Nondismembered side-to-side pyeloureterostomy for uretropelvic junction obstruction in children: preliminary results

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Received: 02 August 2022
Revised: 23 August 2022
Accepted: 24 August 2022
Published: 05 April 2023

The Egyptian Journal of Surgery 2023, 41:1293–1297

Background
Anderson-Hynes pyeloplasty is considered preferable to nondismembered pyeloplasty either open or laparoscopic owing to its versatility and the funnel-shaped-dependent anastomosis done. The anastomosis during laparoscopic Anderson-Hynes pyeloplasty is technically demanding because it necessitates considerable skill in intracorporeal suturing with the risk of ureteral twisting. In an attempt to make the operation easier and less time consuming, some authors turned back to nondismembered procedures, reporting good therapeutic results.

Aim
The aim of our study was to assess the initial results of a nondismembered pyeloplasty in cases of ureteropelvic junction obstruction (UPJO) with dilated extrarenal pelvis either by open surgical or laparoscopic techniques with recording of any intraoperative difficulties or postoperative complications.

Patients and methods
This is a clinical trial conducted at Ain Shams University hospitals including patients with UPJO with dilated extrarenal pelvis who underwent open and laparoscopic pyeloplasty using side-to-side pyeloureteric anastomosis without reduction of renal pelvis in the period from March 2020 till March 2022.

Results
Overall, five patients were included in this study, where three of them were operated by open approach and two by laparoscopic approach. All of them showed marked reduction in renal pelvis antroposterior diameter, with improvement of differential function of the affected kidney on renal isotope scan in a follow-up period of 6 months to 1 year.

Conclusion
Nondismembered side-to-side pyeloplasty is a feasible technique for UPJO with dilated extrarenal pelvis, which has shown successful preliminary results in open and laparoscopic approaches.

Keywords:
nondismembered, pediatrics, pyeloplasty, ureteropelvic junction obstruction

Egyptian J Surgery 2023, 41:1293–1297

1110-1121

Introduction

Anderson-Hynes open pyeloplasty has traditionally been the gold standard for the treatment of patients with ureteropelvic junction obstruction (UPJO). Although open pyeloplasty has demonstrated success rates of more than 90% in children, numerous minimally invasive treatments have gained popularity [1,2].

Although Anderson-Hynes pyeloplasty is considered preferable to nondismembered pyeloplasty either open or laparoscopic due to its versatility and the funnel-shaped-dependent anastomosis done, the anastomosis during laparoscopic Anderson-Hynes pyeloplasty is technically demanding because it necessitates considerable skill in intracorporeal suturing with the risk of ureteral twisting. In an attempt to make the operation easier and less time consuming, some authors turned back to nondismembered procedures, reporting good therapeutic results [3,4].

In 2008, Mesrobian described a nondismembered bypass pyeloplasty carrying the benefit of proper alignment and continuity of the renal pelvis and proximal ureter during the procedure which is supposed to reduce intraoperative time and make it an easier procedure, especially for highly inserted ureters and patients with dilated sagging extrarenal pelvis with promising initial results encouraging its trial in laparoscopic procedures to reduce needed skills and operative time to perform laparoscopic pyeloplasty [5].

The aim of our study was to assess the initial results of a nondismembered pyeloplasty in cases of UPJO with dilated extrarenal pelvis either by open surgical or laparoscopic techniques with recording of any intraoperative difficulties or postoperative complications.

Patients and methods

We conducted a pilot study over a period of 2 years from March 2020 till March 2022. At first, three patients underwent open approach for nondismembered side-to-side pyeloureterostomy, and the initial promising postoperative results encouraged doing it laparoscopically, so we further added four patients for laparoscopic pyeloplasty with UPJO presenting to our center.

Indications for surgery were ultrasonography showing progressive increase of antroposterior (AP) diameter of renal pelvis with dilated extrarenal pelvis, Diethylenetriamine pentaacetate (DTPA) renal scan showing differential renal function less than 40% on the affected side, or symptomatic UPJO with palpable renal pelvis or pain.

Patient with UPJO on single functioning kidney, recurrent cases, anatomical abnormality (pelvic kidney, horseshoe kidney, duplex systems), associated kidney stones, and ureteric abnormalities were excluded from the study.

