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Laterally Extended Pelvic Resection for Gynaecological Malignancies: A Multicentric Experience with *Out-of-the-Box* Surgery

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ABSTRACT

Purpose. To evaluate morbidity and oncological outcome in a multicentre series of women with gynaecological malignancies infiltrating pelvic side wall (PSW) that received laterally extended pelvic resection (LEPR).

Methods. Patients operated between 2007 and 2017 at three institutions were included. LEPR was defined as an en bloc *lateral* resection of a pelvic tumour involving sidewall muscle, and/or bone, and/or major nerve, and/or major vascular structure. Postsurgical complications and survivals were evaluated.

Results. Sixty-three women with gynaecological tumours involving PSW were treated with LEPR. Five women underwent primary LEPR, whereas 58 (92%) patients needed LEPR because of recurrence. Twenty-four women (38%) received previous radiation therapy before the surgery. R0 resection was achieved in 54 patients (85.7%), whereas the pathologic margins were microscopically and macroscopically positive in 8 (12.7%) patients and 1 (1.6%) patient, respectively. There was one perioperative death, whereas major postoperative complications occurred in 17 patients (27.7%). Thirty (47.5%) women experienced recurrences: 24/54 (44.4%) were in the R0 group, and 6/9 (66.6%) were in the R1 group, with a median PFS of 15 months and 7 months, respectively ($p = 0.024$). In total, 11 of 54 (20.3%) patients died of disease in the R0 group and 5 of 9 (55.5%) in the R1 group; a median OS was not reached and was 32 months for R0 and R1 groups, respectively ($p = 0.033$).

Conclusions. Involvement of the PSW should not prevent obtaining R0 resection. Although the LEPR is associated with considerable morbidity ($\approx$ 30%), a long-term survival seems to be achieved in those women with complete resection.

Locally advanced primary or recurrent gynaecological cancer infiltrating the pelvic side wall (PSW) was until recently thought to be contraindicated for surgery, mainly because of the paucity of existing data.[1–6] The preoperative radiological assessment with MRI, ultrasound and PET/CT scan allowed for more accurate exclusion of distant metastases and local disease assessment. The improvement of quality of imaging together with new surgical techniques extend opportunity of curative surgical treatment even in cases with the involvement of lateral pelvic compartments, such as muscles, nerves, vessels, and bony structures.[7]

A possibility of a curative treatment in gynaecological cancer infiltrating the lateral compartment or entrapping the pelvic nerves (i.e., out of the surgical pelvic compartment as defined by M. Hockel) is very limited.[8–11] The

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response of such patients to nonsurgical treatment is extremely low; only one-third of these patients experienced symptom relief with radiotherapy and/or chemotherapy.[12]

The feasibility of surgical approach to the PSW disease, including sidewall muscle and/or pelvic bone and/or major nerve and/or major vascular structure resections, has never been specifically studied in gynaecological malignancies, except small case series.[9,10,13–16]

With the goal to address this specific issue, we evaluated the early and late postoperative complications, as well as the oncological outcome, in a retrospective multicentric series of women with isolated lateral pelvic gynaecological malignancies treated with lateral extended pelvic resection (LEPR) in tertiary referral centres for exenterative surgery.

MATERIALS AND METHODS

After obtaining local approval from the institutional review board (IRB), we reviewed the records of all patients who underwent a lateral endopelvic resection (LEPR) with curative intent between December 2007 and March 2017 at: "Agostino Gemelli" University Hospital in Rome, Italy; General University Hospital in Prague, Czech Republic; and Queen Elizabeth Hospital, in Gateshead, UK.

