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Calculus Induced Hydroureteronephrosis Obstructive Syndrome in a Patient with Two Separate Pelvicalcyeal System in Right Side with Bifid Ureter: A Rare Clinical Entity

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ABSTRACT

Hydroureteronephrosis is a clinical condition where the dilatation of renal calyces and ureter occur jointly due to obstruction. When two ureters arise from single kidney the situation is known as bifid ureter which may be complete or incomplete. The present study examines a congenital anomaly of bifid ureter and rare clinical presentation of calculus induced obstructive hydroureternephrosis in a adult male aged 38 by past 48 hours. The common symptoms of this condition were extreme intolerable pain in the abdomen, flank pain moderate to severe radiate to loin to groin, vomiting/nausea and haematuria. Diagnosis was done by injection of intravenous dye and computed tomography intravenous pyleogram was performed along with lab findings. In this case we found two incomplete ureters i.e. bifid nature arising from right kidney that unite as a single ureter before emptying into the urinary bladder. There was presence of single large calculus measuring approximately 8.6*8mm right at the junction of bifid ureter at the level of L3 vertebra inducing hydroureteronephrosis. Similarly marked upstream dilation of upper right ureter was found. The anomaly of bifid ureter occurs due to the untimely division of ureteric diverticulum. Unless some complication of ureter occurs, the duplication does not expose itself. Acute obstruction of ureter does not cause any significant alternation in renal function. Though the whole clinical presentation is rare itself, it further needs follow ups to avoid re-occurrence.

Keywords: Bifid Ureter, Calculus, ureter, Hydroureteronephrosis

INTRODUCTION

The renal system anomalies are the most commonest anomalies due to disorder in different stages of kidney development during gestation[1]. The anomalies may be complete or incomplete of which having double ureters of incomplete nature is classified as bifid ureter[2]. The urinary lithiasis, nephrolithiasis is the major risk factor of the bifid ureter [3]. The frequency of incomplete duplex ureter is very low as compared to complete ureter accounting for about 0.8% of random population [4]. The duplexing of the ureter may be either bilaterally and unilaterally present or both, having bilateral presence is a rare condition. Urethral duplexing is more common in females as compared to male with the ratio of 1.6:1[5].

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Ureteral duplication may be genetically determined by an autosomal dominant trait with incomplete penetrance[6]. Hydroureteronephrosis is the dilatation of the kidney and ureter due to partial or complete blockage of ureter. However, duplexing of ureters giving bifid rise with calculus inducing hydroureteronephrosis is a rare clinical entity. The anatomical variations are revealed during various medical procedures such as autopsy, urological surgery, radiology and routine anatomic dissections. The renal duplex i.e. bifid ureter is the result of the certain anomaly of renal system during intrauterine gestation of 4^{th} to 5^{th} week due to untimely and early division of ureteric bud or diverticulum. The major structural parts of kidneys such as ureter, renal pelvis, major and minor calyces, including the millions of the nephrons are originated from ureteric bud penetrating the meta-nephric tissue [7]. However, the division of ureteric bud before the penetration of meta-nephric tissue is the main crucial factor for the development of the bifid ureter

[2,3].Individuals having congenital bifid ureter are detected during autopsy, radiological, surgical and urological procedures.

Case Presentation:

Here, we described the case of an adult male patient aged 38-years presented with pain in the right abdomen and right renal colic with hydroureteronephrosis. It was due to partial obstruction of right ureter at bifid junction proximal to right kidney by single large calculus for two days as shown in the Figure 1(b). It was associated with wide spectrum of clinical manifestation and symptoms that include right flank pain moderate to severe radiating to loin to groin, with sudden onset increasing the intensity, episodes of watery vomiting and non-bilious fever with no any alteration in the bowel and bladder habit. Blood pressure of 160/130 mmHg with acute hypertension was observed. According to the patient, he was living normal life without having any sign, symptoms and medications. Similarly, there was no any family history of such anomalies.

MATERIALS AND METHODS

This study was carried out at Gandaki Medical College Teaching Hospital and Research Center after obtaining ethical approval from institutional review board and written consent from the patient. After observing the patient's symptoms and performing physical examination ultrasonography and X-ray was done along with laboratory tests. However, seeing no any clear diagnostic clue, case was revealed using intravenous pyleogram along with computed tomography. Then the intravenous pyleogram by injecting contrast medium ultravist of concentration 1ml/kg body weight was given and CT imaging films were taken along with that by letting the patient on supine position. The biochemical assay for renal function test and electrolyte was performed by means of the autoanalyzer. The routine urine examination was done in the microbiology laboratory. Furthermore, the case was diagnosed by the evaluation of films produced by the intravenous pyleogram and computed tomography.

Similarly finding from the radiology was correlated with the laboratory findings to reach the final diagnosis. The calculus was removed by performing extracorporeal shock wave lithotripsy.

