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Comparison of retroperitoneal and transperitoneal surgical routes in laparoscopic nodal staging for locally advanced cervical cancers (FIGO IB3-IVA)

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A B S T R A C T

Background: This study compares morbidity and mortality associated with retroperitoneal and transperitoneal para-aortic lymphadenectomy (PAAL) for pretherapeutic nodal staging of locally advanced cervical cancers (FIGO IB3–IVA).

Methods: Pre-, per- and postoperative data of patients treated for locally advanced stage cervical cancer between 1999 and 2018 in 12 French referral centers (FRANCOGYN Study Group) were retrospectively collected.

Results: The study was conducted using a sample of 448 patients, of whom 223 (49,8%) underwent retroperitoneal (group 1) and 225 (50,2%) had transperitoneal PAAL (group 2). No differences were noted concerning clinical and histological characteristics between the two groups. Among these 448 patients, 23 (5,1%) had an intraoperative complication (9 (2,0%) in group 1 and 14 (3,1%) in group 2, $p = 0.28$) and 47 (10,5%) had a postoperative complication (22 (4,9%) in group 1 and 25 (5,6%) in group 2, $p = 0.44$), only one of which required revision surgery but the patient died. The length of hospital stay was significantly shorter in group 1 than in group 2 (3.97 versus 4.88 days, $p < 0.001$). There was no significant difference in mortality between the two groups; 34 of 223 patients in group 1 (15.3%) and 40 of 225 patients in group 2 (15.6%) died (HR = 0.968, 95% CI [0.591–1.585]). There was no significant difference in recurrence-free or overall survival between the two groups.

The management of FIGO stage IB3 to IVA cervical cancers is based on an association of radiochemotherapy [1,2] followed by vaginal brachytherapy, with the height of the irradiation field being determined by the anatomical level of nodal invasion.

Para-aortic lymph node metastatic involvement, which is a major prognostic factor, occurs in approximately 15% of locally advanced cervical cancer (LACC) cases [3]. Hence, identifying patients with nodal involvement is a major issue to better adapt therapeutical management [4,5]. A PET-CT scan may be performed for FIGO IB3 stages and above; although it is considered as a standard imaging technique in the assessment of nodal metastases, several authors report a rate of false negatives cases ranging from 8% to 12% (especially for micrometastases) when compared to surgical staging [6,7]. The study Uterus-11 showed no difference in disease-free survival between surgical and clinical staging in patients with LACC [8]. While the surgical approach by para-aortic lymphadenectomy (PAL) is not currently systematized in the management of LACC (FIGO IB3–IVA), infra-mesenteric PAL is proposed as an option in the European guidelines of the European Society of Gynaecological Oncology (ESGO) for the management of LACC [9]. In the absence of a recent French recommendation on this specific topic, this attitude is promoted in the staging of LACC with lymph node negative on PET-CT [10].

Laparoscopic surgery is a validated surgical route for nodal staging in gynecological cancers with reduced morbidity and mortality and no impact on prognosis compared to standard laparotomy [11]. The indication of PAL by laparoscopy follows the standards of the French Society of Gynecological Oncology (SFOG) and the ESGO [12] and represents the reference method as it is associated with lower morbidity and mortality compared to laparotomy [13]. In case of laparoscopic nodal staging, two surgical approaches are currently used: transperitoneal or retroperitoneal techniques [11,14]. Both have advantages and disadvantages in terms of the surgical technique and the perioperative morbidity and mortality of the patients [15].

Currently, there is no consensus on the optimal surgical approach in case of laparoscopic nodal staging, particularly in LACC. In order to evaluate the two laparoscopic approaches, we conducted a large multicenter retrospective study comparing the morbidity and mortality of patients who had retroperitoneal or transperitoneal PAL in pretherapeutic lymph node staging of LACC (FIGO IB3–IVA).

