

How Do I Treat the Ureter in Deep Infiltrating Endometriosis by Laparoscopy?

Como Eu Trato o Ureter na Endometriose Infiltrativa Profunda por Laparoscopia?

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ABSTRACT

Surgery remains the best treatment for deep infiltrating endometriosis affecting the ureter. Different surgical procedures (ureterolysis, segmental ureteral resection with end-to-end anastomosis, ureteral reimplantation, and nephrectomy) have been performed with heterogeneous outcomes. In this article we discussed the indications and the technical details of each procedure.

Key words: Endometriosis. Laparoscopy. Ureter.

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INTRODUCTION

The prevalence of pelvic endometriosis, superficial or deep, in women of reproductive age is estimated at 10%.^{1,2} In women with chronic pelvic pain the prevalence can reach 82%.^{3,4} In those under investigation for infertility the prevalence is 20% to 50%.^{1,5,6}

Deep infiltrating endometriosis may involve the urinary tract.⁷ Such involvement is uncommon, observed in 0.03% to 5% of cases;⁸⁻¹² more specifically, ureteral endometriosis is estimated at 0.08% to 1% of patients.^{12,13} Among the endometriotic lesions of the urinary system, the bladder is the organ most affected (80%-84%), followed by the ureter (15%), kidney (4%) and urethra (2%).¹⁴ Two types of ureteral injury should be considered: intrinsic and extrinsic.

The extrinsic form is the most common and is characterized by contiguous envelopment of the

ureter, compressing and causing periureteral fibrosis, with impaired renal function in 30% of cases.¹⁵ The intrinsic form arises from lymphatic or venous metastasis¹⁶ and can present as an obstructive condition or cause cyclical hematuria when the ureteral mucosa is involved.¹⁷

The diagnosis of ureteral endometriosis can be difficult when specific symptoms are not present.¹⁸ The diagnosis may be missed during the physical examination as well as during the pre-operative work-up, and may even go unnoticed during surgical inspection.¹⁹

Limited series of cases of ureteral endometriosis are described in the literature, making it difficult to assess the efficacy of different treatments. Medical therapy is of limited benefit in patients with endometriosis, leading to temporary regression rather than eliminating the disease. Fibrosis, found in virtually all cases of ureteral endometriosis, responds poorly to hormonal treatment and recurrence

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rates are substantial. The management of the obstructive uropathy caused by endometriosis is primarily surgical, including ureterolysis, ureteral reimplantation, ureterectomy with termino-terminal anastomosis and, in extreme cases, nephrectomy.¹⁹

In this article we detail the techniques of the various forms of laparoscopic surgery for ureteral endometriosis.

SURGICAL TECHNIQUE

Under general anesthesia, the patient is placed in a supine position with the legs abducted so that the thighs are flexed 20° relative to the pelvis. To avoid injuries of the brachial plexus, both arms are positioned alongside the body. Positioning of the lower extremities should avoid compression of the sciatic, external popliteal, and calf nerves. The buttocks of the patient should extend slightly beyond the edge of the operating table.

The set-up for laparoscopy is traditional, with a 10 mm umbilical trocar for the 0° optic and three 5mm trocars in the suprapubic region. One trocar is positioned in the midline, 8 to 10 cm below the umbilical port and two trocars are placed in the iliac fossas, about 2 cm medial to the anterior-superior iliac spine, always lateral to the inferior epigastric vessels.

Uterine cannulation needs to be done with care. We position a large caliber curette through the cervix, anchored with a Pozzi clamp; this permits anterior flexion of the uterus, while reducing the risk of perforation of the uterine fundus.

If the ureter is dilated or if the lateral extension of the lesion is considerable, one can place a double-J catheter before beginning the dissection of the ureters. Placement of the catheter before beginning the laparoscopy facilitates the ureteral dissection, but is not mandatory. The laparoscopic placement of the double-J catheter during surgery is optional and is performed using a retrograde technique.

TREATMENT OF ENDOMETRIOSIS

The principles of surgery for deep endometriosis are simple:

- Start the dissection in healthy tissue to identify vulnerable structures (ureters, gastrointestinal tract, and branches of the nerve plexus) at a distance from the pathological tissue;

- Complete excision of the lesion;
- Avoid unnecessary movement of adjacent organs.

The surgical steps for treatment of deep endometriosis include:

- Release of pelvic adhesions;
- Treatment of any endometriomas – release of adhesions of the endometrioma and ovarian cystectomy;
- Mobilization of the sigmoid colon;
- Identification of the ureters and treatment of ureteral endometriosis (ureterolysis, segmental resection of the ureter, ureteral reimplantation or nephrectomy);
- Resection of anterior deep endometriosis lesions, with or without resection of bladder, as needed;
- Transection of the uterosacral ligament and identification of the pararectal space, identification of the posterior fornix of the vagina, dissection of endometrial nodule, separation of the nodule from the retrocervical region, resection of the posterior vaginal fornix (if there is infiltration of the vagina) and treatment of lesions of the rectal wall (shaving, disk resection, or segmental resection of the rectum).

These maneuvers are individualized for each patient.

The final three surgical steps described above do not occur necessarily in that order. Typically we first address the anterior deep lesions, followed by the ureteral dissection and resection of the posterior deep lesions. When segmental resection or reimplantation of the ureters is necessary, it should be performed before the treatment of deep rectal lesions to avoid contamination of the urinary tract with fecal content.

The checklist at the end of surgery includes:

- Test of tubal patency;
- Verification of hemostasis with and without anteversion of the uterus;
- In cases with bladder resection verification of the integrity of the bladder: injection of

200 ml of normal saline with methylene blue to identify possible areas of leakage;

- In cases of colorectal resection for endometriosis verification of the integrity of the rectum: injection of 100ml air transanally after filling the pelvis with Ringer's lactate solution.

TREATMENT OF THE URETER

The diagnosis of ureteral involvement should ideally be done preoperatively, whenever possible.

The mobilization of the sigmoid colon along the upper narrowing of the pelvis allows the identification of the ureter medial to the lumbo-ovarian vessels (Figure 1). If the ureter is not identified during the mobilization of the sigmoid, or if the lesion is located

on the right side, an incision is made in a healthy part of the peritoneum, and then the ureter is sought in contact with the peritoneum, knowing that if the dissection of the peritoneum is complete, a bluish hue of the peritoneum will be observed, explained by the fact that the pneumo-peritoneum is seen because of the transparency of the serosa. This bluish hue merely permits one to affirm that only the serosa remains and that the ureter is no longer adhering to the peritoneum. The ureteral repair guides the resection of the lesion.

During this phase of the ureteral dissection, the ovarian pexia is very useful because it frees up a surgical instrument. After freeing the ovaries from the broad ligament, the pexia can be performed via a transparietal route uni- or bilaterally with a straight needle (Figures 2 and 3).

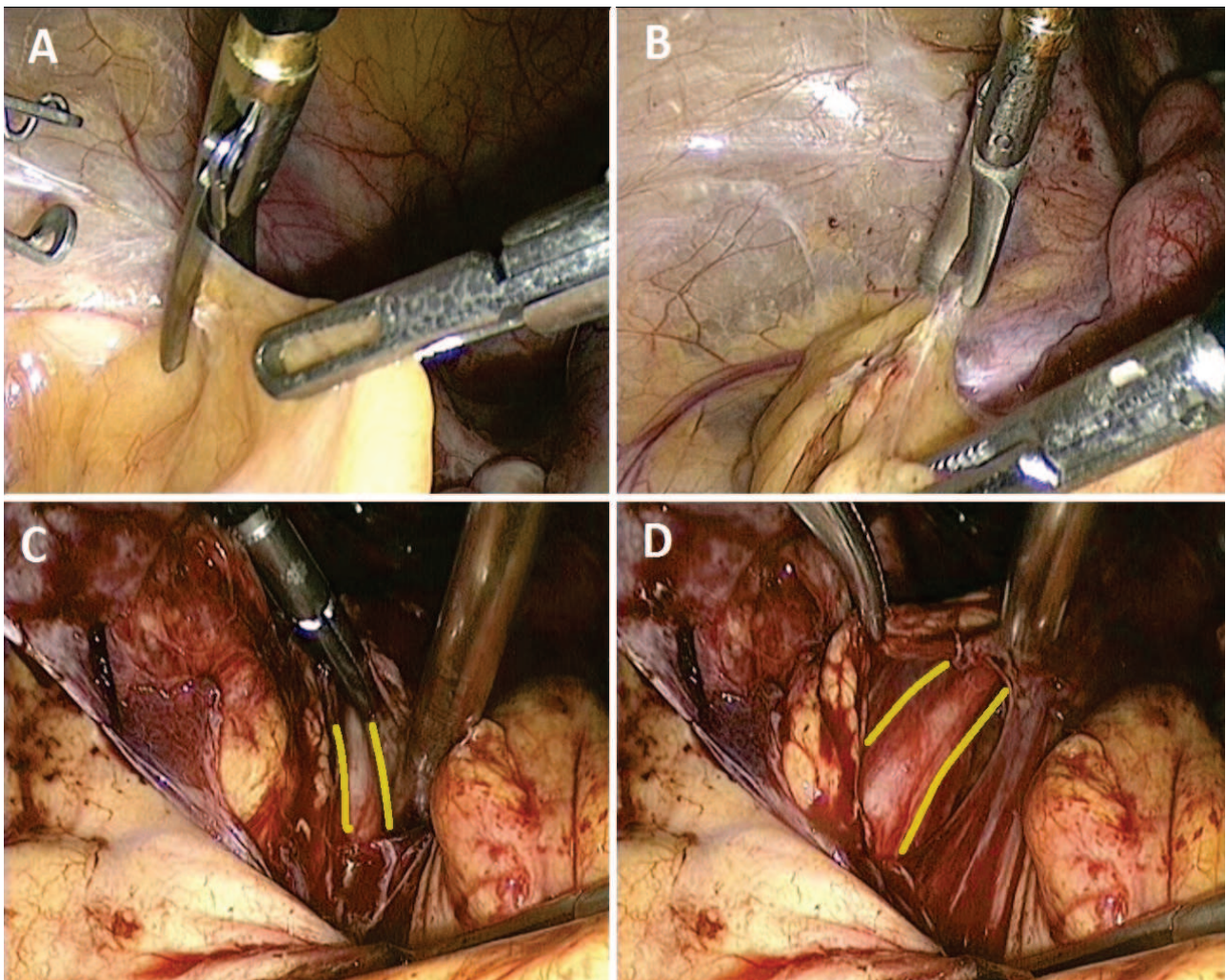


Figure 1 - (A and B) Mobilization of the sigmoid colon. (C and D) Identification of the ureter medial to the vessels of the pelvic infundibulum.

