

Equivocal Ureteropelvic Junction Obstruction on Diuretic Renogram—Should Minimally Invasive Pyeloplasty be Offered to Symptomatic Patients?

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Abbreviations and Acronyms

C-LESS = conventional LESS
DJ = Double-J®
DRG = diuretic renogram
EqUPJO = equivocal UPJO
LESS = laparoendoscopic single site
MIP = minimally invasive pyeloplasty
R-LESS = robotic LESS
T1/2 = half-life
UPJO = ureteropelvic junction obstruction

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Purpose: Equivocal ureteropelvic junction obstruction refers to clinical symptoms and/or other radiological suggestions of possible ureteropelvic junction obstruction but with inconclusive results of obstruction on diuretic renogram. We evaluated long-term outcomes in patients with equivocal ureteropelvic junction obstruction treated with minimally invasive pyeloplasty.

Materials and Methods: We retrospectively analyzed the records of 125 consecutive patients who underwent minimally invasive pyeloplasty as performed by a single surgeon from May 2004 to July 2013. Of 98 patients with followup those with more than 6-month followup were included in analysis. Equivocal ureteropelvic junction obstruction, defined as half-life less than 20 minutes on diuretic renogram, was identified in 23 patients. All patients underwent transperitoneal minimally invasive pyeloplasty. We evaluated patient demographics, preoperative and postoperative symptoms and renal function.

Results: The 16 female and 7 male patients with equivocal ureteropelvic junction obstruction had flank pain and associated hydronephrosis on imaging. At a median followup of 20.2 months (range 7 to 75) 95.7% of patients with equivocal obstruction achieved complete symptom resolution. Mean \pm SD preoperative and postoperative half-life was 14.1 ± 3.7 and 7.4 ± 4.2 minutes, respectively, for an improvement of 6.7 minutes ($p < 0.001$). In 1 patient (4.3%) with equivocal obstruction of a complicated iatrogenic etiology treatment ultimately failed postoperatively and endopyelotomy was required. There was no statistically significant difference in clinical or radiological success between the equivocal obstruction group and the 75 patients treated with minimally invasive pyeloplasty for definitive ureteropelvic junction obstruction ($p = 0.44$ and 0.07 , respectively).

Conclusions: In patients with radiographic equivocal ureteropelvic junction obstruction and flank pain minimally invasive pyeloplasty efficaciously provides symptomatic relief and functional preservation. Results are comparable to those in patients with high grade obstruction.

Key Words: kidney; ureteral obstruction; surgical procedures, minimally invasive; laparoscopy; robotics

THE severity of UPJO is quantitatively assessed by measuring clearance curves on DRG with T1/2 less

than 10 minutes considered normal, greater than 20 minutes considered obstructed, and between 10 and 20

minutes considered equivocal.¹ EqUPJO refers to when patients are clinically symptomatic with hydronephrosis on imaging but have inconclusive DRG findings. In clinical practice the number of patients with EqUPJO is not insignificant and yet currently there is no consensus in regard to a management algorithm that includes operative intervention. Current options are similar to confirmed high grade obstruction on DRG and include observation, ureteral stent placement and surgical treatment via pyeloplasty or endopyelotomy. However, most clinicians are initially reticent to intervene surgically in these patients questioning the degree of pain relative to the radiographic findings.

The success rate of MIP for definitive UPJO is greater than 90%.²⁻⁵ However, currently the MIP success rates for EqUPJO are unknown. We investigated the MIP outcome in patients with EqUPJO and compared it to that in patients treated for definitive UPJO.

MATERIALS AND METHODS

After obtaining institutional review board approval we retrospectively reviewed our MIP database of 161 cases from May 2004 to July 2013. MIP included transperitoneal C-LESS and R-LESS techniques performed by a single surgeon. A total of 36 patients who did not undergo preoperative and/or postoperative renal scan or followup and 27 with 6 months or less of followup were excluded from study. All renal scans were performed between 3 and 4 weeks after stent or nephrostomy tube removal. EqUPJO was defined as T1/2 less than 20 minutes on DRG accompanied by symptoms and hydronephrosis. Symptoms included pain or Dietl crisis with or without associated nausea or vomiting. We identified 17 and 6 patients with right and left EqUPJO, respectively.

We reviewed the medical records, including clinic and hospital notes, hospital discharge summaries, emergency room visits, laboratory data and radiographic studies. Demographic information, including gender, age, body mass index and ASA® score, were recorded. Patient charts were analyzed to identify complications, which were graded according to the modified Clavien classification.⁶

Surgical Technique

A transperitoneal approach was used in all cases, including a combination of C-LESS, LESS and R-LESS pyeloplasty (table 1). We primarily used the Anderson-Hynes dismembered pyeloplasty technique, similar to that in the literature.^{7,8} All patients underwent retrograde or antegrade pyelogram preoperatively or intraoperatively to reveal ureteropelvic junction anatomy. Dismembered pyeloplasty was performed with crossing vessel transposition as indicated and renal pelvis reduction as needed. Absorbable suture (3-zero or 4-zero) was used for the anastomosis and an indwelling stent was placed.

Followup and Success Definition

DJ stents were removed 4 to 5 weeks postoperatively. Routine DRG was performed approximately 6 to 8 weeks after stent removal, at 6 months and annually thereafter. Clinical success was defined as resolution of preoperative symptoms and/or T1/2 improvement on DRG to less than 20 minutes.

Statistical Methods

We evaluated categorical outcomes using the chi-square or Fisher exact test as appropriate. Differences between patients treated with MIP for definitive UPJO vs EqUPJO were compared using the Student 2-tailed t-test for normally distributed continuous variables and the Mann-Whitney U test for variables with a skewed distribution. Preoperative and postoperative median split renal function and T1/2 were compared within the groups using the paired sample test. The proportion of patients with symptoms preoperatively vs postoperatively was evaluated by the McNemar test. Statistical significance was considered at $p < 0.05$ for all tests. Analysis was done with SPSS®, version 19.

RESULTS

At our institution 98 patients were treated with MIP, including the conventional technique in 53, C-LESS pyeloplasty in 27 and R-LESS pyeloplasty in 18, between May 2004 and July 2013. Of the patients 23 (23.5%) had EqUPJO and 75 (76.5%) had definitive UPJO. All 23 patients had ipsilateral flank pain and associated hydronephrosis on imaging. Demographic characteristics and clinical features were largely similar in patients with EqUPJO and those with definitive UPJO (table 1). The incidence of preoperative hematuria was higher in patients with EqUPJO than in those with definitive UPJO (2.7% vs 13%, $p < 0.05$). Laterality also differed between the groups with EqUPJO more commonly observed on the right than on the left side.

Table 1 lists perioperative and postoperative outcomes in patients with EqUPJO and definitive UPJO. No intraoperative complication occurred and no case was converted to open surgery. Median followup was 20.2 months (range 7 to 75) in patients with EqUPJO and 18 months (range 7 to 80) in patients with definitive UPJO ($p = 0.25$). Clavien III complications developed in 4 of 23 patients (17.4%) with EqUPJO, comparable to the rate in patients with definitive UPJO (table 1). Two patients had urine leaks and symptomatic obstruction developed in 2. All cases were managed conservatively by prompt nephrostomy tube placement and none required further intervention during the postoperative period. No statistically significant difference was observed in the radiological failure rate (T1/2 of 20 minutes or greater) between the EqUPJO and definitive UPJO groups (0% vs 13.3%, $p = 0.07$).

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