Diagnosis and Treatment of Ureteral Endometriosis: Study Of 23 Cases

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Received August 2013
Accepted May 2014

Purpose: To describe our experience in the diagnosis and treatment of 23 patients with ureteral endometriosis.

Materials and Methods: We performed a retrospective analysis of 23 cases of ureteral endometriosis with histopathological results from 2002 to 2011.

Results: In patients with ureteral endometriosis, 23 cases were diagnosed by ultrasound, 21 by intravenous urography, 11 by retrograde urography, 16 by computed tomography, and 8 with magnetic resonance imaging. All cases were treated by operative treatment. The treatments included ureterolysis in 3 cases, partial ureteral resection and ureteroneocystostomy in 6 cases, partial ureteral resection and end-to-end ureteral anastomosis in 12 cases, and endoscopic resection of ureteral endometriosis lesion in 2 cases. All of the pathologic examination results were endometriosis.

Conclusion: Our findings suggest that surgery is an effective treatment option in most patients with ureteral endometriosis exhibiting mild or moderate to severe hydronephrosis. The type of technique depends on the location and depth of the lesion.

Keywords: endometriosis; surgery; diagnosis; complications; treatment outcome; abnormalities; ureteral diseases.

INTRODUCTION

Ureteral endometriosis is a rare yet important condition and it is estimated that less than 1% of women with endometriosis also have ureteral endometriosis.[1] There is some evidence that the incidence of ureteral endometriosis is about 1%,[2] whereas other studies reported an incidence of only 0.1%.[3] Although ureteral endometriosis is relatively uncommon and accounts for a small minority of cases, it can lead to renal failure because of the silent obstruction of the ureter. Ureteral endometriosis can be subcategorized into two types: intrinsic or extrinsic.[4] Intrinsic ureteral endometriosis is rare and characterized by the presence of endometriotic tissue in the ureteral wall. However, extrinsic ureteral endometriosis is more frequent and represented by the presence of endometrial stromal and glandular in the ureteral submucosa and adventitia.[5]

Ureteral endometriosis presents a clinical challenge both in diagnosis and treatment. The frequency of ureteral endometriosis is sometimes negligible and missed because patients do not display typical symptoms. Frequently, nonspecific symptoms are those typically connected with endometriosis, including dyspareunia, dysmenorrhea and pelvic pain.[6,7] However, the indicative symptoms such as cyclic colicky flank pain and renal colic is relatively rare and about 50% of patients are asymptomatic.[8] Therefore, it is very difficult to diagnose ureteral endometriosis before surgical procedures. The surgical treatment of ureteral endometriosis remains the gold standard which should relieve ureteral obstruction and avoid the recurrence.[9] Different conservative surgeries have been proposed according to the pathological conditions of ureteral endometriosis, including laparoscopic management,[10] which could remove the pathologic tissue. The preoperative diagnosis and choice of an appropriate surgical approach are both essential for the treatment of patients with ureteral endometriosis. Therefore, the aim of this study was to report the clinical, pathologic, diagnostic and management findings in a retrospective cohort of 23 cases undergoing various types of surgery for ureteral endometriosis.

MATERIALS AND METHODS

Twenty-three cases of ureteral endometriosis were gathered from the urinary surgery department in the Air Force General Hospital and Peking University First Hospital between January 2002 and October 2011. All of the women who underwent surgery with pathological examination confirmation of ureteral endometriosis were included in this study. Patients who had medication treatment for ureteral endometriosis or undergone surgery for other types of endometriosis were excluded. Patient's age, body mass index (BMI, kg/m^2), history of previous medical treatment and surgical treatment, presenting symptoms and site of involvement were obtained by review of the medical records and pathology reports wherever available. Slides from all cases were summarized for pattern of ureteral involvement (intrinsic or extrinsic) and for any additional related pathologic findings. The affected side was the right and left in 9 and 14 cases, respectively. There was no bilateral case.

Preoperative evaluation included, assessment with the evaluation of ureteral endometriosis related pain using a visual analogue scale (VAS) (10 point rating scale: 0 = absent, 10 = unbearable)[11] for six components of disease related pain: dyspareunia, low back pain, menoxenia, hypogastralgia, hematuria and dysmenorrhea. Surgical and clinical data of all cases were collected and recorded in a computerized database. Some patients had previous medical and surgical treatment six months before surgery, whereas none were given hormonal treatment in this period. All patients were preoperatively examined by ultrasonography, and some patients also underwent intravenous urography (21 cases), retrograde urography (11 cases), computed tomography (CT) (16 cases) or magnetic resonance imaging (MRI) (8 cases) examinations to assist in confirming the disease. The results revealed that all cases had hydronephrosis. All cases were treated by surgical therapy, including open surgery and laparoscopic surgery. The treatments included ureterolysis in 3 cases, segmental ureterectomy and ureteroneocystostomy in 6 cases, segmental ureterectomy and ureteroureterostomy in 12 cases, unilateral ovarian cyst excision in 9 cases and laparoscopy fulguration in 2 cases.