1. Material and methods

Our retrospective study was carried out using a French multicentric database (FRANCOGYN study Group), which included all the patients treated for LACC between 1999 and 2018 in 12 French referral centers (Centre Hospitalier Intercommunal de Créteil, Hôpital Jean Verdier de l'Assistance Publique des Hôpitaux de Paris, Centre Hospitalier Régional Universitaire de Lille, Centre Hospitalier de Lyon Sud, Hôpital Nord de l'Assistance Publique des Hôpitaux de Marseille, Hôpital de la Pitié Salpêtrière de l'APHP, Centre Hospitalier Intercommunal de Poissy, Centre Hospitalier Universitaire de Rennes, Centre Hospitalier Universitaire de Reims, Hôpital Tenon de l'APHP, CHU de Tours, Hôpital Universitaire de

Strasbourg). Preoperative data included age, pregnancy, parity, body mass index (BMI), smoking status, completion of a PET-CT scan, and the FIGO stage [16] of the pathology at initial diagnosis. Intraoperative data included laparoscopic approach (retroperitoneal or transperitoneal), number of lymph nodes removed, and occurrence of procedure failures or complications. Postoperative data included the type of postoperative complication, length of hospital stay, and occurrence of recurrence or death. Postoperative complications were assessed according to the Clavien and Dindo classification [17]. The extent of the lymph node dissection (infra-renal or infra-mesenteric) was not recorded in our database. However, we assumed that infra-renal PAAL was performed, as infra-mesenteric lymphadenectomy was not yet widespread during our inclusion period. Therefore, we considered the number of lymph nodes removed during PAAL. Failure to perform PAAL laparoscopically was considered a procedure failure. Complications leading to laparoconversion were considered as a procedure failure. These situations were considered intraoperative complications. The primary outcome measures were the morbidity and mortality associated with each approach to PAAL (retro- and transperitoneal) and the length of hospitalization. The secondary outcomes were overall survival and recurrence-free survival.

Quantitative variables were described by mean and standard deviation or by median and interquartile range. The normality of the distributions was verified graphically, as well as with the Shapiro-Wilk test. Qualitative variables were described by frequency and percentage. When the numbers were sufficient, qualitative variables were compared between groups using chi-square tests. If these tests were not valid (theoretical numbers <5), Fisher's exact tests were used. When the numbers were sufficient, quantitative variables were compared using Student's tests. In cases of non-normal data, nonparametric Wilcoxon tests were used. Overall survival and recurrence-free survival were estimated by the Kaplan-Meier method and compared between groups using Cox proportional hazards models. The significance level was set at 0.05. Analyses were performed using SAS software version 9.4 (SAS Institute, Cary NC, USA).

2. Results

The database included 1977 patients treated for cervical cancer between 1999 and 2018 of whom 448 patients had LACC (stages IB3 to IVA of the current FIGO classification). Of these patients, 223 underwent retroperitoneal dissection (49.8%), and 225 had transperitoneal dissection (50.2%) (Fig. 1). The mean age was 50.5 years \pm 11.6 and the mean BMI was 25.0 kg/m² \pm 5.6 (BMI ranging from 14.3 to 48.8). No differences were noted between the two groups concerning age, menopausal status, BMI, pregnancy, parity, and smoking (Table 1). No differences were noted between the two groups concerning FIGO stages (Table 2). Eight procedural failures were identified (1.8%), 4 (0.9%) in the retroperitoneal group (2 conversions to laparotomy including one for inferior vena cava injury, 1 impossible approach and 1 with no pneumoperitoneum created) and 4 (0.9%) in the transperitoneal group (2 conversion to laparotomy, 2 procedural failures including one for obesity) ($p = 0.73$). We also noted 4 cases of conversion to laparotomy