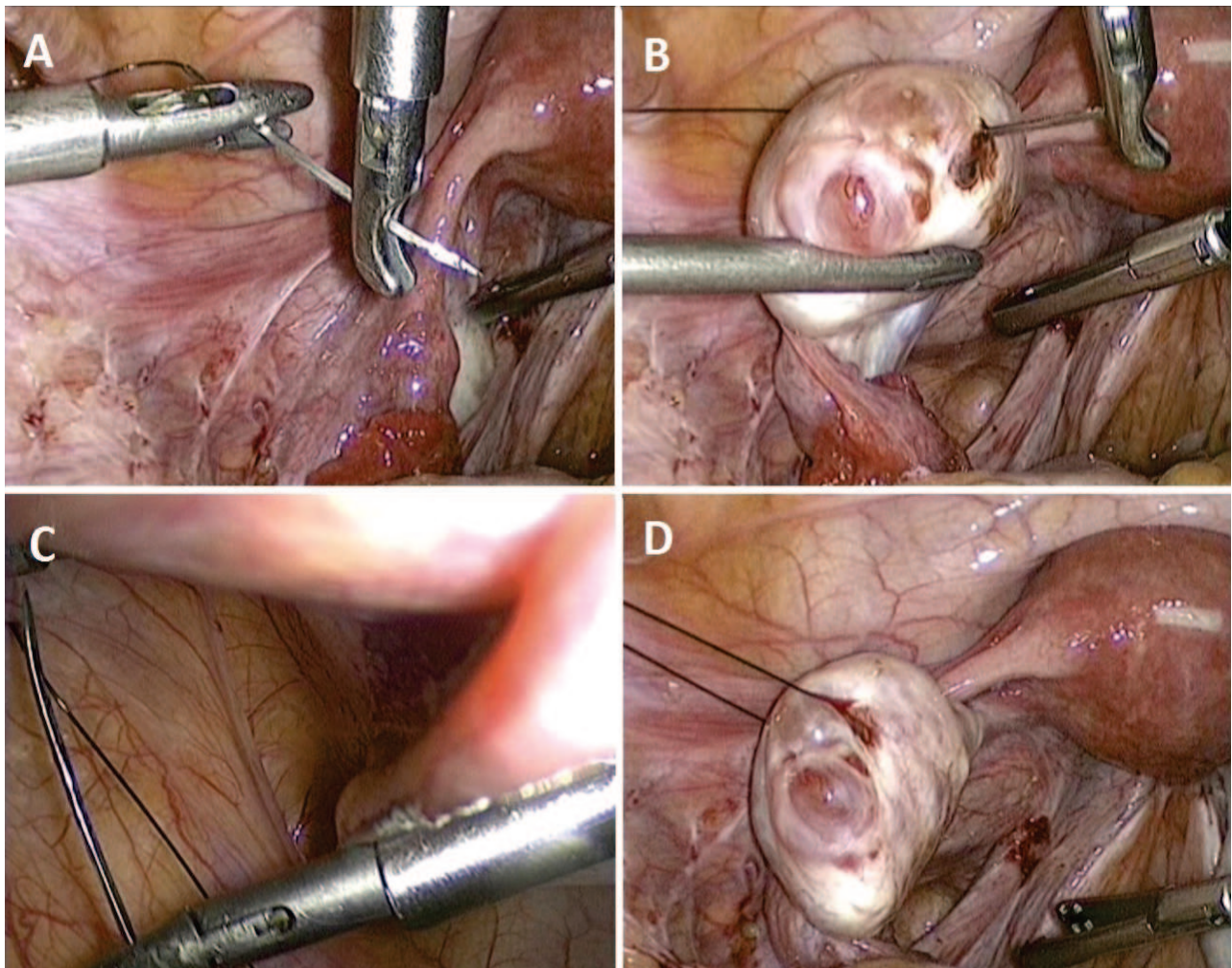


Figure 2 - (A) Transabdominal passing of the suture needle. (B) Pulling the needle through the left ovary. (C) Transabdominal removal of the needle from inside the abdominal cavity. (D) Appearance of the suspended left ovary.

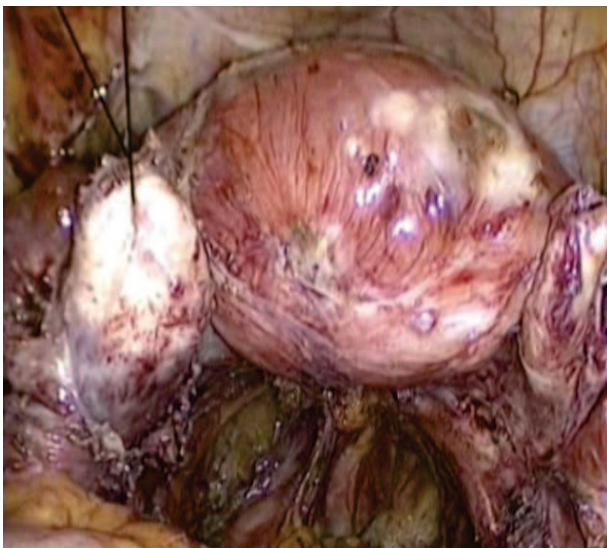


Figure 3 - Bilateral ovarian suspension in a resection of deep endometriosis.

The ureter should be excluded from the dissection in cases where the area to be resected does not involve the broad ligament. This is the case of lesions which only involve the uterosacral ligament or retrocervical region, in which only the dissection medial to the ureter is able to ensure a safe distance from the area of the ureter to be coagulated (Figure 4). When the lesion penetrates only the portion of broad ligament medial to the ureter, dissection of the lateral ureteral face is not required (Figure 5). When there is need for resection of the entire broad ligament because of involvement of endometriosis, the lateral, anterior and medial aspect of the ureter should be dissected (Figures 6 and 7).

In bulky posterior lesions (more than 2 cm in diameter) located in the midline, encompassing the uterosacral ligaments and retrocervical region, in order to ensure that there is no risk of injuring the ureter at

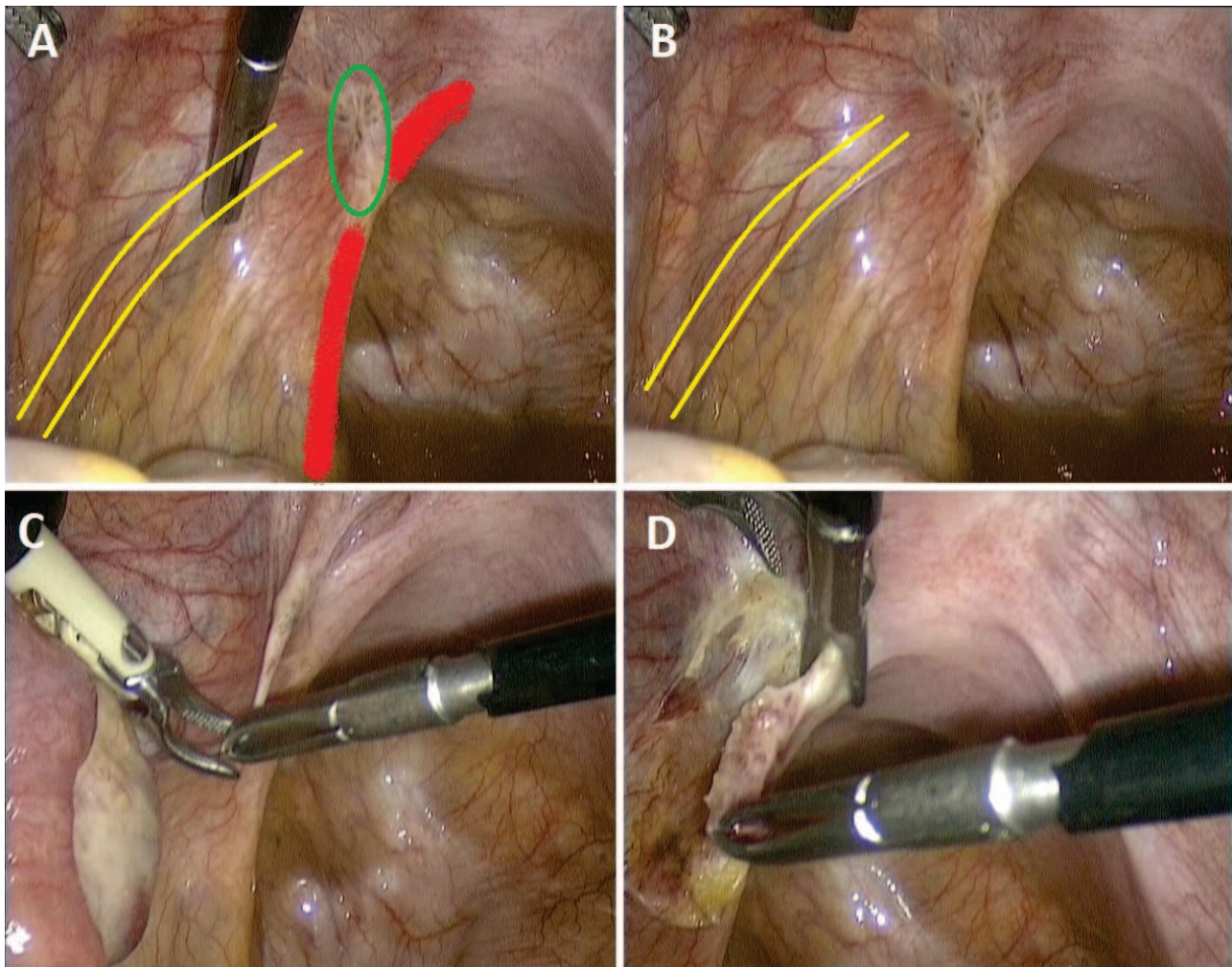


Figure 4 - Endometriosis lesion (green circle) in the left uterosacral ligament (in red), distant from the ureteral course (in yellow). The lesion is resected without having to dissect the medial aspect of the ureter.

the end of resection, it is important to completely release the ureter to where it crosses the uterine artery (Figure 8).