We defined a LEPR as an en bloc resection of a pelvic tumor together with PSW structures including muscles (iliopsoas muscles and/or obturator internus), and/or a portion of pelvic bones, and/or major nerves (obturator nerve, femoral or sciatic nerve), and/or major vascular structures (common and/or external iliac vessels) to attain negative pathologic margins. Anatomical structures were categorized into four segments: cranial segment (medial part of the psoas and iliacus muscle + external iliac vessels), ventral segment (obturator vessels + obturator nerve + obturator fascia and muscle), dorsal segment (internal iliac vessels + dorsal part of the piriformis muscle), caudal segment (sacrococcygeal muscle + pudendal vessels + iliococcygeus muscle; Table 1; Supplemental Fig. S1).[17] Simultaneous resection of more than one of the above mentioned pelvic structures (muscle ± nerves ± bone ± vessels) were defined as the multiple or complex PSW surgical procedure. Patients in whom the internal iliac vessels or their branches were the only vascular structures resected did not meet the criteria for a LEPR and were not included in the study.

Relevant demographic, clinical, and pathologic data were retrieved from medical records. According to each Institutional policy, a priori all women with more than 80 years old and/or with a performance status > 2 according to ECOG (i.e., Eastern Cooperative Oncology Group) were excluded from the procedure. Tumour size, extension to pelvic anatomical structures, and absence of distant metastatic disease were assessed by preoperative imaging (expert ultrasound, CT chest abdomen, MRI pelvis, and PET-CT scans). "Expert ultrasound" is defined as preoperative ultrasonography performed by examiners experienced in gynaecologic ultrasound (level III) (Education, Practical Standards Committee, European Federation of Societies for Ultrasound in Medicine and Biology, 2006).

The type of resection was defined based on the status of the pathologic margins: R0, microscopically negative; R1, microscopically positive; and R2, macroscopically (grossly) positive. The cases were performed by a multidisciplinary surgical team when deemed appropriate, involving surgeons, orthopedics, urologists, vascular surgeons, or plastic surgeons. Major urological procedures were defined as bladder resection, ureterectomy, ureteral reimplantation with or without bladder psoas hitch, and cystectomy with urinary diversion.[18]

Data on postoperative complications were obtained from the records of all hospital admissions, discharge summaries, and office visits up to 180 days postsurgery. Complications were graded using the Memorial Sloan-Kettering Cancer Center (MSKCC) grading system[19]: Grade 1 (G1) complications required oral medications or bedside interventions; Grade 2 (G2) complications required intravenous medications, enteral or parenteral nutrition, or

TABLE 1 Anatomical categorization of the lateral pelvic compartment[17]

Lateral pelvic compartment categorization	Anatomical components
Cranial segment	Medial part of the psoas and iliacus muscle
	External iliac vessels
Ventral segment	Obturator vessels
	Obturator nerve
	Obturator fascia and muscle
Dorsal segment	Internal iliac vessels
	Dorsal part of the piriformis muscle
Caudal segment	Sacrococcygeous muscle
	Pudendal vessels
	Iliococcygeus muscle

chest tube insertion; Grade 3 (G3) complications required surgical or radiological intervention, intubation, or therapeutic endoscopy; Grade 4 (G4) complications produced a chronic disability requiring major rehabilitation or organ resection; and Grade 5 (G5) complications resulted in death. A major complication was defined as any grade between G3 and G5. Early complications included those observed up to 30 days following the LEPR procedure and late complications were defined as those occurring between 31 and 180 postoperative days. In patients with multiple complications, the highest-grade complication per patient was assigned. Adjuvant therapy was defined as any cancer therapy given to patients following LEPR and before the diagnosis of subsequent recurrence. In general, adjuvant treatment was recommended in cases with positive margins, whereas other traditional risk factors (i.e., disease close to resection margins, lymphovascular involvement, or high degree of tumour differentiation) were not considered an indication for any further treatment.

Statistical Analysis

Descriptive data are reported as mean (standard deviation), median (range) or number of patients and percentage. Categorical variables were compared by: the Chi square test; continuous variables by the Student's t test; and the nonparametric Mann–Whitney U test. The logistic regression analysis was used to reduce potential confounding factors and to assess the role of independent variables. Progression-free survival (PFS) was defined as the interval from the LEPR to the diagnosis of recurrence/progression of the disease. Overall survival (OS) and PFS were estimated using the Kaplan–Meier method and differences were calculated using the log-rank test.[20] Multivariate analysis was done using the Cox regression.[21] All statistical tests were two-sided, and differences were considered significant at a level of $p < 0.05$. The NCSS statistical software program, version 11.0 (NCSS Statistical Software, Kaysville, UT) was used.

