

A Novel Non-Dismembering Technique to Advance the Ureteral Insertion for Ureteropelvic Junction Obstruction Caused by High Ureteral Insertion: A Case Report

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1. Abstract

1.1. Background

For ureteropelvic junction obstruction (UPJO) due to high ureteral insertion (HUI), translocation of the ureteral insertion (UI) with dismembering of the ureteropelvic junction (UPJ) has been reported as an effective surgical option. We present a novel technique to advance the UI without UPJ dismembering for the surgical repair of UPJO caused by HUI.

1.2. Case Summary

A 5-year-old boy was indicated for surgical repair of left UPJO, with a renal pelvic anterior-posterior diameter of 43 mm. The patient underwent surgery via a left flank extraperitoneal approach. Intraoperatively, a HUI at the upper half of the renal pelvis caused kinking and obstruction of the UPJ. First, a transverse incision was made in the renal pelvis above the UPJ, and a catheter was inserted through this incision to assess the UPJ. After ruling out intrinsic UPJ obstruction, the opened pelvis was closed perpendicularly with running sutures. Next, a transverse wedge resection of the renal pelvis below the UPJ was performed, and the trimmed pelvis was closed horizontally using running sutures. As a result, the UI was advanced toward the lower pole of the pelvis into a dependent position without dismembering the UPJ. The operative time was 75 minutes. The patient recovered well and was discharged on postoperative day 7. At 36-month follow-up, he was asymptomatic. Ultrasound showed no pelvic dilatation, and renal scintigraphy demonstrated unobstructed drainage.

1.3. Conclusion

This novel technique of ureteral insertion advancement may be

a promising option for the surgical repair of UPJO due to high ureteral insertion.

2. Introduction

Ureteropelvic junction obstruction (UPJO) is a relatively common congenital anomaly in children, with an incidence of approximately 1 in 1,250 live births [1]. The etiology of UPJO are diverse and may involve one or a combination of factors, including intrinsic abnormalities of the ureteropelvic junction (UPJ), such as mucosal folds, ureteral stenosis, mucosal valves, or polyps, as well as extrinsic compression caused by crossing vessels, fibrous bands, or high ureteral insertion [1,2].

Surgical reconstruction of the ureteropelvic junction has been widely used for the treatment of this condition, and various techniques have been described. The most commonly applied approaches involve reconstruction of the UPJ after excision of the obstructed segment (dismembered pyeloplasty) or reconstruction without excision at the site of obstruction (non-dismembered pyeloplasty) [2]. However, these techniques can be technically demanding because they require the creation of a ureteropelvic anastomosis, which carries potential risks of post-operative complications such as urinary leakage and anastomotic stricture, potentially leading to recurrent UPJO [2–6].

In cases where high ureteral insertion (HUI) causes angulation of the ureter at the UPJ, resulting in urinary obstruction without associated intrinsic abnormalities, a less complex surgical option was introduced by Palmer [7]. This technique involves translocation of the ureteral insertion to correct the angulation and has been reported to yield favorable outcomes. Palmer's technique may reduce some complications associated with traditional UPJ

reconstruction; however, it still requires transection and re-anastomosis of a segment of the renal pelvis.

Here, we describe a novel non-dismembering technique to advance the ureteral insertion for the treatment of UPJO caused solely by high ureteral insertion, without the need for transection or ureteropelvic anastomosis.

3. Case Description

A 5-year-old boy was admitted with recurrent episodes of abdominal pain. Ultrasonography revealed marked dilatation of the left renal pelvis, with an antero-posterior diameter of 43 mm. Computed tomography demonstrated left ureteropelvic junction obstruction (UPJO) without ureteral dilatation (Figure 1). Renal scintigraphy showed that the left kidney contributed 43.6% of total renal function, with evidence of impaired urinary drainage. The patient was diagnosed with left UPJO and was indicated for surgical intervention.

The patient underwent surgery via a left flank extraperitoneal approach. Intraoperatively, after exposure of the renal pelvis and ureter, the left renal pelvis was found to be markedly dilated (30 × 50 mm). The ureter was inserted high into the upper half of the renal pelvis, resulting in kinking and obstruction at the uretero-pelvic junction, while the ureteral diameter at the junction was normal. The intraoperative diagnosis was UPJO caused by high

ureteral insertion without intrinsic ureteral narrowing.

A transverse incision approximately 2 cm in length was made on the renal pelvis above the ureteral insertion. A 6Fr feeding tube was inserted through the uretero-pelvic junction into the ureter to exclude any intraluminal obstruction. After that, the pelvic incision was closed longitudinally to advance the ureteral insertion to a lower position on the renal pelvis. The redundant dilated portion of the renal pelvis below the insertion site was excised in a transverse wedge fashion and closed along the same transverse axis (Figure 1) using running 5-0 PDS sutures. As a result, the UI was advanced inferiorly toward the lower pole of the pelvis into a dependent position without dismembering the UPJ, and the kinking at the junction was completely resolved.