Depending on the degree of ureteral involvement of the endometriosis, it may be necessary to perform ureterolysis, segmental resection of ureter, ureteral reimplantation, or, in extreme cases, nephrectomy. When the procedure performed is limited to ureterolysis, without altering the caliber of the ureter and in the absence of upstream dilatation of the urinary tract, no further intervention is required. If, however, after ureterolysis there is a persistent ureteral stenosis, if the ureterolysis involved the resection of a portion of ureteral musculature, or led to the discovery of a cystic lesion in the ureteral wall, a part of the ureteral course should be resected.

The question of whether to conduct reimplantation systematically, or if a termino-terminal

anastomosis is possible after ureteral resection, depends primarily on technical considerations, especially the length of the resected segment. If there is a dilation of the urinary tract, the indications for ureteral resection should be broadened, even when the ureterolysis seemed to have been carried out under ideal conditions.

Ureterolysis

Ureterolysis consists of the surgical excision of fibrotic endometriotic tissue enveloping the ureter to relieve an ureteral obstruction.¹⁸ In these cases, ureteral dissection is initiated close to the bifurcation of iliac vessels in healthy tissue. The ureter should be freed from the peritoneum of the broad ligament, which is often retracted by an inflammatory reaction association of the endometriosis. The dissection proceeds toward the uterosacral ligament, freeing the

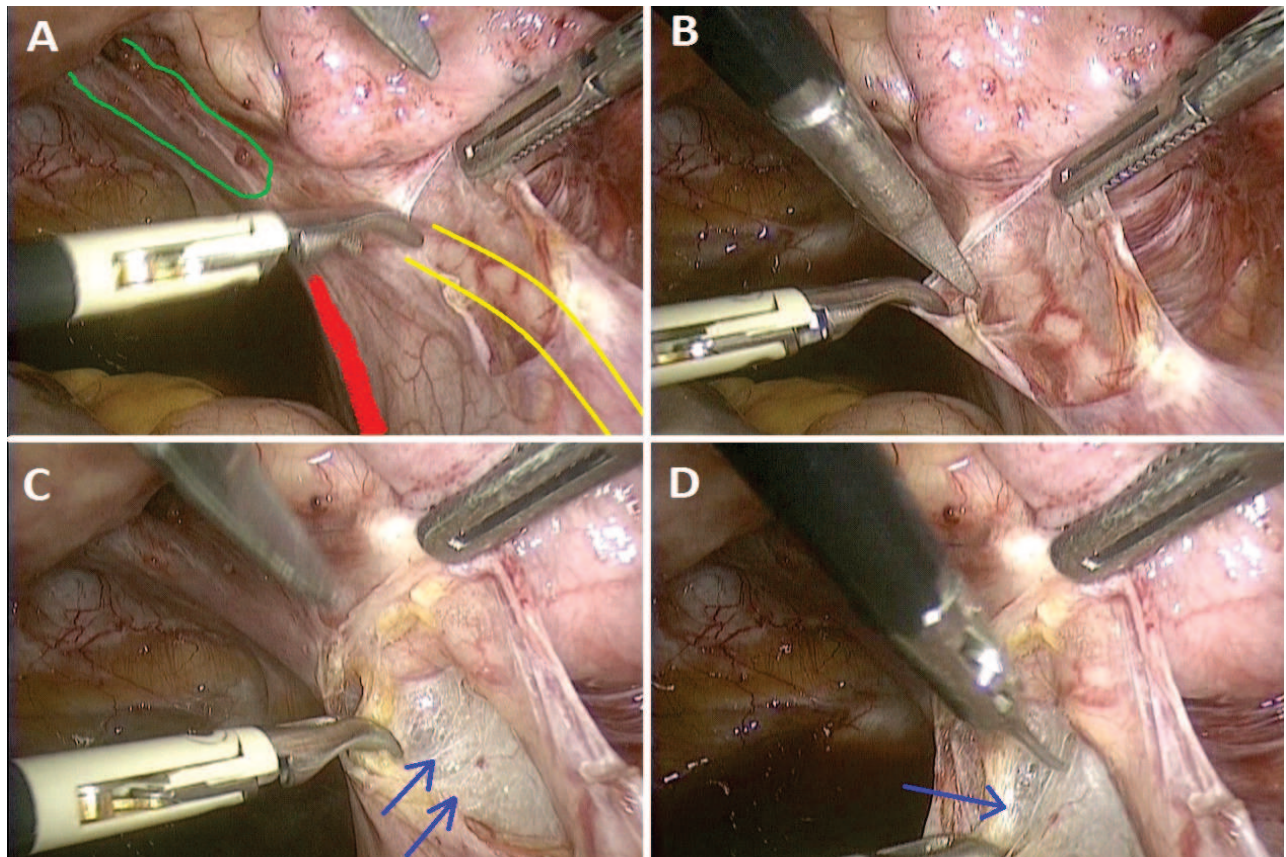


Figure 5 - (A) The endometriotic lesion (in green) involves the broad ligament medial to the ureter (in yellow). The area in red corresponds to the right uterosacral ligament. (B) The dissection of the ureter begins in a region of healthy tissue, medial to the ureter. (C and D) The dissection proceeds toward the right uterosacral ligament. The blue arrows point to “bubbles” of CO₂ gas penetrating into healthy tissue.

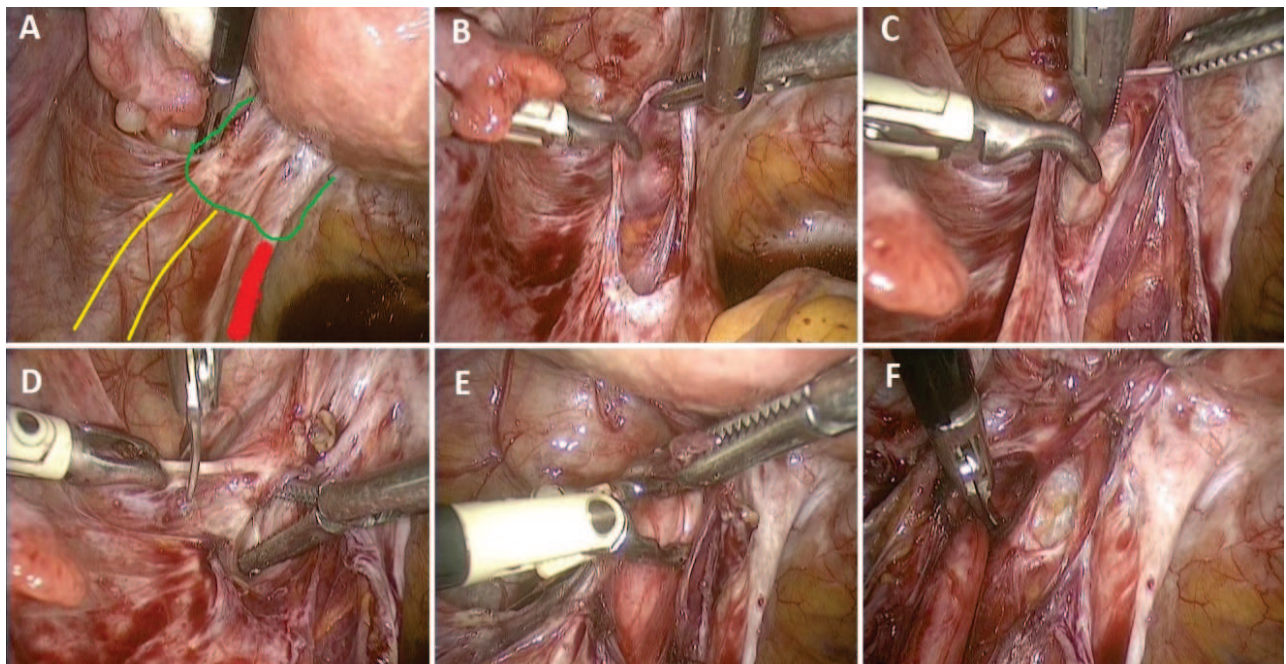


Figure 6 - (A) Endometriosis lesions (in green) involving the uterosacral ligament (red) and the broad ligament, medial and lateral to the ureter (in yellow). (B) The dissection begins in the healthy area and proceeds toward the area of retraction. (C) Identification of the anterior wall of the ureter. (D) Resection the broad ligament lateral to the ureter. (E) Release of the anterior wall of the ureter. (F) Dissection of the medial aspect of the ureter.