RESULTS

Sixty-three women with gynaecological cancer involving PSW were treated with LEPR. Supplemental Fig. S2A illustrates the typical appearance of a PSW involvement before surgery. In the same patient, tumour resection is demonstrated by intraoperative photographs in Supplemental Fig. S2B. The number of procedures has increased over the years (Supplemental Fig. S3).

The relevant demographic, clinical, and pathologic data are summarized in Table 2. The median age at the time of LEPR was 53 (range 26–77) years. The median body mass index (BMI) was 23 kg/m^2 (range 15–45). The primary tumour sites were: cervix (n = 19, 30.2%); endometrium (n = 17, 27.0%); ovary (n = 17, 27.0%); vulva/vagina (n = 7, 11.1%); and synchronous tumours (n = 3, 4.7%). The median tumour diameter was 56 mm (range 15–150). All patients underwent a comprehensive preoperative radiologic evaluation that included a combination of CT and/or expert US and/or MRI and/or PET scan.

LEPR was performed as the primary treatment in five patients and for a recurrence in the remaining 58 women. Twenty-four patients (38.0%) had received pelvic radiation therapy before the LEPR, either as part of the primary or adjuvant therapy or for treatment of an earlier recurrence. Another 39 patients (62.0%) were treated with a combination of surgery and chemotherapy before the LEPR. The median preoperative DFI was 21 months (range 6–202). The perioperative and postoperative characteristics are summarized in Table 3. The median estimated blood loss (EBL) was 800 mL (range 50–5700) and in 16 of 63 patients (25.4%) the EBL was $\geq$ 2000 mL. All patients were admitted to the ICU during their postoperative hospital stay. The median postoperative length of hospital stay after LEPR was 11 days (range 4–70).

Pelvic Structures Removed and Surgical Margins

All patients underwent resection of at least one PSW structure (Table 3). A major nerve (obturator, femoral, or ischiatic nerve) was resected because of disease infiltration in twenty patients (31.7%), pelvic bone partial resection was performed in 9 patients (14.2%), and major vessels (artery and/or vein) were resected in 44 patients (69.8%). The vascular surgery details are shown in Supplemental Table S1. More specifically, the following major vascular reconstruction procedures were performed: resection and ligation of the external iliac artery in combination with a femoral to femoral bypass graft (2 patients); resection and ligation of the external iliac vein followed by saphenous reimplantation (2 patients); segmental resection of the common iliac artery and primary re-approximation (2 patients); common and external iliac veins ligation and resection with venous patch (1 patient). Forty-one patients (65%) had a simultaneous resection of more than one of the above-mentioned pelvic structures (muscle $\pm$ nerves $\pm$ bone $\pm$ vessels).

R0 resection was achieved in 54 patients (85.7%), whereas the pathologic margins were microscopically (R1 resection) and macroscopically (R2 resection) involved in 8 patients (12.7%) and in 1 patient (1.6%), respectively. In all R2 cases, clear delineation of tumour borders was suboptimal due to radiation fibrosis: although the final pathologic margins were positive, the surgeon's

TABLE 2 Patients' clinical–pathological characteristics stratified according to margin resections

