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Surgery for bladder endometriosis: long-term results and concomitant management of associated posterior deep lesions

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BACKGROUND: Deep infiltrating endometriosis (DIE) is presented as a disease with high recurrence risk. Bladder DIE is the most frequent location in cases of urinary endometriosis. Surgical removal has been recommended for bladder DIE but long-term outcomes remains unevaluated. The objectives of this study are to evaluate the rate of recurrence after partial cystectomy for patients presenting with bladder DIE and to outline the surgical modalities for handling associated posterior DIE nodules.

METHODS: Seventy-five consecutive patients with histologically proved bladder DIE were enrolled at a single tertiary academic center between June 1992 and December 2007. A partial cystectomy was performed for each patient. Complete surgical exeresis of all associated symptomatic DIE lesions was carried out during the same surgical procedure. Bladder DIE patients were classified into three groups: patients with isolated bladder DIE (Group A); patients with associated symptomatic posterior DIE (Group B); patients with associated asymptomatic posterior DIE (Group C). Bladder DIE recurrence was defined as a clinical reappearance of the disease or radiological evidence that mandated a new surgical procedure. We assessed pelvic pain symptoms pre- and post-operatively using a 10-cm visual analogue scale.

RESULTS: In a series of 627 patients with DIE, we observed 75 patients (12%) with bladder DIE. With a 50.9 ± 44.6 months mean follow-up after partial cystectomy no patient presented evidence of bladder DIE recurrence. Post-operatively, we observed a significant improvement with respect to pain symptoms, with only two patients (2.7%) developing major complications during follow-up. Among patients with non-operated associated asymptomatic posterior DIE lesions ($n = 15$), a second surgical procedure indicated for pain symptoms was necessary in only one patient (6.7%).

CONCLUSIONS: For patients presenting with bladder DIE, no patients required further surgery for bladder recurrence after radical surgery consisting in partial cystectomy. Exeresis of associated posterior DIE nodules is indicated only when they are symptomatic.

Key words: bladder endometriosis / deep endometriosis / radical surgery / partial cystectomy

Introduction

Endometriosis, defined as the presence of endometrial-like tissue outside the uterus, affects up to 15% of women of reproductive age (Hemmings *et al.*, 2004), and causes a considerable economic burden for society (Gao *et al.*, 2006). Aside from endometriosis extension scored with the revised American Fertility Society (rAFS) (1985), three types of endometriosis are recognized: superficial endometriosis (peritoneum and/or ovary), ovarian endometriomas (OMA) and deeply infiltrating endometriosis (DIE). The latter is mainly located in the uterosacral ligaments (USL), the upper third of the posterior vaginal wall, the intestine and in the urinary tract (bladder and/or ureter; Chapron *et al*., 2006). Endometriosis expanding and invading the urinary tract is a rare occurrence found in $\sim$1–2% of all endometriotic patients (Schneider *et al*., 2006). In cases of urinary endometriosis, the bladder is the most frequent location (Denes *et al*., 1980). Amongst women suffering from DIE, 11% present DIE lesions that affect the bladder (Chapron *et al*., 2006).

Bladder DIE may present with infertility and/or variable painful symptoms (including suprapubic pain, dysuria, hematuria, repeated urinary infection; Abrao *et al*., 2009). Several physiopathological mechanisms might explain the relation between endometriosis and pelvic pain: (i) recurrent cyclic micro-bleeding in the endometriotic lesions responsible for hyperpressure; (ii) production of inflammatory mediators by endometriotic lesions, which can stimulate the nerves; (iii) adhesions responsible for fixed position of pelvic structures; (iv) compression and/or infiltration of the sub-peritoneal nerve fibres by deep implants (Fauconnier and Chapron, 2005).

Although medical treatment may be effective in some DIE patients (Fedele *et al*., 2001; Vercellini *et al*., 2005), the treatment of choice is surgical excision (Garry, 1997). The multifocal nature of DIE lesions—a major characteristic of this form of endometriosis—must be taken into account when defining the surgical strategy (Chapron *et al*., 2003). Preliminary data on small patient series support the feasibility of laparoscopic partial cystectomy for patients presenting with bladder DIE (Donnez *et al*., 2000; Nezhat *et al*., 2002; Antonelli *et al*., 2006). However, as endometriosis is a disease with a high recurrence risk (Redwine and Wright, 2001; Fedele *et al*., 2004a, b), long-term outcome of such surgery needs to be evaluated.