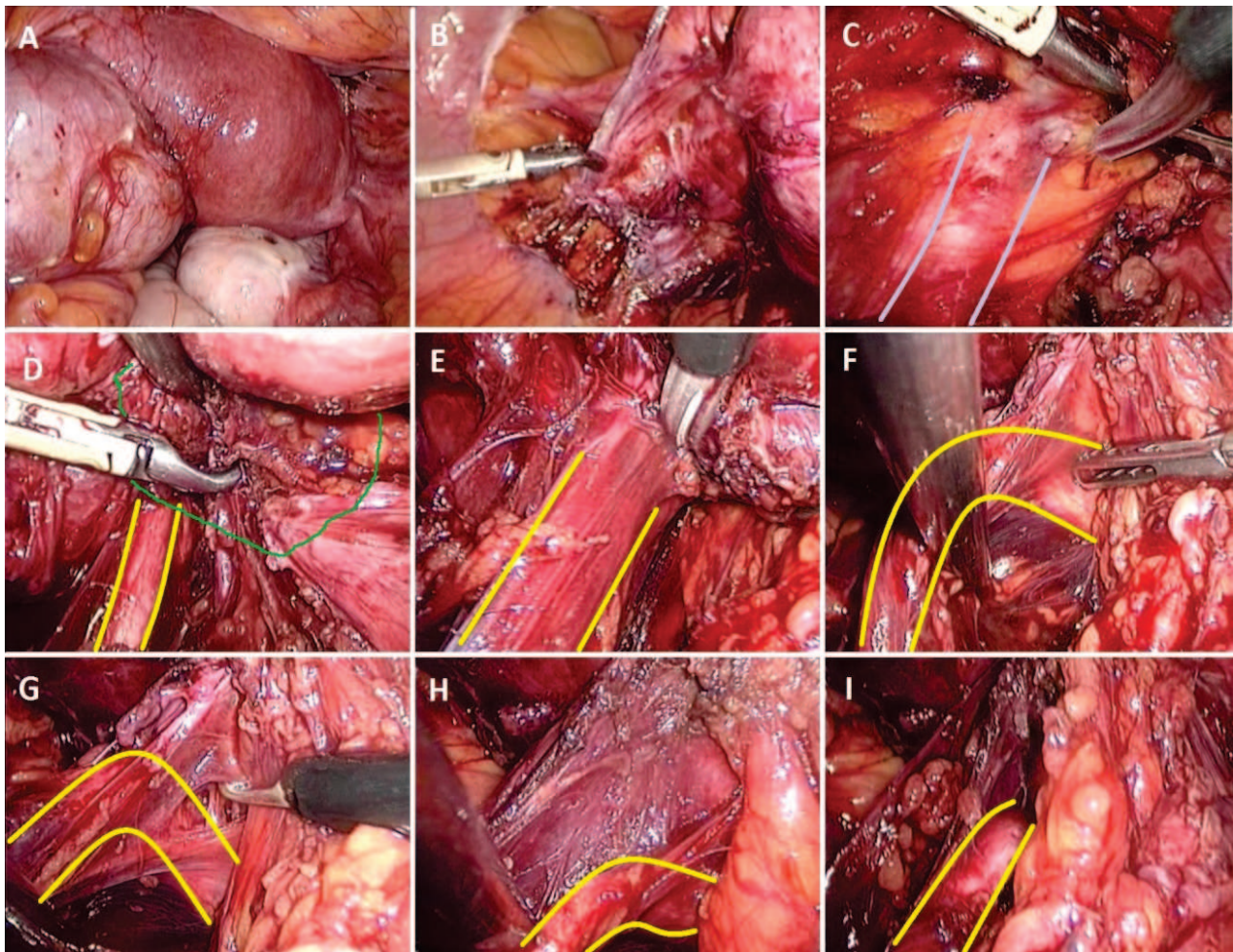


Figure 7 - (A) Endometrioma in the left ovary adhering to the posterior wall of the uterus, left ovarian fossa, and epiploic appendages of the sigmoid colon. (B) Wide resection of the left broad ligament. (C) Identification of the iliac vessels (the iliac artery is outlined in light blue). (D) Identification of the ureter (in yellow) adjacent to the posterior deep endometriosis to be resected (in green). (E through I) Dissection of lateral, anterior, and medial aspects of the ureter (in yellow).

ureter from the inflammatory reaction in this topography, and leaving it alongside the endometriotic area to be resected (Figure 9).

In those cases where it is difficult to identify the ureter or when there is concern about the integrity of the ureter after ureterolysis, a double-J catheter can be inserted via cystoscopy. Placement of the double J catheter before beginning ureterolysis facilitates the identification and dissection of the ureter, but is not routinely required and should be indicated in selected cases.

Ureterectomy and termino-terminal anastomosis

In cases of stenosis of a limited segment of the ureteral course corresponding to the ovarian fos-

sa, a ureteral resection with termino-terminal anastomosis can be performed.¹⁸ After the resection of the endometriosis-affected ureter, the free edges of the ureter should be spatulated. The suture used for the anastomosis should be resorbable, preferably 3-0 or 4-0 polyglactin (Vicryl ®) or polydioxanone (PDS ®). The placement of a retaining suture on the free ends of the ureter before spatulation minimizes ureteral trauma from the manipulation with gripping instruments.²⁰

In the past, ureteral anastomosis was performed with a continuous suture to ensure an impermeable anastomosis.²⁰ Currently, we prefer to perform an anastomosis with interrupted sutures. When about 50% of the circumference of the anastomosis is complete, the double-J catheter is

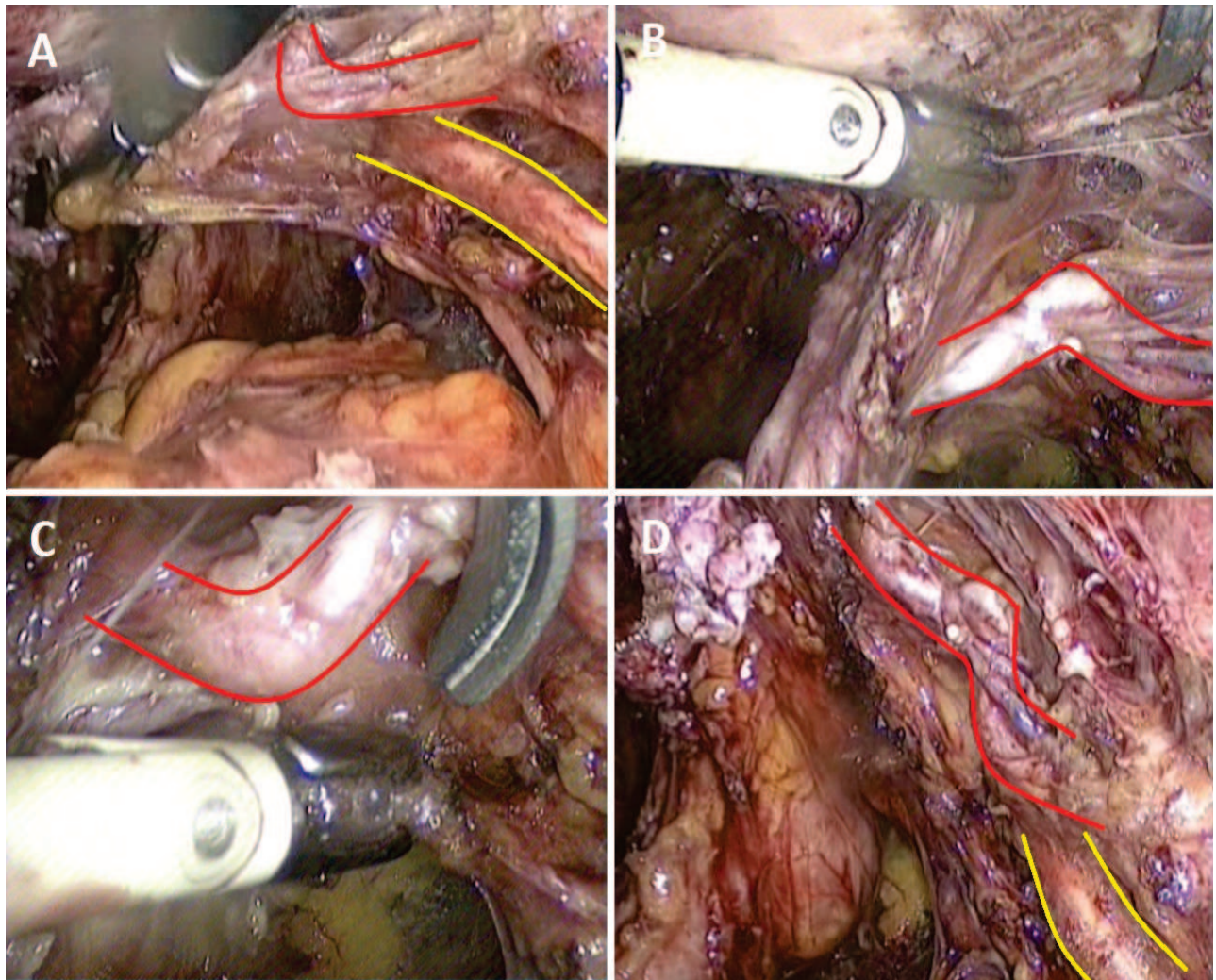


Figure 8 - Dissection of the ureter (in yellow) up to the point where it intersects with the iliac vessels (the uterine artery is outlined in red) in the case of a large retrocervical lesion.

passed in a retrograde manner through the 5mm trocar ipsilateral to the ureter being treated. The proximal end is positioned in the renal pelvis and distal end in the bladder. The rest of the ureteral anastomosis is completed with the double-J catheter in place.