Approval of the ethical committee and written informed consent from all participants were obtained.

Operative procedure

All patients underwent cystoscopy with ascending cystourethrography to assess distal ureter before starting the procedure. The guide wire of the double-J catheter was kept inside the ureter in laparoscopically operated patients to facilitate catheter introduction later in the procedure.

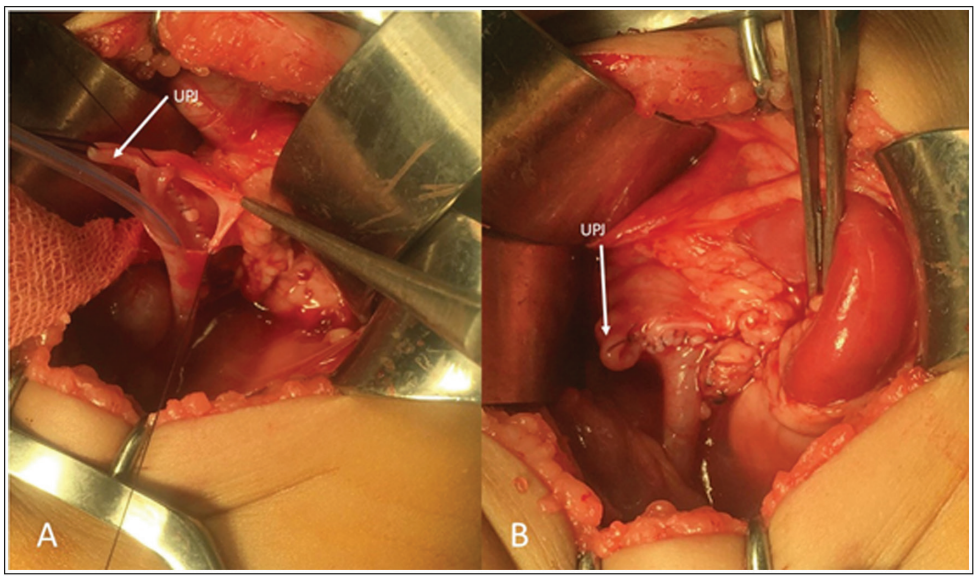
Open surgical approach

The pelvi ureteric junction (PUJ) was approached through anterior extraperitoneal incision. After exposure of the renal pelvis and upper ureter, a medial incision of the renal pelvis was done at the dependent point where the ureter should be placed. The ureter is incised on its lateral aspect opposite the incision of the renal pelvis. The anastomosis is started at the vertex of the incised ureter to the most dependent part of the pelvis using 5/0 vicryl sutures. Continuous running suturing till completion of the posterior wall of the ureteropelvic anastomosis was done. Then, the double-J catheter was inserted and passed into the bladder. The anterior wall of the anastmosis was then completed by continuous sutures. Perianastomotic drain was left in place (Fig. 1).

Laparoscopic approach

The PUJ was explored via transperitoneal laparoscopic approach. The patient is placed at the edge of the table in supine position with 30° elevation of the affected side. Access is obtained with open placement of a 5-mm umbilical port and two instruments (3–5 mm) are placed, one in the midepigastrium and the other in the lower abdomen in the midclavicular line ipsilateral to the affected kidney. For left-sided procedures, the UPJ was accessed via a transmesocolic approach.

Figure 1



Patient with left UPJO. Intraoperative findings of open approach for side-to-side pyeloureterostomy. (a) Completed posterior wall of the anastomosis, (b) full anastomosis completed with preservation of the UPJ. UPJO, ureteropelvic junction obstruction.

Like the open technique, the renal pelvis is mobilized from surrounding tissue. A loop of prolene sutures (hitch stitch) was placed at the pelviureteric junction percutaneously to stretch the PUJ and subsequently the renal pelvis and the ureter. A 2-cm Incision of the renal pelvis was done at the most dependent part medially, and the opposite part of the ureter below PUJ is also incised with the same length. Anastomosis started at the cephalic side of the two incisions and the posterior wall anastomosis was fashioned using running 5/0 vicryl sutures till the caudal end. Double-J catheter is introduced over the guide wire at this point and then the anterior wall anastomosis was continued using the same running suture (Figs 2 and 3).