We therefore conceived the present study with two primary objectives in mind: (i) to assess surgical results and the risk of recurrence after partial cystectomy for bladder DIE and (ii) to review the surgical modalities that are best adapted for treating the associated DIE nodules found in the posterior pelvic area.

Materials and Methods

Between June 1992 and December 2007, a continuous series of patients suffering from pelvic pain underwent surgical management for DIE. DIE was histologically defined as endometriotic lesions extending more than 5 mm beneath the peritoneal surface (Koninckx *et al*., 1991).

In this series, we considered only patients with bladder DIE, defined as endometriotic lesions infiltrating the bladder muscularis propria (Chapron and Dubuisson, 1999).

Pre-operative clinical and radiological work-up (Abrao *et al*., 2007; Piketty *et al*., 2009) allowed classification of patients suffering from bladder DIE into three groups depending on associated posterior DIE lesions (USL, vagina, intestine, ureter): (i) Group A: patients with isolated bladder DIE, i.e. with no associated posterior DIE; (ii) Group B: patients with associated symptomatic posterior DIE; (iii) Group C: patients with associated asymptomatic posterior DIE (Fedele *et al*., 2004a, b). Asymptomatic posterior DIE lesions were defined as posterior DIE nodules without significant deep dyspareunia and/or gastrointestinal symptoms and without pain at palpation during clinical examination. A partial cystectomy was performed for each patient presenting bladder DIE (Chapron and Dubuisson, 1999; Fedele *et al*., 2005a, b). The main steps of the surgical procedure as follows: (i) cystoscopy and bilateral ureteral catheterization; (ii) dissection of the vesico-uterine space 3 cm under the inferior limit of the DIE lesion, in order to render the nodule completely mobile and separate from the anterior uterine wall; (iii) cystotomy and complete exeresis of the bladder nodule by resecting through healthy tissue; (iv) transversally bladder suture in one layer with extracorporeal knots; (v) bladder filling with water at the end of the procedure to ensure water-tight closure; (vi) post-operative bladder drainage with ureteral catheter for 2 days and Foley catheter for a 8 days. During the surgical procedure, complete exeresis of all associated symptomatic posterior DIE lesions was performed (uterosacral resection, colpectomy, intestinal resection with end-to-end anastomosis; Chopin *et al*., 2005). For patients presenting with associated severe ureteral endometriosis, we performed, according to the associated posterior DIE nodule location, combined procedures as ureteroneocystostomy (bladder psoas hitch) or segmental ureterectomy with end-to-end ureteral anatomosis (Carmignani *et al*., 2009; Chapron *et al*., 2009a, b).

For each patient with bladder DIE, demographic data was collected (age, gravidity, parity, height, weight, body mass index, infertility, etc.) together with the history of previous medical and/or surgical treatment(s) for endometriosis (notably transurethral resection), previous history of uterine surgery (myomectomy and/or C-section) and the stage of the disease according to the revised American Fertility Society (1985). Intensity of pelvic pain symptoms (dysmenorrhoea, deep dyspareunia, non-cyclic chronic pelvic pain, gastrointestinal symptoms, lower urinary tract symptoms) were assessed pre- and post-operatively using a 10-cm visual analogue scale (VAS; Huskisson, 1974). Lower urinary tract symptoms were defined as one or more of the following symptoms, either chronic or during menstruation: hematuria, non-microbial cystitis, recurrent urinary tract infections, pain on urinating, pollakiuria and dysuria (Fauconnier *et al*., 2002). We also asked patients to indicate the changes in their pain symptoms after surgery and rate it as either: (i) excellent improvement, (ii) satisfactory improvement, (iii) slight improvement, (iv) no improvement (Chapron and Dubuisson, 1996). During the follow-up visits, we evaluated the persistence/intensity of pre-operative painful symptoms and bladder DIE recurrence. Bladder DIE recurrence was defined as a clinical reappearance of the disease (Vignali *et al*., 2005) or radiological evidence that mandated a new operation (Fedele *et al*., 2004a, b). Follow-up visits took place 8 days post-operatively (to remove the Foley catheter), 6 weeks after surgery and then every 6 month for the first year and yearly thereafter.

