



Retrocaval Ureter and Recurrent Urinary Tract Infection: Case Report

Uréter retrocavo e infección recurrente de vías urinarias: A propósito de un caso

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Summary

Retrocaval ureter is a rare anomaly of congenital etiology, which causes symptoms in adults and is characterized by hydronephrosis in different degrees, in addition to other diseases related to renal injury. The therapeutic approach is mainly surgical and decided according to degree of related renal dysfunction. We present a case of a woman aged 27 who is sent to the radiology service of Hospital San Rafael Tunja for an imaging study after refractory urinary tract infection that did not respond to standard drug therapy.

Resumen

El uréter retrocavo es una anomalía poco frecuente de etiología congénita, la cual causa sintomatología en pacientes adultos; se caracteriza por hidronefrosis en diferentes grados, además de otras patologías relacionadas con lesión renal. El abordaje terapéutico es principalmente quirúrgico y se aplicará de acuerdo con el grado de disfunción renal. A continuación se presenta el caso de una mujer de 27 años de edad, a quien se le practicó un estudio imaginológico por infección recurrente de vías urinarias que no respondió a la farmacoterapia habitual.

Introduction

Retrocaval ureter (UR) is a very rare congenital anomaly. An incidence of 1 per 1,000 live births (1-4) has been reported, with a prevalence of only 0.06% (5); is 3 to 4 times more frequent in men than in women and appears more commonly in the right ureter (1, 5, 6).

It is thought to have its origin in the persistence of the posterior cardinal vein (PCV) during the development of the inferior vena cava (IVC) in the embryo (1-5). Normally the PCV has a complete regression, which allows the ureter to have a ventral position at the definitive IVC (6). When there is anomalous development, the ureter is unable to cross the IVC and is forced to surround it (7), initially positioned posterior to the vein, before being located anterior to the same at a lower location (5, 8).

The diagnostic approach is due to symptoms of dysuria, abdominal pain and signs of oliguria,

which may be aggravated by lower limb edema; the definitive diagnosis is obtained with images such as contrast medium urography, magnetic resonance imaging (MRI) or computed axial tomography (CT). The therapeutic approach is surgical, with complete intervention or by laparoscopy, by retroperitoneoscopy ureteroureterostomy (a procedure consisting of urinary diversion by direct ureteral discharge into the skin) (9); the results are favorable in more than 50% of the cases (10-14). Even a surgical robotic repair technique has been used for the resolution of this condition (15).

Case presentation

This is a 27-year-old female patient from Villa de Leyva, Boyacá, who frequently visits the municipality's health service, with recurrent,

uncomplicated urinary tract infection (UTI) from the age of 24 year old. As an additional medical history reports a gestation and childbirth.

She has a clinical picture of dysuria and polaquiuria diagnosed as cystitis, 4 months of evolution, treated with norfloxacin, trimethoprim sulfamethoxazole and nitrofurantoin at subtherapeutic doses, without improvement. Urinary symptoms persisted and uroanalysis was performed with uro-analysis of oestrus control, which indicated UTI with isolation of ceftriaxone-sensitive *Escherichia coli* with minimal inhibitory concentration (MIC) of 1, cefuroxime with MIC of 4, fosfomicin with MIC of 16, sensitivity intermediate acefalexin MIC of 16 and resistant to ciprofloxacin with MIC of 4 and trimethoprim sulfamethoxazole with MIC of 320. Treatment with macrodantine (nitrofurantoin in macrocrystals) is initiated for 5 days.

It exhibits an ultrasound of the urinary tract with a moderate dilation of the right ureter. In addition, a partial of urine posmacroductina with persistence of the UTI. Because of the ultrasound finding, hydronephrosis is suspected, serum creatinine and urotomography are performed. Treatment with monurol envelopes X 2 and amikacin 750 mg IM is started for three days.