Ureteral reimplantation

In cases of severely obstructive ureteral endometriosis in which ureterolysis is not possible, or for which a resection of a long segment of the ureter is required, ureteral reimplantation is the treatment of choice. Resection of the ureter proximal to the area of stenosis and fibrosis and its reimplantation in the bladder makes it possible for the fibrotic area that surrounds the ureter to be transposed, minimizing the risk of recurrence.¹⁸ Short distances can be managed

with ureteroneocystostomy (ureteral reimplantation) with or without a Psoas Hitch, and large defects can be corrected using a Boari flap, by ileal interposition, or autotransplant.⁹

After the ureter is dissected and isolated, it is sectioned proximal to the area of obstruction. The ureteral end that will be reimplanted is spatulated so that a uretero-vesical anastomosis of a suitable caliber can be performed. The bladder is filled with 200 to 300 ml of saline solution to facilitate its opening (Figure 10A). The peritoneum of the bladder is opened, followed by the opening of the detrusor musculature (Figures 10B and 10C). The mucosa of the bladder wall is opened with laparoscopic scissors (Figure 10E).

The double J catheter is passed into the ureter in a retrograde fashion (Figure 10D). One must be careful not to twist the ureter while inserting the

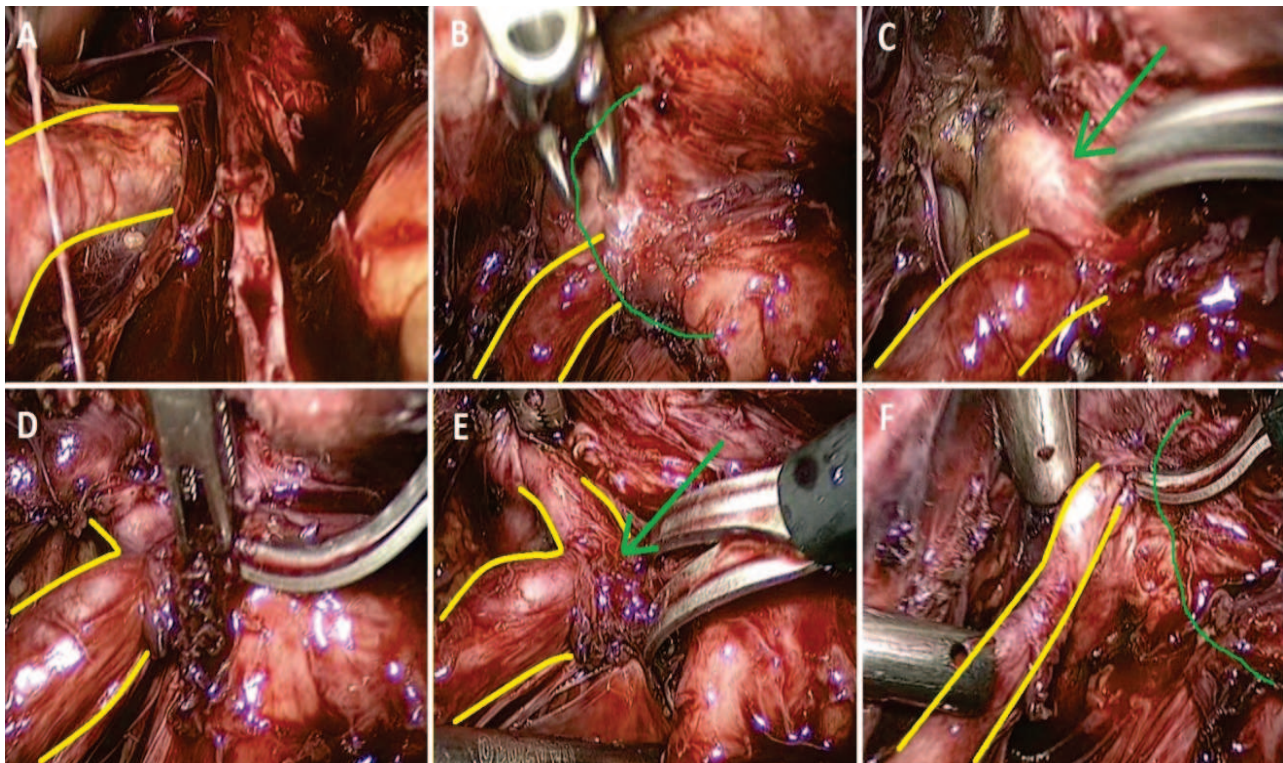


Figure 9 - (A) Dissection of the ureter (in yellow). (B) Identification of the area of fibrosis (in green) in the course of the ureter. (C, D and E) Release of the inflammatory reaction around the ureter (in yellow), which is bent at an angle (green arrow). (F) Appearance of the ureter (in yellow) after ureterolysis, here lateral to the posterior deep endometriosis that will be resected (in green).

catheter, as this may reduce vascularization and lead to postoperative fistulas.

The spatulated end of the ureter is anastomosed to the bladder mucosa with a continuous suture using two 3-0 or 4-0 polyglactin (Vicryl®) or polydioxanone (PDS®) sutures (one for the left hemi-circumference, and one for the right hemi-circumference). Start with an outside to inside suture in the ureter, and an inside to outside suture in the bladder, anchoring the posterior portion of the anastomosis (at six o'clock). This thread is then used to suture continuously in a clockwise direction until 12 o'clock. The second suture is also anchored at six o'clock. The ureter is sutured to the bladder with a continuous suture in a counterclockwise direction. Before finalizing the suture, the distal end of the double J catheter is positioned inside the bladder. The two sutures are tied together at six o'clock (Figures 10F to 10I). Then the anti-reflux mechanism is fashioned according to the Lich-Gregoir technique,^{21,22} using simple sutures of 3-0 polyglactin (Vicryl®) or polydioxanone (PDS®) in the detrusor muscle (Figure 11A and 11B).

The bladder wall can be anchored to the ipsilateral psoas tendon to further decrease the tension of the anastomosis, using a technique called the Psoas Hitch.

In the cases of large urethral defects, the ureteral reimplantation technique with a Boari flap is used. The ureter is sectioned proximal to the area of stenosis. The bladder is filled with 200 to 300ml of normal saline. The bladder is completely mobilized from the Retzius (pre-vesical or retro-pubic) space with monopolar cautery. A generous flap from anterior bladder wall is created with a U-shaped incision (Figures 13A to 13D). The edges of the ureter and the bladder flap are mobilized until they abut without tension. The ureter is spatulated. Full thickness suturing with 3-0 or 4-0 polyglactin (Vicryl®) or polydioxanone (PDS®) is used to construct the posterior wall of the anastomosis.

Using a retrograde approach a double J catheter is inserted into the ureter (Figure 13E). The proximal end of the catheter is advanced until the renal pelvis, and the distal end into the

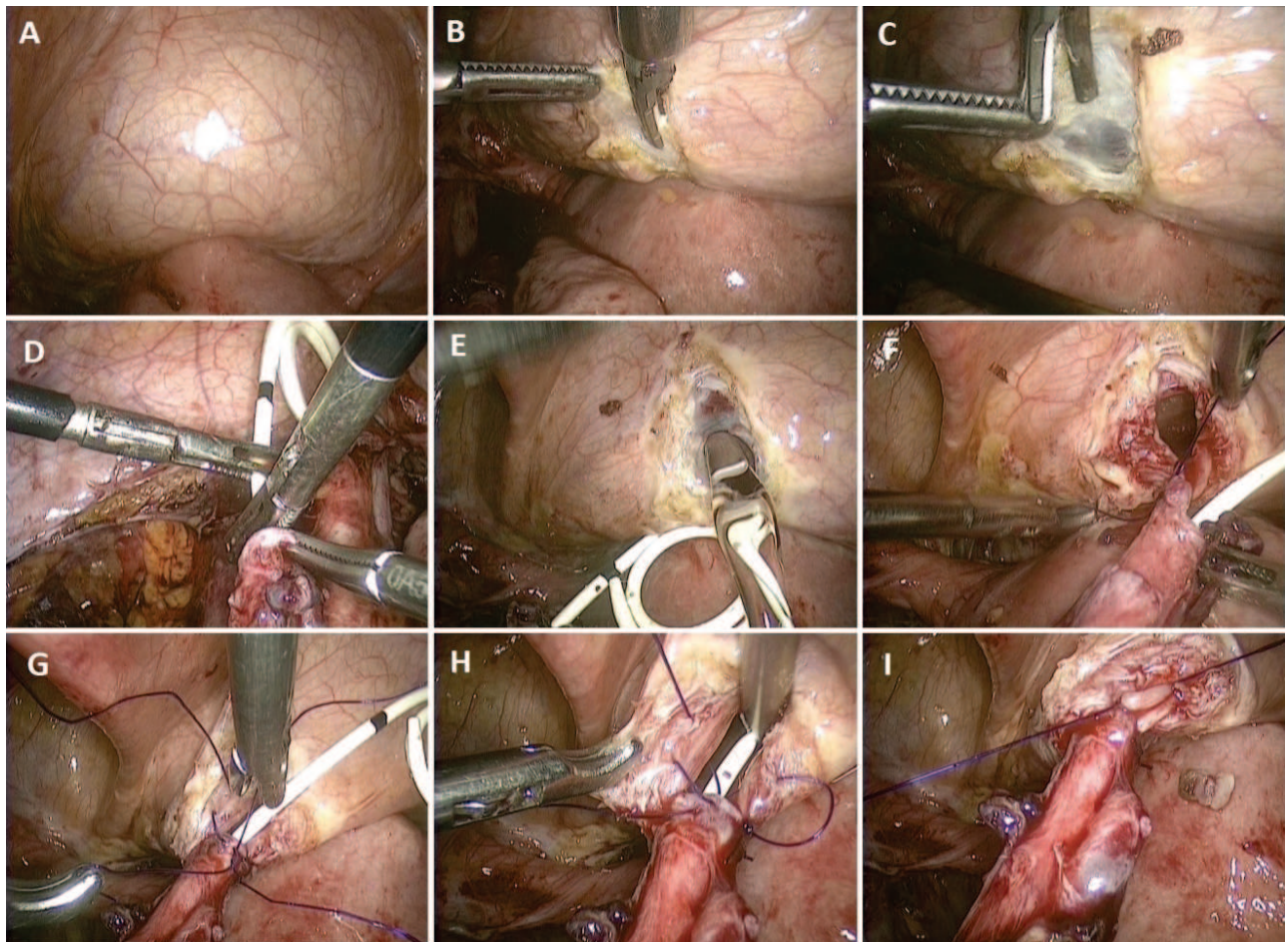


Figure 10 - (A) The bladder filled with isotonic saline. (B and C) Opening of the bladder wall until the mucosa is identified. (D) Retrograde insertion of the double-J catheter. (E) Opening of the bladder mucosa with cold scissors. (F through I) Uretero-vesical anastomosis with two 3-0 PDS sutures.

bladder. Full thickness sutures are positioned to complete the circumferential anastomosis (Figure 13F).