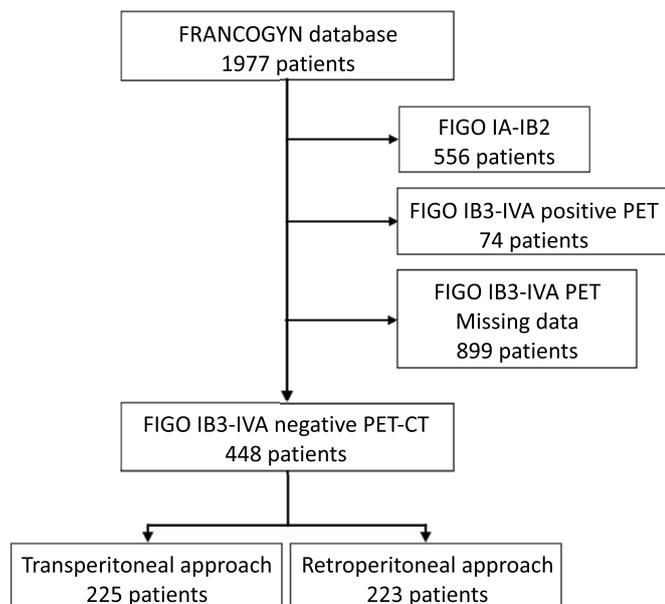


Fig. 1. Flow chart.

Table 1
Population.

APPROACH	TRANSPERITONEAL	RETROPERITONEAL	p
Number	225	223	
Age at diagnosis (years)	50,3 ± 11,9	50,7 ± 11,4	0,86
Menopause (%)	106 [1,47]	108 [5,49]	0,97
BMI (kg/m ²)	24,7 ± 5,5	25,2 ± 5,8	0,54
Smoking (%)	53 (53)	57 [6,45]	0,62
Gestivity	3,0 [0,0,2,4]	2,0 [0,0,1,4]	0,98
Parity	2,0 [0,0,1,3]	2,0 [0,0,1,4]	0,92

Table 2
FIGO in population.

APPROACH	TRANSPERITONEAL	RETROPERITONEAL	p
Number	225	223	
FIGO IB3	36 (16%)	32 (14,35%)	0,27
FIGO IIA	6 (2,67%)	6 (2,69%)	
FIGO IIA1	5 (2,22%)	8 (3,59%)	
FIGO IIA2	12 (5,33%)	5 (2,24%)	
FIGO IIB	150 (66,67%)	147 (65,92%)	
FIGO III	2 (0,89%)	1 (0,45%)	
FIGO IIIA	1 (0,44%)	2 (0,90%)	
FIGO IIIB	7 (3,11%)	7 (3,14%)	
FIGO IIIC	2 (0,89%)	0	
FIGO IVA	4 (1,78%)	15 (6,72%)	

(0,9%): 2 in each group. All immediate intraoperative complications are reported in Table 3. We individualized 23 intraoperative complications (5,1% of all patients); 14 in the transperitoneal group (6.7%) related to i) vascular injuries (8 cases), ii) digestive injuries (2 cases) and iii) injuries of the urinary tract (3 cases), and there was no precision in 1 file, and 9 in the retroperitoneal group (4.3%), linked to vascular injuries (2 cases including an inferior vena cava injury with conversion to laparotomy) and 2 ventilatory complications leading to incomplete sampling. The type of intraoperative complication was not defined in 5 files. No difference between the two laparoscopic approaches was found in terms of intraoperative complications ($p = 0.28$).

Postoperative complications are presented in Table 3. We found 47 postoperative complications (10.49% of all patients): 22 in the

retroperitoneal group (10.4%) and 25 in the transperitoneal group (12.4%) ($p = 0.44$). In group 1, there were 11 stage I, 3 stage II, 3 stage IIIA, 1 stage IIIB and 3 stage IVA complications according to Clavien and Dindo classification, and in group 2 there were 7 stage I, 7 stage II, 1 stage IIIA, 4 stage IIIB, 1 stage IVA, 1 stage IVB and 1 stage V complications: one patient died after a new surgery for incarceration of an intestinal loop in a trocar opening.