A CT scan of the abdomen was performed with contrast medium, with three-dimensional reconstruction and urotomography with the following results: Both kidneys with shape, size, location and normal tomographic aspect, with good concentration and elimination of synchronous, symmetrical and bilateral contrast medium. There is no evidence of solid, cystic or complex masses. All calyceal groups, renal pelvis and proximal right ureter, which presents an inverted "J" deformity (Figure 1), cross the midline behind the inferior vena cava to the vertebral body L2 (Figure 2), then spirally turning lateral to it until it reaches the urinary bladder (Figure 3). The bladder and adrenal glands show no structural alterations.

From the above, we have a 3D reconstruction that allows us to conclude the finding of right retrocave ureter, with right grade II / IV hydronephrosis (Figure 4).

Discussion

The etiology of retrocaval ureter remains uncertain, although some authors have postulated that exposure to substances such as monomethyl ether could be related to the development of the malformation. Other congenital anomalies that may appear simultaneously, such as agenesis or renal hypoplasia, inferior vena cava duplication, hypospadias, abdominal aneurysm, ectopic kidney, Turner syndrome and supernumerary lumbar vertebrae have been associated (8). It should be noted that the disease is symptomatic after the third decade of life, but cases of symptomatic pathology have been reported in children younger than 10 years (16).

Patients who have the abnormality usually remain asymptomatic until the third or fourth decade of life, where the disease usually manifests with colic-type right flank pain, hematuria, lithiasis, recurrent urinary tract infection, hypertension, progressive renal

function and acute ureteral obstruction (1, 3). In the world the basic characteristics of the disease have been evaluated and the most favorable therapeutic approach (5, 6, 8) has been extensively studied, which is substantially surgical.

Often this pathology is accompanied by other disorders, such as ureterocele, malformation of the urinary tract or agenesis of the same, as well as lower vascular disorders (17, 18), which must be taken into account at the time of patient assessment. If an early and adequate approach is not done, this condition may result in the development of hypertension (by renal hypoperfusion) or hydronephrosis (19).

In this regard, while the English literature describes periodically cases of the disease, as well as systematic reports on therapeutic options and complications, the Latin literature, little or no reference does in this regard; and the Colombian has hardly touched the issue. In Colombia, only one case has been reported in 1986 (20). There is no follow-up in any case, and less develop new diagnostic or therapeutic technologies in this regard.

It is necessary to mention that, to achieve the diagnosis of this picture, the use of imaging examinations is of vital importance, since they allow a greater specificity, especially those that show images in real time (19). In order to establish the diagnosis, excretory urography and ascending pyelography are the initial choice studies when one is faced with the suspicion of this pathology. However, imaging methods, such as CT (21, 22) and MRI are the tests of choice for a definitive diagnosis or to rule out another pathology; even more because at present it is possible to perform three-dimensional reconstruction of the entire renal excretory system (1, 8). The main disadvantage of MRI versus CT is its high cost and limited availability in some health services (4).

It is key to the identification of the RU that the ureter in the image can be found as a typical deformation in inverted "J" or italic "S", in addition to a dilation of the collecting systems (5, 8), traits presented by the patient in this case and allow their classification (Table 1).



Figure 1. Coronal CT with contrast medium in phase of elimination: Dilation of renal pelvis with inverted "J" deformity (arrow) is evidenced.

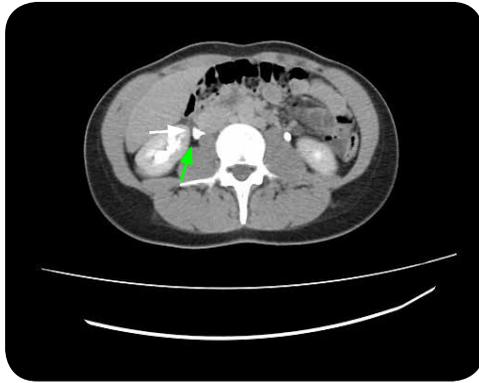


Figure 2. CT, axial cut, in phase of elimination: The crossing of the ureter (green arrow) posterior to the inferior vena cava (white arrow) is observed.



