

Original paper

Comparison between Retrograde and Antegrade ureteric stenting during open Dismembered Pyeloplasty in children with Pelvi-Ureteric Junction Obstruction

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Abstract

Background: Congenital UPJ obstruction can present at any time, from intrauterine life to old age. With the increased use of prenatal ultrasound, a number of infants are found to have hydronephrosis. PUJ obstruction is one of the most common causes of prenatal hydronephrosis

Objective: To compare between retrograde and antegrade internal double-J stent for open Dismembered pyeloplasty in children with Pelvi-Ureteric Junction Obstruction.

Patients and Methods: Thirty two patients with pelvi-ureteric junction obstruction were included in the study from December 2011 to December 2013. . Antegrade double-J stent was done in 13 children and retrograde double-J stent was done in 19 children . Antegrade stent was placed during the pelviureteral anastomosis, and the retrograde stent was placed just before the operation by pediatric cystoscopy. The length of hospital stay and postoperative results were assessed.

Results: Thirty two patients with pelvi-ureteric junction obstruction , aged 3 months to 12 years, with a mean age of 3.4 years were studied. Successful stent placement without malpositioning was achieved in 11 (84.4%) of 13 patients in antegrade group and all 19 (100%) of children in retrograde group . The cause of unsuccessful stenting in antegrade group was the inability to cross the ureterovesical junction .

Conclusion: Retrograde double-J stent more reliable than antegrade stent for open dismember pyeloplasty in children with Pelvi-Ureteric Junction Obstruction with greater success and lower complication rates.

Abbreviations:

PUJO (Pelvi-ureteric junction obstruction).

US (Ultrasonography).

IVU (Intravenous urography).

KUB (kidney-ureter-bladder).

DJ stent (double j stent)

Introduction

A pelvi-ureteric junction obstruction (PUJO) is a restriction to flow of urine from the renal pelvis to the ureter which if left uncorrected leads to progressive renal deterioration.⁽¹⁾

Pelvi-ureteric junction obstruction is the most common diagnosis associated with hydronephrosis in infants and children, occurring in 1 of 1500 live births .⁽²⁾

Urinary tract dilatation does not always indicate ongoing obstruction. Hydronephrosis can occur when a compliant collecting system distends simply because of high urine volumes,

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usually in the fetal kidney late in gestation when urine output and urinary tract compliance increase. In some instances there may also be a temporary fetal ureteral obstruction that resolves before birth. In either case hydronephrosis persists after birth and yet the system is unobstructed. ⁽²⁾ PUJO occurs more commonly in boys than in girls. Left-sided lesions predominate. ⁽²⁾

An early theory of the etiology of intrinsic PUJ obstruction is that the defect results from delayed or failed proximal ureteral recanalization after a brief but normal period of early obstruction.

Animal and human embryologic studies using light and electron microscopy have documented multiple areas of ureteral obstruction and recanalization between 37 and 47 days of gestation. ⁽³⁾

In most cases of intrinsic PUJ obstruction the proximal ureter has a demonstrable lumen that can be intubated. In these patients a functional rather than a strictly mechanical obstruction exists, which is significant enough to cause pressure on the renal pelvis and collecting system. Smooth muscle and collagen abnormalities at the PUJ are evident on light and electron microscopy. Early structural studies of obstructed ureters revealed increased collagen between muscle bundles and suggested that this resulted in decreased elasticity of the PUJ. ⁽⁴⁾ Functional ureteral obstruction also appears to be caused by neural depletion in the proximal ureter. These findings are contrary to the long-standing impression that the autonomic nervous system does not control ureteral function.

Immunohistochemical studies indicate that there are decreased neuronal markers and decreased nerve growth factor within the muscular layer of the PUJ with intrinsic obstruction. ^(5,6)

An aberrant, accessory, or early-branching lower pole vessel is the most common cause of extrinsic PUJ obstruction. These vessels pass anteriorly to the PUJ or proximal ureter and contribute to mechanical obstruction. PUJ obstruction associated with crossing vessels is more common in older children and adult than infants. ⁽¹⁾

In the newborn or infant with suspected PUJ obstruction the radiological evaluation begins with renal and bladder ultrasonography. Renal ultrasonography is used to evaluate the degree of hydronephrosis as well as the thickness and the echo texture of the renal parenchyma. It is also important to note evidence of contralateral renal hypertrophy. In patients with ultrasonographic evidence of PUJ obstruction, diuretic renography is typically the next study performed to evaluate differential renal function and drainage. In infants this study is best obtained after age 6 weeks when the GFR is sufficient to allow accurate functional measurements.

The accepted criteria for surgical correction of PUJ obstruction in infants and children include differential function less than 40%, half-time greater than 20 minutes, contralateral hypertrophy or worsening ipsilateral parenchymal thinning. Pyeloplasty is also appropriate for children who are symptomatic with pain, hematuria or hypertension.

For most infants and children requiring surgical repair of PUJ obstruction, dismembered pyeloplasty is the technique of choice. Introduced by Anderson and Hynes in 1949, this procedure allows excision of the abnormal proximal ureter, reduction of the renal pelvis and placement of the new ureteropelvic junction into a dependent position that maximizes drainage.