A transrenal pelvic–ureteral external drainage tube was placed. No intraoperative complications occurred. The operative time was 75 minutes. Postoperatively, the patient recovered uneventfully. The drainage tube was removed on postoperative day 5, and the patient was discharged on postoperative day 7.

At 24-month follow-up, the patient remained asymptomatic and in good health. Ultrasonography demonstrated a renal pelvic anteroposterior diameter of 8 mm, with no ureteral dilatation. Follow-up scintigraphy showed improved left renal function, accounting for 48.2% of total renal function, with no evidence of urinary outflow obstruction.

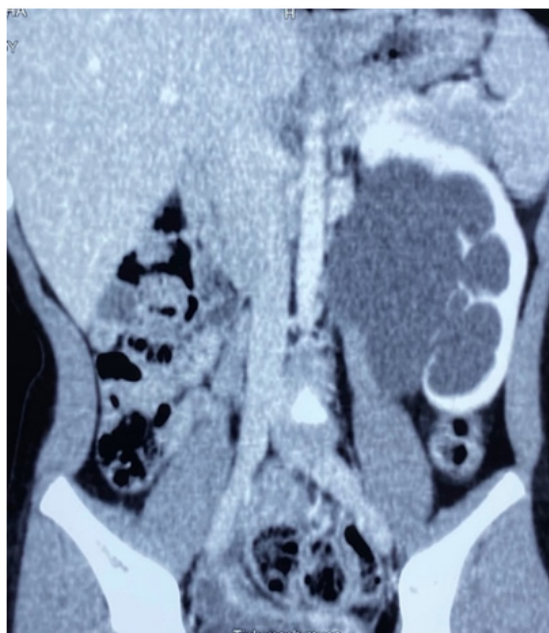


Figure 1: Computer tomography showed a dilated pelvis and calyces.

4. Discussion

The ideal surgical technique for ureteropelvic junction obstruction (UPJO) should address the underlying cause of the obstruction. In cases of UPJO caused by intrinsic abnormalities or narrowing of the ureteral lumen, reconstructive techniques targeting the obstructed ureteropelvic junction either dismembered or non-dismembered are considered optimal because they directly eliminate the obstructive pathology. Among these, the Anderson Hynes pyeloplasty remains the most widely used technique

[1–5]. This procedure involves excision of the stenotic uretero-pelvic junction followed by reanastomosis of the renal pelvis to the spatulated proximal ureter.

In UPJO caused by high ureteral insertion (HUI), which represents a distinct anatomical variant, the Anderson–Hynes technique can still be applied. However, several alternative surgical techniques specifically designed for this condition have also been reported with favourable outcomes, such as the non-dismembered Foley Y–V pyeloplasty and the dismembered V-flap pyeloplasty or its modifications [2,8,9].

A common feature of these techniques is that they involve reconstruction or anastomosis of the ureteral segment at the ureteropelvic junction. This anatomical structure is delicate and small in diameter, requiring meticulous surgical technique to avoid complications, particularly secondary UPJ stricture. Although these procedures generally achieve high success rates, postoperative complication rates have been reported to range from 3% to 22.2–30.5% for the Anderson–Hynes technique [2–5] and around 10% for non-dismembered pyeloplasty techniques [2,6]. High ureteral insertion may cause angulation of the ureter at the ureteropelvic junction and can represent a solitary cause of UPJO without associated intrinsic abnormalities. In such cases, correction of the angulation alone may be sufficient to relieve the obstruction and restore normal urinary drainage without the need for direct reconstruction or anastomosis involving the ureteral segment of the UPJ. Repositioning the ureteral insertion from a higher location to a more dependent position on the renal pelvis may effectively correct this angulation.

In 2005, Palmer described a technique for translocation of the ureteral insertion for the treatment of UPJO caused solely by high ureteral insertion [7]. In this technique, the funnel-shaped portion of the renal pelvis containing the ureteropelvic junction is transected from the renal pelvis as a renal pelvic cuff, without manipulation of the ureteropelvic junction itself. This pelvic cuff is then reimplanted at the most dependent portion of the lower renal pelvis (Figure 2) after closure of the original pelvic incision. With this approach, the ureteral insertion is repositioned to a lower anatomical location, thereby eliminating the ureteral angulation. The anastomosis between the detached pelvic cuff and the remaining renal pelvis at the new site is wide, and no anastomosis to the ureter is required; therefore, the risk of postoperative secondary stricture is considerably lower than when the anastomosis involves the ureter. Palmer applied this technique in 10 pediatric patients and reported favorable outcomes without complications [7].