Regarding postoperative lymphocysts, there was no difference between the two laparoscopic approaches ($p = 0.86$) (Table 3). Major postoperative complications were treated by radiological interventions in 5 cases: lymphocyst puncture (4 cases) and arterial embolization (management of a retroperitoneal hematoma in one case). Surgery was required in 6 cases: nephrostomy (ureteral obstructions in 2 cases), ureteral stenting (2 cases), laparoscopic lymphocyst puncture in one case and surgery for incarceration of an intestinal loop in a trocar opening. No difference was found between the two surgical approaches concerning the occurrence of postoperative complications ($p = 0.44$). The length of hospital stay was significantly shorter in the retroperitoneal group ($p < 0.001$) (Table 3).

14,72 ± 9,89 lymph nodes were removed in group 1, and 13,56 ± 9,0 in group 2. There were significantly more lymph nodes removed in group 1 ($p = 0,020$). However, the number of positive lymph nodes was not significantly higher in the transperitoneal group (0.52 ± 1.45 positive nodes against 0.40 ± 1.32 positive nodes in the retroperitoneal group, $p = 0.35$) (Table 3).

The median follow-up was 6,80 years. 56 patients in the retroperitoneal group (25,1%) and 55 patients in the transperitoneal group (24.4%) experienced a recurrence. There was no difference in recurrence-free survival between the two groups (HR = 0.996, 95% CI [0.675–1.469]) (Fig. 2). Regarding overall survival, 34 of the 223 patients in the retroperitoneal group (15.25%) and 40 of the 225 patients in the transperitoneal group (17.78%) died, with no difference between the two groups (HR = 0.968, 95% CI [0.591–1.585]) (Fig. 3). Treatments received were the same in both groups ($p=0.95$, Table 3).

3. Discussion

In our study, we found no difference between transperitoneal and retroperitoneal approaches concerning per and postoperative complications as well as prognosis. However, the length of hospital stay was significantly shorter in the retroperitoneal group.

In 2012, Souadka et al. assessed the morbidity of PAL by laparoscopy. They found low morbidity and no delay in starting concomitant radiochemotherapy [18]. Other studies have obtained similar results [19]. However, the literature remains elusive on the choice of laparoscopic route. Indeed, it has been the case in Ramirez and al. study in 2010 [20]. In 2015, Akladios and al., did not find any significant difference between the two approaches with regard to intraoperative or postoperative complications (16 postoperative complications in the transperitoneal group and 5 in the retroperitoneal group, $p 0.28$) [21]. The results of this study should be qualified, however, since PAL by laparoscopy is performed under different conditions depending on the origin of the cancer (cervix or endometrium). In our study, we identified 4 laparoconversions, which is lower than the rates of between 3% and 5% reported in other studies [22,23] and the rate of 1.3% reported by Akladios et al. [21]. Some research teams, such as that of Gouy and al., have suggested that single-port laparoscopy can limit the risk of laparoconversion or transperitoneal conversion when approaching the retroperitoneal space [24].

Regarding complications, our study mainly found complications of classes I to III according to the classification of Dindo and Clavien [17]. However, some data was missing, and it is possible that more

Table 3
Peri operative and post-operative data.

APPROACH	TRANSPERITONEAL (225)	RETROPERITONEAL (223)	p
Intraoperative complications (%)			
No	194 (93,3)	200 (95,7)	0,28
Yes	14 (6,7)	9 (4,3)	
Missing data	17	14	
Postoperative complications (%)			
No	177 (87,6)	190 (89,6)	0,44
Yes	25 (12,4)	22 (10,4)	
Missing data	23	11	
Procedural failures (%)			
No	214 (98,2)	193 (98,0)	0,73
Yes	4 (1,8)	4 (2)	
Missing data	7	26	
Intraoperative complications (%)	14 (6,7)	9 (4,3)	0,28
Vascular complications	8	2	
Digestive complications	2	0	
Urologic complications	3	0	
Others	1	7	
Postoperative complications (%)	25 (12,4)	22 (10,4)	0,44
Lymphoceles (%)	8 (3,6)	16 (7,2)	0,86
Urologic complications	5	2	
Digestive complications	2	0	
Wall complications	4	0	
Septic complications	2	0	
Respiratory complications	1	0	
Right flank hematoma	1	0	
Retroperitoneal hematoma	0	1	
Thrombosis	0	1	
Others	2	2	
Duration of hospitalization (mean/days)	4,88	3,97	<0,001
Number of lymph nodes removed	13,56 ± 9,0	14,72 ± 9,89	0,02
Missing data	2	4	
Number of positive lymph nodes removed	0,52 ± 1,45	0,40 ± 1,32	0,35
Missing data	2	3	
Ratio positive lymph nodes/lymph nodes removed	0,038	0,027	0,02
Treatments			
Chemoradiotherapy/Brachytherapy	214	213	0,95
Exclusive chemotherapy	5	4	
Others	6	6	