Characteristics	Whole population (*N*) (%)	R0 group (*N*) (%)	R1-2 group (*N*) (%)	*p* Value
All	63	54 (85.7)	9 (14.3)	–
Median age (year) (range)	53 (26–77)	56 (26–77)	48 (34–75)	0.687
Median BMI (Kg/mq) (range)	23 (15–45)	23 (16–47)	24 (19–46)	0.748
Centre				
#1 (Prague)	24 (38.1)	21 (38.9)	3 (33.3)	0.669
#2 (Rome)	27 (42.9)	22 (40.7)	5 (55.6)	
#3 (Gateshead)	12 (19.0)	11 (20.4)	1 (11.1)	
Tumor type				
Ovarian cancer	17 (27.0)	14 (25.9)	3 (33.3)	0.758
Endometrial cancer	17 (27.0)	15 (27.8)	2 (22.2)	
Cervical cancer	19 (30.2)	15 (27.8)	4 (44.4)	
Vulvar/vaginal cancer	7 (11.1)	7 (13.0)	0	
Synchronous endometrial + ovarian cancer	2 (3.2)	2 (3.7)	0	
Synchronous endometrial + ovarian + cervical cancer	1 (1.5)	1 (1.9)	0	
Timing of LEPR				
Primary disease[a]	5 (8.0)	4 (7.4)	1 (11.1)	0.704
Recurrent disease[b]	58 (92.0)	50 (92.6)	8 (88.9)	
Tumor diameter (mm) (median)	56 (15–150)	56 (15–150)	60 (25–121)	0.836
Prior radiation therapy				
Yes	24 (38.1)	21 (38.9)	3 (33.3)	0.751
No	39 (61.9)	33 (61.1)	6 (66.7)	
Prior radiotherapy or chemotherapy				
Yes	47 (74.6)	39 (72.2)	8 (88.9)	0.288
No	16 (25.4)	15 (27.8)	1 (11.1)	
DFI after primary treatment (months) (median, range)[c]	21 (6–202)	24 (6–202)	18 (8–55)	0.457
Adjuvant therapy				
Yes	24 (38.1)	23 (42.6)	1 (11.1)	0.072
No	39 (61.9)	31 (57.4)	8 (88.9)	

[a]Three women were submitted to neoadjuvant treatment before LEPR

[b]Ten women were firstly treated with neoadjuvant treatment before LEPR

[c]Considering only the gynecological recurrences

intraoperative assessment was a complete tumour resection in all cases.

Furthermore, almost half of patients (n = 30, 47.6%) needed a major urological surgery. All surgical and post-surgical details are shown in Tables 3 and 4.

Complications, Readmissions, and Reoperations

There was one case of postoperative death (1.6%). The postoperative course of this woman was complicated by bowel perforation on the seventh day and massive hemoperitoneum in the following day. At the reopening of the abdomen, there was a massive haemorrhage from the right common iliac artery, which appeared to be completely replaced by fibrin and malacic tissue. The patient died the following day due to heart failure. Overall, major early complications (Grade $\geq$ 3) ($\leq$ 30 postoperative days) occurred in 18 patients (28.5%): G3 in 17 patients (26.9%); and G5 in 1 patient (1.6%). Major late complications (Grade $\geq$ 3) (31–180 postoperative days) occurred in 13 patients (20.6%). An overview of types and grades of complications is presented in Table 4. Ten patients (15.8%) required a reoperation within 30 postoperative days: 8 women underwent diverting stoma because of bowel anastomotic leak or perforation, 1 woman was submitted to decompressive fasciotomy to correct compartment syndrome of the leg, and 1 woman was submitted to both thrombectomy of vascular bypass graft and decompressive fasciotomy. The sole factor associated with higher risk of severe postoperative complications was the

