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Original Research Paper

Urology

PELVI-URETERIC JUNCTION OBSTRUCTION CAUSED BY AN ABERRANT LEFT RENAL VEIN: LAPAROSCOPIC MANAGEMENT

Dr. Samit Doshi	DrNB Urology Resident, Department Of Urology, Bhaktivedanta Hospital And Research Institute, Mira Road.
Dr. AjayKumar Gajengi	Consultant Urologist, Department Of Urology, Bhaktivedanta Hospital And Research Institute, Mira Road.
Dr. Vikash Kumar*	Consultant Urologist, Department Of Urology, Bhaktivedanta Hospital And Research Institute, Mira Road. *Corresponding Author
Dr. Siva Prasad Gourabathini	Consultant Urologist, Department Of Urology, Bhaktivedanta Hospital And Research Institute, Mira Road.

ABSTRACT Pelvi-Ureteric Junction obstruction (PUJO) is a frequent manifestation of various urological conditions, eventually leading to hydronephrosis not only in adults but also in neonates. Although calculus at PUJ is the most common acquired cause for PUJ obstruction in adults, the other causative factors are fibrosis, strictures, and rarely the presence of aberrant renal vessel/s. The new terminology used for the entity of an aberrant renal vessel crossing and obstructing the PUJ is "Vascular Bar". Most commonly, it is caused by crossing inferior branches of renal artery rather than a renal vein. Additional renal veins are more common on the right side than the left. In this case, an aberrant left renal vein crossing anteriorly resulted in PUJO, which is one of the rarest cause. This case report demonstrates one such case and its successful management where a left sided aberrant renal vein detected incidentally and was found to obstruct the PUJ and was managed laparoscopically.

KEYWORDS : PUJO, Aberrant, Left sided, Renal vein, Laparoscopically, Pyeloplasty

INTRODUCTION

Pelvi-Ureteric Junction obstruction (PUJO) is a frequent manifestation of various urological conditions, eventually leading to hydronephrosis not only in adults but also in neonates. Approximately one in seven neonates with antenatally detected hydronephrosis has Pelvi-Ureteric junction obstruction (PUJO), making PUJO one of the most common causes of congenital urinary tract obstruction, with an incidence of one in 1000 to one in 2000 live births.[1] Intrinsic obstruction due to an adynamic stenotic segment at the PUJ is the most common etiology (75% of cases), with failure of peristalsis producing an incomplete, functional obstruction.[2] Although calculus at PUJ is the most common acquired cause for PUJ obstruction in adults, the other causative factors are fibrosis, strictures, and rarely the presence of aberrant renal vessel/s.[2]The new terminology used for the entity of an aberrant renal vessel crossing and obstructing the PUJ is "Vascular Bar".[2]

Embryologically, kidneys derive their blood supply from aorta in a ladder like pattern. In normal kidneys, these aberrant vessels are found in about 20% of cases whereas in cases of Ureteropelvic junction obstruction, they have been noted in 63% cases.[3] It is mentioned in literature that this crossing vessel is not the primary cause of PUJ obstruction rather PUJ is already obstructed by congenital muscular defect and crossing vessel only causes partial obstruction and redundant pelvis kinks and falls over the vessel increasing hydronephrosis.[4] In all the patients of crossing vessel the mean renal pelvic pressure significantly declined after transposing the vessel showing that lower polar vessels directly contributed to UPJ obstruction by causing extrinsic compression.[4] Preoperative diagnosis of such a vascular bar is of utmost importance to avoid catastrophic complications intraoperatively. Multiple radiologic modalities can be used to diagnose aberrant vessels. Ureteric obstruction due to aberrant vessels may masquerade as Preureteral vena cava on imaging.[3] Such type of cases requires vigilant dissection to prevent injury of important structures. This case report demonstrates one such case and its successful management where a left sided aberrant renal vein detected incidentally and was found to obstruct the PUJ and was managed Laparoscopically.

CASE CAPSULE

A 32-year old male patient without any comorbidity presented to the Urology Out Patient Department with a history of intermittent pain in the left loin since 5 months. The pain was insidious in onset, dull aching and non- radiating temporarily responded to analgesics and antispasmodics. There was no history of fever, chills, vomiting, hematuria or any lower urinary tract symptoms (LUTS).

His general condition was good and vitals were stable. Physical examination was unremarkable. Per abdomen examination was normal. He was then subjected to blood, urine examination and radiological investigations. Urine examination was normal. Biochemical indices including Renal Function Tests and Serum electrolytes were within normal limits.