The cases with negligible adherent involvement that required no specific procedures were excluded. Follow-up included clinical evaluation and radiologic assessments (urography or ultrasonography examination) every 3 months for 2 years and then every year.

Main outcome measures were preoperative findings, operative details (type and site of ureteral endometriosis, type of intervention), postoperative urinary function, pain relief, hydronephrosis relief and complications.

RESULTS

Of 1135 patients with endometriosis in the study period from 2002 to 2011, twenty-three cases of ureteral endometriosis were observed, a prevalence of 2.03%. **Table 1** shows the preoperative characteristics and findings of the 23 patients in the study. In most patients, the main symptoms were low back pain (17 cases, 73.9%) and hypogastralgia (15 cases, 65.2%). Of the 23 patients, 9 patients (39.13%) had previous medical treatments, such as danazol (3 cases), progesterone (1 case) and gonadotropin-releasing hormone analogue (GnRH)-α (5 cases); 10 patients (43.48%) had previous surgical treatment, which consisted of ipsilateral ureterolysis (3 cases), nephrostomy for ureteral obstruction (4 cases), open ureteroneocystostomy (1 case) and ipsilateral dilatation of ureteral stenosis (2 cases). However, no patients had received hormonal therapy six months before surgical treatment.

The 23 patients all were examined by ultrasonography before surgery; the results showed that all patients had hydronephrosis to a certain extent and ureterectasia. Moreover, the ultrasonography examination also showed an ovarian cyst in 9 of the 23 patients and uterine myoma in 7 of the 23 patients. Twenty-one patients underwent preoperative intravenous urography, which revealed a stricture of the lowest portion of the ureter that was 1.5 to 4.3 cm long. Thirteen patients had mild (5 cases) or moderate to severe (8 cases) hydronephrosis. The results

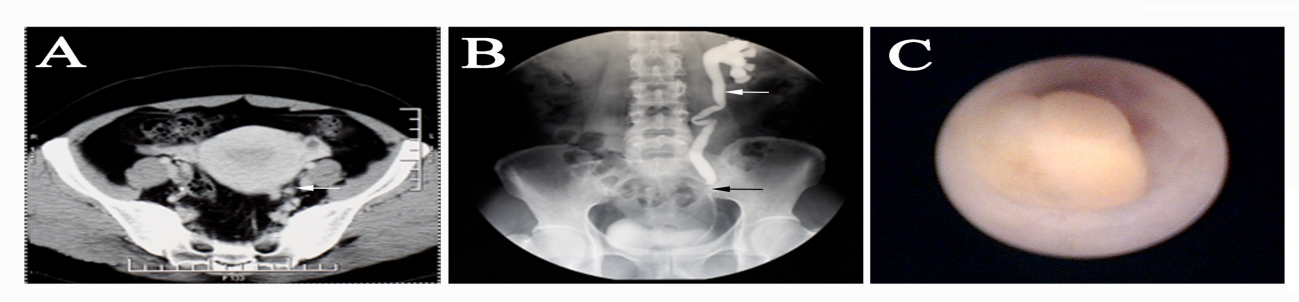

Figure. (A) Enhanced computed tomography scan of patients. White arrow shows the space occupying lesion in lower part of left ureter. **(B)** Retrograde pyelography of patients. White arrow shows hydronephrosis in left kidney and dilatation in upper part of ureter. Black arrow shows the filling defect in lower part of left ureter. **(C)** Ureteroscopy shows the papillary neoplasm in lower part of left ureter.

also indicated normal kidney function in 13 patients, which was accompanied with a filling defect of the lower ureter in 2 of the 13 patients. Moreover, 11 of the 13 patients had a stricture of the lower ureter. Eight patients who had absent or extremely faint kidney images were further examined by retrograde pyelography. The results indicated that 5 patients had hydronephrosis, dilation of upper ureteral and stricture of the lower ureter. Three patients who failed to be examined by retrograde pyelography were assessed using MRI. Sixteen of the 23 patients underwent preoperative CT scan, which revealed that 14 of the patients had strictures of the lower ureter and a soft-tissue mass around the tube wall, and 2 patients had a mass in the lumen of the ureter. As shown in **Figure**, enhanced CT scan imaging shows the space occupying lesion in lower part of left ureter. Retrograde pyelography of patients shows hydronephrosis in left kidney,

dilatation in upper part of ureter, and filling defect in lower part of left ureter. Ureteroscopy shows the papillary neoplasm in lower part of left ureter. Eight patients underwent preoperative MRI; the results showed that all patients had dilatation of the upper ureter and hydronephrosis. The results of clinical evaluation support the notion that all patients may suffer from ureteral endometriosis.

