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CASE REPORT

Duplicated Ureter: A Rare Anatomical Variation Diagnosed Incidentally During Open Radical Hysterectomy for Carcinoma Endometrium and Avoidance of Mishappening: A Case Report

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Abstract
This case report presents a rare anatomical variation known as double ureter, where a comprehensive unilateral duplication of the left ureter originating from a single renal tissue was incidentally discovered during staging laparotomy for CA endometrium. This congenital anomaly significantly heightens the possibility of unintentional damage to the ureter during surgeries involving the pelvic area. In summary, ensuring careful exposure of both ureters along with the continuous vigilance of surgeons remains pivotal for ensuring a secure surgical procedure.

Keywords Double ureter · Carcinoma Endometrium · Ureteral anomaly · Ectopic ureter · Duplicated ureter

Introduction

Double ureter, also referred as duplex ureter or duplicated ureter, is a congenital anomaly characterized by the presence of two ureters originating from a single kidney. It is a rare occurrence, and the estimated incidence is only 0.8% in the general population (1). The duplicated ureter can manifest clinically with urinary tract infections, renal stones and vesicoureteral reflux; however, the presentation is mostly vague (2). Majority of the time, it is diagnosed incidentally during the operative procedure when the surgeon is not aware of it preoperatively. This anatomical variation can cause difficulties for the surgeon intraoperatively as well as poses a significant risk for intraoperative damage to the ureter, which is a possible complication in both open and laparoscopic pelvic surgeries. The severity of injury may depend on the radicality of the surgery; hence, surgery for pelvic malignancy poses the greatest challenge. Here, we present a case of double ureter incidentally identified during the surgery for CA endometrium and the importance of meticulous surgical technique to avoid any untoward incident.

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Case Report

A 58-year-old postmenopausal lady presented to the surgical oncology clinic with complaints of lower abdominal pain and bleeding per vaginum for the past 2 months. Based on her medical and gynecological background, she is parity two, with two previous normal vaginal deliveries. She had no medical comorbidities or family history of malignancies. She also did not have any history of urinary tract infection or renal stone disease. On clinical examination, she was ECOG 1 and her BMI was 22.5 kg/m^2. Her abdominal examinations were unremarkable. The per vaginum and per speculum examination revealed a normal cervix and vagina with no contact bleeding, and the external genitalia was normal. MRI (1.5 Tesla) abdomen revealed heterogeneously hyperintense signal intensity mass within the uterus of size 5 × 4 × 4 cm with few non-enhancing areas of necrosis likely neoplastic and more than 50% myometrial invasion. There were no enlarged pelvic or retroperitoneal lymph nodes. There was no evidence of metastatic disease. Endometrial Biopsy was done which was reported as moderately differentiated adenocarcinoma, endometrioid type. She was taken up for staging laparotomy after multimodality tumor

board discussion. As working in a resource constrained setting in a sub-Himalayan tertiary care center, the patient was planned for open surgery.

Surgical Procedure

The surgery was planned under general anesthesia and Lloyd Davis position. The patient was catheterized, and midline laparotomy was performed. Peritoneal washing was collected, and the whole abdominal cavity was examined for any metastatic disease. After ruling out metastatic disease, the surgery commenced from developing avascular pelvic spaces. Before ovarian pedicle ligation, identification and separation of the ureter from its attachment to the posterior leaf of the broad ligament were done during which we encountered the double ureter lying in close proximity to each other (Figs. 1 and 2). To avoid any harm to the ureter, the lower portion of the ureter's path was carefully revealed. During this step, it was noticed further that both ureters on the left side were isolated and separated. However, additional identification of the ureter's insertion point, which was unnecessary for the surgery, was not carried out. Both ureters were observed to have similar courses adjacent to each other within the pelvis, but entry point into bladder was not explored. The course of both ureters was kept under vision at all times, and safety was ensured. The right ureter was single and in normal position and appearance. In hindsight, the imaging studies were revisited; however, the presence of the duplicated ureters was not appreciated well, probably because they were in absolute close proximity to each other (Fig. 3). Total abdominal hysterectomy was completed, and vaginal stump was sutured. Bilateral pelvic lymph node dissection and infra-mesenteric retroperitoneal lymph node dissection were done. Omentectomy was performed, and the abdomen was closed with drain in situ. Though the patient had uneventful postoperative recovery, she was discharged on postoperative Day 10 for desired close follow-up and logistic issues as patient hailed from distant hilly region. Renal ultrasonography confirmed no evidence of hydronephrosis. Given the absence of symptoms related to this anatomical variation, conservative management with close follow-up was recommended.