Figure 3. CT axial cut with contrast medium, phase of elimination: The right ureter (green arrow) is seen anteriorly and medial to the vena cava (white arrow).



Figure 4. Three-dimensional reconstruction of urotomography: It is evident how the right ureter crosses posterior to the vena cava and then embraces it, the flow of the contrast medium is reduced by compressive stenosis. With elimination of the contrast medium (arrow).

Table 1. Classification of Bateson and Atkinson for retrocaval ureter

Type 1	Type 2
Most common (90% of cases)	Less common (10% of cases)
The ureter crosses at the height of the third lumbar vertebra	The ureter crosses at the level of the renal pelvis
Deformity in the form of hook or fish, 'S' or hook	Skeletal deformity
Marked hydronephrosis	Minimal hydronephrosis

Source: Taken from Hassan (4).

For the management of this anomaly, open surgery is the method of choice, although it has been recently replaced by laparoscopic surgery, given that it has advantages over the first, in terms of shorter hospital stay, lower pain and better aesthetic results, with less time of incapacity of work of the individual, besides lower risk of bleeding (1-3). The most recent advance in the surgical approach of this table is the use of robotic UR repair (20).

Ureteroureterostomy treatment is indicated only in patients with important symptoms such as urolithiasis, haematuria and urinary tract infection and who present hydronephrosis with significant deterioration of renal function; Occasionally, nephrectomy may be necessary when thinning of the renal cortex with severe atrophy or hydronephrosis is evident (7, 8). Treatment and its subsequent outcome may vary if there are underlying comorbidities, such as obesity (23), or even more, if there are severe renal pathologies.

It should be noted that early diagnosis involves a rapid approach to facilitate patient recovery, and prevent it from entering into renal failure or major complications. In patients who do not show a significant deterioration of their renal function, in which there is no ureteral dilation or are asymptomatic, only periodic follow-up with ultrasound or excretory urography of control could be performed periodically (5,8).

Conclusion

Imaging paraclinic aids are a fundamental tool for the diagnosis of the entity, since they allow a complete evaluation of the patient without resorting to invasive methods that are often unfruitful, annoying and carry a considerable risk for the patient. In this case, the suspicion was initiated by the patient's clinic and the radiological signs that coincide with the diagnosis of UR type II were confirmed. Although this is a rare entity, patients should be identified early to perform an evaluation of renal function and, if the malformation warrants it, opportunely apply a surgical treatment either by conventional or laparoscopic method. In this way a secondary prevention is performed on the health of the patients, goal that can only be fulfilled with the proper use of diagnostic images. It is also urged to increase scientific research on this and other low incidence groups, since despite their low incidence among the population, they are pathologies that seriously affect the quality of life of those who suffer from it, and development of new technologies, could improve the forecast of them.

