Clinical Characteristics and Surgical Treatment of Ureteral Endometriosis: Our Experience with 40 Cases

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Abstract

Background: To present the experience of surgical management of ureteral endometriosis (UE) in our single center.

Methods: A retrospective analysis of 40 cases of UE who had intraoperative surgical findings of endometriosis involving the ureter and pathology-proven UE.

Results: Forty patients (median age, 42.5 years) with histologic evidence of UE were included. Six (15%) patients had history of endometriosis. Twenty-one (52%) patients had urological symptoms and 19 (48%) patients were asymptomatic. All patients had hydronephrosis. The mean glomerular filtration rate of the affected-side kidney was significantly worse than the healthy-side one (23.4 vs 54.9 ml/min; $P < 0.001$). Twelve (30%) patients were treated with ureteroureterostomy (11 open approaches and 1 robotic approach). Twenty-two (55%) patients underwent ureteroneocystostomy (17 open approaches, 4 laparoscopic approaches and 1 robotic approach). Five patients underwent nephroureterectomy. One patient refused the aggressive surgery and received ureteroscopic biopsy and ureteral stent placement. Thirteen (33%) cases were required gynecological operations. Three (8%) patients in open group suffered from major surgical complications. Nine (24%) patients received postoperative endocrine therapy. Twenty-eight (70%) patients were followed up (median follow-up time, 71 months). The success rate was 25/28 (89%).

Conclusions: Although UE is rare, early diagnosis and treatment of UE will help reduce the morbidity of this disease. Most of time, A multidisciplinary team is necessary. For the patients with severe UE, segmentally ureteral resection with UU or ureteroneocystostomy may be a good choice.

Background

Endometriosis is a common gynecologic disorder in women of childbearing age, with the prevalence of 10%-20% for general female population.¹ The involvement of the urinary tract by endometriosis is defined as urinary tract endometriosis (UTE). The prevalence of UTE is difficult to be determined because about 50% of women with endometriosis may be asymptomatic.² The literature reported the incidence of UTE ranges from 0.3%-12% of all women affected by endometriosis.³

The ureteral endometriosis (UE) is a relatively rare situation which is the second most common type of UTE followed bladder endometriosis.⁴ UE is usually unilateral and the distal ureter is the most commonly affected site. Symptoms related to UE are often nonspecific and clinical presentation is usually asymptomatic.⁵ Most of time, UE is diagnosed incidentally at a gynecologic follow-up or annual health examination. However, the late diagnosis and treatment of UE might lead to the silent loss of renal function.

The goals of treatment for UE are to relieve ureteral obstruction and protect renal function. The management depends on the site and extend of UE. The aim of this retrospective study is to summary

our experience and provide more information on UE.

Methods

We performed a search of our surgical database and urological pathology database from May 2004 to May 2020 for cases of UE. All patients had pathology-proven ureteral endometriosis and intraoperative surgical findings of endometriosis involving the ureter. We collected the clinical and surgical data of all cases. We followed up the patients who we could contact with.

Traditionally, the ureteroneocystostomy and the ureteroureterostomy (UU) were performed by open approach. In recent years, some cases were performed by laparoscopic or robotic approaches in our center. We defined the criteria of success as the relief of the symptoms and hydronephrosis. Any unresolved symptoms about hydronephrosis or deterioration of hydronephrosis would be considered as failure. Statistical analysis was performed with Microsoft® Excel® 2019 for Windows. Two samples were compared using t tests. P value < 0.05 was considered to be statistically significant.

Results

Forty-two cases were found from surgical database. Two cases without pathological examination were excluded. A total of 40 patients with histologic evidence of UE were finally included. The median age was 42.5 (range, 27–72) years. Six (15%) patients had history of endometriosis. One patient had received hormonal therapy before surgery and one patient had previously surgical history for endometriosis. Of these 40 patients, 4 (10%) had dysmenorrhea, 12 (30%) had flank pain, 1 (3%) had abdominal pain, 3 (8%) had hematuria, 1 (3%) had frequent urination and 19 (48%) had no symptom (Table 1). Twenty patients were involved left ureter and 20 patients were involved right ureter. All patients had hydronephrosis. With the data of glomerular filtration rate from 24 (60%) patients who had received renal dynamic scan examination preoperatively. The mean GRF of affected-side kidney was 23.4 ml/min and healthy-side kidney was 54.9 ml/min ($P < 0.001$).