TABLE 3 Surgical and postoperative characteristics

Characteristics	Whole population (*N*) (%)	R0 group (*N*) (%)	R1-2 group (*N*) (%)	*p* Value
All cases	63	54 (85.7)	9 (14.3)	–
Operating time (min) (median, range)	360 (115–720)	360 (115–720)	358 (207–500)	0.799
Estimated blood loss (mL) (median, range)*	800 (50–5700)	750 (50–5700)	1100 (500–3500)	0.581
PSW structures resected				
Pelvic side wall muscle	55 (87.3)	47 (87.0)	8 (88.9)	0.877
Major nerve	20 (31.7)	17 (31.5)	3 (33.3)	0.912
Pelvic bone	9 (14.2)	6 (11.1)	3 (33.3)	0.078
Major vessel	44 (69.8)	38 (70.4)	6 (66.7)	0.823
Multiple resections	41 (65.1)	34 (63.0)	7 (77.8)	0.388
Major urologic procedure				
Ileal conduit urinary diversion	15 (23.8)	14 (25.9)	1 (11.1)	
Partial cystectomy	2 (3.1)	2 (3.7)	0	0.304
Uretero-vesical anastomosis	8 (12.7)	7 (13.0)	1 (11.1)	
Uretero-ureteral anastomosis	5 (7.9)	4 (7.4)	1 (11.1)	
Resection margins				
Microscopically negative (R0)	54 (85.7)	54 (100)	–	
Microscopically positive (R1)	8 (12.7)	–	8 (88.9)	n.a.
Grossly positive (R2)	1 (1.6)	–	1 (11.1)	
Length of hospital stay (days) (median, range)	11 (4–70)	11 (4–70)	11 (8–60)	0.690
Early major postoperative complications (grade)**				
3				
4	17 (27.0)	16 (29.6)	1 (11.1)	0.450
5	0	0	0	

n.a. Not applicable

*EBL was ≥ 2000 mL in 16/63 patients (25.4%)

**According to MSKCC grading system[19]

multiple or complex PSW surgical procedure performed ($p = 0.055$; Supplemental Table S2).

Survival Analysis

At the time of data retrieval, 29 patients (46.0%) were alive with no evidence of disease, and 18 patients (28.6%) were alive with disease. Sixteen women (25.5%) died: among them 1 woman (1.6%) died of postoperative complications, 12 patients (19.0%) died of disease, and the remaining 3 patients (4.7%) died for reasons not related to disease or treatment.

With a median PFS of 13 months (95% confidence interval [CI] 8.7–17.2), 30 of 63 (47.5%) women experienced a recurrence: 24 of 54 (44.4%) were in the R0 group, and 6 of 9 (66.6%) were in the R1 group, with a median PFS of 15 months (95% CI 9.8–20.1) and 7 months (95% CI 4.9–9.0) respectively ($p = 0.024$; Fig. 1a). With an overall median follow-up of 13 months (range 1–81 months), in total 11 of 54 (20.3%) died of disease in the R0 group and 5 of 9 (55.5%) in the R1 group, with a median OS that was not reached and was 32 months (95% CI, not calculable) for R0 and R1 group, respectively ($p = 0.033$; Fig. 1b). No differences were noted in the pattern of relapse (i.e., pelvic recurrence vs. carcinosis or distant metastases) between R0 and R1 group (Supplemental Table S3).

When analysed by multivariate analysis, resection margins remained an independent prognostic factor for both PFS and OS, irrespective of multiple surgical procedures performed (Supplemental Tables S4 and S5). Finally, after LEPR, 24 patients (38%) received adjuvant treatment (23/24 women from R0 group), 20 women were submitted to adjuvant chemotherapy, and the remaining 4 women received radiotherapy (Table 2).

TABLE 4 Postoperative complications details*

Type of complications	Early period (0–30 days)	Late period (31–180 days)
All cases	63	63
Infective	8 (12.6%)	8 (12.6%)
Pelvic abscess	1 (1.5%)	4 (6.3%)
Urosepsis	3 (4.7%)	2 (3.1%)
Wound infections	3 (4.7%)	1 (1.5%)
Fever	1 (1.5%)	1 (1.5%)
Neurologic	14 (22.2%)	16 (25.3%)
Neuropathy	14 (22.2%)	16 (25.3%)
Urologic	4 (6.3%)	4 (6.3%)
Urinary leak or hydronephrosis	3 (4.7%)	2 (3.1%)
Uro-vaginal fistula	1 (1.5%)	2 (3.1%)
Lymphatic		5 (7.9%)
Lower extremity lymphedema		3 (4.7%)
Lymphocele		2 (3.1%)
Bowel	12 (19.0%)	8 (12.6%)
Ileus	6 (9.5%)	4 (6.3%)
Intestinal leak or perforation	4 (6.3%)	–
Recto-vaginal fistula	1 (1.5%)	1 (1.5%)
Bowel occlusion	–	1 (1.5%)
Diarrhea	1 (1.5%)	2 (3.1%)
Other	8 (12.6%)	10 (15.8%)
Pneumonia	2 (3.1%)	–
Decubitus ulcer	–	1 (1.5%)
Delirium	–	1 (1.5%)
Hematoma/hemorrhage	3 (4.7%)	1 (1.5%)
Vascular thrombosis	3 (4.7%)	1 (1.5%)
Abdominal hernia	–	2 (3.1%)
Pulmonary embolism	–	1 (1.5%)
Parastomal hernia	–	3 (4.7%)

