Annals of Case Reports & Reviews

Case Report

doi: 10.39127/2574-5747/ACRR:1000262
Panagiotis P, et al. Annal Cas Rep Rev: ACRR-262

Endoscopic Management of a Ureteral Avulsion with Double J Ureteric Stent Only Annual Replacement Over A Decade

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Citation: Panagiotis P, Nick A, Eleni K, Nick P (2021) Endoscopic Management of a Ureteral Avulsion with Double J Ureteric Stent Only Annual Replacement Over A Decade. Annal Cas Rep Rev: ACRR-262.

Received Date: 26 July, 2021; **Accepted Date:** 30 July, 2021; **Published Date:** 04 August, 2021

Abstract

Introduction: *This case represents the first effective endoscopic management of a ureteral avulsion, which occurred 11 years ago, by replacing a 4,8/26Fr ureteral stent (Percuflex Plus) every year.*

Case presentation: *A 62-year-old patient presented to our Urology department suffering from flank pain, due to right upper third ureteral stone. The patient was examined with ultrasonography and CT scan, revealing mild to moderate right hydronephrosis due to a proximal ureteral stone measuring 7,6mm. He underwent right ureteroscopy using a 6/7,5 Fr semirigid ureteroscope followed by Ho YAG laser stone fragmentation with complete stone clearance. On withdrawal of the ureteroscope, avulsion of the ureter occurred, extending 2 cm below the ureteropelvic junction (UPJ) as far as the vesicoureteral orifice. An immediate insertion of a 6/26Fr stent over the safety guide wire to the right renal upper pole was achieved followed by a nephrostomy tube placement to ensure the preservation of the renal unit.*

The patient recovered well with excellent renal function and drainage on subsequent CT urography and renogram. He was thoroughly informed for his situation and all possible solutions, so he decided to avoid any reconstructive surgery and therefore opted for endoscopic management with ureteral stent replacement and surveillance. His renal function was normal over the time according to subsequent renograms.

Conclusion: *Ureteral avulsion is a rare but serious complication of ureteroscopy with numerous options available for management. One of those options could be, depending to the patient preference, endoscopic long-term replacement of a double -J- stent.*

Keywords: *Ureteral injury, ureteral avulsion, ureteroscopy, stent placement.*

Introduction

In the last years ureteroscopy has become an integral part in the diagnosis and treatment of ureteral as well as renal collecting system disease. Nevertheless, as in any advanced technique, expected complications (some of which are severe) can happen, including ureteral perforation and avulsion. The term ureteral avulsion is referred to describe a discontinuation of the full thickness of the ureter.

The first cases of ureteral avulsion were reported by Hart et al. in 1967 and Hodge et al. in 1973 both after difficult manipulation of ureteral stones using Dormia basket for extraction [1].

We present a case of complete ureteral avulsion treated endoscopically with annual stent replacement for 11 consecutive years, well tolerated by the patient and with no impairment of his renal function.

Case Report

A 62-year-old patient presented to our clinic on May 17th2010 with acute right flank pain, due to ureteral stone. His medical history included hypertension and diabetes. Non-contrast CT revealed the presence of a right proximal ureteral stone 7,6mm in diameter, with mild to moderate hydronephrosis.

The patient underwent a right semi rigid ureteroscopy under general anaesthesia. After retrograde ureteropyelogram a 0.038-inch hydrophilic guide wire was inserted into the ureter up to the right upper pole of the kidney which was followed by a 0.038 nitinol safety guide wire and the scope was advanced into the right ureter

alongside the guide wire. No ureteral stricture was encountered, and the ureter was not tight or narrow. The stone was found in the upper third of the ureter and Ho YAG laser fragmentation was performed with complete stone clearance. At the end of the procedure, on withdrawal of the scope a right ureteral avulsion occurred extending from 2 cm below the ureteropelvic junction down to vesicoureteral junction. The avulsed ureter was pulled out of the patient's body, engaged firmly to the ureteroscope (Figure1).