A continuous suture is used for “make a tube” in the bladder flap to the bladder (Figures 13G and 13H). Inflation of the bladder with 200 to 300 ml of isotonic saline solution establishes the impermeability of the anastomosis (Figure 13I).

After reimplantation of the ureter, the Foley catheter is left in for a period of 7 to 10 days. Some authors obtain cystography before removing the Foley catheter.²³ The double-J ureteral catheter is removed 3 to 4 weeks after surgery by cystoscopy. A functional study of the kidney (excretory urography, abdominal CT with intravenous contrast, or renal scintigraphy with furosemide) is performed four weeks after the removal of double J catheter to ensure the absence of recurrent obstruction.²³

Nephrectomy

In extreme cases of ureteral obstruction with renal exclusion, nephrectomy is indicated. The technique for nephrectomy is well described in literature.²⁴ Briefly, the patient is positioned in lateral decubitus contralateral to the kidney that will be operated. The colon is mobilized medially and the renal vessels are identified. The ureter is dissected and isolated. The renal vessels are controlled with LT-300 titanium clips and the kidney is completely freed from the retroperitoneum.

DISCUSSION

Ureteral involvement is a serious and silent complication that should be considered in all cases of

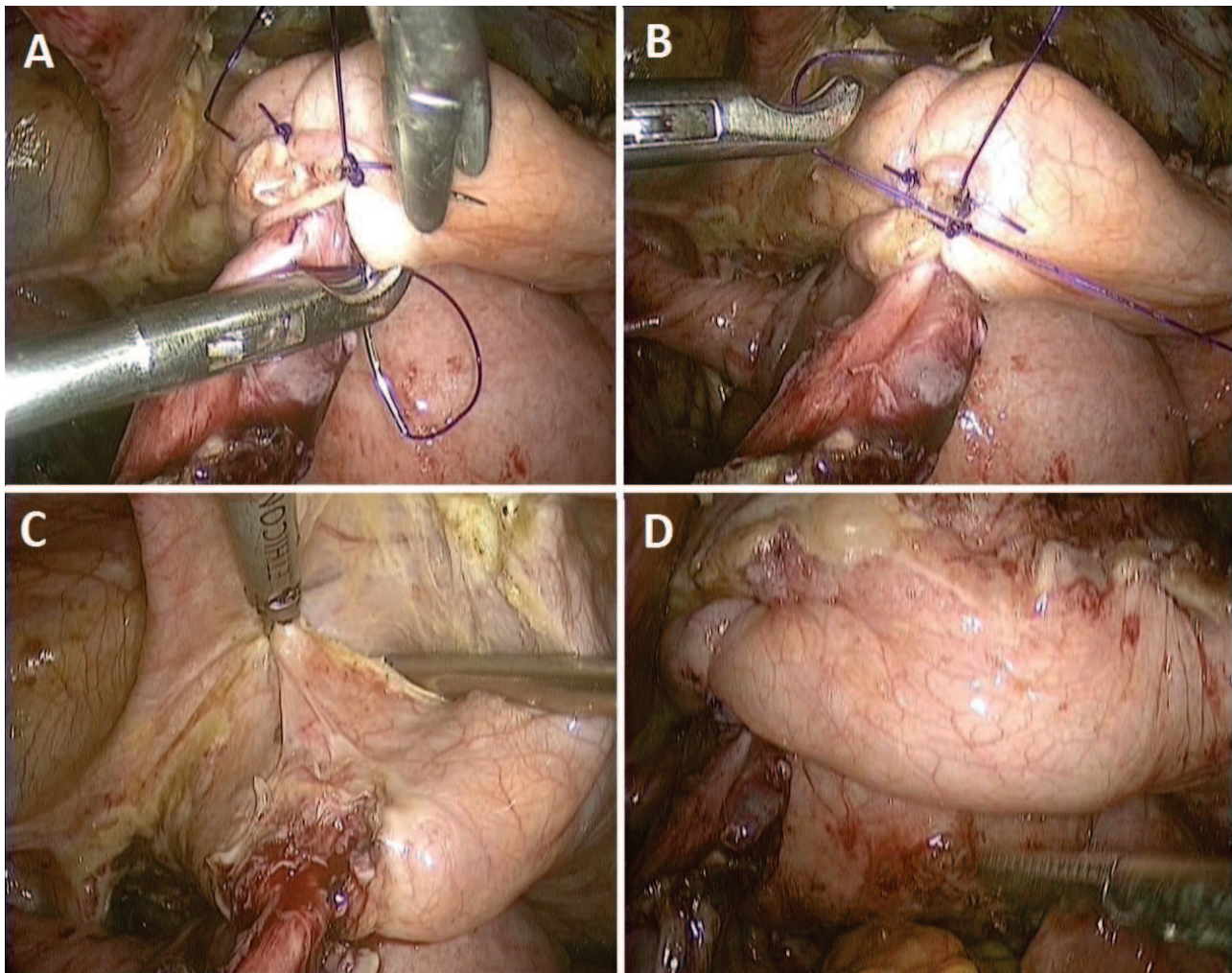


Figure 11 - (A and B) Construction of the anti-reflux valve. (C and D) Freeing of the bladder in Retzius' space to reduce the tension on the anastomosis. To reduce the tension on the anastomosis, the bladder should be completely freed in Retzius' space (Figures 11C and 11D).

deep infiltrative endometriosis. Isolation and laparoscopic retroperitoneal inspection of both ureters helps to diagnose cases of clinically silent ureteral involvement.

Approximately 25-50% of kidneys affected by ureteral endometriosis are lost. This high rate of renal wastage may be the result of (1) a delay in diagnosis, since the endometriotic lesion progressively narrows the ureteral lumen, with consequent worsening of the hydronephrosis, or (2) a misdiagnosis when ureteronephrectomy is performed because of a suspicion of a ureteral cancer.⁹

Ultrasonography of the urinary tract is essential in the preoperative investigation of all large volume posterior infiltrative endometriosis lesions located in the midline or posterior lateral lesions. Donnez et al²⁵ showed that with a nodule 3 cm or greater in diameter in the posterior fornix, the risk of

ureteral involvement was 11%, justifying the systematic use of ultrasonography of the urinary tract.

In the study by SERACCHIOLI et al²⁶ including 30 women with laparoscopic diagnosis of endometriosis with ureteral involvement, confirmed histologically, the diagnosis was considered preoperatively in only 40% of patients. Involvement of the ureter occurred on the left side in 46.7%, on the right side in 26.7%, and bilaterally in 26.7%. Ureteral involvement was associated with endometriosis in the ipsilateral uterosacral ligament in 100% of cases, in the bladder in 50%, in the rectovaginal septum in 80%, in the ovaries in 53.3%, and in the bowel in 36.7%. A case series published by BOSEV et al²⁷ included 96 patients with ureteral endometriosis diagnosed surgically and confirmed histologically. Among the preoperative findings were four cases of hydroureter and two cases of