In 15 cases, endometriosis involved the left ureter, whereas the right ureter was involved in 9 cases. No patient had bilateral involvement. All patients were affected in the distal third of the ureter. Moreover, ureteral involvement by endometriosis was extrinsic in 18 cases, but intrinsic in 5 cases. All cases were treated by surgical therapy, including open surgery and laparoscopic surgery; the surgical methods are summarized in **Table 2**. Intra- and post-operative complications are reported in **Table 3**.

There were no cases of complications requiring re-intervention. Intraoperative complications include bladder injury in 1 case (4.3%), ureteral injury in 3 cases (13.0%), hemorrhage in one case (4.3%) and large vessel injury in one patient (4.3%). After surgery, 2 patients displayed dysuria, blood loss causing anemia occurred in 3 cases, hematuria occurred in one patient, 4 patients developed fever, and vaginal infection and urinary infection occurred in 1 and 2 cases, respectively. Follow-up ranged from 7 to 98 months. The median follow-up was 3.42 years (3 years, 5 months). The maximum follow-up was 8.17 years (8 years, 2 months) and the minimum follow-up was 7 months.

Of the 23 patients, follow-up data were obtained for 20 patients, while 3 cases were lost to follow-up (**Table 2**). The 20 patients were submitted to clinical and radiological follow-up (ultrasonography and intravenous urography) every 6 months for the first 2 postoperative years and then every year thereafter. Relief from pain was noted in 18 patients (90%). Only 1 of the 20 patients (case no. 18) underwent repeated laparoscopy after 7 months because of the recurrence of pelvic pain. However, preoperative intravenous urography and ultrasonography in this woman; did not show ureteral dilatation. In the 20 patients, no relapses of ureteral endometriosis were found within the follow-up period of 41 months (range 7-98 months). Relief from hydronephrosis was observed in all patients and the symptoms of ureteral disease disappeared in 12 patients. Additional hormonal medications were given to 8 patients who had severe ureteral endometriosis. According to the follow-up data of all cases, we found that surgery is an effective treatment option in patients with ureteral endometriosis exhibiting mild or moderate-to-severe hydronephrosis. After ureterolysis and segmental ureterectomy, there were no relapses of disease during the follow-up period. Our study increased the degree of awareness in clinicians and providing evidence in choosing a more adequate clinical management method for the lesser understood aspects of the disease.

DISCUSSION

Endometriosis is one of the most common gynecologic disease in women, it usually occurs between menarche and menopause as a result of the fluctuating levels of progesterone and estrogen required for the propagation and stimulation of endometrial proliferation.[12] The insidious onset of endometriosis portends considerable morbidity, and thus, the disease need a high index of suspicion for both urologists and gynecologists.[13] About 10% of women in the reproductive age have involvement of the genitourinary tract by endometriosis, whereas disease affecting the ureter is infrequent, accounting for less than 0.3% of all types of endometriosis. Although the morbidity of ureteral lesions is relatively low, the disease can cause severe silent loss of renal function.[14] In contrast to the literature, in our study, the ureter was involved in 23/1135 (2.03%) cases. The peak incidence of ureteral endometriosis is around 30-45 years, and the patients were either nulliparous (9 cases, 39.1%) or had one (8 cases, 34.8%) or two children (6 cases, 26.1%), born several years ago.

Table 1. Characteristics of cases in the study.