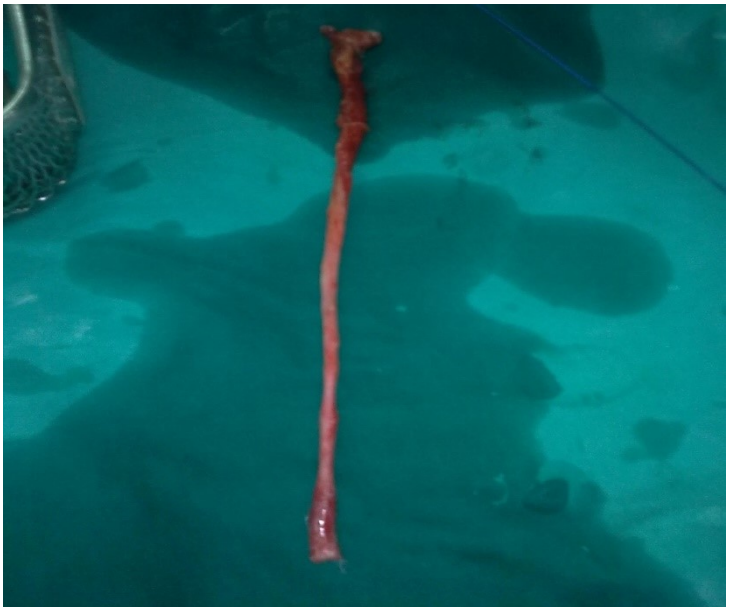

Figure 1: Ureteral avulsion.

As the injury was recognised immediately, a 6/26Fr – JJ-stent (Percuflex plus) was inserted to the upper pole of the right kidney, fluoroscopically, through the safety guide wire, to preserve the patency of the mid and lower ureteral segment, as the ureter was completely avulsed with no overlying mucosa. A urethral catheter was also placed into the bladder.

Postoperatively, the patient received double intravenous antibiotic treatment with piperacillin/tazobactam and ciprofloxacin. The patient remained haemodynamic stable and afebrile during his hospital stay.

Additionally, a right nephrostomy was inserted to decompress the right renal unit and a CT urography was undertaken to evaluate the post-operative anatomy of his right upper urinary tract (Figure 2).

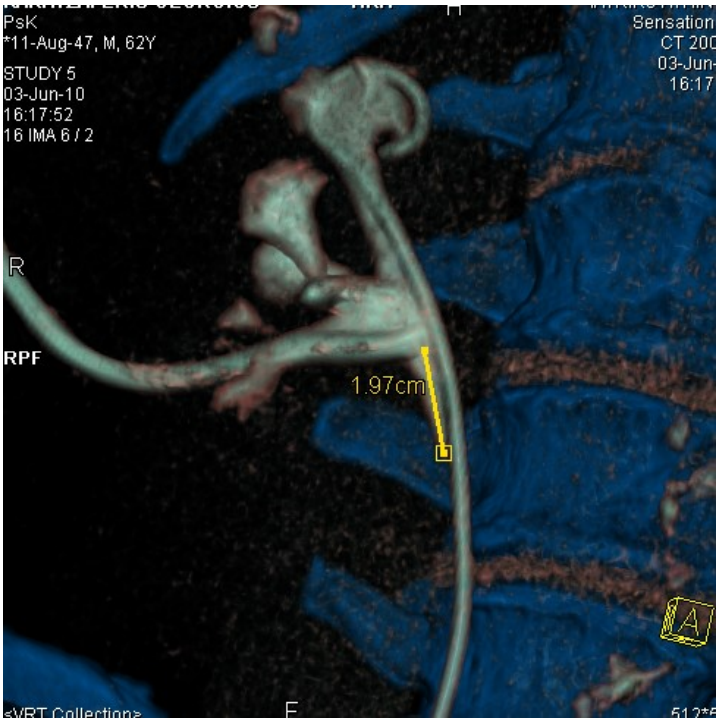

Figure 2: CT Urography 2010.

The patient was thoroughly informed about the management options which included: reconstruction of the right ureter by either Boari flap or ileal interposition, auto transplantation, endoscopic management and even nephrectomy. He decided to avoid any reconstructive surgery and therefore he opted for endoscopic management with the undertaking of ureteral stent replacement and surveillance.

The patient recovered well post operatively with normal routine haematology and biochemistry blood test results and he was discharged home on the 5th post-operative day with nephrostomy and urethral catheter on free drainage.

