Laparoscopic management of misplaced ureteral double J stent into a left branch of duplicated inferior vena cava

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Case Report

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Houssam Khodor Abtar MD, FACS1, Abbass Shibli MD1,2, Mohammad Rida Farhat MD1,2, Youssef Hamdan MD1,2, Zakaria Dika MD1,2, Jad J Terro MD*, Mohammad Ahmad Al Raishouni MD3, Mohamad Alwan MD1 and Charbel chalouhy MD1

1Central Military Hospital, Department of Surgery, Beirut, Lebanon
2Department of General Surgery, Faculty of Medical Sciences, Lebanese University, Beirut, Lebanon
3FAHS Surgical Services, Michigan, USA

*Corresponding Author: Jad J Terro, Initials: Resident of General Surgery, Department of General Surgery, Faculty of Medical Sciences, Lebanese University, Beirut, Lebanon, Email: j.terro@hotmail.com

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Abstract

**Introduction:** Double J Stent is frequently used to preserve urine flow to the kidney in urolithiasis. Migration of double J stent is highly reported in literature. Duplicated inferior Vena Cava is a rare entity that is asymptomatic and usually incidentally diagnosed.

**Case Presentation:** A case of a 46 years old male patient known for multiple episodes of kidney stones presenting for left urolithiasis with hydronephrosis and have underwent a double J stent insertion without fluoroscopic guidance and have underwent a double J stent placement which perforated the ureteric wall and enter the duplicated left inferior vena cava. Therefore, a laparoscopic intervention was done to extract the stent and replace it with a new one simultaneously with repair of both the ureter and the vein.

**Conclusion:** Duplicated inferior vena cava is an uncommon finding that has a lot of complications. This is the first reported migration of double J stent into a duplicated inferior vena cava that was Laparoscopically repaired.

**Keywords:** Ureteral stone; Computed tomography scan; Double J stent migration; Duplicated inferior vena cava

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Introduction

Double J stent (DJS), first time described by Zimskind et al in 1967 [1], it is used for preservation of the urine flow from the kidney to the bladder [2]. The most common complications of DJS are dysuria, hematuria, stone formation, frequency, bacteriuria and fragmentation, [3]. During insertion of DJS, it may perforate the ureteric wall and enter the adjacent structures leading to stent induced trauma (SIT) [4]. Such perforations can happen when excess force is applied during insertion.
The majority of these complications are mild and self-limited and can be treated by conservative management. However, the DJS is rarely displaced into the vena cava through the ureter, and can be treated percutaneously, open surgery or laparoscopic approach [5]. Furthermore, the duplicated inferior vena cava (D-IVC) was first reported in 1916 in the gross anatomy labs of the London School of Medicine for Women [6]. Since that description, multiple reports of this anomaly have been published and the incidence rate is between 0.3% and 3% [7, 8]. This anomalous anatomy, if unrecognized, can lead to significant complications during abdominal surgery [9]. The majority of cases are asymptomatic and diagnosed incidentally by imaging computed tomography (CT) scan or Magnetic resonance imaging (MRI) done for other causes. In this case report, we present our experience and management of a case, first time described in the literature, of migration of a DJS into duplicated inferior vena cava.

