



# Double J Stent Mislocation—Case Report

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## Abstract

Double J Stents (DJS) have been universally used in endourologic practices worldwide for the treatment of occluded ureters. DJS dislocation is considered very rare. We report an interesting case of a closed tip double J stent (DJS) misplacement in a patient that suffered renal colic's due to a small impacted ureteric stone. During the insertion procedure the ureteral stent perforated the ureter and passed into the inferior vena cava. It was incidentally diagnosed when the patient underwent a follow up CT scan 2 months later to review and confirm the passing of the stone. The stent was successfully removed with flexible cystoscopy under fluoroscopy and with interventional radiology supervision. The patient was discharged after that and remained asymptomatic after the event. Objective of this article is to review the literature and raise awareness of the risk of JJ Stent dislocation and its potential complications.

## Subject Areas

Urology

## Keywords

Urology, Medicine, Stent, JJ Stent, Pigtail Stent, Endourology, Double J Stent Dislocation

## 1. Introduction

Insertion of a ureteral stent is a common and routine procedure in Urology during which a thin tube is inserted into the ureter in order to drain urine from the kidney into the bladder. This results in managing and preventing urinary tract (UT) obstruction in numerous urological conditions when conservative treatment fails [1] [2] [3] [4] [5]. In addition, stenting the ureter has various other indications such as to allow healing after ureteric injuries, as a prophylactic measure to prevent ureteric trauma in gynecological or general surgery oper-

ation and after renal transplantation.

Although the procedure of placing a ureteric stent has been standardized and significant experience has been accumulated, malpositioning of a stent outside the ureter remains a possibility. Perforating the ureter and placing the stent in the adjacent fat tissue do not cause serious complications and consequences. However, misplacement in the inferior vena cava is scanty, hazardous and unpredictable [2] [3] [4]. Such perforations can happen when excess force is placed during ureteroscopy and while introducing a guide wire and/or stent in the ureter without fluoroscopic guidance [3] [4] [6]. It is suggested that ureteral wall fragility, as a consequence of chronic ureteral trauma and inflammation or urolithiasis, forms a predisposing factor for ureteral perforation [3] [7].

Intravascular DJS misplacement is rare according to the literature although many cases may be underreported. With this case report we discuss our experience and approach, since this is the first and only incident that has occurred in our clinic.

## 2. Case Report

A 68-year-old female was referred to our hospital for removal of a misplaced closed tip double j ureteral stent. A CT scan performed prior to the referral revealed that the stent had penetrated the distal part of the ureter, entered the right common iliac vein and passed in the inferior vena cava. The stent had been placed 2 months earlier in another hospital, cystoscopically without fluoroscopy control, because of a small, obstructive stone in the distal ureter which caused dilatation of the left kidney, colic and pyelonephritis. Abdominal x-ray that had been performed after the placement of the stent showed a somewhat medial position of the DJS with a proximal curl.

The abnormal pathway of the stent couldn't easily be observed and diagnosed through the x-ray [Figure 1] mainly due to lack of signs and symptoms and low suspicion at the time. It showed a seemingly well positioned stent and the patients' symptoms and infection subsided within days. The patient was then discharged from the ward.

The dislocation was identified by a non-contrast CT scan that was performed two months later in order to organize further management. The proximal end of the stent appeared to be coiled in the supra-renal vena cava and the distal tip was in normal position in the urinary bladder [Figure 2]. The scan did not show hematomas.

The patient was asymptomatic and had normal vital signs and ECG readings. Laboratory assessment was generally unremarkable without leukocytosis or compromised renal function. Microscopic urinalysis did not show pyuria or hematuria. A multidisciplinary team including Urologists, Vascular Surgeons and Interventional Radiologist, was put together for the removal of the stent. This was performed cystoscopically in the vascular lab, under fluoroscopy. An emergency endovascular approach was planned to be used first in the case of any



**Figure 1.** Right DJS with medial position and proximal curl.



**Figure 2.** CT scan showing the DJS at the level of supra-renal vena cava. Proximal curl is noted.

vascular complication and surgical exploration was planned in the event of severe bleeding from the inferior vena cava (IVC).

During cystoscopy, the integrity of the bladder wall was confirmed before retrieving the DJS. The coiled stent was encountered in the bladder and was successfully withdrawn without obvious complications. Retrograde pyelogram was performed which revealed integrity of the urinary tract wall, without extravasation of contrast. After the procedure, the patient was clinically well but presented tachycardia a few hours later, with normal blood pressure and no other symptoms. CT angiography revealed limited contrast leakage at the perforation site and no signs of internal bleeding. The heart rate normalized spontaneously. The

laboratory tests showed normal levels of hemoglobin.

The patient was discharged the following day and fortunately had an uneventful recovery. As far as we know the stone had passed and the patient had no stone remission.

### 3. Discussion

Stents were made known in 1978 and since then have been universally used in endourologic practices worldwide for the treatment of impacted ureters. Ureteral J-stent placement, either antegrade or retrograde is a frequent urological and radiological interventional procedure [4] [8] [9] [10].

Ureteric stent materials and design have been revised and upgraded, leading to fewer complications correlated within their use. They are flexible and are designed to curl at their two ends to avoid organ trauma and stent migration [11]. Nonetheless, complications from their use do exist and these extend from minor clinical symptoms to more austere problems.