A right nephrostogram was performed 3 weeks later which showed satisfactory passage of contrast from the pelvis into the urinary bladder with no evidence of leakage of contrast around the stent. The nephrostomy was clamped, and the urethral catheter was removed. A DMSA renogram was also performed which showed homogenous distribution of the tracer to both kidneys as well as which demonstrated a differential renal function of 51% for right and 49% for left respectively. At 6 weeks follow-up assessment, the right nephrostomy was removed and during his 6 months follow-up assessment a new DMSA was performed which showed normal split function with no significant change from the previous DMSA scan (Figure 3).

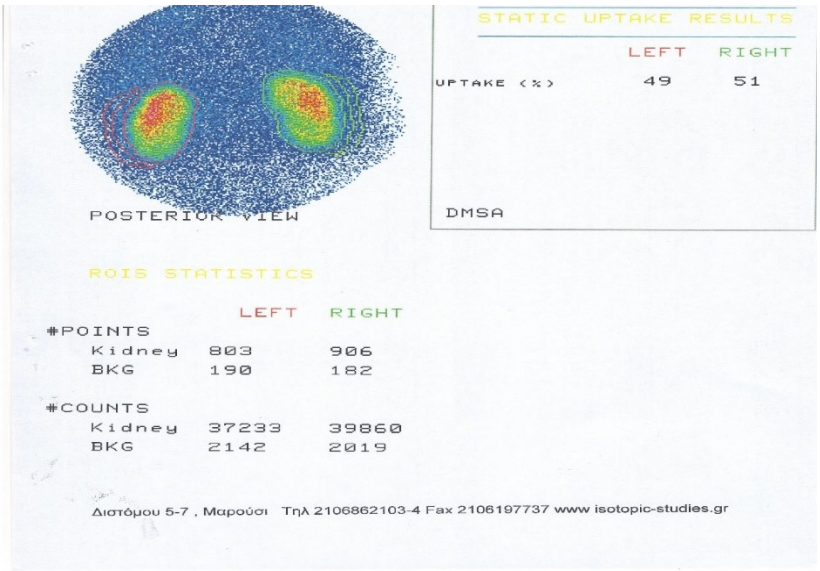

Figure 3: DMSA.

In a lower third ureteroscopy which was performed before a scheduled stent replacement 2 year after the incidence, a fibrotic tissue was formed around the stent creating a sheath. On subsequent CT urography no sign of leak was present (Figure 4).

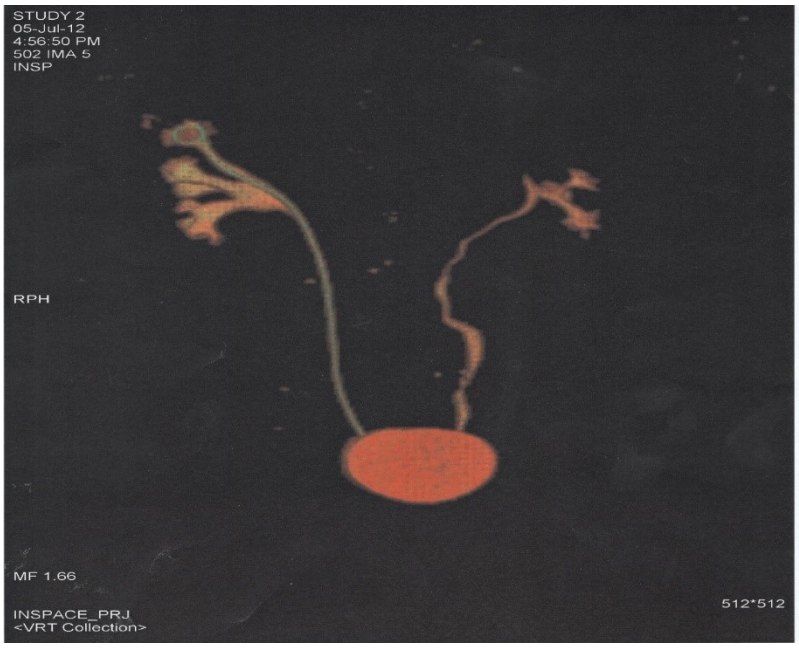

Figure 4: CT Urography 2012.