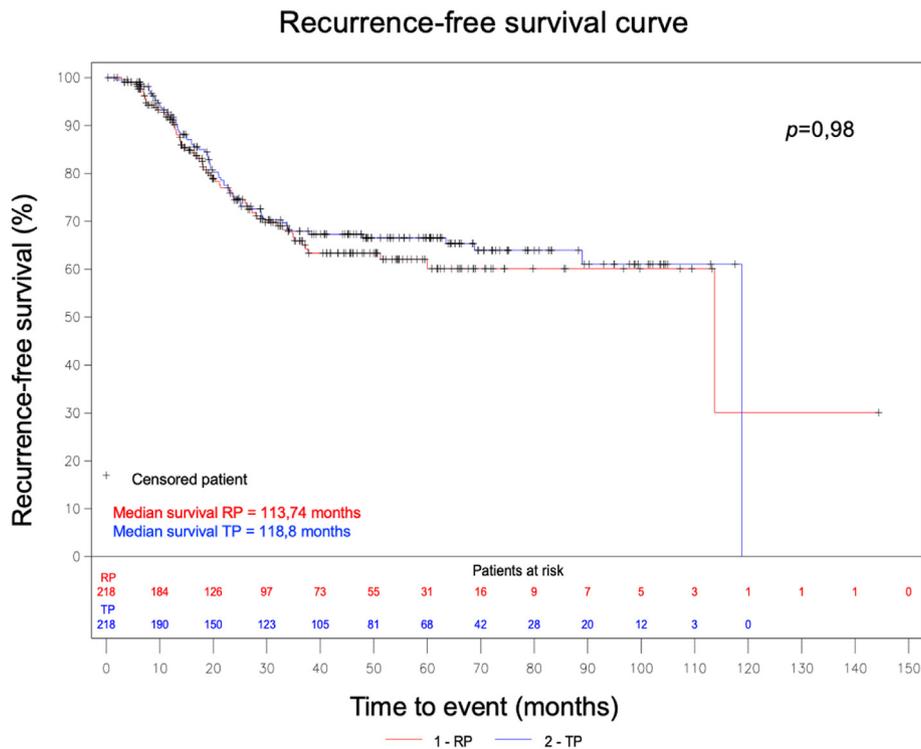


Fig. 2. Recurrence free survival.

