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Does the surgical approach change the need for a retrograde pyelogram prior to pyeloplasty?

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Abstract *Objective:* The opinion on the use of retrograde ureteropyelography (RUPG) prior to routine pyeloplasty for an ureteropelvic (UPJ) obstruction has been divided. This study analyses the efficacy of a preoperative RUPG and determines if a dorsal lumbotomy (DL) approach offers any advantage in this situation.

Methods: This is a retrospective analysis of application of RUPG prior to pyeloplasty in children with ages ranging from 42 days to 16.2 years who underwent surgery at the Children's Hospital at Westmead between 2009 and 2013.

Results: We identified a total of 95 children with isolated UPJ obstruction, with 59 (62.1%) boys and 36 (37.8%) girls. Overall, open pyeloplasties were performed in 89 (42 DL: 47 loin incision) and the rest ($n = 6$) laparoscopically. Preoperative RUPG was performed in 58 (61%) and it provided additional information in 11 (18.9%) patients for whom the surgical approach was modified. Hospital stay, operative time, and time to full diet were shorter with the DL approach ($p < 0.05$).

Conclusions: The current study suggests that RUPG is avoidable if the approach for pyeloplasty is through the conventional loin incision. The short-term advantages might rationalize the use of RUPG if a DL incision is employed.

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Introduction

Ureteropelvic junction (UPJ) obstruction is a condition where the flow of urine from the renal pelvis to the proximal ureter is obstructed. A gamut of surgical treatments for this condition today includes laparoscopic or open pyeloplasty, endopyelotomy, endopyeloplasty, and robot-assisted laparoscopic pyeloplasty [1]. The time-honored gold standard treatment for UPJ obstruction is conventional open pyeloplasty. Prior studies have demonstrated its success rates exceeding 90% [2]. Some surgeons believe that ultrasound and diuretic renal scintigraphy are adequate preoperative investigations for UPJ obstruction and a routine retrograde ureteropyelography (RUPG) is not necessary for a successful open pyeloplasty, especially when the approach is via the loin incision [3]. Dorsal lumbotomy (DL) incision is an alternative approach for pyeloplasty but may provide suboptimal exposure when the anatomy is abnormal. As it provides good exposure to the UPJ but not the distal ureter, some surgeons image the ureter immediately before pyeloplasty to ensure the anatomy is appropriate for this approach. Consequently, RUPG at the time of surgery is considered optional and its use remains controversial [4].

The aim of this study was to assess the importance of routine RUPG prior to the pyeloplasty for straightforward UPJ obstruction. In addition, we have also reflected on the advantages and disadvantages of a DL approach.

Materials and methods

Patients and study groups

All patients who underwent Anderson–Hynes dismembered pyeloplasty for presumed UPJ obstruction at The Children’s Hospital at Westmead between January 2009 and July 2013 were identified and charts were reviewed. Hospital ethics committee approval was obtained for this retrospective study. The patients who were suspected preoperatively to have pathologies other than clear-cut intrinsic UPJ obstruction on ultrasound, diuretic renogram (MAG3), and voiding cystoureterography (VCUG) were excluded from analyses. Additionally, if the position and orientation of the kidneys were abnormal on these modalities and/or if VCUG demonstrated reflux and/or if the patient previously had renal surgery, they were excluded. In all cases obstruction was diagnosed preoperatively based on the presence of pelvic dilatation without ureteral dilatation, appearance on the ultrasound, and/or prolonged pelvic drainage on MAG3. No other imaging studies were obtained in any of these patients. All surgeries were performed by four pediatric urologists at the hospital. The open pyeloplasties were performed via loin or a DL incision in a retroperitoneal manner by means of the typical Anderson–Hynes technique (diamond-shaped anastomosis). All patients had a post-operative JJ stent. The laparoscopic pyeloplasties were performed transperitoneally using three 3–5 mm ports. The choice of laparoscopic as opposed to open surgery was made according to the surgeon’s and parent’s preference. The decision to perform a RUPG was variable between surgeons as seen in most other institutions. Only one

surgeon used the RUPG routinely before all pyeloplasties via the DL approach while another did not perform RUPG as he favored the loin approach for all patients. The other urologist had employed it previously but has stopped using it as he has now started using laparoscopy.

Patient demographics and data recorded included patient age at diagnosis and surgery, results of preoperative imaging, preoperative RUPG, surgical approach including modifications, time taken for RUPG/pyeloplasty, time taken to full diet, and duration of hospital stay. The standard approach to the kidney was through the loin. However, the DL approach was used if the RUPG confirmed an isolated UPJ obstruction and the anatomy deemed suitable. The most important indication of RUPG was to confirm the normal location of the renal pelvis and the site of obstruction allowing an easy access via the DL incision. All patients who underwent the RUPG prior to pyeloplasty underwent the procedures under the same general anesthesia. A modification was defined as any change in the approach which is normally followed by the particular surgeon (with loin approach being the standard) directly as a result of the RUPG finding. Although this study includes the experience of multiple pediatric urologists, the basic surgical technique was similar.

All data are presented as mean/SD (median/range) based on normality of data. To test for the efficacy of RUPG compared with the standard pyeloplasty, data were analyzed using SPSS. Statistical analysis was performed using Mann–Whitney *U* test with $p < 0.05$ considered significant.

RUPG technique

Under anesthesia and in a dorsal lithotomy position, a cystoscopy was performed. The ureteric orifice was identified and cannulated using a 3–4F ureteric open-ended or cone-tipped catheter. Prior to cannulating the ureteral orifice, the ureteral catheter was flushed. At this point, screening films were taken to ensure correct placement of the catheter. About 5–10 mL of the contrast (Ultravist 240) was injected and images were taken at the same time (less than 1 min screening and 3 or 4 images on average). One milliliter of methylene blue was injected into the bladder (for backflow to check position of the JJ stent) and an 8–10F indwelling Foley catheter was left in situ at the end of the study.

Results

A total of 95 patients underwent pyeloplasty among whom 59 (62.1%) were boys and 36 (37.8%) girls. In total we had 95 renal units (one of them was bilateral, but operated on one side). The median age was 31 months with a range of 42 days to 16.2 years. In 68.4% ($n = 65$) of the sample the obstruction was on the left side and in 31.6% ($n = 30$) on the right side. Preoperatively split differential renal function was equal or almost equal (45–55%) in 44 (46.3%) patients. Greater than 55% function was seen in four (4.2%) patients while 41 (43.1%) had a function between 20% and 45%. Six patients (6.3%) had poorly functioning kidneys (<20%). An open pyeloplasty was done in 89 (93.6%)

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