The patient has been closely followed-up for the last 10 years and during this period of time, he has been undergoing ureteric stent replacement once every year. Over the preceding 7 years, a 4,8/26Fr ureteric stent has been utilized in order to minimize his stent related symptoms. During his latest surveillance right ureteroscopy, it was noted that within his lower third ureter the urothelium of his urinary bladder had extended to cover the fibrotic tissue which had formed around the ureteric stent all these years. During that time, the patient was also found to have normal renal function with normal serum urea, creatinine, and estimated glomerular filtration rate (EGFR) levels as well as normal renogram, He additionally had contrast-computed tomography (CECT) urography examination which did not demonstrate any sign of ureteral leakage of contrast, and no evidence of urinary infections. Furthermore, he had tolerated his stent related symptoms very well, and he stated that he has been having good quality of life (Figure 5).

Figure 5: CT Urography 2019

Discussion

It has been iterated that although an infrequent event in the endoscopic management of ureteral stones, with an incidence of 0,2-1%, ureteral avulsion should always be taken into account when performing endoscopic procedures [2,3,4].

The potential factors which may predispose to the development of ureteral injuries have been summated to include the following: Presence of ureteral oedema due to mucosa inflammation, cases of impacted stones, reduced elasticity of the ureter due to strictures, anatomical variations of the ureter including severe tortuosity of the ureter, previous endourological manipulations and stone retrieval using wire baskets especially when the stone is large and measuring 1cm or more [2].

It has been iterated that the mechanism of complete ureteral avulsion could occur during advancement of the scope through a tight ureteric stricture area, up to the level where the stone is impacted or stuck. The tight grip of fibrous stricture on the body of the scope can cause the first avulsion. The second avulsion then occurs during withdrawal of the scope, as this area is further weakened by the microtrauma created from lithotripsy [4].

Furthermore, it has been documented that ureteral injuries can occur throughout the entire length of the ureter, but the most severe injuries tend to be the ones that are associated with the proximal ureter, because this area has less muscular support and fewer mucosal cell layers in comparison with the distal or intramural part of the ureter [4].

Therefore, based upon the aforementioned factors for the development of the ureter, it would be advised that proper handling and extreme gentleness during the procedure is mandatory to prevent serious complications. Additionally, it would be advised that basic rules should be followed such as:

- Placement of at least one safety guide wire should be undertaken
- Small calibre rigid ureteroscopes or flexibles ureteroscopes should be used if possible
- Prior balloon dilation of a ureteric stricture should be undertaken whenever a ureteral stricture is present
- Lubricant should always be applied along the entire length of the shaft of the ureteroscope, in order to avoid potential ripping effect on the ureter.

Some of the guidance iterations relating to ureteric avulsion treatment measures do include: Maintenance of continuity of the urinary tract is of crucial importance, when handling a ureteral avulsion. The repair of complete ureteral avulsion is a particularly challenging task and treatment should be individualized. It varies according to

the compromised ureteral segment as well as from the functional status of the renal unit [2].

The surgical management of ureteral defects may require complicated procedures such as ileal interposition, Boari flap, auto transplantation of the kidney or even nephrectomy. It has been stated that the aforementioned procedures are highly complex and have their own inherent risks, so the patient must be informed and counselled appropriately [1,2].

Rouhani et al. presented in 2017 an endoscopic management of ureteral avulsion using a thermo-expandable, titanium-nickel stent (Memocath 051) as an alternative. Such a permanent stent may have a role to play in the management of non-curable ureteral obstructions including malignancies and retroperitoneal fibrosis or in patients who have short life expectancy [1].

Overall, the optimal management approach for proximal ureteral avulsion remains inconclusive.

Conclusion

Ureteral avulsion is a rare but very serious complication of ureteroscopic procedures.

The loss of long segment of the upper ureter, when end-to-end anastomosis is not technically feasible, is a major challenge for the Urologist.

Although, evidence-based recommendations that may offer the best possible solution are surgical reconstruction, the minimally invasive endoscopic solutions such as stenting with JJ stent does seem to have a significant role to play in the management of such difficult cases.

In our case, a yearly ureteric replacement with utilization of a 4,8/26Fr stent for 10 consecutive years, has been well tolerated by the patient with no impairment of his renal function over time.

Therefore, endoscopic management should be considered as a viable, effective and safe option of treatment of avulsion of the ureter.

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