The most common indication of stenting is to prevent and diminish upper urinary tract obstruction. The most common reason of obstruction is a stone stuck in the ureter. The stent is used briefly to prevent damage to a blocked kidney, until measures to remove the stone can be implemented. The stent may remain for a longer period of time if indicated (*i.e.* ureter compression by tumors, inoperable tumors) [1] [12].

Stents are also placed in impaired ureters that have undergone irritation or damage during ureteroscopy. These stents usually remain for a about a week to establish that the ureter does not spasm and collapse after the trauma of the procedure [1] [13].

In addition, further relative indications of DJS after an ureteroscopy include ureteroscopy on a solitary kidney, any endourologic procedure performed bilaterally and obstruction during pregnancy [1] [3] [14] [15].

An ideal stent without significant side-effects is yet to be engineered.

Closed tip pigtail stents were replaced by the more preferable modern pigtail open tip ureteral stents which are safer to use and cause fewer complications as they can be placed under fluoroscopic guidance with the use of a guidewire.

Even though a closed tip design allows a one-step insertion it must be applied with caution. Guidewire and fluoroscopy offer safety and certainty of the stents' final position. It minimizes the odds of creating a false passage, ureter perforation and dislocating the stent inside or outside the ureter and offers solutions for their correction [16].

Typical ephemeral complications of DJ stents are increased urgency and frequency of urination, loin-bladder-groin pain, urinary tract infection/pyelonephritis, vesicoureteral reflex, hematuria, leakage of urine, discomfort during strenuous physical activity. These complications dissolve with the removal of the stent. Most of them are self-limited and can be handled with proper urologic interventions and supportive medical management medication such as a-blockers and antimuscarinics which may alleviate the stent related symptoms. Further com-

plications may include urethral irritation, stent dislodging, cramping and irritation during ejaculation and may hinder sex. These symptoms are more common with tethered stents [1] [2] [3] [4] [8] [9] [14].

Rare complications after ureteral stent placement are seen on **Table 1** and may require surgical intervention.

Vascular complications concerning the ureter are unlikely and usually present as an arterio-ureteral fistula. They can derive in several situations including degenerative iliac artery disease, pelvic irradiation, extirpative surgery for pelvic or abdominal malignant disease, urolithiasis, urinary diversion procedure, previous vascular reconstruction procedures, extensive ureteral mobilization and prolonged indwelling ureteral stent [2] [4] [8] [9] [14]. Common complications due to intravascular migration may include chest pain, tricuspid valve insufficiency, endocarditis, myocardial damage, recurrent pericardial effusions, organ embolism and arterioureteral fistula [2] [4] [8] [9] [14].

Since 2002, 11 cases have been reported in the literature and all stents were retrieved using different approaches, including the need for laparoscopy [17].

Sabnis and colleagues reported a case of migration of a DJ stent into the IVC and right atrium after ureteroscopy. Farshi, A. R., & Roshandel, M. R. reported an Intracardiac migration of ureteral double-J stent in a pregnant female.

Kim and colleagues reported a case of cardiac migration after hysterectomy. Michalopoulos and colleagues reported an acute pulmonary thromboembolism after the migration of a pigtail in the left pulmonary artery [2] [8] [9] [14].

In our case it is considered that the ureteral perforation and intravenous migration was generated by forced placement of the closed tip stent without proper fluoroscopic guidance, which most likely caused erosion to the ureter, passed into the submucosa and the adjacent vessel (common iliac vessel). It must be noted that trauma to the iliac vessels carry a mortality of 30%, mostly from uncontrolled hemorrhaging and is potentially a desolating complication if not promptly diagnosed [8].

Fortunately, this did not lead to significant retroperitoneal hemorrhage nor gross hematuria. On the other hand, these complications would have ultimately helped in perceiving the misplacement of the stent instantly [9] [17].

**Table 1.** Rare Complications [1] [2] [3] [4] [8] [9] [14].

1) Dislocation	2) Ureteral fistula
3) Distal/proximal migration	4) Stone Formation
5) Vascular migration	6) Forgotten stent
7) Arterioureteral fistula	8) Stenturia
9) Stent knotting	10) Ureteral erosion
11) Encrustation	12) Ureteral necrosis
13) Luminal occlusion	14) Acute Renal Failure
15) Urinoma	16) Spontaneous rupture of the kidney
17) Hematoma	

We report this case to inform our fellow urologists and raise suspicion of DJS dislocation. Cautiously inserting stents and confirmation of their position via imaging is mandatory to avoid such events.

Guidelines for the management of such cases have not yet been clarified due to the scarcity of these cases. Some management modalities include removing the stents via femoral vein with vascular forceps and open vascular surgery or endoscopically by cystoscope/ureteroscope. Furthermore, the treatment of choice is also determined by the general condition of the patient, expertise of the surgeon, and infrastructure [15].

#### 4. Conclusions

DJS placement has no single, universally accepted, or recommended technique. However, the endoscopic placement over a guidewire and with the use of fluoroscopy is widely considered the safest technique.

Intravascular placement or migration of pigtails is considered rare.

As urologists who regularly treat patients by stenting, we must have a high degree of suspicion and consider being more cautious and careful in order to fend off intraoperative misplacement and malpositioning. We must avoid placing too much pressure during insertion, follow the markings on the stents, make sure we have sufficient coiling and perform fluoroscopically controlled procedures and, of course, postoperative imaging.

#### Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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