Concerning bladder DIE lesions, the following criteria were noted for each patient: (i) existence of haematuria; (ii) results of clinical examination: speculum inspection and pelvic examination; (iii) results of cystoscopy; (iv) bladder DIE nodule size and location (base or posterior wall; Fedele *et al*., 2005a, b); (v) existence of associated histologically proved OMA of more than 1 cm (right, left, bilateral); (vi) the existence, the location and the number of associated DIE lesions (USL, vagina, intestine, ureter); (vii) duration of follow-up and post-operative course (complications and recurrences).

Pre- and post-operative pelvic pain scores were compared using Student's *t*-test for paired data. The differences were considered to be statistically significant if $P < 0.05$. Analyses were performed using Statistics Package for the Social Sciences (SPSS) 14.0 (SPSS for Windows release 14.0 Chicago SPSS Inc.).

Results

During the study period, 627 patients underwent surgical exeresis of DIE lesions. Of these, 75 patients (12%) presented histologically proven bladder DIE. Patients' characteristics are presented in Table I.

Fourteen patients (18.7%) had already undergone transurethral resection (once: 12 patients; twice: 2 patients). Three patients (4.0%)

Table I Bladder DIE: baseline characteristics.

Patients' characteristics (n = 75)	
Age (years)[a]	33.5 ± 6.2 (range 23–49)
Gravidity[a]	0.7 ± 1.2 (range 0–7)
Parity[a]	0.4 ± 0.9 (range 0–5)
Height (cm)[a]	164.2 ± 6.6 (range 150–180)
Weight (kg)[a]	58.2 ± 9.1 (range 39–84)
Body mass index (kg/m^2)[a]	21.6 ± 3.3 (range 15.2–29.3)
Haematuria (n, %)	12 (16.0)
Previous uterine surgery (n, %)	3 (4.0)
Previous C-section (n, %)	9 (12.0)
Previous treatment for endometriosis	
Hormonal treatment (n, %)	54 (72.2)
Surgery (n, %)	42 (56.0)
Mean number of previous surgery	0.8 ± 0.9 (range 0–4)
Previous transurethral resection (TUR) (n, %)	14 (18.7)
Mean number of previous TUR	0.2 ± 0.5 (range 0–2)
Infertility (n, %)	23 (30.7)
Pre-operative painful symptom scores[a,b,c]	
Dysmenorrhoea	7.8 ± 2.5 (range 0–10)
Deep dyspareunia	6.0 ± 2.9 (range 0–10)
Non-cyclic chronic pelvic pain	2.8 ± 3.4 (range 0–10)
Gastrointestinal symptoms	3.1 ± 3.7 (range 0–10)
Lower urinary tract symptoms	5.9 ± 3.5 (range 0–10)
Mean implants score rAFS[a,d]	12.8 ± 11.8 (range 4–46)
Mean adhesions score rAFS[a,d]	24.4 ± 26.7 (range 0–104)
Mean total score rAFS[a,d]	37.2 ± 33.9 (range 4–150)
rAFS Stage[d] (n, %)	
Stage I	6 (8.0)
Stage II	27 (36.0)
Stage III	11 (14.7)
Stage IV	31 (41.3)

DIE, deep infiltrating endometriosis.
[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 revised American Fertility Society Classification (1985).

presented a previous history of myomectomy. Nine patients (12%) presented a previous history of C-section. For these nine patients, the mean number of previous C-sections was 2.0 ± 1.3 (range 1–5). During speculum inspection we never saw red and/or bluish lesions that suggest endometriosis in the upper part of the anterior vaginal wall. During pelvic examination an anterior nodule was palpated in only 56% of the cases (42 patients). Cystoscopy demonstrated typical red and/or bluish lesions in only 30% of the cases. For the other patients cystoscopy demonstrated a non-specific endoluminal mass located at the dome or at the posterior bladder wall.

The bladder DIE nodule was always unifocal (i.e. without a second one) in the bladder wall and in no cases infiltrated the anterior wall of the vagina. The mean size of the bladder DIE nodule at pathological examination was 23.6 ± 8.0 mm (range 8–50 mm). Bladder DIE nodule was located on the posterior wall for 56 patients (74.7%) and on the vesical dome for the remaining 19 patients (25.3%). Partial or complete obliteration of the vesico-uterine pouch was observed in the great majority of the patients (69 cases; 92.0%). Bladder DIE was isolated (Group A) in only 36.0% of the cases (27 patients). In 64% of the patients (n = 48), bladder DIE nodules were associated with posterior DIE lesions. In 33 patients (44%), one or several associated symptomatic posterior DIE nodule were found (Group B). Fifteen patients (20%) presented associated asymptomatic posterior DIE lesions (Group C).