Case no.	Age (years)	BMI (kg/m^2)	Previous Medical Treatment	Previous Surgical Treatment	Presenting Symptoms
1	42	21.3	+		Dyspareunia, Menoxenia, Low back pain
2	34	22.6		+	Low back pain, Hypogastralgia
3	45	23.1		+	Dysmenorrhea, Menoxenia, Low back pain, Hypogastralgia
4	42	22.6	+		Dyspareunia, Menoxenia
5	23	18.6		+	Hematuria, Hypogastralgia
6	50	22.4	+		Low back pain, Hypogastralgia
7	45	23.5	+		Dyspareunia, Low back pain
8	37	23.3		+	Dysmenorrhea, Menoxenia, Hypogastralgia
9	43	22.2			Low back pain, Hypogastralgia
10	44	24.0		+	Hematuria, Low back pain Hypogastralgia
11	41	21.9	+	+	Dyspareunia,Low back pain
12	26	18.8			Menoxenia, Hypogastralgia
13	33	23.7			Menoxenia, Low back pain
14	29	21.5		+	Dysmenorrhea, Low back pain, Hypogastralgia
15	27	20.9	+	+	Dysmenorrhea, Menoxenia Low back pain, Hypogastralgia
16	47	22.4			Dyspareunia,Low back pain
17	39	21.7			Hypogastralgia
18	33	19.9	+		Low back pain, Hypogastralgia
19	35	23.6		+	Hematuria, Low back pain, Hypogastralgia
20	22	18.9	+		Dysmenorrhea, Menoxenia, Low back pain
21	34	20.5			Dyspareunia,Low back pain Hypogastralgia
22	21	20.7	+		Hypogastralgia Hematuria
23	40	22.5		+	Dysmenorrhea,Low back pain, Hypogastralgia
Mean	36.2(SD = 4.5)	36.2 (SD = 2.6)		-----	

Abbreviation: BMI, Body mass index.

Ureteral endometriosis can be divided into extrinsic and intrinsic types.[15,16] The extrinsic form (70%-80% of cases) is characterized by

Table 2. Surgical and follow-up data of study subjects.

Case no.	Surgical Therapy	Duration of Surgery (min)	Follow-up (month)	Intraoperative Complication	Post operative-Complication
1	Left ureteroureterostomy and left ovarian cyst resection	150	33	Ureter injury, hemorrhage	Anemia
2	Right ureteroureterostomy	195	Lost to follow-up	None	None
3	Right ureteroureterostomy and right ovarian cyst resection	237	31	Bladder injury	Hematuria
4	Left ureteroneocystostomy and left ovarian cyst resection	359	56	None	Dysuria, Fever
5	Right ureterolysis	187	48	None	None
6	Right ureteroureterostomy	285	51	None	None
7	Left ureteroureterostomy	169	98	Ureter injury	UTI, Vaginal infection, Fever
8	Right ureteroneocystostomy and right ovarian cyst resection	415	45	Large vessel injury	Anemia
9	Left ureteroureterostomy	177	68	None	None
10	Left ureteroneocystostomy and left ovarian cyst resection	430	40	Ureter injury	None
11	Right ureteroureterostomy	265	54	None	Anemia
12	Left ureteroureterostomy and left ovarian cyst resection	345	35	None	UTI, Fever
13	Left ureterolysis	280	42	None	None
14	Right ureteroureterostomy	330	65	None	None
15	Left ureteroneocystostomy	385	49	None	Dysuria, Fever
16	Left ureteroureterostomy and left ovarian cyst resection	430	37	None	None
17	Right ureteroneocystostomy	210	40	None	None
18	Left laparoscopy fulguration	240	12	None	None
19	Left ureterolysis	335	9	None	None
20	Left ureteroneocystostomy and Left ovarian cyst resection	395	Lost to follow-up	None	None
21	Left ureteroureterostomy	248	11	None	None
22	Right laparoscopy fulguration	155	7	None	None
23	Left ureteroureterostomy and left ovarian cyst resection	310	Lost to Follow-up	None	None
Mean/median	-----	284 (mean) (SD = 3.69)	41 (median) (7 ~ 98 months)	-----	

Abbreviation: UTI, urinary tract infection.

ureteral obstruction caused by external compression by surrounding endometriosis. In the extrinsic form, patients were found to have ureter strictures, ureteral obstruction and hydronephrosis, because endometriosis lesions affect the external ureteral tunics through adherence to the surrounding organs or structures. The intrinsic form (20%-30% of cases) is less common than the extrinsic form. The intrinsic ureteral endometriosis always occurred in the ureteral mucosa or the muscular layer, because of hematogenous metastasis or lymphatic metastasis.

Ureteral endometriosis is often asymmetrical, more commonly involving the distal segment of the left ureter.[5] In the current study, in all cases of ureteral endometriosis involving the distal segment of the ureter and occurring on a single side, the affected side was the left in fourteen and the right in nine of the twenty-three cases, whereas, bilateral involvement was not found in the twenty-three patients. Of the 23 patients, 18 cases (78.3%) presented with extrinsic ureteral endometriosis, whereas 5 of the 23 patients presented with intrinsic form. The ratio of extrinsic and intrinsic forms was consistent with the literature reports.[16]

The onset of ureteral endometriosis is latent. Indeed, clinical symptoms and signs are often silent (52.2% of our cases), owing to the non-specific symptoms; the disease always progressed to silent obstruction and the loss of renal function. Therefore, the diagnosis of ureteral endometriosis is very difficult. Along with extensive pelvic endometriosis, some patients presented the clinical symptoms of dysmenorrhea, dyspareunia, pelvic pain, infertility and repeated urinary tract infections. Also, symptoms of chronic pelvic inflammation, interstitial cystitis, irritable bowel syndrome and other diseases often co-occurred. Thus, the surgeon should distinguish ureteral endometriosis from other diseases.