Table 1
Patients' characteristics and preoperative findings

Total number of patients	40
The median age (years, range)	42.5 (27–72)
History of endometriosis	No. Pts (%)
Previous hormonal therapy	6 (15%)
Previous surgery for endometriosis	1 (3%)
	1 (3%)
History of abortion	4 (10%)
History of cesarean section	8 (20%)
History of ovarian cystectomy	5 (13%)
Concomitant myoma of uterus	8 (20%)
History of hysterectomy	2 (5%)
History of ectopic pregnancy	3 (8%)
Presenting symptoms	4 (10%)
Dysmenorrhea	12 (30%)
Flank pain	1 (3%)
Abdominal pain	3 (8%)
Hematuria	1 (3%)
Frequent urination	19 (48%)
Asymptomatic	
Ureteral involvement	20 (50%)
Left	20 (50%)
Right	
Mean GFR under renal dynamic scan (ml/min), No. Pts (%)	24 (60%)
Affected-side kidney (range)	23.4 (0–51)
Healthy-side kidney (range)	54.9 (39–77)

Twelve (30%) patients were treated with UU. Of these 12 patients, 11 received open approach and 1 received robotic approach (Fig. 1). Of 22 (55%) patients who underwent ureteroneocystostomy, 17 (43%) received open surgery, 4 (10%) received laparoscopic surgery and 1 (3%) received robotic surgery

(Table 2). Sometimes, ureteral reimplantation might be performed concomitant with psoas hitch (Fig. 2). Among 5 (13%) patients, 2 patients were more likely to be considered as ureteral tumor preoperatively and 3 patients were diagnosed with a nonfunctioning affected-side kidney. So, these 5 patients underwent nephroureterectomy. One patient refused to undergo the aggressive surgery and finally received ureteroscopic biopsy and ureteral stent placement. There were 13 (33%) cases who required gynecological operations. The mean operative time was 152.4 min. The mean post-operative hospitalization was 6.7 days. Three (8%) patients in open group separately suffered from major surgical complications (Sigmoid colon injury / Intestinal obstruction / Blood transfusion). Nine (24%) patients received postoperative endocrine therapy (Table 2).

Table 2
Intraoperative details and follow-up results

Surgical procedures	No. Pts (%)
Ureteroureterostomy	12 (30%)
Open	11 (28%)
Robotic	1 (3%)
Ureteroneocystostomy	22 (55%)
Open	17 (43%)
Laparoscopic	4 (10%)
Robotic	1 (3%)
Nephroureterectomy	5 (13%)
Open	2 (5%)
Laparoscopic	3 (8%)
Ureteral stent placement	1 (3%)
Concomitant gynecologic operation	13 (33%)
Total hysterectomy + pelvic endometrial nodules resection	2 (5%)
Total hysterectomy + salpingo-oophorectomy	3 (8%)
Salpingo-oophorectomy + pelvic endometrial nodules resection	2 (5%)
Pelvic endometrial nodules resection	1 (3%)
Salpingo-oophorectomy	3 (8%)
Myomectomy	2 (5%)
Mean operative time, min (range)	152.4 (19–380)
Mean post-operative hospitalization, day (range)	6.7 (2–13)
Surgical complications, n	3 (8%)
Sigmoid colon injury / Intestinal obstruction / Blood transfusion	1/1/1
Postoperative endocrine therapy, n	9 (23%)
Total follow-up patients, n	28 (70%)
Median follow-up time, month (range)	71 (11–150)

Positive follow-up result, n	3
Flank pain	1
Recurrent urinary tract infection	1
Unresolved hydronephrosis	1

Excluded 2 patients whose follow-up time was still too short and 10 patients who could not be contacted with, 28 (70%) patients were totally followed up. The median follow-up time was 71 months. Among 28 patients, we found 3 (11%) patients still had persistent flank pain, recurrent urinary tract infection or unresolved hydronephrosis, which meant our treatment was failed. Twenty-five patients achieved the criteria for success. The success rate was 25/28 (89%).

Discussion

In the patients of endometriosis, UE accounts for only 0.01–1.7% according to the reported cases in the literature.⁶ Most of the time, UE is very difficult to diagnose due to the absence of special symptoms. About half of the patients are found when accidental health examination. Our data also shows that 48% of patients were asymptomatic. For the symptomatic women of UE, the three most common symptoms are severe dysmenorrhea (75%), dyspareunia (70%) and pelvic pain (60%).⁴ In our study, flank pain is the most common symptom. The UE is usually unilateral. Some studies reported that the left UE was more than the right one.^{1, 4, 7} The distal third of the ureter is most frequently affected by endometriosis.

The pathogenesis of UE is still unknown. The hypothesis of retrograde menstruation is the most popular theory.⁸ However, this theory can't completely explain the isolate UE without any other implants of endometriosis. Hydronephrosis is common in endometrial nodules larger than 3 cm.^{9, 10} The UE is found predominantly in women with hydronephrosis and/or in women with lesions larger than 4 cm.⁹ The UE lesions are very rarely isolated and are frequently associated with other kinds of endometriosis.^{11, 12}

Although physical examination often has no positive findings in UE, the rectovaginal palpation is necessary which may provide a helpful indication of UE.¹¹ There are two types of UE: extrinsic and intrinsic. The extrinsic compression of the ureteral wall is more common than the intrinsic invasion which may originate from lymphatic or venous metastases.¹³ When UE is suspected, all urologic causes of extrinsic and intrinsic ureteral stenosis should be considered, such as stones, primary megaureter, primary or secondary ureteral cancer, infections, retroperitoneal lymphadenopathy and idiopathic retroperitoneal fibrosis.⁶ For differentiating these conditions, the imaging techniques are needed.¹⁴ The transvaginal and abdominal ultrasonography are the first-line exam which can detect rectovaginal nodules at the distal third of ureter and evaluate the degree of hydronephrosis and the thickness of the renal parenchyma.¹⁵ The magnetic resonance imaging (MRI) is highly accurate to detect and predict the type of UE. MRI is more sensitive, but less specific than surgery in detecting intrinsic involvement which may overestimate

the prevalence of intrinsic lesions.¹⁶ Multislice computed tomography is alternative to MRI, but it has irradiation and can cause discomfort for the eventual enema.⁶ Renal scintigraphy should be performed when a decision between kidney preservation and nephrectomy is being considered.

