients because it can diagnose and treat patients in the same session and avoid surgical incision of the bladder and repeat surgery with further general anesthesia. Surgeons were attempting to resect the valves completely; this practice produced frequent complications like urethral stricture resulting from electrosurgical and instrument damage to the urethra. Today the goal is not to remove the valves but to incise them so that they are suspended across the urethra and not obstructing urine flow. Well-placed incisions can disrupt their integrity and allow the valves to lie freely along the walls of the urethra when the child voids. The valve remnants involute after incision, and there is often no evidence of them on later cystoscopic examination. [17-19].

If the infant is too small to instrument safely for valve ablation, then a cutaneous vesicostomy can be performed as a temporary measure, Temporary vesicostomy drainage allows the urologist to incise the valves later when the patient is older and healthier. The vesicostomy has proven to be a safe and efficient treatment with long-term results in preserving renal function and somatic growth equal to primary valve ablation [14]. Vesicostomy itself is not without complication; however, one study reported an 8.6% reoperation rate [15]. Some authors have questioned whether vesicostomy would cause permanent loss of bladder volume, but this has not proven to be true and vesicostomy does not significantly affect bladder capacity [20]. Some authors report that compliance may decrease in

vesicostomy bladders compared with those treated with primary ablation [21]. In general, primary ablation is the preferred surgical procedure to treat posterior urethral valves and vesicostomy reserved for very small or very ill infants. Vesicostomy remains an excellent alternative treatment in these difficult situations.

Sometimes upper tract diversion with ureterostomy required to overcome extensive ureteral tortuosity, we used low loop ureterostomy because it provides adequate drainage, places the stoma under the diaper, and offers the most logical and simple reconstruction later. If upper tract diversion is performed, reconstructive surgery to internalize the urinary tract should be delayed until the bladder and upper tracts have improved as much as can be expected. The disadvantage of this approach includes incontinence from stoma, stoma complications and the need further surgical reconstruction [22].

In this study, we did not find any statistical significant difference of the outcome for patients treated with diversion or valve incision, although a primary valve incision had higher curative rate and less need for secondary procedures.

In a large retrospective series from the Children's Hospital of Philadelphia comprising 100 patients who were treated in the newborn period, one-third eventually went on to have chronic renal failure. This retrospective series reviewed the 10- to 20-year follow-up (mean: 11.2 years) and stratified the patients who were treated by primary valve resection (74%), vesicostomy (13%), and high urinary diversion (9%). Critical outcome analysis of the different treatments showed no statistical difference in the incidence of chronic renal disease [23].

When comparing primary valve ablation with primary vesicostomy, Godbole et al. [24]; found no significant difference in serum creatinine and glomerular filtration rate (GFR) at 1 year of age between the two groups. The group who had a vesicostomy formation as their primary procedure had diverted for a median time of 18 months. Seven boys who had subsequent urodynamics that demonstrated a normal bladder capacity. Jaureguizar et al [25]; compared bladder function outcomes in boys treated with supravesical diversion with primary valve ablation alone. the mean time for which supravesical diversion was present was 13 months and all diverted in the first 2 months of life. They carried out invasive urodynamics studies at age 9–10 years and found very similar proportions of normal, poorly compliant, unstable, and failing bladders in both groups. Thus, the place of early urinary diversion in the management of boys with PUV is limited. It has the potential to improve renal function in the short-term, which is very important in boys with fragile kidney function and can defer renal replacement to a later stage [26]. There is no convincing evidence to support its role as a way of improving long-term renal function and on long-term bladder function [27,28]. Therefore, urinary diversion must be considered in selected cases with clear goals and endpoints in mind, and has an important place in the management of boys with PUV.

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