Table II Number and locations of histologically proved additional deep lesions removed at surgery in 75 women undergoing partial cystectomy for bladder endometriosis.

DIE lesions	Patients		DIE lesions
	n	%	n
USL	25	33.3	38*
Vagina	20	26.7	20
Intestine	24	32.0	53
Ureter	7	9.3	8**
Total	75	100.0	119

DIE, deeply infiltrating endometriosis; USL, uterosacral ligament.
*USL DIE lesions: 7 right; 5 left and 13 bilateral; total number USL DIE: 38.
**Ureteral DIE lesions: 1 right; 5 left and 1 bilateral; total number ureteral DIE lesions: 8.

The anatomic locations of additional symptomatic DIE lesions removed during the operative procedure are detailed in Table II. The mean number of symptomatic DIE lesions was 2.6 ± 2.2 (range 1–10). One-third of the patients (n = 24; 32.0%) presented an associated symptomatic intestinal DIE. For these 24 patients, the mean number of intestinal DIE lesions was 2.2 ± 1.3 (range 1–6). Seven patients (9.3%) presented ureteral DIE lesions associated with the bladder DIE. Eighteen patients (24%) presented associated OMAs (unilateral: 14 patients and bilateral: 4 patients). Patients with associated OMAs presented significantly more symptomatic DIE lesions (3.9 ± 2.7 versus 2.2 ± 1.8; $P = 0.002$). Patients with (n = 9) or without (n = 66) previous history of C-section presented the same mean number of DIE lesions (2.78 ± 2.6 versus 2.56 ± 4.6; P = ns).

We observed two major complications (2.7%). One was a vesico-uterine fistula. This patient had a previous history of C-section and due to the severity of the adhesion process, a perforation of the anterior uterine wall occurred at the site of C-section scar during dissection of the vesico-uterine pouch. The injury was sutured via laparoscopy during the same procedure. Twenty days after surgery, hematuria occurred during menstruation. Investigations resulted in the diagnosis of a vesico-uterine fistula, which was surgically treated. The post-operative history was uncomplicated and 109 months later the patient is well with no sequelae. The second case occurred in a patient who suffered from pain with considerable and persistent hematuria post-operatively. Repeated bladder irrigation did not cure the symptoms and the patient had to undergo surgical exploration ultimately, to drain a large intravesical haematoma. One year later the patient still complained of dysmenorrhoea and permenstrual haematuria, despite hormonal treatments. Ultrasound examination found a vaguely defined mass at the cystectomy scar site. On the basis of these findings the patient underwent new surgery. During the operation there was no sign of recurrent bladder endometriosis, but one of the Fallopian tubes was incarcerated within the vesical suture. Salpingectomy was carried out together with repair of the cystectomy scar. Forty-four months later the patient is well, with no sequelae, no pain and no hematuria.

The mean follow-up time is of 59.9 ± 44.6 months. No patients were re-operated for bladder DIE recurrence. The painful symptoms improved in 100% of the patients, and improvement judged excellent in 77%, satisfactory in 11.5% and slight in 11.5% of the cases. Comparison between pre- and post-operative pain scores showed a statistically significant improvement for each painful symptom (Table III). The comparison between pre- and post-operative pain scores for the three groups of patients is presented in Table IV. In the Group C of patients with non-operated associated asymptomatic posterior DIE lesions, only one (6.7%) patient was re-operated because of the appearance of painful symptoms related to the posterior DIE lesions.

Table III **Bladder DIE: comparison between pre- and post-operative VAS pain scores.**

Painful symptoms	Pre-operative	Post-operative	*P*
DM	7.8 ± 2.5	2.2 ± 3.0	$P < 0.0001$
DP	6.0 ± 2.9	0.9 ± 1.8	$P < 0.0001$
NCCPP	2.8 ± 3.4	0.8 ± 1.9	$P < 0.0001$
GITS	3.1 ± 3.7	0.6 ± 1.8	$P < 0.0001$
LUTS	5.9 ± 3.5	0.4 ± 1.6	$P < 0.0001$

DIE, deep infiltrating endometriosis; DM, dysmenorrhea; DP, deep dyspareunia; NCCPP, non-cyclic chronic pelvic pain; GITS, gastrointestinal tract symptoms; LUTS, lower urinary tract symptoms; VAS, visual analogue scale.

