

Laparoscopic Dismembered Pyeloplasty in PUJ Obstruction with Incidentally Detected Double Crossing Arteries: Expanded Technical Insights and Literature Review

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Abstract- Laparoscopic Dismembered Pyeloplasty is the gold standard for managing Pelvi-ureteric junction (PUJ) obstruction, offering minimal invasiveness and excellent functional outcomes. However, the presence of Aberrant crossing vessels poses technical challenges, requiring meticulous dissection and vascular preservation. This study presents a case of PUJ obstruction with incidentally detected Double crossing arteries managed via laparoscopic Dismembered Pyeloplasty. We provide expanded technical insights, including intraoperative strategies for vascular identification, Ureteral Repositioning, and anastomosis optimization to ensure long-term patency. Additionally, we review the existing literature on anatomical variations and their impact on surgical outcomes. This report aims to enhance the understanding of complex PUJ obstruction cases and refine laparoscopic techniques for improved patient care.

Keywords- Laparoscopy, Dismembered Pyeloplasty, Pelvi-ureteric Junction, Aberrant vessel, Ureteral Repositioning, Double crossing arteries

Introduction

Laparoscopic dismembered pyeloplasty, based on the Anderson-Hynes technique, has evolved into the standard treatment for Ureteropelvic junction (PUJ) obstruction.¹ It offers excellent functional outcomes, with success rates often exceeding 90%.

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In up to 40–60% of these cases, crossing vessels contribute to the etiology, while the presence of double crossing arteries—occurring in approximately 1–3% of patients—adds a layer of complexity that demands advanced laparoscopic skills.

Case Summary

27-year-old male presented with history of right flank pain off and on of few weeks duration. On evaluation Right congenital uretero-pelvic junction obstruction was diagnosed. He was planned for laparoscopic Dismembered pyeloplasty. After colon reflection a triangular patch of tissue was found covering the PUJ with apex pointing towards the lower pole of kidney. On careful dissection it was found to contain crossing vessel causing the obstruction. Yet another band of tissue was seen coursing at an angle to this. As the dissection progressed another large crossing vessel was found coursing towards the PUJ. Two vessels with different origin and supplying the lower pole are rare in occurrence. Both the vessels were transposed and the uretero-pelvic anastomosis done.

Preoperative Evaluation

A comprehensive preoperative assessment is critical. While the Diethylenetriaminepentaacetic acid (DTPA) diuretic renogram finds regular place in armamentarium of the urologists while diagnosing PUJ obstruction. Contrast-enhanced CT angiography is also essential and the imaging modality of choice, given its high sensitivity (over 90%) for detecting crossing vessels and mapping their course. This imaging guides the surgical strategy by delineating both the ureteropelvic anatomy and any aberrant vascular structures.³

Advanced Laparoscopic Techniques and Technical Nuances

Patient Positioning and Port Configuration

Technique: Patients are typically placed in a lateral decubitus position, optimizing exposure of the renal hilum. A four-port trans peritoneal setup is standard, although in cases with complex vascular anatomy, some surgeons prefer a retroperitoneal approach for direct control of the vessels. High degree of suspicion is must to notice the deviation from usual appearance e.g. in our case the obstructing band was triangular with broad base away from the lower pole of kidney was indication for further finer dissection before cutting and coagulating.

Technical Point: Adjust port placement dynamically if preoperative imaging suggests unusual vessel trajectories. In select cases, employing an additional working port can facilitate delicate maneuvers around double crossing arteries.

Intraoperative Identification of Vascular Anatomy

Technique: Early, meticulous dissection around the renal pelvis is essential. Laparoscopic magnification assists in identifying both the primary and any accessory crossing vessels.

Technical Point: Utilize intraoperative indocyanine green (ICG) fluorescence imaging to delineate the vascular supply in real time. This technique helps confirm the viability of the renal pelvis and avoids inadvertent injury to both the single and double-crossing arteries.

Additional Insight: Gentle blunt dissection around the adventitia minimizes trauma and reduces the risk of vasospasm. Use of fine-tip energy devices in a controlled manner can help achieve hemostasis without collateral thermal injury.

