Clinical characteristics of urinary tract endometriosis: A one-year national series of 232 patients from 31 endometriosis expert centers (by the FRIENDS group)

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Highlights :

- a series of 232 patients suffering from urinary tract endometriosis describing their symptoms and the most frequent locations.
- Ureteral endometriosis was significantly associated with other deep invasive endometriosis lesions
- Ureteral endometriosis was more often asymptomatic than bladder locations

Key Word : Bladder endometriosis-Diagnosis of urinary tract endometriosis-Ureteral endometriosis;

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ABSTRACT

(247 Words)

Objective. To review prospectively the clinical characteristics of patients suffering from urinary tract endometriosis (UTE) in France, in 2017.

Study Design. We conducted a prospective observational multicenter study including women managed surgically for UTE in 31 French endometriosis expert centers (FRIENDS group) from January 1, 2017 to December 31, 2017. We distinguished patient with isolated bladder endometriosis (“IBE”) or isolated ureteral endometriosis (“IUE”) and patients associating both locations (mixed locations “ML”). Surgeons belonging to FRIENDS group enrolled patients by filling a 24 items questionnaire the day of the surgery and 6 weeks later. Data on the locations of UTE, preoperative assessment, urinary symptoms and associated pelvic locations were collected in a single anonymized database.

Results. A total of 232 patients from 31 centers were included. IBE concerned 82 patients (35.3%), IUE 126 patients (54.4%) ML 24 patients (10.3%). 111 patients reported urinary symptoms (47.8%). IUE was more often asymptomatic than the rest of the locations (59.5% versus 43.3%, OR 1,92, p = 0.017). Associated deep infiltrating endometriosis (DIE) lesions were found in 193 patients (83.1%). IUE was significantly associated with other DIE lesions (82.5% versus 66%, OR2.4, p = 0.006), particularly with rectum or sigmoid nodules (57.1% versus 36.8%, OR 2.3, p = 0.002) and retrocervical space nodules (31.7% versus 19.8%, OR 1.9, p = 0.05).

Conclusion. Our study reports the second largest series of patients operated from a UTE and shows that ureteral location seems more frequent, less symptomatic and more frequently associated to other DIE locations than bladder endometriosis.

INTRODUCTION

Deep infiltrating endometriosis (DIE) is defined as the infiltration by ectopic endometrial glands under the peritoneum for more than 5 mm. The most frequent locations are the retrocervical space, uterosacral ligaments, the ovaries, the bowel wall and the urinary tracts (1,2). Urinary tract endometriosis (UTE) is a rare location of the disease, which affects 1.2 to 6% of women (1–5). The incidence increase in populations of patients undergoing surgery for DIE (6). The bladder is usually reported as the most common location of UTE and may be present in up to 85% of cases (22, 37). The ureter is less often affected, with a prevalence ranging from 0.5 to 10% of UTE locations (7,8). Bladder endometriosis (BE) is responsible for symptoms of bladder irritation such as voiding dysfunction, polyuria, urgency, hematuria and urinary incontinence (9–15). Symptoms appear to be related to the location and size of the nodule (16).

The definition of ureteral endometriosis (UE) remains controversial. According to Nezhat *et al.*, extrinsic and intrinsic form of UE endometriosis should be differentiated. Intrinsic endometriosis, which is defined by the involvement of the ureter wall may affect up to 20% of patients with UTE (17). Conversely, extrinsic UE is d**efined by an involvement of the ureter by an endometriosis nodule from adjacent structures(17)**. The incidence and characteristics of this pathology remains difficult to evaluate.

The objective of this study was to perform a prospective review of the main characteristics of patients with UTE in France during a one year period..

MATERIAL AND METHOD

Population of the study

We performed a multicentric prospective study on a population of patients managed surgically for deeply invasive UTE in France, from January 1, 2017 to December 31, 2017. All surgeons affiliated with the FRIENDS group (French coloRectal Infiltrating ENDometriosis Study group), were invited to prospectively and consecutively include all of their patients corresponding to the inclusions criteria, who underwent a surgery for UTE. The FRIEND group was founded in 2015 and consists of a network of advanced endometriosis surgeons in France. The aim was to foster shared experiences and collect routine data on surgery to improve DIE management between gynecologist surgeons interested in endometriosis (6).