Operative time was recorded in all surgical procedures. Postoperatively the following data were collected: total hospital stay, start of oral feeding, anastomotic leakage, and timing of perinephric drain removal.

Short-term follow-up of patients included pelviabdominal ultrasound after 1, 3, and 6 months and DTPA scan after 6 months.

Results

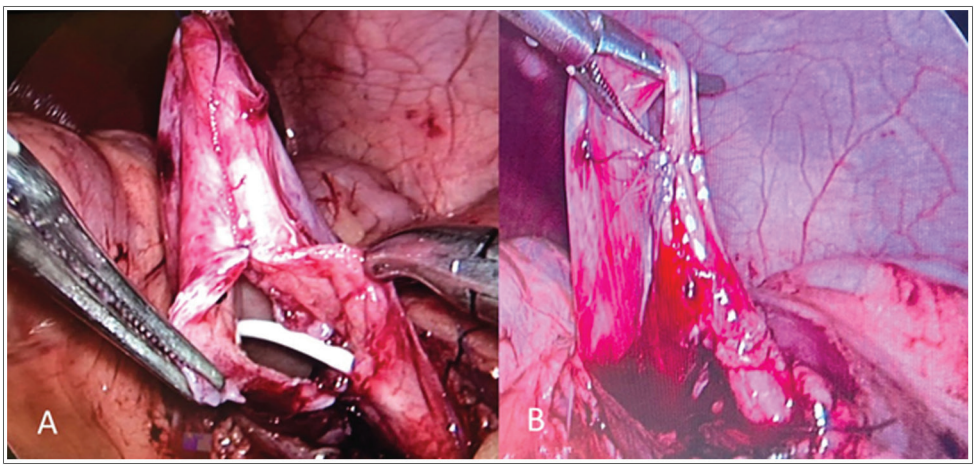
From March 2020 till March 2022, we have performed this procedure in five patients who were candidates for pyeloplasty: three of them underwent open surgery and two underwent laparoscopic intervention. Another two patients were converted to a standard Anderson-Hynes pyeloplasty (one of them revealed an aberrant lower pole vessel and the other showed a dilated intrarenal pelvis during laparoscopy that could not be done by our technique). These patients comprised three males and two females, all having UPJO on the left side. One of them was operated for a right UPJO 1 year ago. The age of these five patients at surgery ranged between 4 months and 3 years old. Regarding the intraoperative time for open surgery, one case lasted for 80 min, another one lasted for 90 min, and the third one lasted 120 min, and this was the patient who presented with palpable abdominal cyst. As for the laparoscopic technique intraoperative time, it was 135 and 120 min in both operations.

All patients were discharged home within 2 days postoperatively without postoperative complications. The perinephric drain was removed 24 h after the

Figure 2

A 2-year-old female patient. Demonstration of laparoscopic port sites.

Figure 3



Patient with left UPJO underwent laparoscopic side-to-side pyeloureterostomy. (a) Double-J catheter was inserted after completion of the posterior wall of the anastomosis, (b) After completion of the anastomosis with preservation of UPJ. UPJO, ureteropelvic junction obstruction.

Figure 4

IVP done 3 months postoperatively for the first operated case (by open approach), showing free passage of the contrast through the left ureter into the urinary bladder.

surgery. Postoperative analgesia included intravenous paracetamol for the first 48 h after surgery. Double-J stent was removed 4 weeks following the surgery.

Intravenous pyelography was done for the first operated case by open approach 3 months postoperatively, which showed free passage of the contrast through the left ureter into the bladder (Fig. 4).

Follow-up ranged between 6 months and 1 year. The AP diameter of the repaired renal pelvis decreased by a mean of 62% in open surgery and 40% in laparoscopic surgery during the follow-up period. DTPA renography after 6 months improved by a mean of 25% in our patients; one of the laparoscopically operated patients showed stationary differential renal function.

Discussion

Anderson-Hynes dismembered pyeloplasty is considered a gold standard procedure for UPJO in both open and laparoscopic approaches. The evolution of both instruments and video equipment has made the laparoscopic approach widely accepted, and it has become the method of choice at many centers [1,6–9]. However, when we performed laparoscopic Anderson-Hynes dismembered pyeloplasty, we sometimes experienced difficulty with spatulation and anastomosis of the dependent portion after dividing the ureter and renal pelvis.