Case Presentation

Herein, we present a case of 46 years old male patient known to have left renal stones who underwent left sided double J stent by ureteroscopy placement due to left hydroureteronephrosis on August 2020. The operation was done in a peripheral hospital without fluoroscopy guidance or any other imaging to confirm the DJS position. The patient was discharged two days later with no complaints. After two weeks the patient presented for recurrent left flank pain. He denied any gross hematuria. All his labs were within normal limits except for urine analysis which showed high leukocytes and erythrocytes counts. Abdominal Xray was done (figure 1). A CT scan of abdomen and pelvis was performed to validate the position of the DJS. Surprisingly, a perforation of the left distal ureter along with intravascular migration of the stent, at the level of sacroiliac joint, into the left iliac vein then reaching the left branch of a duplicated inferior vena cava was revealed associated with left sided hydronephrosis (figure 2). After discussion with the patient, the decision was taken to remove the DJS laparoscopically. Our surgical intention was removing the stent, repairing the vessel and the ureter, and replacing the stent with another one. Three ports were used: one for optical access at the level of the umbilicus, and tow working trocars (5 mm each placed in a triangular way with the umbilical trocar). After mobilization of the left colon and careful dissection, the ureter was visualized. The stent was noted perforating the ureter and entering high in the left branch of the duplicated IVC (figure 3). The inferior vena cava was clamped by a laparoscopic bulldog clamp (Time of clamping vena cava: 10-15 minutes). It was then extracted smoothly from the site of the perforation. IVC injury as well as ureteral injury were recognized and repaired (5/0 pds for the ureteral opening, 3/0 pds for the venous opening). A new double J stent was inserted in the ureter. At the end, a drain was inserted via the 5 mm port. Total operative time 40 minutes. The post-operative period was uneventful, the patient started on antibiotics and anti-coagulation therapy for. The position of the new double J was assured by X-rays. The patient was discharged home 1 week after the operation. The latter DJS was extracted via cysto-uretero-scopey after performing lithotripsy, approximately in 3 months after surgery. Following up the patient for 7 months after surgery provided with imaging showed no complications.
Figure 1: Kidney ureter bladder X-ray showing double mal-placed double J stent.

Figure 2: A: Coronal view of CT scan of abdomen and pelvis showed DJS protruding through the left branch of duplicated IVC up to the main IVC; ureterolithiasis marked with blue arrow. B: Axial view revealed the DJS within the main branch of IVC (White arrow).
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Discussion

IVC duplication occurs because the left supramarginal vein fail to regress early in gestation, resulting in large veins on both sides of the aorta that usually join the suprarenal IVC to the anterior level of the renal arteries [10]. Three separate variants of inferior vena cava duplication are identified, i.e., Form I or Major duplication: Two bilaterally symmetrical trunks with a preaortic trunk of the same caliber. With two bilateral symmetrical trunks, Type II or minor duplicate, but smaller than the preaortic trunk. In Type III or asymmetric duplication there is small left IVC, larger right IVC and even larger preaortic trunk. Genitourinary anomalies associated with duplication of the IVC are Retro-aortic left renal vein, circum-aortic renal vein known as ‘venous collar’, cloacal extrophy and horseshoe kidney [11]. In our patient it is a major duplication since imaginary showed left duplicated inferior vena cava with a preaortic trunk of a same caliber (figure 1). DJ stent is frequently used in urology practice. It is usually well tolerated and is devoid of major complications. Endovascular migration or positioning of the DJ stent is a rare occurrence. It has been reported both during open and endourological procedures [12]. In our case, migration of the DJS into the IVC was missed intra-op due to the absence of fluoroscopy that is used routinely in such operation to confirm the positioning of DJ.

In order to avoid such complications, many approaches have been utilized. First of all, the surgeon must always be knowledgeable of the serious problems and pay attention to the length of DJS during the procedure. If resistance is encountered, it is important not to force the DJS. Second, in the renal pelvis and bladder, the DJS coil should be at least 180° and >2cm in length. Third, the surgeon should give importance to the patient's warning signs and symptoms, such as excessive bleeding and severe abdominal pain. In addition, to validate the location of the DJS, perioperative x-ray imaging should be performed. In order to detect complications early, it is very significant to perform monitoring and follow-up after a DJS placement. To avoid the creation of more difficult complications, a migrated DJS must be removed early [13].

Conclusion

The present case is interesting because the diagnosis of endovascular stent positioning was detected after two weeks from the surgery, some degree of hematuria was ignored as a
normal post-surgery consequence, until the patient arrived to the ER with non-tolerated flank pain. To the best of our knowledge, this is the first reported case in the literature of migrated DJS into a duplicated IVC which was treated laparoscopically by extraction and suturing off the defects.

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