In this study, patients were selected by their surgeon prior to surgery each time a surgical treatment for UTE was planned. Inclusion criteria were patients with suspected UTE who had at least one lesion of the bladder or ureter, regardless of if they were isolated or congruent with each other or congruent with another endometriotic lesion. Exclusion criteria included patients under age 18 and surgery limited to ureterolysis performed as part of the dissection for the resection of DIE or extra urinary endometriosis with absence of a bladder or ureteral lesion.

Definition of UTE locations and surgeries

We defined UTE as endometriosis involving the bladder, the ureter or both. BE (bladder endometriosis) was defined as a deep infiltration of the bladder including detrusor muscle, with or without mucosae infiltration according to Chapron *et al*. definition (18). Ureteral endometriosis (UE) was defined as any situation where there existed a compression or distortion of the ureter by ureteral endometriosis nodule, either with or without ureteral dilatation or hydronephrosis (17). Ureteral dilatation was defined as an abnormal ureteral diameter measured up to 4 mm in size (19). Hydronephrosis was defined as an abnormal renal pelvis measured up to 10mm in size (19). Ureterolysis was defined as a dissection of the ureter from the endometriosis nodule until extracting all macroscopic endometriosis tissue and total liberation of the ureter, according to Nezhat *et al* and Uccella *et al* definition (17,20). As

explained previously, ureterolysis for the protection of the ureters prior to the resection of nodules not involving the bladder and ureters (DIE, uterosacral ligaments, rectal endometriosis, etc.) were excluded in this study.

Population subgroups

In our study, we distinguished five overlapping subgroups depending on the considered variable. Some analysis included nodules confined to one urinary location either bladder (isolated bladder endometriosis “IBE”) or the ureters (isolated ureteral endometriosis “IUE”). In other part we considered all bladder lesions either associated or not with ureteral involvement (bladder endometriosis “BE”) and all ureteral lesions either associated or not with a bladder involvement (ureteral endometriosis “UE”). A final subgroup including a combination of the mixed lesions (involving both ureter and bladder) was designated "mixed locations" (ML).

Standardized questionnaire and data collection

A 24-items questionnaire was sent to surgeons to be filled right after surgery. Patient demographic data were recorded (age at endometriosis diagnosis and surgery, parity, gravidity, history of surgery), as well as symptoms (urologic and non-urologic), pre-operative management (medical treatment, imaging examinations), location of urinary tract nodule or other locations of DIE, surgical procedure performed, and operative route. A specific part of the questionnaire concerned complications, which were defined as any adverse event in relation to the surgery, up to 6 weeks post operatively, according to the modified Clavien-Dindo classification (21). The questionnaires were anonymized and returned by surgeons at the end of the study period. Data were collected by a unique investigator (E.F.) in an anonymous database. Due to word constraints, data concerning surgical management and complication will be reported in a specific publication.

Ethic consideration

The National Data Protection Authority (Commission Nationale de l'Informatique et des Liberte´s) approved the study. All data were fully de-identified before analysis. Our work complied with French statutes and regulations, which authorize epidemiologic surveys without advance approval of an ethics committee. Our survey involved no intervention and is thus excluded from the French statute on biomedical research (Huriet-Serusclat law, dated December 20, 1998). We complied with all French statutes concerning data about the subjects, confidentiality, and restrictions.

Statistical analysis

Data were collected in a Microsoft Excel for Windows files (Microsoft®, Redmond, Washington, USA). Median, mean, standard deviations were calculated directly in Microsoft Excel files. Odds ratios, relative risks, 95% confidence intervals and all statistical analysis were performed using "R: A Language and Environment for Statistical Computing" (R Core Team® 2008 by the R Foundation for Statistical Computing Vienna, Austria). Univariate analysis: Wilcoxon rank sum test was used to look for association with continuous data. Fisher exact test was used to assess correlation and risk associated with binomial data. Data were considered significant if p-value was below 5%. Each odds ratio and relative risk was calculated comparing the proportion of "positive" and "negative" value of each considered variable using the rest of our population of UTE patients as the reference population and not a whole endometriosis or healthy control population.