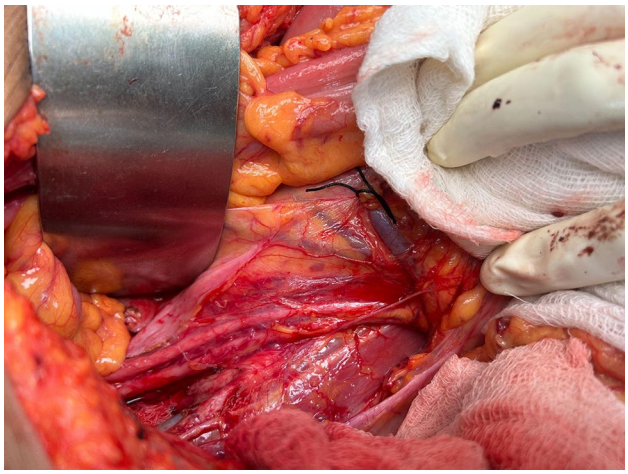

Fig. 2 Duplicated ureters lying in close proximity to each other

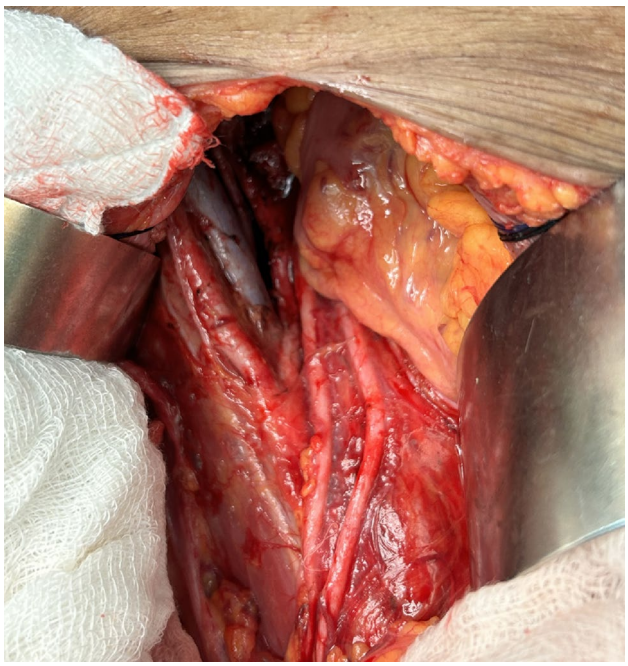

Fig. 1 Left-sided double ureter crossing left iliac vessels

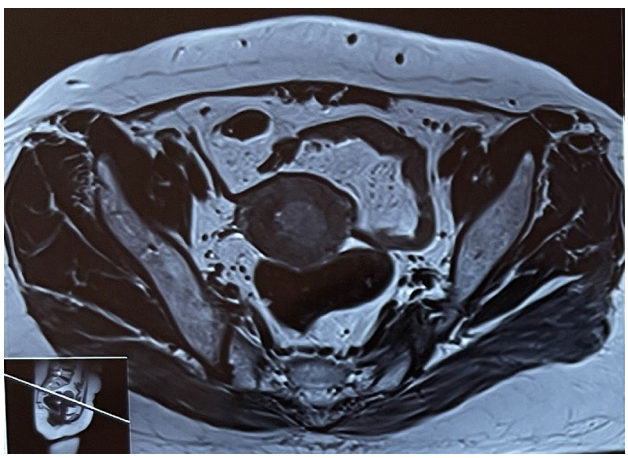

Fig. 3 Magnetic resonance imaging of the patient

Discussion

The ureteral duplication is a very uncommon anatomical variant. Autopsy investigations have revealed a prevalence of approximately 0.8% and 0.16–0.32% for unilateral and bilateral ureteral duplication, respectively (3). Unfortunately the conclusive data regarding incidence of duplicated ureter during pelvic surgery are lacking as only isolated case reports are available. Despite the rarity, its recognition and vigilance are essential to ensure successful surgical outcomes and to prevent potential complications.