When intrinsic UE needs to be distinguished from the malignant ureteral tumor, a ureteroscopic biopsy may also be necessary to help a final choice. However, as it is invasive and it is not able to detect extrinsic lesions, it is now rarely used in clinical practice.¹⁷

The surgical treatment for UE is aim to relieve ureteral obstruction and protect renal function. The main procedures include ureterolysis, ureterectomy with UU, ureteroneocystostomy and excision of all other endometrial lesions. In our hospital, some simple UE cases which may just need ureterolysis were all treated by gynecological doctors. If a more invasive procedure was needed like UU or ureteral reimplantation, the surgery will be mainly performed by urologists. In this study, almost all cases were recommended from gynecological department to urological department. Sometimes, the treatment process needed multidisplinary team.

The choice of surgical procedure is determined by the severity and location of lesions. The patients with less extensive endometriosis undergo ureterolysis and excision of all other lesions. Compared with ureteroneocystostomy, UU and uretrolysis have higher restenosis rate (11% and 8% versus 3%).¹⁸ For women with moderate to severe diseases, radical surgery is often required, including segmental resection with UU or ureteral reimplantation.¹⁹ Furthermore, nephrectomy or nephroureterectomy should be performed when renal function is less than 10–15% with symptoms like flank pain, renovascular hypertension and recurrent urinary tract infections.²⁰ In our study, two patients were considered as ureteral cancer and three patients were diagnosed as nonfunctional kidney who finally underwent nephroureterectomy.

In the past ten years, open procedure was the main type of surgery in our center. With the development of laparoscopic and robotic techniques,^{21,22} we also did some difficult operations under laparoscopy or robot-assisted laparoscopy. Especially for the complex cases, the robotic surgery has special advantages on anastomosis. As the surgery shown in Fig. 1, it was unlikely to be done by open or laparoscopic approach.

In all patients, we noticed that a 72 years old woman who was suspected as malignant ureteral cancer preoperatively was finally diagnosed as UE by the postoperative pathology. As we known, the endometriosis tends to occur in women of childbearing age under 60 years. However, Haydon had reported one of the oldest patients with endometriosis, aged 78.²³ This reminds us that UE can also occur in the elderly, although it is very rare.

Although cases of successful hormone therapy of UE have been reported,^{24,25} medical treatment is not able to resolve the fibrotic component of the lesion, which is mainly responsible for the ureteral

obstruction.²⁶ Therefore, UE with obvious ureteral obstruction should be treated surgically. For some patients with severe diseases, postoperative adjuvant hormone therapy may be helpful.^{27,28}

Conclusions

UE is rare and the diagnosis of UE is difficult with few guidelines on surgical treatment. A multidisciplinary team (at least including gynecologists and urologists) is necessary. For the patients with severe ureteral involvement, segmental resection with UU or ureteral reimplantation may be a good strategy.

Abbreviations

UTE = urinary tract endometriosis

UE = ureteral endometriosis

MRI = magnetic resonance imaging

UU = ureteroureterostomy

Declarations

Ethics approval and consent to participate

This study was approved by the Peking University First Hospital Ethics Committee, and all of the study procedures met the stipulations of the WMA Declaration of Helsinki.

Consent for publication

Written informed consent was obtained from all of the patients with respect to publication of this study and any accompanying images.

Availability of data and materials

The data of the current study are available from the corresponding author upon reasonable request.

Competing interests

The authors declare that they have no competing interests

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Authors' contributions

XS L and AB M designed the study. XS L, LQ Z and Y L performed the operation. KL Y and SD C participated in the operation and drafted the manuscript. YK C and JK Q participated in the analysis and interpretation of the data. YY X, XF L and SW X participated in the operation and clinical follow-up. All authors read and approved the final manuscript.

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Figures

Figure 1

Robotic-assisted laparoscopic ureteroureterostomy. (A) Blue area shows the dilated ureter. (B) Cut the suspensory ligament of right ovary and resect the right ovary and endometrial lesion. (C) Dissect the distal ureter with stricture (blue area) which is close to the bladder. (D) Excise the ureteral stricture. (E-I) Perform the ureteroureterostomy.

Figure 2

Laparoscopic ureteroneocystostomy with psoas hitch. (A) Dissect the ureter and the endometrial nodule (red arrow). (B) Blue arrow shows the ureteral stricture and red arrow shows the endometrial nodule. (C) Excise the endometrial lesion and cut the ureter. (D, E) Free the Retzius space. (F) Make a ureteral nipple extracorporeally. (G) Perform psoas hitch of the bladder. (H, I) Perform anastomosis of the ureter and the bladder.

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