RESULTS

Population and patient's characteristics

A total of 232 patients with UTE were included in our study from January 1, 2017 to December 31, 2017. Among the members of the FRIENDS group, 31 centers participated in the study, 23 (74.2%) were from University Hospitals and 8 (25.8%) from private structures. The median number of inclusions by department was 5 and varied between 1 to 27 patients.

Surgical history of endometriosis was reported in 76 patients (32.7%) which involved a urological location in 23 patients (9.9%). The patients with IBE has a mean age of 32.6 years (Standard Deviation (SD) = 5.56) against 34.4 years (SD = 7.05) for IUE (p=0.08).

There was no significant difference for the mean age of first symptoms of urinary symptoms between IBE and IUE (30.7; SD 5.31 versus 31.4 SD 8.42 years, p=0.46). The mean time between apparition of the first urinary symptoms and the diagnosis of UTE was 0.7 years (SD 1.46) for IBE and 1.1 years for IUE (SD = 5.84, p= 0.63). There was no significant difference between IBE and IUE for the mean time between diagnosis of endometriosis and surgery (1.06 versus 1.68 years, respectively, p=0.33), neither for the mean time between the first urinary symptoms and surgery (1.75 versus 2.33 years respectively, p = 0.85). The existence of a preoperative ureteral dilatation or specific urinary symptoms did not influence the mean time between diagnosis and surgical management. Patients' characteristics were summarized in table 1.

Location of urinary lesions

Among the 232 patients with UTE, 126 presented an IUE, 82 an IBE and 24 a ML. In total, 150 patients presented a ureteral involvement associated or not with a bladder involvement (Ureteral Endometriosis: UE), 134 were unilateral (89.3%) and 16 were bilateral (10.6%). Similarly, 106 patients (47.7%) presented a bladder involvement associated or not with a ureteral involvement (Bladder Endometriosis: BE). Among BE lesions, 31 accounted for the bladder base (29.2%), 70 the bladder dome (66%), 8 the trigone (7.5%) including 3 patients (2.8%) which presented several bladder lesions (association of nodule of the bladder base and dome). (Table 1)

Urinary symptoms

Among the 232 patients, 111 (47.8%) presented at least one urinary symptom. Fifty-one of them had IUE (45.9%), 49 IBE (44.1%) and 11 ML (9.9%). The urinary symptoms reported were voiding dysfunction (15.9%), cystalgia (21.1%), polyuria (6.0%), urinary incontinence (0.9%), urgency (1.7%), macroscopic hematuria (5.6%), and recurrent cystitis (3.9%). The

presence of cystalgia, polyuria and hematuria were more frequent in cases of IBE than in other locations (46.3% versus 7.3%, OR = 10.9, p<0.001, 12.2% versus 2.6%, OR = 5.07, p=0.007, and 12.1% versus 2%, OR= 6.81, p=0.002 respectively).

IUE were more often asymptomatic than other locations (59.5% versus 43.3, OR 1.92, p = 0.017). However, the presence of lower back pain and renal colic were more frequent in IUE cases compared to other patients (30.1% versus 6.6%, OR 6.11, p<0.001 and 4.8% versus 0%, OR = +∞, p = 0.03 respectively) (Table 2).

IBE was significantly associated with the presence of cystalgia, polyuria and hematuria as compared to other locations (OR 10.9 p<0.001, OR 5.07, p=0.007, and OR 6.18, p=0.002 respectively). iUE was more frequent in asymptomatic patients (OR 1.92, p = 0.017).

Preoperative assessment

Before surgery, 172 patients (74.1%) underwent a pelvic MRI, 48 (20.7%) a pelvic ultrasound, 58 (25%) a CT scan and 50 (21.5%) a cystoscopy. Nineteen renal scintigraphy (8.1%) were performed (Table 1).