However, despite being less complex than some traditional reconstructive techniques, Palmer's procedure still requires transection and re-anastomosis of the pelvic cuff, which may carry a risk of anastomotic complications such as urinary leakage or stricture.

In the present report, we describe a novel surgical technique that advances the ureteral insertion without transection or anastomosis of either the renal pelvis or the ureter. Similar to Palmer's approach, our technique aims to relocate the ureteral insertion to a more dependent position on the renal pelvis; however, it is technically simpler. The procedure involves a transverse incision

of the renal pelvis above the ureteropelvic junction followed by longitudinal closure, combined with a wedge resection of the renal pelvis below the ureteropelvic junction with subsequent transverse closure. These maneuvers advance the ureteral insertion to a more dependent position on the renal pelvis, thereby correcting the angulation at the ureteropelvic junction and relieving the obstruction.

In Palmer's technique, the renal pelvic cuff is relatively wide but receives its blood supply mainly from the intramural vessels of the relatively small ureter, which may pose a risk of ischemia at the anastomotic site and related complications. Furthermore, surgical techniques involving a circumferential (360°) anastomosis carry potential risks such as torsion or anastomotic stricture. Our technique avoids these issues and is technically simpler.

Compared with non-dismembered UPJ reconstruction techniques, our method also has the advantage of removing a substantial portion of the dilated renal pelvis, particularly at the lower pole. This reduction in pelvic redundancy may facilitate more efficient urinary drainage from the renal pelvis into the ureter.

In some cases, high ureteral insertion may not only cause angulation at the ureteropelvic junction but may also be associated with intrinsic narrowing of the ureteral lumen. Therefore, a crucial step in determining the indication for ureteral insertion advancement is to evaluate whether intrinsic obstruction is present at the UPJ. This assessment relies mainly on intraoperative findings. Similar to Palmer's approach [7], we observed intraoperatively that the ureteral diameter at the angulated segment was comparable to that of the distal ureter once the angulation had been released. A 6-Fr catheter was then passed easily across the ureteropelvic junction, thereby excluding intrinsic ureteral narrowing. The postoperative follow-up in the present case, together with the outcomes reported in Palmer's series, suggests that this approach is effective in excluding intrinsic ureteral obstruction and supports the concept that repositioning the ureteral insertion to a more dependent position on the renal pelvis—thereby correcting the angulation—may be sufficient to treat UPJO caused solely by high ureteral insertion.

Although this ureteral insertion advancement technique has so far been applied in only a single patient, it may represent a simple, feasible, and effective alternative for the treatment of UPJO caused solely by high ureteral insertion. In addition to open surgery, this approach may also be applicable to minimally invasive procedures, including laparoscopic or robotic surgery. Nevertheless, further studies involving a larger number of patients are required to confirm the safety and effectiveness of this technique.

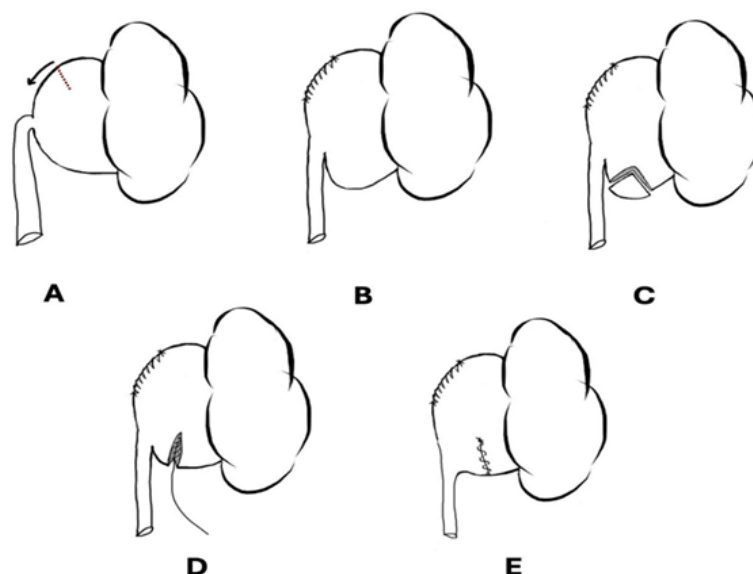


Figure 2: Technical key steps of non-dismembered advancement of ureteral insertion: (A): transverse incision of the pelvis above the ureteral insertion; (B): perpendicular closure of the incision by a running suture; (C): transverse wedge excision of the pelvis below the ureteral insertion; (D): transverse closure of this second incision by a running suture; (E): The final result: the ureteral insertion is advanced inferiorly toward the lower pole into a dependent position of the pelvis.

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