Severe ureteral endometriosis: the intrinsic type is not so rare after complete surgical exeresis of deep endometriotic lesions

Charles Chapron, M.D.,[a,d,e] *Ilda Chiodo, M.D.,*[a] *Mahaut Leconte, M.D.,*[b] *Delphine Amsellem-Ouazana, M.D.,*[c] *Nicolas Chopin, M.D.,*[a] *Bruno Borghese, M.D.,*[a,d,e] *and Bertrand Dousset, M.D.*[b]

[a] Department of Obstetrics and Gynecology II and Reproductive Medicine; [b] Department of Digestive and Endocrine Surgery; [c] Department of Urology, Université Paris Descartes, Assistance Publique, Hôpitaux de Paris (AP-HP), Groupe Hospitalier Universitaire (GHU) Ouest, Centre Hospitalier Universitaire (CHU) Cochin Saint Vincent de Paul, Paris, France; [d] Institut Cochin, Université Paris Descartes, Paris, France; and [e] Inserm, Paris, France

Objective: To evaluate the rate of intrinsic ureteral endometriosis in patients presenting with severe ureteral endometriosis.
Design: Observational study between June 1992 and December 2007.
Setting: University tertiary referral center.
Patient(s): Twenty-nine patients presenting deeply infiltrating endometriosis (DIE) with severe ureteral endometriosis. Severe ureteral endometriosis was defined as DIE lesions causing significant obstruction to the urinary flow with ureteral stenosis.
Intervention(s): Complete surgical exeresis of DIE lesions.
Main Outcome Measure(s): Pre- and peroperative evaluation associated with histologic analysis. Intrinsic ureteral endometriosis was defined as presence of DIE lesions infiltrating the ureteral muscularis.
Result(s): In a series of 627 patients with histologic proved DIE, we observed 29 (4.6%) patients with severe ureteral endometriosis. Ureteral lesions (n = 34) were right sided in 7 (24.1%) patients, left sided in 17 (58.6%) patients, and bilateral in 5 (17.3%) patients. Eleven (37.9%) patients presented intrinsic lesions. Out of the 34 ureteral lesions 13 (38.2%) were intrinsic. In cases of radical ureteral surgery (n = 21 patients; n = 24 ureteral lesions) intrinsic ureteral DIE was observed in 52.4% (11 cases) of the patients and in 54.2% (13 cases) of the ureteral lesions.
Conclusion(s): The prevalence of intrinsic ureteral endometriosis is underestimated. This result must be taken into account when specifying the surgical modalities for patients presenting with severe ureteral endometriosis. (Fertil Steril® 2009;■:■–■. ©2009 by American Society for Reproductive Medicine.)

Key Words: Ureteral endometriosis, deeply infiltrating endometriosis, deep endometriosis, radical surgery

Deeply infiltrating endometriosis (DIE) is a multifocal pathology (1) that can infiltrate the following different pelvic locations: bladder, uterosacral ligament(s) (USL), vagina, intestine, and ureter. The rarest of these DIE locations is ureteral endometriosis (2).

There are two histologic types of ureteral DIE: intrinsic and extrinsic. Intrinsic ureteral endometriosis is histologically defined when DIE lesions infiltrate the muscularis of the ureteral wall. Ureteral endometriosis is considered as extrinsic when DIE lesions are responsible for a significant ureteral obstruction but without involvement of the ureteral muscularis (3).

Surgical management of ureteral endometriosis is controversial (4), with either conservative excisional surgery associated with ureterolysis or radical procedures (segmental ureterectomy with end-to-end anastomosis, ureteroneocystotomy, and so forth). Given that extrinsic ureteral endometriosis is reported in over 80% of cases (5, 6), several investigators (7–9) consider that the treatment of choice is ureterolysis and that radical surgery is exceptionally indicated.

The efficiency of surgery in a context of DIE is correlated to the radicality of the procedure, meaning that exeresis of the DIE lesions must be complete (10–12). For patients with severe ureteral endometriosis, recurrent hydronephrosis would be probable if ureterolysis only is performed witout removal of the affected ureteral segment. The goal of this work, which is based on a continuous series with a large number of patients presenting histologically proved DIE, is to clarify after radical surgery what is the real rate of intrinsic ureteral endometriosis for patients with severe ureteral endometriosis. This information is essential to specify the surgical modalities for patients with DIE lesions causing hydronephrosis.