CT scan and renal scintigraphy were significantly associated to the presence of IUE (OR 2.05, p=0.02 and OR +∞, p<0.001 respectively), whereas a cystoscopy was significantly associated with the presence of IBE (OR 3.02, p<0.001). Among the patients presenting IUE, 12 underwent a preoperative cystoscopy, which was performed as part of the insertion of a Double-J stent (Table 2a, b). The existence of a hydronephrosis was significantly associated with the performance of a renal scintigraphy (OR = 13.9, p<0.001).

Associated pelvic locations

One hundred and ninety three patients (83.1%) presented at least one pelvic lesion associated with urological involvement. The most frequent associated locations were the digestive tract (111, 47.8%), the uterosacral ligaments (95, 40.9%), endometriomas (60, 25.7%) and the retrocervical space (61, 26.3%).

IUE was significantly associated with the presence of other pelvic lesions, compared to the rest of the urological locations (82.5% versus 66%, OR 2.4, p = 0.006) and in particular with Gastrointestinal nodules (57.1% versus 36.8%, OR 2.3, p = 0.002) and retrocervical space nodules (31.7% versus 19.8%, OR 1.9, p = 0.05). IUE and ML were not significantly associated with other pelvic locations (Table 2 and 3).

High urinary tract dilatation and preoperative Double-J stent

Data regarding to ureteral dilatations and hydronephrosis were available for 164 patients (70.6%) and 144 patients (62%) respectively. Among them, a preoperative ureteral dilatation was reported in 68 patients (41.4%) whereas a hydronephrosis was present in 20 patients (13.9%).Ureteral dilatation or hydronephrosis were more commonly found in iUE cases compared to the rest of the locations (respectively 57.1% versus 18.1%, OR 6.0 and 17.8% versus 5.7%, OR = 3.6). Four isolated bladder lesions were however associated with a ureteral dilatation and affected the bladder base in one case, the trigone in one case and the bladder dome in two cases.

The insertion of a Double-J Stent before or during surgery was reported in 107 patients (46%) and concerned 66 patients with IUE (52.4%), 22 patients with IBE (26.8%) and 19 patients with ML (79.1%). It was significantly associated with the presence of a ureteral lesion whether it was isolated (52.4% for IUE versus 39.2% for BE, OR = 1.74, p<0.04) or associated with bladder lesion (79.1% for UE versus 22.6% for IBE, OR = 3.57 p<0.001) (Table 2 and 3).

DISCUSSION

We report the results of a prospective longitudinal study, which included 232 patients managed surgically for UTE, in 31 French endometriosis center throughout the year 2017. To our knowledge, this is the second largest documented series of patients with UTE. Indeed, Ceccaroni *et al* recently reported a single center experience on 160 patients with UE and 264 patients with BE over a 10 years period (21, 22).

We report 82 patients (35.3%) with IBE, 126 (54.5%) with IUE and 24 (10.3%) with ML, accounting for a total of 150 ureteral lesions (UE) and a total of 106 bladder lesions (BE). The incidence of UTE in our series varied from 8% to 27.7% depending on the center. According to Nezhat *et al.*, UTE concerns from 1% to 6% of patients suffering from endometriosis (17). In the series of Gabriel *et al.*, the prevalence of UTE was to 19.5% and up to 52.6% in the series of Knabben *et al.* (10,11).

We observed a higher rate of ureteral lesions than bladder lesions in this series (64.6% for UE versus 45.7% for BE, ratio = 1.41), while Macaggnanno *et al.* reported in their review a 85% rate of bladder lesions versus 9% of ureteral lesions (7). However, our results are consistent with those of Knabben *et al.,* which reported a higher rate of ureteral lesions (94.6%) than bladder lesions (14.3%) (11). This variation in UTE repartition could be related to the existence of different definitions in UE and BE in the literature. Indeed, some authors only consider intrinsic nodule as real UE, which is defined by Nezhat *et al.* as an infiltration of ureteral wall by an endometriotic nodule. Conversely, Nezhat *et al*. also describe an extrinsic UE, which correspond to a compression or distortion of the pelvic ureter by a peritoneal nodule or an adjacent structure(17). In their study, Knabben *et al.* regrouped these two entities into UE definition (11). Similarly, we both included endometriosis nodule from the ureteral wall as well as compression of the ureter by an endometriosis nodule from an adjacent anatomical structure. However, by consensus with the whole FRIENDS group, ureterolysis performed as a prerequisite for resection of an endometrioma, a gastrointestinal nodule or utero sacral ligaments were excluded to avoid an overestimation of extrinsic ureteric involvement, which could be the case in some series (6). These distinctions raise the problem of the need for a common definition for UE, which is currently heterogenic in the literature. A new objective definition of UE could implicate pre-operative imaging.