An Ultrasound (USG) of Kidney Ureter Bladder (KUB) scan revealed a left-sided grossly dilated pelvis with multiple calculi within the pelvis. In view of the USG findings, patient was subjected to CT Intravenous Pyelography (CT-IVP). CT-IVP showed Left kidney sized 11.7 x 5.6cms revealing prompt contrast enhancement and contrast excretion. Moderate to severe dilatation of Left Pelvicalyceal system with narrowing at Left Pelvi-ureteric junction with mild narrowing at left renal parenchyma. AP diameter of left renal pelvis was 4cm with average parenchymal thickness of 10mm. Delayed ureteric contrast excretion noted (Figure 1A). Possibility of Left Pelvi-ureteric junction likely.

Multiple (at least 7) calculi noted in lower pole of left kidney, largest measuring 8mm of HU 430 (Figure 1B). Right kidney was normal in shape, size, position, axis and contour. Rest findings were normal. His Diethylenetriamine pentaacetate (DTPA) scan was done. DTPA scan revealed left kidney with slightly reduced parenchymal function with obstructed drainage pattern and uptake was 41%, right kidney suggested a normal parenchymal function with normal drainage pattern (Figure 2). Rest routine haematological investigations were within normal limits. He was then worked up and posted for Laparoscopic Left Anderson-Hynes Dismembered Pyeloplasty with Extraction of Left Renal calculi.

Figure 1A- Sagittal cut of CT IVP showing showing moderate to severe dilatation of Left Pelvicalyceal system (blue arrow)

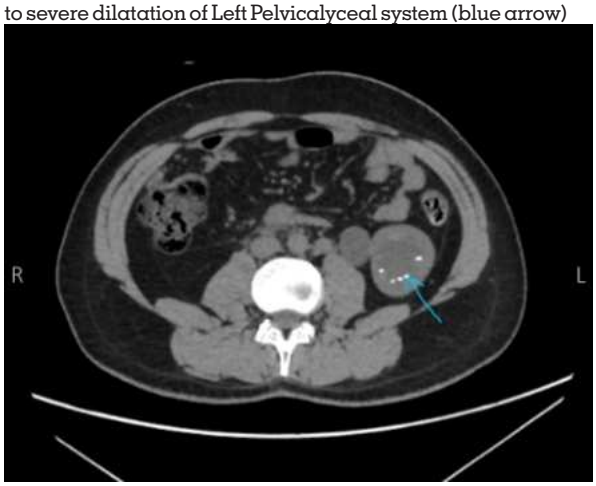

Figure 1B- Plain CT axial cut showing left grossly dilated pelvis with multiple renal calculi (blue arrow)

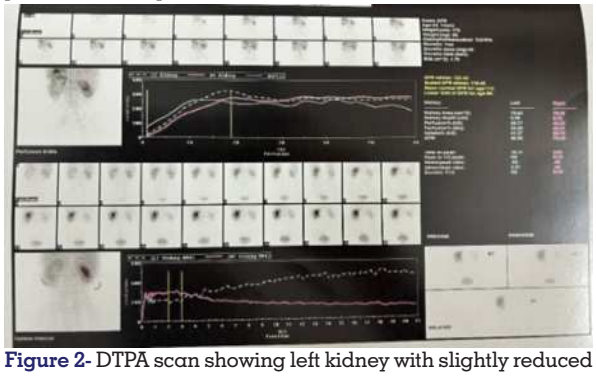

Figure 2- DTPA scan showing left kidney with slightly reduced parenchymal function with obstructed drainage pattern and uptake was 41%

After general anaesthesia induction, patient was catheterised and nasogastric tube was placed. The patient was placed in Left-up position. After painting and draping, pneumoperitoneum was established using a Veress needle. Ports were placed. Colon was mobilised. Adhesions released and Gerota's fascia was dissected. Left ureter traced and dissected till hilum. On mobilising PUJ, he was found to have aberrant left renal vein originating from inferior vena cava (IVC) traversing and extrinsically compressing the PUJ. The renal pelvis was hugely dilated. After carefully dissecting the vessel off the PUJ, the spasmodic PUJ was excised by transecting the upper ureter and the lower pelvis. An additional port for Amplatz sheath was placed. Flexible Nephroscopy was performed through the Amplatz sheath and multiple renal calculi (8-10mm) in the middle and inferior calyx were retrieved. The left ureter was then, splayed adequately and made ready for the anastomosis. The pelvis was then dissected and brought in front of the aberrant vessel. The Ureteropelvic anastomosis was performed using Vicryl 3-0 with simple interrupted sutures. On completion of the posterior layer, a 6/26 Double-J stent was inserted antegrade into the ureter and positioned across the anastomosis. The anterior layer of sutures was then taken up and anastomosis was completed. A 24Fr drain was placed (Figures 3A, 3B, 3C, 3D and 3E).