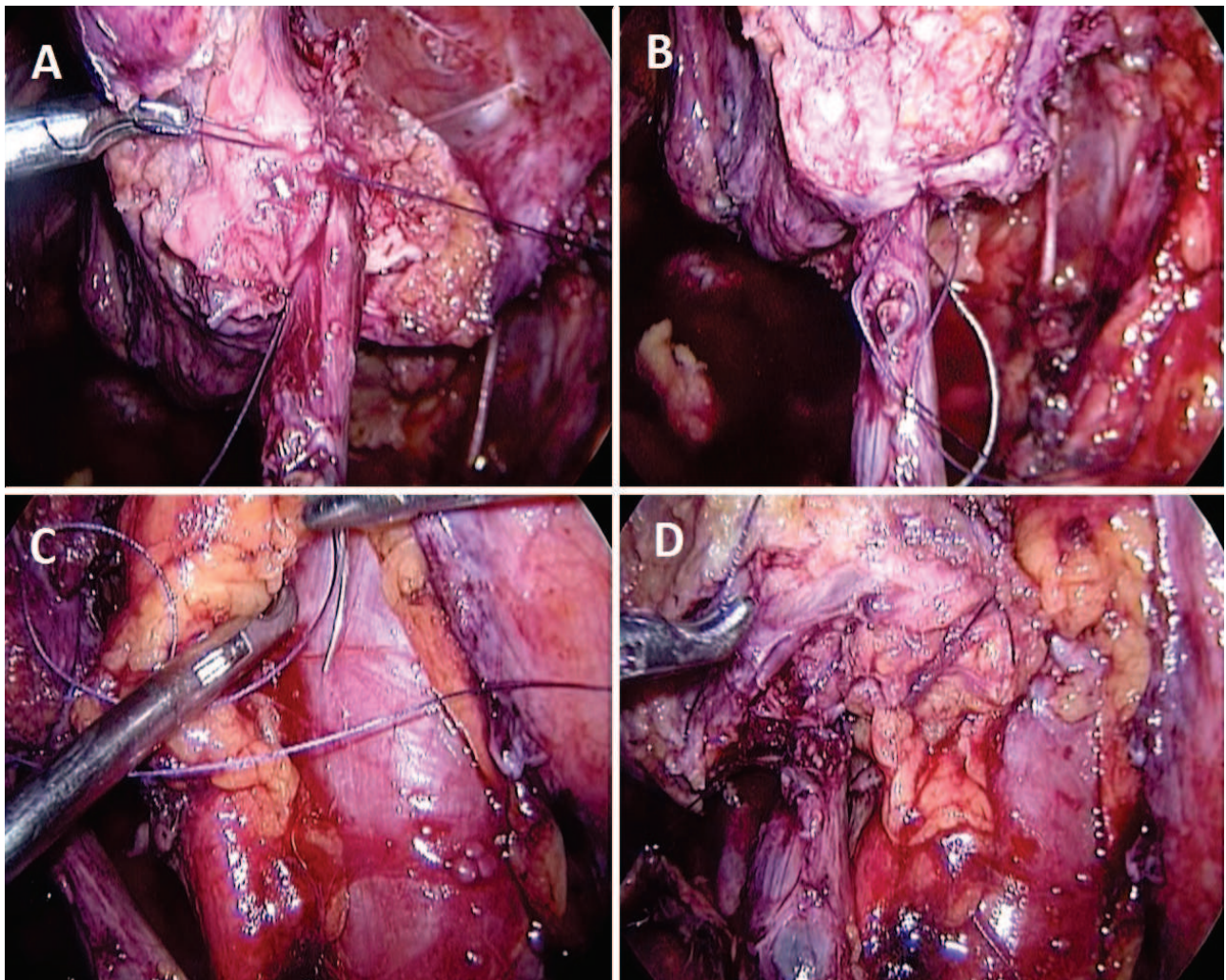


Figure 12 - (A) Right ureteral reimplantation. (B) Construction of anti-reflux mechanism. (C) Stitching into the psoas muscle. (D) Final appearance after fixation of the bladder wall to the psoas muscle (Psoas Hitch).

hydronephrosis. Endometriosis affected only the left ureter in 53% of the cases, only the right ureter in 36%, and both ureters in 10%.

Surgical treatment of ureteral endometriosis should be directed at relieving urinary tract obstruction and preventing recurrence of the disease, with as little morbidity as possible. Using the combined skills of a team of urologic and gynecologic surgeons, the goal of the surgery is the complete excision of the endometriosis, including its fibrotic reactive component, with the long-term relief of ureteral obstruction and preservation of renal function. If the kidney is not functioning, the prospect of recovering renal function after conservative surgery is poor; in these cases, nephrectomy is the best option.¹⁹

Ureteral endometriosis can be treated effectively and safely by laparoscopy, as has been

demonstrated in several case series.²⁶⁻²⁹ Ureterolysis was performed in 69% of patients with ureteral endometriosis. Obviously, the degree of difficulty of the procedure depends on the size, location, and degree of infiltration of endometriotic tissue in the ureteral wall. Ureterolysis is contraindicated in patients with complete ureteral obstruction, while it is the procedure of choice for minimal nonobstructive extrinsic endometriosis.¹⁸

There is no consensus regarding the benefit of ureterolysis in patients with mild to severe ureteral obstruction.¹⁸ In a series of 96 cases of ureteral endometriosis reported by BOSEV *et al*,²⁷ all patients initially underwent ureterolysis, followed by evaluation of ureteral function. In cases with a non-dilated ureter with subjective signs of impairment (significant change in the appearance of the ureter, poor peristaltic activity, or a desvascularized serosa), or of a dilated ureter for

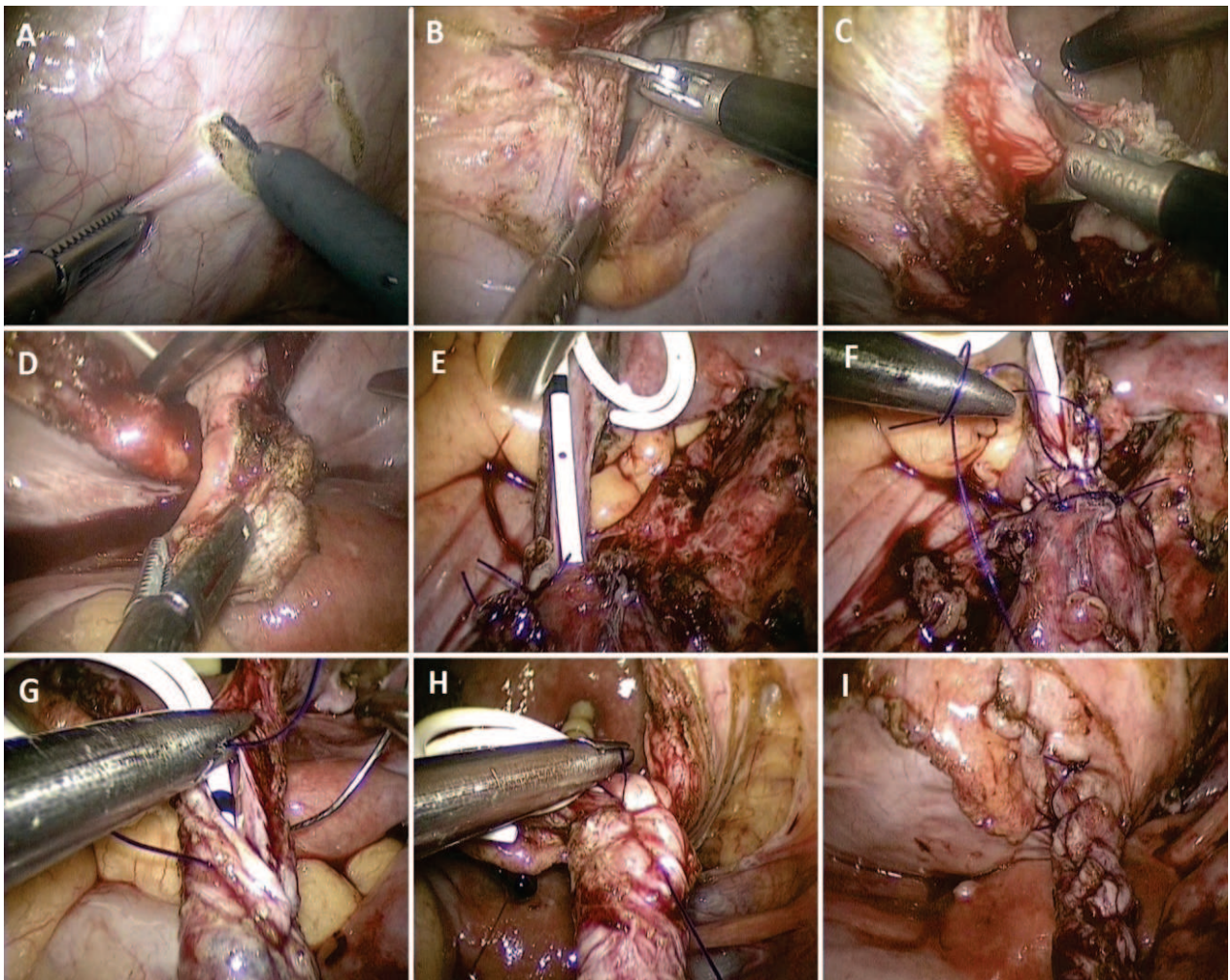


Figure 13 - (A through D) Preparation of the U-shaped bladder flap. (E) After fixation of the posterior wall of the anastomosis between the bladder flap and the ureter, the double J catheter is inserted in a retrograde fashion. (F and G) Non-continuous 4-0 PDS sutures are used for the anastomosis between the bladder flap and the ureter. (H) The bladder flap is wrapped around the double-J catheter with a continuous 4-0 PDS suture. (I) The bladder is closed with continuous 4-0 PDS sutures and the integrity of the anastomosis is tested.

which decompression was not possible, placement of a double J catheter was considered. The dilated ureter that could not be decompressed, suggesting true involvement of the ureter was resected and reimplanted. In two cases there was a need for a segmental ureteral resection and uretero-vesical reimplantation with a Psoas Hitch, and in six cases placement of a double J catheter was required. Two patients required rehospitalization, including one case of a septic pelvic thrombosis, and one case of partial stenosis of the right ureter, which was treated with ureteral dilatation and placement of a double J catheter.

FRENNA et al¹² reported no recurrence in 54 patients with ureteral endometriosis who underwent ureterolysis. In this series, obstructive uropathy was

present in three cases. In a series reported by SERACCHIOLI et al,²⁶ thirty patients with retroperitoneal fibrosis involving the ureter were described, of which 10 had hydronephrosis. Thirty-two (73%) underwent ureterolysis; no recurrence or complication was reported.