We reported bilateral lesions in 10.7% of UTE patients, while ML accounted for 24 patients (10.3%). These results are in agreement with the study of Cavaco-Gomez *et al*. which reported

a rate of 10.6% bilateral UE and Chapron *et al.* which found a similar rate (9.3%) of mixed urinary tract locations (18,24).

We reported that UE was associated with less urinary symptoms than IBE (41.3% versus 59,8%, RR = 1.45, p = 0.008), while it was associated with “unspecific” endometriosis symptoms. Data from the literature confirm that UE remains asymptomatic in nearly 50% of the cases (17,25). Cavaco-Gomez *et al.* reported also that UE was rarely associated with urinary symptoms (34.7%) but frequently associated with unspecific symptoms (dysmenorrhea in 81.4% of cases, pelvic pain in 70.2% of cases and dyspareunia in 66.4% of cases). These findings can be justified by the high association between UE and other DIE locations, which could explain these unspecific symptoms.(24). In our series, lower back pain was much more frequent in IUE or UE than for the rest of the population (30.1%, RR = 4.57, p<0.001 and 26.7, RR = 4.35, p<0.001 respectively). History of repetitive renal colics was only found in 6 cases of IUE (4.8%, p = 0.03). This association between lower back pain as also been reported in the literature, by Bosev *et al.* (11% of patients) and by Frenna *et al.* (9.2% of patients) (26,27).

Conversely, we report that BE is significantly associated with numerous urinary symptoms. This association was also reported by Fauconnier *et al*. in 2002, confirming the high specificity of urinary symptoms for the diagnosis of BE (9). In a series assessing urinary symptoms in patients with posterior DIE isolated or associated with BE, Panel *et al*. also reported an association between the existence of cystalgia and the presence of BE (90% versus 45%, p = 0.024) (14). Villa *et al.* also confirmed that location (bladder base) and size of BE lesion were related to the presence of this symptom (16).

In our study, 83% of UTE patients also presented associated DIE lesions; in particular IUE was strongly associated with gastrointestinal endometriosis. This association had already been described in the first prospective study of the FRIENDS group carried out on 1135 patients undergoing surgery for rectal and sigmoid endometriosis, which reported 13.4% of associated ureteral lesions (6).Based on 18 studies regrouping 668 patients with UE, Cavaco Gomez *et*

al. also found 58.8% of rectal lesions associated with UTE (24). In is monocentric study Ceccaroni *et al* report associated bowel nodule in 53% of BE and in 75.6% in case of UE. (21, 22) We also reported that retrocervical space lesions and parametrium nodules were strongly associated with IUE. These data illustrate from our point of view the importance of systematically looking for UE in patients presenting a posterior DIE and especially in case of rectum or sigmoid involvement.

CONCLUSION

Our study describes the main clinical characteristic of urinary tract endometriosis patient in France, in 31 gynecological surgical departments over a one-year period. Schematically, we distinguished two different populations of patients with their own characteristics: Patients with UE are usually slightly older, often asymptomatic and present more frequently associated posterior DIE lesions. Conversely, BE is associated with specific urinary symptoms (polyuria, cystalgia, voiding dysfunction, hematuria) and presents less often concomitant DIE lesions. The FRIENDS group, which has twice shown its ability to organize national prospective studies, should continue on its path to improve the understanding of the surgical management of endometriosis.