MATERIALS AND METHODS

Between June 1992 and December 2007, a continuous series of patients suffering from pelvic pain (alone or associated

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Reprint requests: Charles Chapron, M.D., Department of Gynecology and Obstetrics II and Reproductive Medicine, CHU Cochin, Saint Vincent de Paul, Pavillon Lelong, 82 avenue Denfert Rochereau, 75014 Paris, France (FAX: 33-1-58-41-18-70; E-mail: charles.chapron@cch.aphp.fr).

with infertility) underwent surgical management for DIE. During these surgical procedures complete exeresis of all DIE lesions was performed (10). Deeply infiltrating endometriosis was histologically proven for each patient. Between June 1992 and December 2000, the medical, operative, and pathologic reports for each patient were reexamined retrospectively in blinded fashion by two investigators (C.C; I.C.). Disagreements were resolved by discussion with a third gynecologist investigator (B.B). The same analysis was performed prospectively for patients operated between January 2001 and December 2007. Deeply infiltrating endometriosis lesions were classified according to five locations (2): bladder, uterosacral ligaments, vagina, intestine, and ureter.

In this series we considered only patients with severe ureteral endometriosis. Severe ureteral endometriosis was defined as (extrinsic or extrinsic) DIE lesions, causing significant obstruction to urinary flow with ureteral stenosis resulting in hydronephrosis during radiologic examination (13). By definition, patients with deep endometriotic tissue encasing the ureter but not causing stenosis or patients with a deep endometriotic nodule adjacent to the ureter but not completely encasing it (8) were not considered as having severe ureteral endometriosis and were excluded from the study. By definition, in addition, patients in whom ureteral catheters were installed peroperatively to make surgery easier but who had no ureteral stenosis were not considered as having severe ureteral endometriosis and were also excluded from the study. We considered that ureteral endometriosis is intrinsic when the ureteral muscularis is involved by the DIE lesions (3). By definition, lesions that infiltrate only the ureteral serosa were considered as extrinsic.

For each patient with severe ureteral endometriosis the following were noted: general data (age, gravidity, parity, height, weight, body mass index, and so forth), together with the existence of clinical urologic signs (renal colic, flank pain, pyelonephritis, urinary infection, painful dysuria, and so forth), the intensity of pelvic pain symptoms (dysmenorrhea, deep dyspareunia, noncyclic chronic pelvic pain, gastrointestinal symptoms, lower urinary tract symptoms) according to a visual analogue scale, any history of previous medical and/or surgical treatment for endometriosis, the stage of the disease according to the American Fertility Society (rAFS) (14), and the mean rAFS scores (total, implants, adhesions) according to the same classification (14), and the surgical procedures performed. Concerning the ureteral lesions the following criteria were noted for each patient: [1] side (right, left, or bilateral); [2] type (extrinsic or intrinsic); [3] existence of associated histologically proved ovarian endometrioma of >1 cm (right, left, bilateral); [4] the existence, location, and number of associated deep endometriotic lesions (bladder, USL[s], vagina, intestine).

RESULTS

During the study period 627 patients underwent complete surgical exeresis of DIE lesions. Twenty-nine patients (4.6%) with severe ureteral endometriosis were observed. Two patients were retrospective and 27 prospective. Patient characteristics are presented in Table 1. In over half the cases (17 patients; 58.6%) the patients with severe ureteral endometriosis did not present any urologic symptoms. In 89.6% of cases (26 patients) there were severe painful symptoms (dysmenorrhea, deep dyspareunia, noncyclic chronic pelvic pain, gastrointestinal symptoms, and so forth). Two (6.9%) patients only presented with hematuria. Five (17.2%) patients presented with rectorrhagia. In three (10.3%) cases the diagnosis was made during pregnancy (case 8 [hypertension], cases 13 and 24 [hemodynamic shock]) (15). For one (3.4%) patient (case 22) the diagnosis was made in the postpartum period.

Severe ureteral endometriosis was right sided in 7 (24.1%) patients, left sided in 17 (58.6%) patients, and bilateral in 5 (17.3%) patients. The total number of ureteral lesions is 34 (5 patients with bilateral ureteral lesions). Concerning the total ureteral DIE lesions, these were right sided in 12 (35.3%) cases and left sided in 22 (64.7%) cases.