Some series, on the other hand, have reported complications of ureterolysis for the treatment of ureteral endometriosis. Antonelli et al²⁹ described 19 patients with ureteral endometriosis; eight of them had evidence of a dilated or non-functioning urinary tract with preoperative intravenous pyelography (IVP) or computed tomography (CT). After preoperative urinary drainage by nephrostomy or ureteral stent, six patients showed a good recovery of renal function,

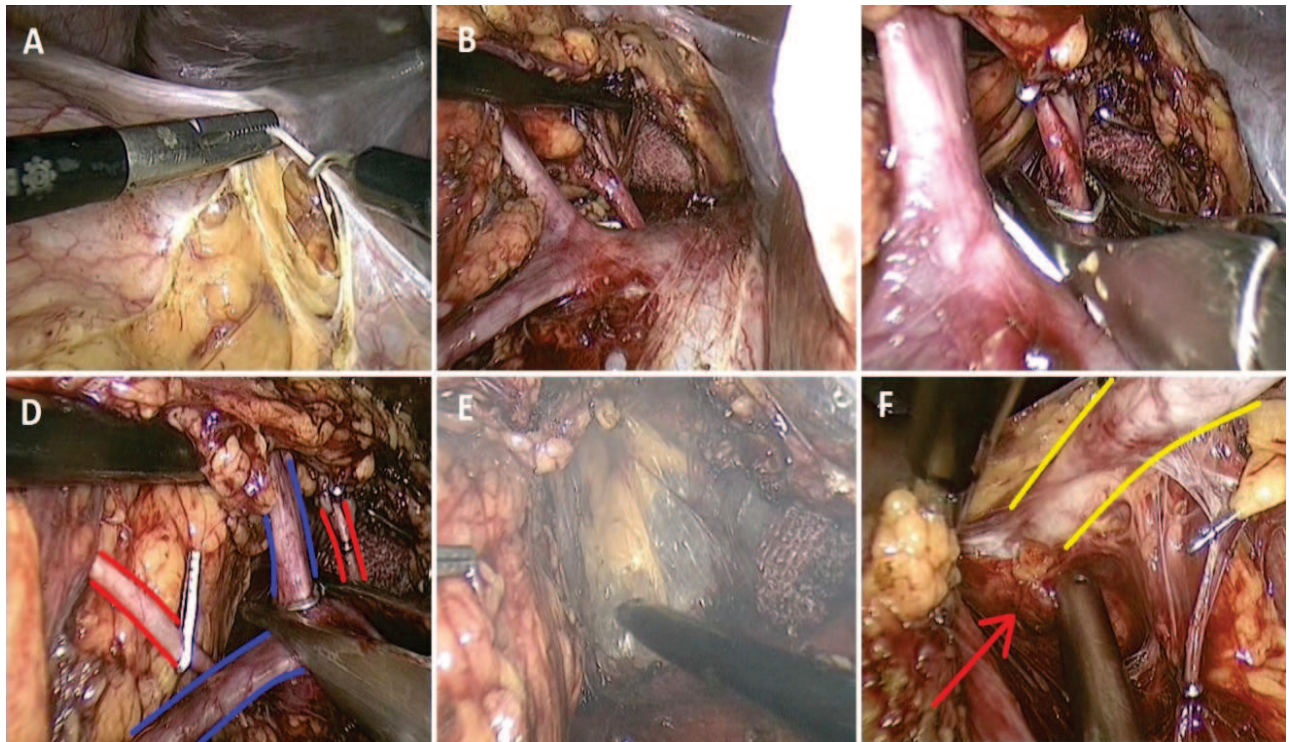


Figure 14 - (A) Mobilization of the colonic flexure. (B) Dissection of the renal veins. (C) Ligation of the right renal artery with a LT-300 clip. (D) Ligation of the renal vein with a LT-300 clip. Note the presence of two renal arteries (in red) and the gonadal vein draining into right renal vein (in blue). (E) Release of the posterior wall rim near the psoas muscle. (F) Dissection of the right ureter (in yellow) at the point of the obstruction (red arrow).

while two patients showed irreversible renal atrophy and underwent nephrectomy. Of the remaining 17 patients, six underwent ureterolysis, with two recurrences (33%).

Mereu et al³⁰ reported 52 patients with ureteral endometriosis and moderate or severe uretero-hydronephrosis, defined as ureteral dilatation ≥ 1 cm. Among the 35 patients who underwent ureterolysis, 7 (20%) required neo-cystostomy two months after the procedure. The postoperative complications requiring reoperation included one ureteral fistula, one hemoperitoneum, and two intestinal anastomotic fistulas.

GHEZZI et al³¹ reported 33 patients with moderate to severe hydronephrosis documented by preoperative IVP. One patient underwent vesico-psoas hitch and one a partial ureteral resection. Among the 31 patients who underwent ureterolysis, there were 4 cases (12.9%) of recurrent ureteral stenosis four to nine months after surgery. Another patient had extensive recurrence of the endometriosis, not involving the ureter, and underwent a hysterectomy 18 months after the initial surgery.

PEREZ et al¹⁵ reported a series of seven patients with ureteral endometriosis, of whom two underwent ureterolysis. One patient underwent immediate reoperation with a termino-terminal anastomosis, requiring percutaneous nephrostomy two months later for obstructive uropathy. She underwent neocystostomy seven months after the first surgery. The other patient had an ureterovaginal fistula which was treated with percutaneous nephrostomy.

When ureterolysis is chosen, it is important that the periureteral vascular supply be preserved during the procedure.²⁷ The vascular supply of the distal ureter usually comes laterally from the iliac artery, while the supply for the proximal and middle ureter comes medially from the aorta. Also, a thin vascular network extends along the ureter. Therefore, ureterolysis should preserve the peritoneal tissue and the adventitia of the ureter.³²

The partial resection of the ureteral wall was reported in seven patients by Nezhat et al²⁸ and in one patient by GHEZZI et al.³¹ The evaluation of the indications and results of this procedure were

hampered by the small number of cases reported in the literature.¹⁸

The segmental ureteral resection with termino-terminal anastomosis is another option for the surgical treatment of ureteral endometriosis. Mereu et al³⁰ reported 17 patients who underwent this procedure, with two (11.7%) requiring neocystostomy two months after the procedure. ANTONELLI et al²⁹ reported one recurrence in two patients treated. SERACCHIOLI et al²⁶, NEZHAT et al²⁸ and DONNEZ et al⁵ had no complications and no recurrences in 5, 4 and 1 treated patients, respectively. Because the affected ureteral segment is resected, it is considered a more radical procedure than ureterolysis. However, as in ureterolysis, the distal ureter is preserved. This is the segment of the ureter that crosses the parametrium, which makes the chance that fibrotic tissue will recur high.¹⁸

In cases of severe obstructive ureteral endometriosis, when uretero-lysis is not possible and resection of a long segment of the ureter is necessary, neo-cystostomy is the treatment of choice. Resection of the ureter above the stenotic area and reimplantation into the bladder allows the fibrotic area that surrounds the urethra to be transposed, which minimizes the risk of recurrence. As the affected ureteral segment is usually the lower third, a tension-free anastomosis is possible, using the psoas hitch technique as necessary.¹⁸ An anti-reflux surgery is important to prevent ascending infections.^{33,34}

Among the 39 patients reported in the series by PÉREZ-UTRILLA et al,¹⁵ one (2.6%) had recurrence. This patient presented with bilateral obstructive uropathy two months after a bilateral posterior neocystostomy, and was treated with ureteral stents and percutaneous nephrostomy. Over the ensuing 16 months she presented intestinal involvement of the endometriosis, requiring colorectal anastomosis. At 22 months of follow-up, she required a right renal auto-transplant in the right iliac fossa.

CARMIGNANI et al³⁵ reported 13 patients with ureteral endometriosis treated with ureteroneocystostomy with psoas hitch. The indications for the procedure were severe hydronephrosis, radiologic evidence of ureteral stenosis measuring more than 4cm, or the impossibility of performing ureterolysis because of macroscopic infiltration of endometriosis or atonia secondary to a

fibro-sclerotic segment. No recurrence was observed during six months of post-operative follow-up.

According to Seideman et al,³⁶ in the presence of ureteral stenosis caused by benign disease which is localized at or below the pelvic brim, ureteroneocystostomy is the treatment of choice. Obtaining a well-vascularized anastomosis, without tension and that is impermeable is critical to the success of this procedure. If there is uncertainty about the viability or vascular supply of the distal ureter, it should be resected until viable tissue is obtained. If reimplantation cannot be achieved without tension, reimplantation with a Boari flap is preferred.

In the case series reported, in general, the recurrence rates of ureterolysis, termino-terminal anastomosis, and neocystostomy were 7.9%, 10.7% and 2.6% respectively. However, due to the heterogeneity of the populations studied in the different series, one should consider that the value of such comparisons is limited.¹⁸

Kidneys with a glomerular filtration rate (GFR) of less than 10ml/min have sustained irreversible damage.³⁷ In these cases, the affected system should be totally removed by ureteronephrectomy. However, in asymptomatic patients, non-surgical management can also be considered. There is no data that informs the indications for and results of nephrectomy versus nonsurgical management in patients with irreversible loss of function renal.¹⁸

FINAL CONSIDERATIONS

Ureteral endometriosis should be considered in all women with large lesions of deep infiltrating endometriosis. Surgical treatment is almost always necessary in order to preserve organ function. There is still no absolute consensus regarding the best technique to use, but in our personal experience ureterolysis should be attempted in all patients, followed by intraoperative evaluation of the ureter. In the case of signs of ureteral stenosis after ureterolysis, segmental resection with ureteral reimplantation should be considered even during the same surgical procedure. Prospective randomized trials with a larger numbers of patients are needed to define the true indications for each type of surgical procedure.

RESUMO

A cirurgia permanece o melhor tratamento para a endometriose profunda infiltrativa com comprometimento ureteral. Várias técnicas cirúrgicas têm sido aplicadas (ureterólise, ressecção segmentar ureteral com anastomose término-terminal, reimplante ureteral e nefrectomia) com resultados variados. Neste artigo abordamos as indicações de cada procedimento bem como os detalhes técnicos das mesmas.

Palavras chave: Endometriose. Laparoscopia. Ureter.

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