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Table 2: Univariate analysis depending on the urological location (Ureteral or bladder location)

Variable	N=	Bladder endometriosis [a] (82) YES *	OR	*p-value*	Ureteral endometriosis [b] (126) YES *	*OR*	*p-value*
Surgical history for endometriosis	76	16(19.5)	0.36	**0.001**	53(42.4)	**2.78**	**0,001**
Urinary symptoms							
Asymptomatic patients	121	33 (40.2)	0.47	**0.008**	75(59.5)	**1.92**	**0,017**
Lower back pain	45	5 (6.1)	0.18	**<0.001**	38(30.1)	**6.11**	**<0,001**
Cystalgia	49	38 (46.3)	**10.9**	**<0.001**	5(4)	0.06	**<0,001**
Dysuria	37	17 (20.7)	1.7	0.18	13(10.3)	0.39	**0,012**
Polyuria	14	10 (12.2)	**5.07**	**0.007**	4(3.2)	0.31	**0,05**
Hematuria	13	10 (12.1)	**6.81**	**0.002**	1(0.8)	0.06	**<0,001**
Recurrent cystitis	9	6 (7.3)	3.87	0.07	1(0.8)	0.09	**0,01**
Renal colics	6	0 (0)	0	0.09	6(4.8)	+∞	**0,03**
Preoperative imaging							
CT	58	9 (10.1)	0.25	**<0.001**	39(31)	**2.05**	**0.02**
MRI	172	64 (78)	1.38	0.34	95(75.4)	1.15	0.65
Pelvic or urinary ultrasound	48	16 (19.5)	0.89	0.86	29(23)	1.36	0.41
Cystoscopy	40	28 (34.1)	**3.02**	**<0.001**	12(9.5)	0.19	**<0.001**
Renal scintigraphy	19	0 (0)	0	**<0.001**	18(14. 3)	**+∞**	**<0.001**
High urinary tract dilatation							
Ureteral dilatation	68	4 (8.2)	0.07	**<0.001**	56(57.1)	**6.0**	**<0.001**
Hydronephrosis	19	0 (0)	0	**0.001**	16(17.8)	**3.60**	**0.04**
Associated lesions							
Digestive tract	111	26 (31.7)	0.35	**<0.001**	72(57.1)	**2.29**	**0,002**
Adenomyosis	19	4 (4.9)	0.46	0.21	14(0 .11)	2.52	0,08
Parametrium	27	4 (4.9)	0.28	**0.018**	23(18.2)	**5.69**	**<0,001**
USL	95	31 (37.8)	0.82	0.48	56(44.4)	1.37	0,28
Endometrioma	60	14 (17.1)	0.46	**0.02**	39(31)	1.81	0,07
Retrocervical space	61	15 (18.3)	0.51	**0.04**	40(31.7)	**1.88**	**0,05**
Operative route							
Laparoscopy	169	62(75.6)	1.24	0.54	93(73.8)	1.11	0 ,76
Laparotomy (total)	25	6(7.6)	0.54	0.27	12(9.5)	0.75	0.53
Laparoconversion	8	3(3.7)	1.1	1	1(0.8)	0.11	**0.02**
Urological surgery							
Double-J Stent	107	22(26.8)	0.28	**<0.001**	66(52.4)	**1.74**	**0.04**
Collaboration with urologist	85	24 (29.3)	0.60	0.08	46(36.8)	1	1
Ureteral resection	28	0(0)	0	**<0.001**	24(19)	**6.00**	**<.001**
Ureteroneocystostomy	23	0(0)	0	**<0.001**	20(15.9)	**6.48**	**<0.001**
Ureteroureterostomy	5	0(0)	0	0,16	4(3.2)	3.44	0.38
Ureterolysis	128	14(17.1)	0.07	**<0.001**	95(75,4)	**6.78**	**<0.001**
Partial cystectomy	100	77(93.9)	85.0	**<0.001**	0(0)	**0**	**<0.001**
Associated surgical procedure							
Retrocervical space	64	15(18.3)	0.46	**0.02**	41(32.5)	1.74	0,07
Digestive tract	109	25(30.1)	0.34	**<0.001**	72(57.1)	**2.48**	**<0 ,001**
Unilateral ovariectomy	21	2(2.4)	0.17	**0.008**	16(12,7)	**2.94**	**0,039**
Bilateral ovariectomy	14	1(1.2)	0.13	**0.02**	9(7.1)	**1.55**	**0.44**
Hysterectomy	40	6(7.3)	0.27	**0.003**	30(23,8)	**3.00**	**0,004**
Parametrium nodules	24	3(3.7)	0.23	**0.01**	21(16.7)	**6.87**	**<0,001**
Uterine adenomyosis	3	3(3.7)	**+∞**	**0.04**	0(0)	0	0,09
Complications							
Total	61	17(20.7)	0.63	0.16	35(27.8)	1.18	0,65
Urological	34	11(13.4)	0.77	0.57	18(14.3)	0.81	0,58
Second surgery	14	4(4.9)	0.72	0.77	9(7.1)	1.55	0,58