Thirteen (44.8%) patients had an ovarian endometrioma associated with severe ureteral endometriosis. The endometrioma was right sided in 2 (15.4%) patients, left sided in 5 (38.5%) patients, and bilateral in 6 (46.1%) patients, meaning there was a total number of 19 associated ovarian endometriomas. Concerning the total number of associated endometriomas, ovarian endometriomas were right sided in 8 (42.1%) cases and left sided in 11 (57.9%) cases. The mean size of the largest associated right ovarian endometrioma was 34.9 $\pm$ 18.9 mm (range = 15–72). The mean size of the largest associated left ovarian endometrioma was 32.6 $\pm$ 16.6 mm (range = 20–62).

Severe ureteral endometriosis was never isolated. Each patient (n = 29; 100%) presented associated histologically proven DIE lesions. The rate of patients with associated DIE lesions were the following: USL (20 patients; 68.9%); vagina (20 patients; 68.9%); bladder (7 patients; 24.1%); intestine (28 patients; 96.5%). Taking into account the bilaterality of certain DIE lesions (USL: 12 patients; ureter: 5 patients) and the multifocality of intestinal DIE (n = 11 patients) (1, 2, 16, 17), 139 (n = 139) histologically proven DIE lesions were observed after complete DIE lesion exeresis. For these 29 patients with severe ureteral endometriosis, the anatomic distribution of the DIE lesions was the following: USL (32 DIE lesions), vagina (20 DIE lesions), bladder (7 DIE lesions), intestine (46 DIE lesions), ureter (34 DIE lesions). The mean number of histologically proven DIE lesions for patients presenting with severe ureteral endometriosis was 4.8 $\pm$ 1.9 (range = 2–9). Details of major surgical procedures performed to achieve complete surgical exeresis of all DIE lesions are listed in Table 2.

Concerning the histologic results, 11 (37.9%) patients presented instrinsic lesions. Out of the 34, 13 (38.2%) ureteral lesions were intrinsic and 21 (61.8%) extrinsic. The real rate of intrinsic ureteral DIE can only be assessed for those

TABLE 1

Severe ureteral endometriosis: baseline characteristics.

Patients' characteristics (n = 29)	
Age (years)[a]	32.7 ± 5.4 (range = 26–45)
Gravidity[a]	0.6 ± 0.8 (range = 0–3)
Parity[a]	0.2 ± 0.5 (range = 0–2)
Height (cm)[a]	161.7 ± 6.7 (range = 150–173)
Weight (kg)[a]	53.5 ± 10.9 (range = 35–77)
Body mass index (kg/m^2)[a]	20.36 ± 3.5 (range = 14.1–30.1)
Previous treatment for endometriosis[b]	
Hormonal treatment (%)	100.0
Surgery (%)	58.6
Mean number of previous surgeries	0.7 ± 0.9 (range = 0–3)
Preoperative painful symptoms scores[a,b,c]	
Dysmenorrhea	7.1 ± 2.7 (range = 0–10)
Deep dyspareunia	4.8 ± 3.4 (range = 0–10)
Noncyclic chronic pelvic pain	2.6 ± 3.1 (range = 0–9)
Gastrointestinal symptoms	4.5 ± 3.3 (range = 0–10)
Lower urinary tract symptoms	1.3 ± 2.2 (range = 0–7)
Mean implants score rAFS[a,d]	18.3 ± 15.9 (range = 4–46)
Mean adhesions score rAFS[a,d]	54.7 ± 29.3 (range = 4–104)
Mean total score rAFS[a,d]	73.0 ± 39.2 (range = 8-150)
rAFS Stage[d] (%)	
- Stages I + II	17.2
- Stages III + IV	82.8

[a] Data are presented as mean ± standard deviation.
[b] Sometimes more than one for the same patient.
[c] Visual analogue scale.
[d] Score according to the American Fertility Society Classification (14).

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patients given radical ureteral surgery. Twenty-one patients (72.4%) underwent this type of surgery, namely, unilateral nephrectomy, five cases; nephrectomy and contolateral uretroneocystotomy, two cases; ureteroneocystotomy without controlateral ureteral resection, seven cases; unilateral segmental ureterectomy with end-to-end anatomosis, six cases; bilateral segmental ureterectomy with end-to-end anatomosis, one case (Table 2). For these patients (n = 21) intrinsic ureteral DIE was observed in 52.4% (11 patients). Because there were bilateral ureteral lesions (n = 3), histologic examination was performed for 24 ureteral lesions. Intrinsic ureteral DIE was observed in 54.2% of cases (13 ureteral lesions) (Table 3).

With a mean follow-up of 45.5 ± 29.0 months (range = 2–106), no patient has presented any recurrence of ureteral DIE.