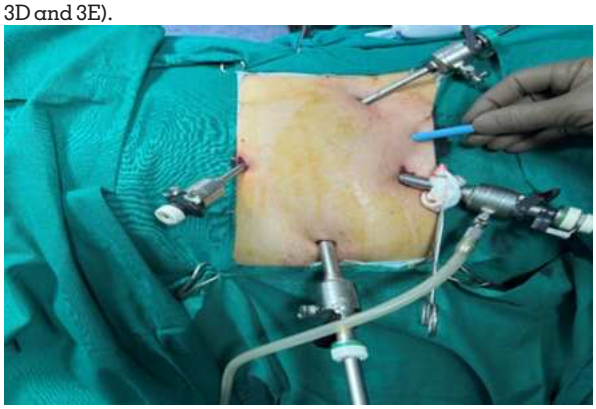

Figure 3A- Intra-operative image of port placement for Laparoscopic Anderson Hynes Pyeloplasty and additional Amplatz sheath placement for stone retrieval via Flexible Nephroscopy

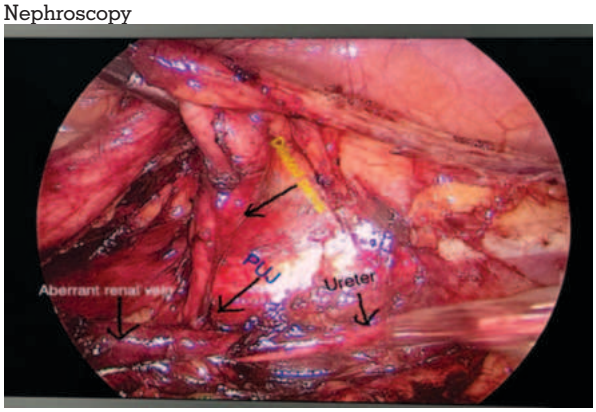

Figure 3B- Operative pictures: Image of anatomy after initial dissection showing aberrant renal vein, obstructed PUJ, normal ureter and the dilated pelvis

Figure 3C- Operative image showing Ureteropelvic anastomosis being performed over 6/26 DJ stent

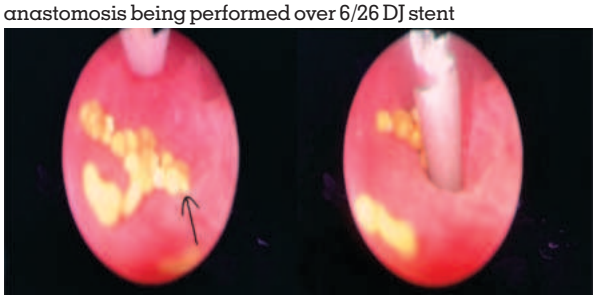

Figure 3D and 3E- Operative images showing multiple renal

calculi in the middle and inferior calyx, measuring 8-10mm and retrieval by a grasper via Flexible Nephroscopy

Figure 4- Post-operative healed scar

The patient had an uneventful post-operative recovery. Foleys was removed on 2nd day followed by drain removal on 3rd day and was discharged on Post-operative day 4. On his Post-operative day 10 OPD visit, all staples were removed and wounds had healed well (Figure 4). The DJ stent retrieved by Flexible Cystoscopy after 6 weeks. An USG KUB done 3 months after the DJ stent removal revealed no increase in Hydronephrosis as compared to the pre-operative scan. DTPA scan after 1 year revealed no significant dye hold up. He was then advised to get annual DTPA scans for more 3 years.

DISCUSSION

Clinical knowledge of vascular variation is important in practice. It is best to diagnose beforehand to avoid any inadvertent catastrophe. In our case, pre-operative CT did not reveal any lower polar crossing aberrant vessel causing PUJ obstruction.

An aberrant renal vessel is one of the rarest causes of PUJO.[2] The causes of PUJO can be either congenital or acquired. Congenital causes include high insertion of ureter, hypoplasia of ureter, aberrant crossing vessel/s, or malrotation of kidney.[2] Common acquired causes can be intraluminal, intramural and extramural. Intraluminal causes include- stones, polyps, mucosal folds and webs, transitional cell carcinoma. Intramural causes are iatrogenic fibrosis due to previous surgeries such a pyelolithotomy, ureteroscopy, endopyelotomy or failed repair and recurrence of PUJO and certain extramural causes are Ormond's disease, lymphadenopathy- common in carcinoma testis, retroperitoneal sarcomas.