Table IV **Bladder DIE: differences between pre- and post-operative VAS pain score according to the three groups of bladder lesions.**

Painful symptoms	Group A (n = 27)	Group B (n = 33)	Group C (n = 15)
DM	−5.4 ± 3.5 $P < 0.0001$	−5.5 ± 3.6 $P < 0.0001$	−6.6 ± 2.9 $P < 0.0001$
DP	−6.3 ± 2.8 $P < 0.0001$	−4.8 ± 3.0 $P < 0.0001$	−3.4 ± 3.5 $P = 0.009$
NCCPP	−1.9 ± 3.8 $P = 0.02$	−2.6 ± 3.9 $P = 0.001$	−1.0 ± 2.7 $P = 0.16$
GITS	−1.4 ± 3.0 $P = 0.05$	−3.3 ± 3.8 $P < 0.0001$	−1.5 ± 3.3 $P = 0.059$
LUTS	−7.2 ± 2.8 $P < 0.0001$	−2.9 ± 3.2 $P < 0.0001$	−7.4 ± 2.6 $P < 0.0001$

Group A: patients with isolated bladder DIE.
Group B: patients with associated symptomatic posterior DIE.
Group C: patients with associated asymptomatic posterior DIE.
DIE, deep infiltrating endometriosis; DM, dysmenorrheal; DP, deep dyspareunia; NCCPP, non-cyclic chronic pelvic pain; GITS, gastrointestinal tract symptoms; LUTS, lower urinary tract symptoms; VAS, visual analogue scale; *P* values denotes comparison between pre- and post-operative pelvic pain scores.

Discussion

These data, in a large series with a 5-year mean follow-up, support the contention that partial cystectomy is a safe and efficient procedure for patients suffering from bladder DIE. Only two major complications (2.7%) were observed. The long-term relief of pre-operative painful symptoms is satisfactory. No patients were re-operated for bladder DIE recurrence.

In this series, we consider by definition that bladder endometriosis must be considered as DIE only if endometriotic lesions infiltrate the bladder muscularis propria. Classically, DIE is histologically defined in arbitrary manner when endometriotic lesions extending more than 5 mm beneath the peritoneal surface (Koninckx *et al*., 1991). Suggested 20 years ago, this definition is arbitrary, difficult to ascertain and has never been verified formally. In 2010, we believe that it is now time to have a more objective histological definition for DIE. We suggest, regardless of location (bladder, intestine, ureter, etc.), that endometriosis is only considered to be DIE when the muscularis is involved (Chapron *et al*., 2009a, b).

In cases of DIE, the success of surgery correlated with the radicality of the surgical exeresis (Garry, 1997; Chopin *et al*., 2005; Vignali *et al*., 2005). Generally, DIE is presented as a pathology with a high risk of recurrence, estimated at ∼30% (Redwine and Wright, 2001; Fedele *et al*., 2004a, b). Often, however, recurrence corresponds to actual persistence of DIE lesions that were left in place as the result of an incomplete initial surgical removal (Fedele *et al*., 2005a, b; Vignali *et al*., 2005). In this study 56% of the patients ($n = 42$) had already undergone surgical treatment and 44% ($n = 33$) presented a Stage I or II according to the rAFS classification (1985). These observations demonstrate that DIE is not solely encountered in cases of Stage IV endometriosis. On the contrary, we should take care not to overlook bladder DIE nodules in all forms of suspected endometriosis. If, as in the great majority of the cases, a partial or complete obliteration of the anterior pouch is observed, sometimes ($n = 6$; 8% in this study) there is no adhesions in the vesico-uterine recess. It is often patients who previously had laparoscopies judged as subnormal or with superficial disease, who were simply treated by bipolar coagulation or laser vaporization without recognition of the underlying bladder disease. In these cases, treating the superficial lesions only deals with the visible part of the disease, while leaving behind the subperitoneal nodules that cause urinary symptoms. Partial cystectomy, which allows removing the entire vesical lesion, prevents recurrence (Seracchioli *et al*., 2009). Transurethral resection, which 14 (18.7%) of our patients had undergone, is not an appropriate surgical technique because it does not permit complete exeresis of the disease. Because the disease originates outside (from the peritoneum) the bladder (Vercellini *et al*., 2002), transurethral resection will be by definition incomplete, because radicality would imply bladder perforation. In our opinion therefore, there are no indications for transurethral resections in patients presenting with bladder DIE. Fedele et al. (2004a, b) showed that the greatest risk factor for recurrence after surgical management of DIE was the patient's age. The younger the patient, the greater the risk of recurrence. In younger patients, surgeons are likely to be more hesitant in carrying out radical treatment with partial cystectomy. Yet, inappropriate surgical management with incomplete excision stands as the primary factor of recurrence after DIE surgery.