DISCUSSION

These data suggest that the rate of intrinsic ureteral endometrosis is very frequent after complete surgical exeresis of DIE lesions for patients presenting with severe ureteral endometriosis. In our series the rate of patients presenting intrinsic ureteral endometriosis is 37.9% (n = 11 patients). This figure reaches 52.4% for the 21 patients who underwent radical ureteral surgery. These rates are far higher than those reported in the literature, because intrinsic ureteral endometrisosis is observed in only 14% of cases on average (Table 4). These results are important to take into consideration when specifying the surgical modalities for patients with severe ureteral endometriosis. In this context, these results demonstrate that to perform complete exeresis of DIE lesions it is necessary for certain patients to carry out radical ureteral surgery (segmental ureterectomy with end-to-end anatomosis, ureteroneocystotomy, and so forth). In other words, a conservative treatment with exeresis of DIE lesions associated with "simple ureterolysis" will not allow complete treatment to be performed for the 38% of patients presenting intrinsic ureteral DIE. These results explain why in our experience >50% of the patients were previously conservatively operated.

The fact the rate of instrinsic endometriosis in our experience is far higher than that observed in the literature (Table 4) raises the problems of how difficult it is to assess the real rate of intrinsic endometriosis, and indeed, the definition of ureteral endometriosis. In our series we only took into account

TABLE 2

Severe ureteral endometriosis: major surgical procedures performed for complete exeresis of deep endometriosis (n = 29 patients).

Major surgical procedures	N	n	%
Urologic surgery[a]			
Partial cystectomy	7		24.1
Nephrectomy	7		24.1
Left		4	
Right		3	
Segmental ureterectomy with end-to-end ureteral anastomosis:	7		24.1
Left		4	
Right		2	
Bilateral		1	
Ureteroneocystotomy:	9		31.0
Left		5	
Right		4	
Severe ureteral ureterolysis	29		100.0
Intestinal surgery[a]			
Colorectal end-to-end anastomosis	21		72.4
Total proctectomy with colo anal anastomosis	6		20.7
Rectal discal excision	1		3.4
Ileo-cecal resection	2		6.9
Appendectomy	3		10.3
Extensive intestinal adhesiolysis	24		82.8
Gynecologic surgery[a]			
Ovarian cystectomy for OMAs	5		17.2
Salpingectomy	6		20.7
Unilateral adnexectomy	18		62.1
Major adnexal adhesiolysis	22		75.9
Total hysterectomy with bilateral salpingo-oophorectomy	4		13.8
Procedures for associated posterior DIE lesions			
Uterosacral resection	20[b]		68.9
Colpectomy	20		68.9

Abbreviations: OMAs, ovarian endometriomas; DIE, deeply infiltrating endometriosis.

[a] Sometimes more than one operative procedure for each patient.

[b] Four right; 4 left, and 12 bilateral: total number DIE USL is 32 for 20 patients.

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patients presenting with severe ureteral endometriosis, defined as DIE causing significant obstruction of the urinary flow with major ureteral stenosis (13). Antonelli et al. (13), with comparable selection criteria to our own concerning the severity of ureteral endometriosis, reports a rate of intrinsic involvement identical to that which we observed (38%) (Table 4). Similarly, when the investigators decide to carry out radical ureteral surgery because of the severity of the lesions (29% of cases; Table 4), the rate of intrinsic endometriosis is then far higher and reaches 47% on average. So, in the same way as there are two histologic types of ureteral endometriosis (intrinsic and extrinsic), we believe it should be considered that there are also two clinical forms. For the simple forms of "minimal ureteral endometriosis," conservative excision of DIE lesions associated with ureterolysis will indeed allow complete treatment with satisfactory functional results (7–9). However, for patients presenting "severe ureteral endometriosis," a conservative surgical approach will be inadequate (13, 18–20), and will involve a real risk of recurrence (7, 21). In our experience, with a mean follow-up of nearly 4 years, we have not observed any cases of recurrent ureteral endometriosis. In addition, this radical surgery gives excellent functional results from the urologic point of view without any negative impact on urodynamic parameters (18). It is a mistake to allow the belief that the treatment of choice for ureteral endometriosis is based on "simple ureterolysis." What dictates the surgical strategy is the extent of the disease (1). In the same way as DIE lesions can penetrate the vagina, bladder, or intestine, they can also infiltrate the ureteral muscularis (3).