We present an initial series of patients with UPJO with dilated extrarenal pelvis who were successfully corrected by nondismembered side-to-side pyeloureterostomy (bypass procedure) without reduction of the renal pelvis.

This technique involves doing an anastomosis between the lateral side of the ureter and the medial most dependent part of the renal pelvis bypassing the UPJO in cases with high ureteral insertion and sagging extrarenal pelvis. Our rationale was to introduce a more simple technique that can be used in selected cases with dilated extrarenal pelvis to overcome some difficulties encountered in the standard Anderson-Hynes pyeloplasty, which can be further used in laparoscopic pyeloplasty adding advantages from nondismembered pyeloplasty including a dependent tension-free anastomosis with preservation of ureteropelvic alignment and reduction in the difficulty of intracorporeal knotting.

Our study included five patients: three patients were done by open approach initially followed by two patients done by laparoscopic approach with a short period of follow-up. Another two patients were converted to Anderson-Hynes technique, where one of them had an intrarenal pelvis in which the ureter could not be aligned to the dependent portion of renal pelvis and the other had an aberrant lower polar vessel.

In our study, the three patients operated by open surgery showed a mean decrease of AP diameters by 62% over a period of 6-month follow-up (range, 60–66%), which was more than that reported by Mesrobian [5] (mean decrease of 55% ranging from 28 to 95%).

In the same study, they reported a return to normal MAG3 renal scan after the operation in two patients. We reported here a rise in the differential renal function in DTPA renal scan of the three cases but without return to normal.

In 2015, Haga and colleagues performed a modified bypass pyeloplasty where they did a dismembering of the UPJ junction after suturing the dependent angles to facilitate the suturing of the ureter and pelvis sides far from the laparoscopic camera. Our laparoscopically operated patients showed reduction in the renal pelvis AP diameters after 6-month follow-up with stationary differential renal functions in DTPA renal scan of a single patient, which was similar to what Haga and colleagues reported in their study, where reduction

in renal pelvis diameters was not associated with significant early improvement in renal functions on DTPA, and it was not considered a failure.

The mean operative time recorded in their study was 205 min (range, 145–311 min), including the time needed for the hitch stitch for the renal pelvis and placement of the double-J catheter. There was no significant correlation between age and operative time in their study [4].

Our intraoperative time was recorded for laparoscopic and open approach. The intraoperative time for open surgery ranged from 80 to 120 min, and for the laparoscopic surgery, one case endured 135 min and the other 120 min, which was less time consumed in comparison with early experience laparoscopic pyeloplasty by the Anderson-Hynes technique. The mean operative time in the study of Van der Toorn *et al.* [10] was 177 min. Kojima *et al.* [11] operated on 13 U with a mean operative time of 275 min. During transitioning from open to laparoscopic pyeloplasty, the mean operative time recorded by Herndon *et al.* [12] was about 387 min.Postoperative hospital stay for our patients did not exceed 2 days either for open or laparoscopic approaches, whereas hospital stay did not exceed 3 days for all of the seven patients in the study by Mesrobian [5], where all were operated by open surgery.

One of the difficulties that we faced in this technique during laparoscopic surgery was the suturing of the side of anastomosis far from the camera, and although we did not practice dismembering the UPJ junction after suturing of the dependent angles, we can explore this later on to facilitate this step.

We still think that Anderson-Hynes pyeloplasty is the gold standard technique for repair of UPJO either by open or laparoscopic approaches. The promising preliminary results of this study add an alternative valid technique to be used in selection of cases as aforementioned and also in re-do surgeries, where dissection of areas of previous pyeloureteral anastomosis is difficult.

Our limitations were a short follow-up period with a limited number of cases owing to the COVID-19 pandemic restrictions. Further bigger population and longer follow-up periods are needed to give a better view of an initially promising procedure for highly selected group of patients.

Conclusion

Nondismembered side-to-side pyeloplasty is a feasible technique for UPJO with dilated extrarenal pelvis, which has shown successful preliminary results in open and laparoscopic approaches.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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