Bladder DIE was isolated in only 36% of the cases. In other words, in two cases out of three the bladder DIE nodule was associated with other posterior DIE lesions (USL, vagina, intestine, ureter). Association of bladder endometriosis with other forms of the disease has been reported previously (Donnez *et al*., 2000; Fedele *et al*., 2005a, b; Somigliana *et al*., 2007). Contrary to Vercellini *et al*. (1996) however, we did not observe that patients with previous history of C-section presented significantly fewer associated DIE lesions. Concerning the pathogenesis of these lesions, our findings indicate that bladder DIE nodules should not be considered as an independent form of the disease (Somigliana *et al*., 2007). The multifocal distribution of DIE lesions indeed prompted us to cease considering this disease as a single organ pathology but rather, to see it as an 'abdomino-pelvic multifocal pathology'. Moreover in 18 cases (24%) bladder DIE was associated with OMAs. In these cases, the mean number of DIE lesions was significantly higher. These results confirm that OMA should be considered as a marker of severity of DIE (Redwine, 1999; Chapron *et al*., 2009a, b). These considerations need to be taken into account for defining the modalities for managing these patients. The pre-operative work-up (questioning, clinical examination and imaging information) aims to clarify the exact location and likely extension of DIE lesions. This is essential in order to: (i) Specify the surgical procedures required in order to achieve complete excision of symptomatic DIE lesions, the only way to prevent the recurrence; (ii) Thoroughly describe the surgical risks to the patient; (iii) Obtain the patient's full informed consent, as necessary prior to surgery for a benign pathology responsible for painful symptoms. The pre-operative work-up (including cystoscopy) is useful not only for the diagnosis of bladder endometriosis, but also to rule out vesical epithelial malignancy, to ascertain the precise location of bladder DIE nodule (distance with the ureteral meata and the lower endometriotic margin) and to define the ureteral status.

DIE is a heterogeneous disease. Posterior DIE lesions associated with a symptomatic bladder DIE nodule are not always painful. In this study, a posterior DIE nodule was associated with bladder DIE lesions in 48 patients (64%). For 15 patients, the associated posterior nodule is asymptomatic. These patients underwent surgery due to severe dysmenorrhoea and urinary symptoms during menstruation. In these cases, a partial cystectomy only was performed, and asymptomatic posterior nodules were left in place in order to restrict the treatment to the painful functional symptoms. With a 76.3 ± 50.5 months follow-up, only one patient (6.7%) was re-operated due to the appearance of pain symptoms connected with the initially asymptomatic posterior DIE lesions. These results confirm the observations of Fedele *et al*. (2004a,b) who reported that for patients with untreated asymptomatic rectovaginal endometriosis, the estimated cumulative proportion of patients with progression of disease and/or appearance of pain symptoms attributable to rectovaginal DIE was 9.7% after 6 years follow-up. It is important to take these observations into consideration for DIE patients' management. The discovery of a DIE nodule during clinical and/or imaging investigations is not always followed by surgery. Only lesions that give rise to symptoms should be operated on.

Conclusion

When medical treatments (oral contraceptives, progestins) are ineffectual, partial cystectomy is an effective surgical option for patients suffering from bladder DIE. This operative procedure allows complete removal of vesical lesions and prevents recurrence. Not all DIE lesions give rise to symptoms. For patients presenting with bladder DIE, only associated posterior DIE nodules responsible for incapacitating painful symptoms should be operated on. The heterogeneous nature of DIE lesions mandates careful customization of each individual treatment.

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