Isolated ureteral endometriosis is rare (22). In our experience, severe ureteral endometriosis is never isolated and always associated with other DIE lesions (USL, vagina, baldder, intestine). The rate of associated retrocervical (vagina and/or USL) (7–9, 23, 24) (and this study) or intestinal DIE lesions is high (18, 24) (and present study). In our series the mean number of histologically proved DIE lesions for patients presenting severe ureteral endometriosis is 4.8 ± 1.9 (range = 2–9). These results confirm that DIE must be considered as a multifocal pathology (2, 21, 25). It is essential to bear this DIE multifocality in mind when deciding on

TABLE 3

Severe ureteral endometriosis: rate of intrinsic ureteral endometriosis after radical surgery.

	Intrinsic ureteral DIE		
	N	n	(%)
Patients with radical ureteral surgery[a]			
N patients	21	11	52.4
N ureters	24	13	54.2

Abbreviation: DIE, deeply infiltrating endometriosis.

[a] Nephrectomy; segmental ureterectomy with end-to-end ureteral anastomosis; ureteroneocystotomy.

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TABLE 4

Rates of intrinsic ureteral endometriosis according to the surgical procedures performed for severe ureteral endometriosis.

Authors	Patients N	Intrinsic ureteral DIE n (%)	Radical ureteral surgery[a] n (%)	Real intrinsic ureteral DIE[b] n (%)
Nezhat et al. (1996)	21	4 (19)	11 (52)	4 (36)
Donnez et al. (2002)	18	2 (11)	2 (11)	2 (100)
Antonelli et al. (2004)	13	5 (38)	13 (100)	5 (38)
Ghezzi et al. (2006)	33	1 (3)	2 (6)	1 (50)
Frenna et al. (2007)	54	0 (0)	0 (0)	0 (0)
Seracchioli et al. (2008)	30	4 (13)	8 (27)	4 (50)
Present study (2009)	29	11 (38)	21 (72)	11 (52)
Total	198	27 (14)	57 (29)	27 (47)

Abbreviation: DIE, deeply infiltrating endometriosis.
[a] Nephrectomy; segmental ureterectomy with end-to-end ureteral anastomosis; ureteroneocystotomy.
[b] Rate of intrinsic ureteral endometriosis for patients with radical ureteral surgery.

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the surgical modalities for these patients whose lesions are particularly severe (1, 21, 26). In this context an interdisciplinary surgical approach (gynecologist, urologist, and intestinal surgeons) is necessary to excise all the DIE lesions in a single operation.

This optimum method of surgical management requires that the diagnosis be made preoperatively and not fortuitously during surgery. The difficulty is that the diagnosis of ureteral endometriosis is difficult because the clinical presentation is nonspecific (4). Even if urologic signs are rarely present (27) (and present study), they must be sought systematically during questioning if there is a clinical suspicion of DIE. The diagnosis must be born in mind in case of incapacitating dysmenorrhea (24) and/or large (3 cm or more) posterior DIE nodules during clinical examination, and especially when the lesion is lateral (9). In case of any clinical doubt as to ureteral involvement, renal ultrasonography (US) must be performed first to detect hydronephrosis. When renal US is abnormal, uro-magnetic resonance imaging (Uro-MRI) shots must be made during MRI (28). When ureteral involvement is revealed, renal function must be checked by kidney scintigraphy. Unlike some investigators (4), we do not consider that there is any indication in this situation to carry out an intravenous pyelogramm (IVP). The radiologic investigation of reference is MRI with Uro-MRI shots which, unlike IVP, will allow a complete workup (29) for these patients who frequently present associated DIE lesions. Lack of awareness of this diagnosis is what explains the high rate of silent loss of renal function, which then requires associated nephrectomy during the operative procedure (7 patients [24.1%] in our experience).

In conclusion, intrinsic ureteral endometriosis seems to be underestimated. In the same way as there are two histologic types (extrinsic vs. intrinsic ureteral endometriosis), we believe that two clinical forms should be differentiated (minimal and severe ureteral endometriosis) for which the surgical management is very different. We propose calling the disease "severe uretral endometriosis" only in cases of histologically proven intrinsic endometriosis and/or in cases that require resection of a long ureteral segment. For patients presenting "minimal ureteral endometriosis," conservative treatment with exeresis of DIE lesions associated with ureterolysis is an effective approach. However, in case of "severe ureteral endometriosis" conservative treatment is insufficient and complete exeresis of the DIE lesions requires radical ureteral surgery. Not all cases of ureteral endometriosis can be treated with simple ureterolysis. Surgeons must classify patients in homogenous groups to be sure that "everyone is talking about the same thing," so that it will be possible for scientific studies to "compare what is comparable."

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