Duplex collecting systems or anomalies related to the duplex kidney can be categorized into distinct groups based on the extent or lack of fusion (4). It can be a duplex kidney where two distinct pelvicalyceal systems drain from a single renal parenchyma. It can be a duplex collecting system with single ureter, bifid ureter or double ureter (complete duplication). Further it can be a bifid collecting system where the two individual pelvicalyceal collecting systems unite either at the PUJ or as bifid ureters.

Unilateral duplication is six times more common than bilateral duplication (5). Based on the anatomical configuration, ureteral duplications are classified into complete and incomplete types. Complete duplication occurs when two distinct ureteral buds arise from the same mesonephric duct and each ureter drains a separate pelvicalyceal system, leading to separate ureteral orifices draining into the bladder, while incomplete duplication involves the convergence of two ureters before entering the bladder. Clinically, individuals with a duplicated ureter might exhibit no symptoms or could experience manifestations such as hematuria, discomfort in the abdomen or flank region. Such cases may also have an increased likelihood of encountering issues like ureteral blockages, reflux between the duplicated ureters, and recurring urinary tract infections (6).

The incidental discovery of a double ureter during surgery, whether it is a gynecological procedure like a hysterectomy or other pelvic surgical intervention, underscores the importance of thorough knowledge of anatomy and meticulous dissection techniques. As a general rule, the abnormal organs are more liable to get injured as compared to the normal ones. Hence, the unexpected finding can significantly impact the surgical plan and necessitate modifications to ensure patient safety and optimal outcomes. The key to the safety here is careful ureterolysis under vision from the posterior leaf of the broad ligament for the entire course in the pelvis (7).

Recognizing a double ureter intraoperatively can pose challenges, especially if the surgeon is not familiar with this anatomical variation. In cases of complete duplication, identifying a second ipsilateral orifice or the branching point of a partially duplicated ureter is crucial to avoid iatrogenic injury and complications (8). Surgeons who are not aware of this possibility might inadvertently waste time trying to locate the ureter, potentially leading to disruptions in the surgical procedure.

It must be determined whether the duplication is associated with any functional abnormalities, reflux or obstruction. This evaluation involves assessing the condition of both ureters and the ipsilateral kidney, as well as the anatomical and functional characteristics of the bladder. The treatment approach may range from conservative management for asymptomatic cases to surgical interventions for cases with clinical implications (9).

The incidental diagnosis of a double ureter highlights the significance of preoperative imaging, such as computed tomography (CT) scans or magnetic resonance imaging (MRI). Proper preoperative assessment can provide crucial insights into the patient's unique anatomy, helping the surgical team anticipate potential variations and make informed decisions during the procedure. However, most of the time the anatomy is obscured due to the mass effect or imaging techniques may be suboptimal which makes the diagnosis difficult (8). In our case, we had done the MRI, but imaging could not identify the anomaly.

Conclusion

The incidental diagnosis of a double ureter during surgery emphasizes the importance of surgeon preparedness, anatomical awareness and preoperative imaging. This case report underscores the significance of a methodical strategy when identifying pertinent anatomy and landmarks, all while accounting for the diverse nature of the duplicated collecting system. It offers valuable insights into this congenital abnormality, not solely for surgeons specializing in pelvic surgeries, but also for radiologists whose involvement is essential within the multidisciplinary context of each case. By maintaining a high level of awareness and being proactive in addressing unexpected findings, surgical teams can navigate such cases effectively, ensuring patient safety and favorable outcomes. Surgeons should also consider the possibility of anatomical variants that are not recognized prior to surgery for safer outcomes.

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Declarations

Conflict of Interest None.

Research involving Human Participants and/or Animals None.

Informed Consent Not applicable.

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