Most commonly, it is caused by crossing inferior branches of renal artery rather than a renal vein. Additional renal veins are more common on the right side than the left. In this case, an aberrant left renal vein crossing anteriorly resulted in PUJO, which is one of the rarest cause.

Congenital Hydronephrosis is associated with crossing vessels in 26% of cases.[4] Relationship of crossing vessel to the anterior surface of the PUJ was showed by FJ.B Sampaio and in 45% of these cases the relationship was with the inferior segmental vessel.[5] Digital angiography obtained in patients before endopyelotomy by Van Cangh et al found an associated vessel in 39% of patients with PUJO.[6]

Common symptomatology in adults are periodic loin pain, vomiting, recurrent pyelonephritis, fever, abdominal mass, or hematuria secondary to infection, secondary stones.[7] One of the rare presentations of PUJO can be hypertension secondary to hyperreninemia. Appropriate pre-operative imaging is very important in such cases. The evaluation starts with an Ultrasound KUB. Almost 20% of antenatally detected hydronephrosis is not found after birth. CT IVP is commonly used in adults versus pediatric population due to exposure to ionizing radiation. IVP gives information about the degree of dilatation of the affected pelvis and contralateral side along with the ureteric contour. The excretory function of the affected kidney is also assessed compared to the normal functioning kidney. Diuretic Renography evaluates the split function of each kidney and is the gold standard to assess the severity of PUJO. In adults DTPA scans while in paediatric populations technetium 99 m Mercaptoacetyltriglycine (99m Tc-MAG3) is used. Functionally significant obstruction is diagnosed with such scans with no washout of isotope even after Furosemide (Lasix). Poorly functioning kidneys (<10% GFR) are managed with nephrectomies.[8,9]

It is mentioned that the extrinsic crossing vessel is not the primary cause of PUJO rather PUJ is obstructed already by congenital muscular defect and crossing vessel partially obstructs the pelvis and redundant pelvis kinks and falls over the vessel worsening hydronephrosis.[10] Some think that this vessel is the sole cause of obstruction and its transposition is all that is required in the treatment.[11] Stern JM et al revealed that the obstruction is due the crossing vessel itself and not due to intrinsic defect as the put a 22gauge cannula in the pelvis and perform the Whittaker test intra-operatively, before and after transposing the crossing vessel.[12] All the patients of crossing vessel revealed decline in the mean pelvic pressure after transposing the vessel showing the lower polar vessels directly contributed to PUJO by extrinsic compression.[12]

There are different ways of treatment of PUJO ranging from minimal invasive surgeries like endopyelotomy with cold knife, electrocautery or laser and balloon dilatation to other surgeries like Foley VY Pyeloplasties, and the classical Dismembered Anderson Hynes Pyeloplasty.[13] Anderson Hynes Pyeloplasty is still the gold standard as it has around 95% success rates.[13] Due to improvement of surgical techniques these procedure are managed laparoscopically. Robotics have also tried this procedure showing an excellent success rate.[14] Our case was successfully managed with Laparoscopic surgery.

The first Laparoscopic Pyeloplasty was described by Kavoussi et al in 1993 using the Anderson Hynes technique on a 24 year old female.[15] Laparoscopy provides the benefit of better magnification, but this approach has a steep learning curve in suturing techniques and tissue manipulation leading to prolonged surgery times.[15] The transperitoneal route is preferred, because it maximizes the internal working space and is far more ergonomic for suturing. In spite of this, some centres prefer the retroperitoneal approach, because they feel they are more confident and there are no differences in the complication rates.

Unfit patients are treated with conservative techniques such as DJ stenting or Percutaneous nephrostomy. Medical modality of PUJO entails antibiotics for urinary tract infections. It also entails a close monitoring of renal function in those patients who are subjected to conservative measures instead of surgery as well as those in their respective post-operative period.

Complications of PUJO are recurrent urinary tract infection, chronic loin pain, formation of secondary renal stones, and partial or complete loss of kidney function warranting the need for nephrectomy. Thus pre-operative evaluation and preparation with appropriate surgery is recommend in patients with PUJO.

CONCLUSION

An accurate pre-operative diagnosis of a compressing vascular pedicle (aberrant renal vessel) causing PUJO is rare.

Aberrant vessels may have a profound effect on treatment outcome, thus it should not be ignored as a differential diagnosis for PUJO. Mostly, it is found incidentally or intra-operatively. Our case report demonstrates an incidentally detected aberrant left sided renal vein causing PUJO, which was managed successfully by Laparoscopic Anderson Hynes Pyeloplasty. A Laparoscopic approach is well established as the gold standard for management of such patients.

Conflicts Of Interest- NONE

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