References

1. Montoya G, Maldonado E, Moreno J, Serrano E, Martínez A, Torres L. Manejo laparoscópico del uréter retrocavo. Presentación de un caso y revisión de la literatura. *Cirugía Cirujanos*. 2011;79(4):366-70.
2. Ballesteros S. Ureter retrocavo. *Actas Urol Esp*. 2008;32(3):368.
3. Gosavi VS, Hombalkar NN, Dhandore PD, Mody NB, Bankar SS. Retrocaval ureter: An innocent bystander. *J Clin Diagnost Res*. 2014;8(5):5-6.
4. Hassan R, Aziz A, Kamariah S. Retrocaval ureter: The importance of intravenous urography. *Malaysian J Med Sci*. 2011;18(4):84-7.
5. López PA, López P, Server G, Girón O, Ruiz R, Doñate G, et al. Ureter retrocavo en el niño: A propósito de un caso y revisión de la literatura. *Arch Esp Urol*. 2011;64(5):461-4.
6. Husillos A, Diez JM, Molina R, Ogaya G, Tabares J, Hernández C. Ureter retrocavo. *Arch Esp Urol*. 2011;64(4):390-1.
7. Yen JM, Lee L, Wai C. Conservative management of retrocaval ureter: A case series. *Int J Surg Case Rep*. 2015;15(1):93-5.
8. Vásquez C, Cisneros MB, Contreras EA, Lomelín JP, Figueroa GR, Castro GA. Ureter retrocavo. *An Méd*. 2005;50(3):130-5.
9. Ricciardulli S, Ding Q, Li H, Napoli R, Viola D, Ruoppo G, et al. Retroperitoneoscopic ureteroureterostomy for retrocaval ureter: Technique and results on 27 patients. *Eur Urol (Suplemento)*. 2015;14(2):59.
10. Autorino R, Khanna R, White MA, Haber G-P, Shah G, Kaouk J, et al. Laparoendoscopic single-site repair of retrocaval ureter: First case report. *Surg Tech Urol*. 2010;10(1):1501-5.
11. Dogan HS, Oktay B, Vuruskan H, Yavascaoglu I. Treatment of retrocaval ureter by pure laparoscopic pyelopyelostomy: Experience on 4 patients. *Lapar Robot*. 2010;10(1):1343-7.
12. Li H-Z, Ma X, Qi L, Shi T-P, Wang B-J, Zhang X. Retroperitoneal laparoscopic ureteroureterostomy for retrocaval ureter: Report of 10 cases and literature review. *Lapar Robot*. 2010;10(1):873-6.
13. Xu D-F. Retroperitoneal laparoscopic ureteroureterostomy for retrocaval ureter: Report of 7 cases. *Lapar Robot*. 2009;9(1):1242-5.
14. Fernández Fernández J, Pachano F. Laparoscopic-assisted correction of a retrocaval uréter. *J Pediatric Surg*. 2008;43(1):1560-2.
15. Nayak B, Dogra PN, Gupta NP. Robotic repair of retrocaval ureter: A case series. *African J Urol*. 2012;18(1):135-7.
16. Kajal P, Rattan K, Sangwan V, Bhutani N. Retrocaval ureter presenting at 6 years of age in a girl child: An extreme rarity. *Asian J Urol*. 2015;2(1):1-3.
17. Duque M, Mendoza LA. Manejo laparoscópico de uréter retrocavo y cálculos en el sistema urinario superior con ureteroscopia. *Rev Urol Colomb*. 2005;14(3):160.
18. Gaudiano C, Busato F, Corcioni B, Orrù L, Golfieri R. An unusual case of right retrocaval ureter associated with ipsilateral ureterocele. *Imag Clin Urol*. 2012;12(1):109-10.
19. Acharya SK, Jindal B, Yadav DK, Singha S, Bagga D. Retrocaval ureter: a rare cause of hydronephrosis in children. *J Pediat Surg*. 2009;44(1):846-8.
20. López López J. Primera edición de Urología colombiana. *Urol Colomb*. 1986;1(1):78-80.
21. González Roiz C, García Esquinas M, Prieto Soriano A, Salazar Andía G, Cabrera Martín M, Carreras Delgado J. Valor complementario de la PET y la TAC en la correcta valoración del uréter retrocavo. *Rev Esp Med Nucl Imagen Mol*. 2013;32(2):121-2.
22. López Amaya J, Mejía Restrepo J, Nicolau Molina C, Zuluaga Santamaría A, Mazzaro M. Ureter: Hallazgos en tomografía computarizada multidetector. *Radiología*. 2010;54(4):311-20.
23. Abdel AM, Yahia E, Hassouna M, Missiry M. Laparoscopic single site surgery for repair of retrocaval ureter in a morbidly obese patient. *Urol Case Rep*. 2016;4(1):61-3.

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