Patients and Methods

Thirty two patients with PUJO were treated during the period from December 2011 to December 2013. The age ranged from three months to 12 years with a mean of 3.4 years. Of these thirty two children, 24 were males and 8 were females. In 21 cases, the left kidney was involved and in 11 cases, the right kidney was involved.

Investigations used to confirm PUJO included ultrasonography (US), intravenous urography (IVU).

Indications for surgery included ipsilateral flank pain, recurrent pyelonephritis, severe hydronephrosis.

The patients divided into two groups, the first group (19 cases) the DJ stent placed retrogradely just before the operation by pediatric cystoscope and in the second group (13 cases) the DJ stent placed antegradely during the pelviureteral anastomosis. Standard dismembered pyeloplasty was done in all cases through an extraperitoneal flank incision. Following incision and division of the muscles, the peritoneum is swept medially; accessory renal arteries, supplying the lower pole of the kidney that crosses the ureter at the point of the PUJ obstruction are identified if present. Once the region at the PUJ is dissected out, holding stitches are placed on the renal pelvis and the ureter distal to the PUJ obstruction. The region of the PUJ is then excised out sharply. Next, the ureter is spatulated laterally at a distance of approximately 1 to 1.5 cm. If the renal pelvis is largely hydronephrotic, it is reduced then anastomosis was performed using 5-0 absorbable suture, between the spatulated ureter and renal pelvis.

postoperatively, antibiotics were continued for few days. The drain was removed postoperatively when drainage was minimal. The ureteric stent was removed 3 months

postoperatively by pediatric cystoscope under general anesthesia.

The outcome analysis was based on clinical follow-up, renal ultrasound performed 1, 3, 6 and 12 months postoperatively.

Result

A total number of thirty two patients with pelvi-ureteric junction obstruction (PUJO) were studied over a period of 2 years (from December 2011 to December 2013). The age of those patients ranges from 3 months to 12 years, with a mean age of 3.4 years (Table 1).

Table 1. Age of patients with pelvi-ureteric junction obstruction.

age	No. of patients	%
3-12 months	16	50 %
1-5 years	10	31.25 %
More than 5 years	6	18.75 %

Male: female ratio was 4:1 (Table 2).

Table 2. Sex of patients with pelvi-ureteric junction obstruction.

Sex	No. of patients	%
Males	24	75 %
Females	8	25 %

The left side affected in 1 patients and right side in patients in a ratio of left to right 2:1 (Table 3).

Table 3. Laterality of patients with pelvi-ureteric junction obstruction.

laterality	No. of patients	%
Left	21	65.6%
Right	11	34.4%

No stent malpositioning occurred with retrograde stent group, two children in the antegrade stent group had a malpositioned stent in the distal ureter which was diagnosed postoperatively by significant drain leak and KUB in next day. One stent was repositioned

by ureteroscopy and one by open surgery. (Table 4).

Table 4. Success rate of stent positionin patients with pelvi-ureteric junction obstruction.

Technique	No. of patients	Successful stent	%
Retrograde	19	19	100%
Antegrade	13	11	84.6%

All children with successful stent placement by either technique were discharged within 48 hours after the operation. The hospital stay for children with unsuccessful double-J stent placement varied from 7 to 10 days.

Discussion

Although dismembered pyeloplasty has become a well-accepted gold standard treatment modality for PUJ obstruction, the question of whether postoperative urinary diversion after pyeloplasty is beneficial has been debated for decades, particularly in infants and smaller children who have narrow ureters. There are many ways to divert urine, and different types of drainage methods have been described in the literature, including nephrostomy tube drainage, internal ureteral stents such as the double 'J' stent, external stent anastomosis, and a combination of these modalities.⁽⁷⁾ Krishnanath Gaitonde et al found that retrograde ureteral stent placement facilitates identification of the distended renal pelvis with less chance of stent damage/migration during pyeloplasty, and permits accurate positioning of the ureteral stent.⁽⁸⁾

Rocco Papalia, Giuseppe Simone et al found that retrograde placement of the ureteral stent and the ureteropelvic anastomosis with running sutures seemed to be tips of success in reducing operative time, and also reduce urine leak and hospital stay.⁽⁹⁾ Chandrasekharam et al found that retrograde double-J stent seems more

reliable than antegrade stent for pediatric pyeloplasty, with greater success and lower complication rates .⁽¹⁰⁾

In current study ,we found that retrograde double-J stent more successful with lower complication rate and hospital stay than antegrade stent.

Conclusion

Retrograde stent during open Dismembered Pyeloplasty in children with Pelvi-Ureteric Junction Obstruction have a better results than antegrade stent.

It permits accurate positioning of the ureteral stent in renal pelvis and urinary bladder with lower complications and less hospital stay.

Recommendation

Good success rate achieve by Retrograde stent Dismembered Pyeloplasty in children with Pelvi-Ureteric Junction Obstruction.

By Retrograde stent ,we can ensure the position of ureteric stent in the bladder to avoid the morbidity of misplacement of ureteric stent if inserted by antegrade method.

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