RESULTS AND DISCUSSION

There are wide variations of the ureteric duplications but in this case, we found two incomplete ureters arising from right kidney that unite as a single ureter before emptying into the urinary bladder. The presence of single large calculus measuring approximately 8.6*8mm right at the junction of bifid ureter at the level of L3 vertebra inducing hydroureteronephrosis and marked upstream dilation of upper right ureter was found as shown on figure 1 (a) and (b). There was no any alteration regarding the biochemical profile of renal function test and electrolyte level. Based on the literature review, most of the duplex renal ureters are associated with another anomaly. Like that this anomaly was also characterized by the presence of multiple calculi in the lumen of gall bladder having size of gall bladder lumen 11mm*23mm with air foci within some calculi forming Mercedes Benz sign. No any malformations were seen regarding in other parts of the body like thoracic, abdominal structure or pelvic viscera. The case of isolated bifid ureter was illustrated by some of the medical literature during cadaveric dissection and imaging . Having this in mind we do not found enough case report and recent literature regarding the hydroureteronephrosis due to calculus in bifid ureter. So, we can say the present case is rare. The routine urine showed the plenty of RBC with haematuria. Increased in neutrophil count i.e. 88%(normal range:40-75%), and decreased in lymphocytes count i.e. 12%(normal range: 25-40%) was observed during routine haemogram. The haemoglobin level was within the normal range 14 gm/dl (normal range: 13.5-17.5 gm/dl). Similarly, the electrolyte level and results from renal function test were within normal range with the absence of post-renal azotemia which is shown on table no.1 below.

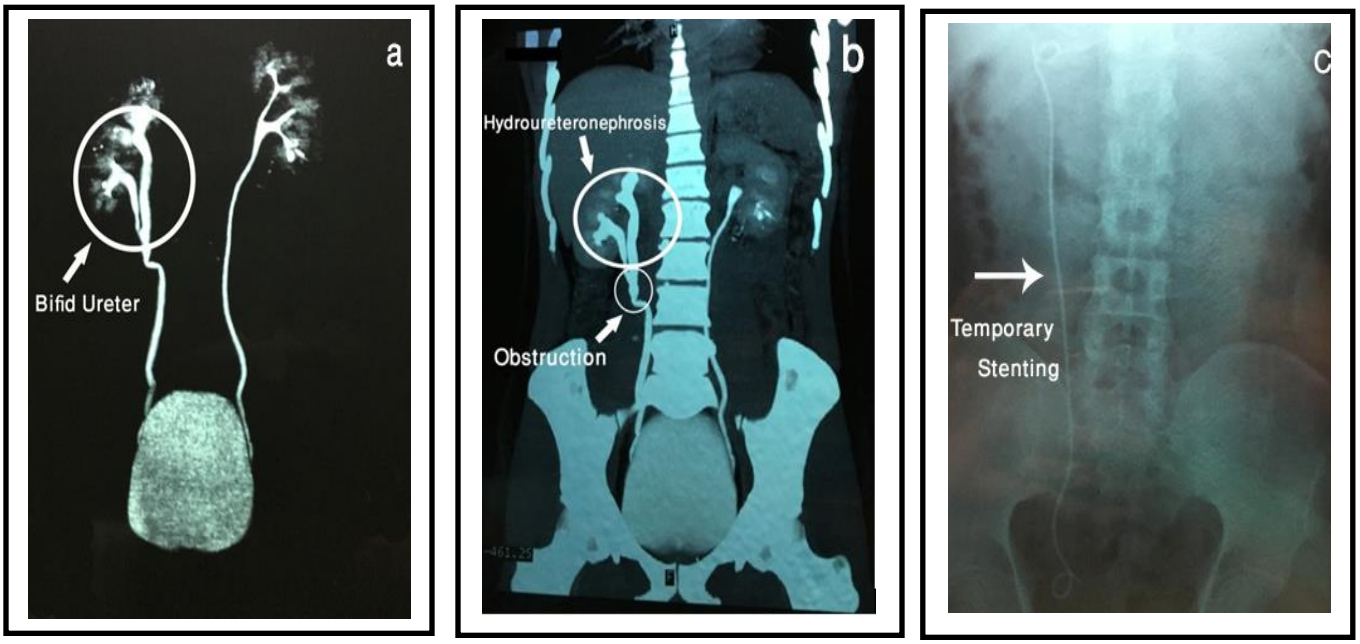

Figure 1:
a) Intra Venous Pyelogram Imaging (IVP) showing bifid ureter inducing hydroureteronephrosis. The arrow indicates the bifid ureter and junction. (Bone subtracted image)

b) Computed Tomography Imaging showing Coronal view. Arrow in big circle indicates hydroureteronephrosis induced by calculus, while arrow in small circleshows obstruction.

c) X-ray imaging (Arrow indicates temporary stenting)

Table 1: Biochemical Findings

Tests	Result (Average)	Units	Normal Range
Blood Urea	5.7	mmol/L	2.5-7.5
Serum Creatinine	101	µmol/L	40-110
Na	141.3	mEq/L	135-145
K	4.3	mEq/L	3.5-4.5

Note: The figure 1(a) and 1(b) are the images taken from the CT films by the help of smart phone facing it towards light, while figure 1(c) is the image taken from X-ray.

Recent genetic findings have revealed that, there is association between the congenital anomalies of the kidney and urinary tract with BMP4(Bone Morphogenetic Protein) gene polymorphism[8]. The bifid ureter congenital anomaly follows the autosomal dominance pattern of inheritance [9]. Knowledge in medicine is ever changing phenomenon and the patient in the present study may possibly followed genetic changes during embryonic development. The duplexing of renal system i.e. bifid ureter can be both of medical and academic importance. The bifid ureter can be the major risk factors for the urolithiasis, hydro nephrosis, hydroureteronephrosis, pyelonephritis, reflux and urinary tract infection [10]. In fetus and adult, the congenital anomalies of kidney and ureter play significant role for the cause of morbidity [11].

CONCLUSIONS

From the above study, we conclude that though the case of bifid ureter is common and its occurrence with hydroureteronephrosis is a rare phenomenon. Individuals having bifid ureter may remain asymptomatic throughout the life and remain largely undetected unless triggered by some form of calculus and physiological condition. Just having the acute renal obstruction by calculus does not alter the renal function.

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