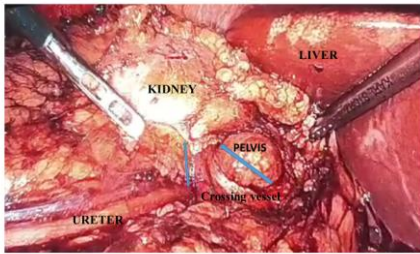


Figure 1

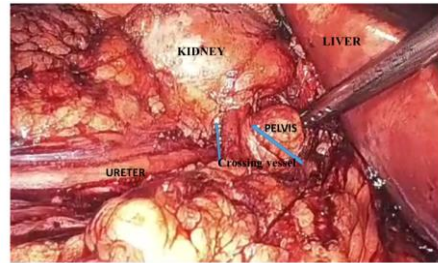


Figure 2

Laparoscopic view showing Double arteries crossing and causing PUJ Obstruction

Dismemberment and Excision of the Obstructed Segment

Technique: Once the aberrant vessels are identified and safeguarded, the fibrotic, obstructed segment of the PUJ is carefully excised. The ureter is then spatulated laterally to create a wide, tension-free anastomosis.

Technical Point: In the presence of double crossing arteries, it is crucial to extend the dismemberment adequately to remove all stenotic segments while preserving the integrity of the vascular supply. This might require additional mobilization of the ureter and renal pelvis to ensure an unobstructed anastomosis.

Anastomosis and Vascular Repositioning

Technique: A meticulous, tension-free anastomosis is achieved using fine, absorbable sutures—either via a continuous or interrupted technique based on intraoperative judgment.

Technical Point: Special care is taken when repositioning the double-crossing arteries. The vessels may need gentle retraction or, in some cases, transposition (akin to a vascular hitch) to prevent postoperative compression of the anastomosis. Barbed sutures have been utilized by

some centers to reduce operative time and ensure even tension distribution across the repair.

Additional Insight: Verify the patency of the anastomosis intraoperatively with diuretic tests or endoscopic evaluation, ensuring that the double vessels are not compromising urinary flow.

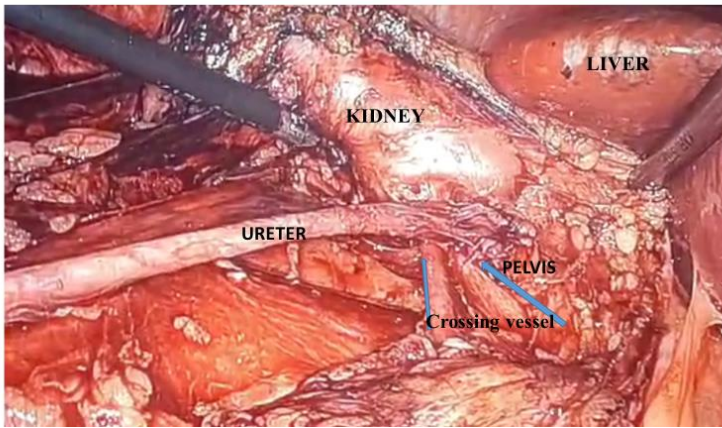


Figure 3 Repositioned Double-Crossing Arteries, and Ureter released

Instrumentation and Ergonomics

Technical Point: Laparoscopic instruments with enhanced articulation and 3D visualization can be particularly advantageous. The use of robotic assistance, when available, may further improve precision in dissection and suturing, especially in anatomically complex cases with double crossing vessels.

Additional Insight: Consider maintaining a low insufflation pressure during critical dissection phases to reduce the risk of venous congestion around the renal hilum, thereby enhancing both safety and clarity of the operative field.

Discussion

Laparoscopic pyeloplasty has revolutionized the management of PUJ obstruction.² Studies indicate that even in the presence of crossing vessels, excellent outcomes are achievable with proper technique. The incidental finding of double crossing arteries, though rare, necessitates heightened vigilance. Surgeons must adapt their standard technique by incorporating more extensive dissection, real-time vascular imaging³ and precise vessel management strategies.

Additional studies have reinforced the importance of advanced laparoscopic instrumentation and techniques. It was reported that use of barbed sutures for anastomosis had improved functional outcomes⁴, while other study highlighted the advantages of robotic assistance in complex vascular scenarios⁵.

Conclusion

Laparoscopic dismembered pyeloplasty continues to be the treatment of choice for PUJ obstruction, even when confronted with the rare challenge of double crossing arteries. By integrating advanced imaging modalities, meticulous laparoscopic techniques, and innovative instrumentation, urologists can achieve optimal outcomes. Continuous refinement of these techniques—guided by emerging literature—ensures that even the most complex anatomical variations are managed safely and effectively. Strong suspicion can be a guide to safe and complete dissection of the usual band at PUJ causing obstruction.

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Declaration of patient consent-

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given his consent for his images and other clinical information to be reported in the journal. The patient understand that name and initials will not be published and due efforts will be made to conceal identity, but anonymity cannot be guaranteed.

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