*Notes: OR = odds ratio / USL: Uterosacral ligaments * n (%)* [a:] comparison of isolated bladder endometriosis (YES) with the rest of urological locations (NO) / [b:] comparison of isolated ureteral endometriosis (YES) with the rest of urological locations (NO)

Table 3: Characteristics of the population depending on the urological location (Mixed location)

		Mixed Urinary Endometriosis [c] (24)		
Variable	n	YES *	*OR*	*p-value*
Surgical history for endometriosis	76	7(29.1)	0.82	0.84
Urinary symptoms				
Symptomatic patients	111	11(45.8)	0.91	1
Lower back pain	45	2(8.3)	0.34	0.18
Cystalgia	49	6(25)	1.27	0.60
Dysuria	37	7(29.2)	2.44	0.07
Polyuria	14	0(0)	-	0.37
Hematuria	13	2(8.3)	1.62	0.54
Recurrent cystitis	9	2(8 .3)		0.23
Renal colic	6	0(0)	-	1
Preoperative imaging				
CT scan	58	10(41.7)	2.38	0.07
MRI	172	13(54.2)	**0.36**	**0.02**
Pelvic or urinary ultrasound	48	3(12.5)	0.51	0.43
Cystoscopy	40	10(41.7)	**3.0**	**0.01**
Renal scintigraphy	19	1(4.2)	0.46	0.70
High urinary tract dilatation				
Ureteral dilatation	68	8(47)	1.29	0.62
Hydronephrosis	19	3(23.1)	2.14	0.38
Associated lesions				
Digestive tract	111	13(54.1)	1.33	0 .53
Adenomyosis	19	1(4.2)	0.45	0.70
Parametrium	27	0(0)	0	0.09
USL	95	8(33.3)	0.69	0.51
Endometrioma	60	7(29.2)	1.20	0.80
Retrocervical space	61	6(25)	0.92	1
Operative route				
Laparoscopy	169	14(58.3)	0.47	0.14
Laparotomy (total)	25	7(29.2)	**4.34**	**0.007**
Laparoconversion	8	4(16.7)	**10.2**	**0 .005**
Urological surgery				
Double-J stent	107	19(79.1)	5.18	**<0.001**
Association with urologist	85	15(62.5)	**3.26**	**<0.001**
Ureteral resection	28	4(16.7)	1.53	0.50
Ureteroneocystostomy	23	3(12.5)	1.34	0.71
Ureteroureterostomy	5	1(4.2)	2.21	0.42
Ureterolysis	128	19(79.2)	**3.45**	**0.02**
Partial cystectomy	100	23(95.8)	**39.1**	**<0.001**
Associated surgical procedure				
Retrocervical space	64	8(34.8)	1.36	0.48
Digestive	109	12(50)	1.14	0.83
Unilateral ovariectomy	21	3(12.5)	1.5	0.46
Bilateral ovariectomy	14	4(16.7)	3.96	0.04
Hysterectomy	40	4(16.7)	0.96	1
Parametrium nodules	24	0(0)	0	0.15
Uterine adenomyosis	3	0(0)	0	1
Complications				
Total	61	9(37.5)	1.8	0.22
Urological	34	7(29.1)	2.54	0.07
Second surgery	14	1(4.2)	0.65	0.20

*Notes: RR = relative risk of presenting the variable according to the presence (YES) or not (NO) of a mixed location(ML). USL: Uterosacral ligaments * n (%) [c]: comparison between mixed locations (ML) (+) and the rest of urological locations (-)*