The preoperative diagnosis is very difficult when specific symptoms of ureteral endometriosis are lacking. Ureteral endometriosis is increasingly recognized with the greater the awareness of it. On clinical examination, ureteral endometriosis can be easily missed. A delay in diagnosis can lead to significant morbidity,[17] such as a consequent worsening of hydronephrosis and silent renal function loss. Therefore, early diagnosis is very important for this disease. Multiple diagnostic tests can be used to confirm the existence of ureteral endometriosis. Ultrasonography, laparoscopy, intravenous urography, ureteroscopy with endoluminal ultrasound, CT scan and MRI are common diagnostic tools.[14] In the current study, the 23 cases were examined by ultrasonography, laparoscopy, intravenous urography, CT scan and MRI. Based on the medical history, signs, results of imaging modalities and ureteroscopy of the patients, we suspected that all cases suffered from ureteral endometriosis. However, the final diagnosis of the disease requires demonstration of endometrial tissue on a pathology specimen.

Table 3. Intraoperative and postoperative complications.

Intraoperative			**Postoperative**		
Complication	Number	(%)	Complication	Number	(%)
Bladder injury	1	4.3	Dysuria	2	8.7
Ureter injury	3	13.0	Anemia	3	13.0
Hemorrhage	1	4.3	Hematuria	1	4.3
Large vessel injury	1	4.3	Vaginal infection		4.3
			UTI	2	8.7
			Fever	4	17.4

Abbreviation: UTI, urinary tract infection.

The general principles of treatment for ureteral endometriosis should be considered to relieve the ureteral obstruction and symptoms, and to protect renal function. The therapeutic methods for endometriosis include medical and surgical therapy.[17] Surgical therapy is the paramount consideration for the patients with hydronephrosis; most scholars argue that ureterolysis is the first choice for treating patients with hydronephrosis.[18] Bosev and colleagues believe that ureterolysis is an effective treatment option in vast majority of cases that can be safely accomplished, even in patients with moderate to severe hydronephrosis.[10,19] However, the management of ureteral endometriosis in cases of moderate to severe hydronephrosis is still contentious; some researchers believe that ureterolysis is more suited to cases with mild hydronephrosis, whereas patients with moderate to severe hydronephrosis should be treated by resection of the diseased ureter and subsequent ureteroneocystostomy or ureteroureterostomy, which can prevent further renal damage.[20,21] Pelvic endometriosis should be treated if the patients have ureteral endometriosis accompanied with pelvic endometriosis. In cases with severe local lesions, perioperative auxiliary treatment with hormones (such as progestone, nemestran or danazol) can reduce tissue edema, narrow lesions and reduce the recurrence rate.

In the current study, preoperative assessment by CT scan and MRI examination and intraoperative ascertainment of 23 patients revealed that 5 patients had lesser degrees of obstruction and mild hydronephrosis. These patients were treated by relatively conservative ureterolysis and laparoscopy fulguration. The other patients (18 cases) suffered from high degrees of obstruction and moderate to severe hydronephrosis. Of the 18 patients, segmental ureteral resection and ureteroneocystostomy were performed in 6 cases, segmental ureteral resection and ureteroureterostomy were carried out in 12 patients and ovarian cyst resection was performed in 9 cases in the corresponding period. Of the 23 patients, follow-up data were obtained for 20 patients, ultrasonography and intravenous urography were performed to recheck for symptoms, and the results showed that the hydronephrosis has been alleviated in all patients. The symptoms of 12 cases disappeared after surgery; 8 cases were observed to have serious lesions intraoperatively, auxiliary treatment with hormones was given after surgery, but there was no recurrence during the follow-up period. Overall, these results revealed that the surgical management is a better choice for patients with hydronephrosis. The effects of surgical management is associated with a number of factors, such as patient's age, symptoms, degree of obstruction, the surgery thoroughness, adjuvant therapy and the desire to preserve reproductive function.

CONCLUSION

We concluded that ureterolysis is an effective treatment option for patients with lesser degrees of obstruction and mild hydronephrosis, whereas resection of the diseased ureter and subsequent ureteroneocystostomy or ureteroureterostomy were more suitable for patients

with moderate to severe hydronephrosis.

CONFLICT OF INTEREST

None declared.

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