*Early major complications affected 18 women (28.5%). Late major complications affected 13 women (20.6%)

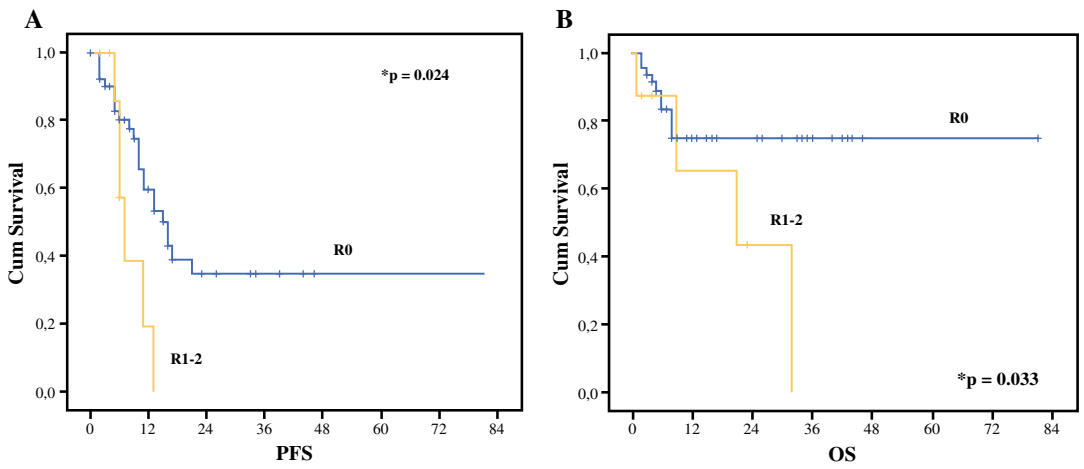

FIG. 1 **a** Progression-free survival plots for patients undergoing LEPR with R0 (black line) versus R1 (grey line). PFS was expressed in months. $p = 0.027$ (log-rank test). **b** Overall survival plots for patients undergoing LEPR with R0 (black line) versus R1 (grey line). OS was expressed in months. $p = 0.033$ (log-rank test)

DISCUSSION

To date, only a few papers have reported the outcome of complex surgical procedures performed in patients with gynaecological tumours with the involvement of PSW structures on a total population of fewer than 45 women (Supplemental Table S6). We first demonstrated in a large, multicentric experience on 63 women who a LEPR with or without synchronous PE seemed a feasible procedure, for selected patients with gynaecological malignancies that involve PSW, with a potentially favourable survival outcome.

In this group of patients for whom palliative therapy would have been the only alternative, survival with no evidence of recurrence was observed in almost half of the cases (n = 29, 46%) with a median PFS of 13 months. The reported survival is comparable to other groups of patients undergoing other extensive pelvic exenterative procedures (Supplemental Table S6).

In our multicentric experience, the critical prognostic factor was the ability to remove the tumour completely with R0 resection. A detailed disease assessment with description of the involvement of individual pelvic structures by a comprehensive radiologic evaluation (CT, expert US, MRI, and PET scans) is critical in the selection of candidates suitable for LEPR. Indeed, the high rate of R0 resections (> 85%) was attributed to thorough patient selection in referral centres for exenterative procedures. However, it cannot be neglected that in 15% of cases surgical margin involvement could not have been diagnosed intraoperatively. Especially in previously radiated cases, differentiation of residual tumor from postradiation fibrosis even by the frozen section will remain a challenge unless any new technology allowing for microscopic intraoperative tumor detection is invented. Moreover, because sometimes this kind of operation could be justified with the goal to improve the quality of life, a potential benefit of the LEPR for palliation remains unclear and needs further investigation.[14]

Interestingly, more women with R0 than with R1 resections received adjuvant treatment. In most of these cases, adjuvant radiotherapy was not recommended by multidisciplinary boards of our institutions, but it was decided by the referring units. Thus, it is not only an experience of exenterative units but also collaboration between them and referring sites, which requires a learning curve. However, because the multivariate analysis in our series showed that free resection margins remained the only independent prognostic factor for both PFS and OS, irrespective of adjuvant treatment performed (supplemental Table 4 and 5), our study supports the role of an extended surgery without any further treatment in this subset of patients.

The high rate of observed morbidity remains the main concern of patients undergoing PSW procedures. Some authors reported their experience with LEPR with severe postoperative complications ranging between 27.6 and 64% (Supplemental Table S6). In our series, we observed 1 postoperative death (1.6%), and 17 patients (27.5%) experienced major postoperative complications, which makes our results slightly better than described in other reports (Supplemental Table S6). However, it should be emphasized that some of those complications, such as intestinal leak/perforation (4 cases, 6.3%) and postoperative haemorrhage (3 cases, 4.7%) could be even life-threatening.

Remarkably, the risk of severe postoperative complications was not associated with the previous radiation therapy and/or recurrent disease but only with multiple PSW radical procedures. Because several factors could act synergistically and jeopardize the healing of various anastomosis, a high risk of postoperative complications should be considered when deciding on reconstruction techniques. Thus, when possible, a less complicated strategy should be adopted, such as terminal colostomy or cutaneous ureterostomy or nephrostomy, instead of bowel anastomosis or ileal conduit. In this context, it should be noted that 46% of women needed a major urologic procedure, which were associated with major complications in 20% of them (neurological, infective, and/or bowel complications in 25.3% 12.6%, and 12.6% of cases, respectively; Table 4).

We acknowledge that our study is limited by the: heterogeneity of the primary tumours; wide variety of procedures; and limited median follow-up time. However, our main goal was to report the feasibility of procedures, which were traditionally considered contraindicated to surgical treatment on a larger series of cases.

Currently, there is a paucity of information regarding treatment options for *lateral* disease infiltrating PSW structures (Supplemental Table 6). Opportunity for radical pelvic resection has been growing because of: better accuracy of imaging studies; the evolution of surgical techniques (i.e., advanced bipolar electrosurgery); improvement of perioperative care; and our knowledge of potential complications and its management after removal of pelvic organs, vessels, and nerves. Indeed, although it is difficult to demonstrate in the paper, all three institutions can document a learning curve for the whole multidisciplinary team how to assess local extent of the disease and how to avoid positive surgical margins, with a more successful selection over the time of suitable candidates for the procedure (Supplemental Fig. S3). Thus, women with isolated pelvic malignancy without distant metastases, suitable for major surgical procedure, should be referred to

exenterative unit and properly consulted in order to exclude unsuitable cases but not to miss an opportunity for potentially curative treatment.

In conclusion, LEPR is a therapeutic option with a curative potential in recurrent or persistent gynaecological malignancies infiltrating the PSW, especially if chemoradiation failed. Despite a short median of the follow-up time and a heterogeneity of the primary tumours in our series, it should be emphasized that a longer survival seems to be achieved in those women with complete resection after LEPR with an acceptable morbidity and mortality. However further larger and homogeneous studies are needed to confirm these results.

DISCLOSURE The authors have no conflicts of interest to declare.

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