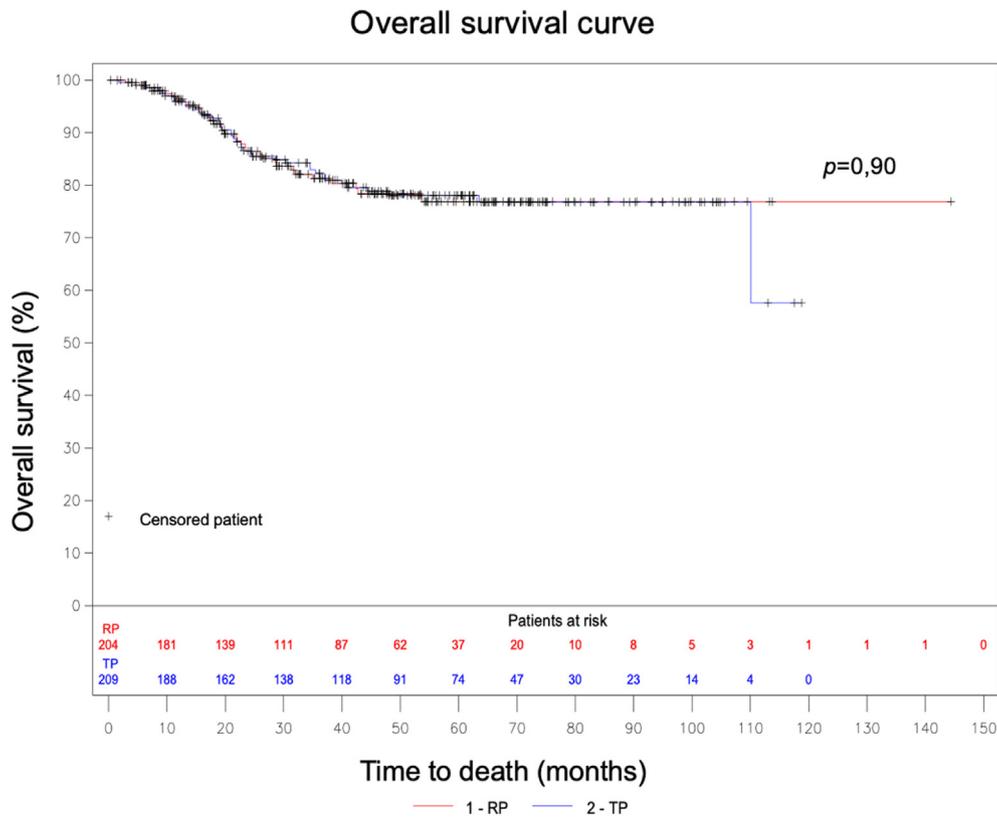


Fig. 3. Overall survival.

patients required postoperative recovery. Neither surgical route resulted in a type V complication (death of the patient). In Akladios and al. study, 16 postoperative complications were reported in the transperitoneal group and 5 in the retroperitoneal group, which does not represent a significant difference ($p = 0.40$) [21]. These results are comparable with the results of our study, and other studies have same results [25,26].

The main postoperative complication reported in our study was lymphocele, with no significant difference between the transperitoneal and the retroperitoneal routes. The literature, particularly Achouri and al. study, indicates that lymphoceles after PAL are more frequent in cervical cancer [27]. However, this article did not specify which surgical route. In our study, the risk of developing postoperative lymphocele was greater with PAL by the retroperitoneal route (7,2% versus 3,6% in the transperitoneal group, $p = 0,88$). This result is similar to the results found in the literature. The only prospective study comparing the two laparoscopic approaches for performing lymph node staging, found a significantly increased risk of developing postoperative lymphocele after surgery via the retroperitoneal route: no cases of lymphocele were found in the 33 pigs in the transperitoneal group, whereas 13 cases (43.33%) were found in the 33 pigs in the retroperitoneal group ($p = 0.0002$) [28].

In our study we found no difference in recurrence-free survival or in overall survival between the two surgical routes. In the literature, there is no comparison of these two approaches in terms of overall survival or recurrence-free survival. However, the study Uterus-11 showed no difference in disease-free survival between surgical and clinical staging in patients with LACC [8].

In our study, the length of hospital stay was shorter in the retroperitoneal group, with an average length of stay of 3.97 days ($p < 0.001$). Gouy and al. Found similar length of stay, although

their study examined retroperitoneal staging using the single-port technique, with no comparison with transperitoneal surgery [24]. Morales and al. [29] found that the retroperitoneal route significantly reduced the duration of stay in the intensive care unit (0.59 days for the retroperitoneal group versus 1.1 days for the transperitoneal group, $p = 0.02$). However, this study found no significant difference between the groups in terms of total duration of hospitalization ($p = 0.72$); this was also the case in Akladios and al. Study ($p = 0.49$) [21].

Our database did not contain information regarding the extent of the lymphadenectomy performed. However, this should not represent a bias, since in their 2016 study on the management of locally advanced cervical cancers, Petitnicolas and al. Found no difference between infra-renal PAL and infra-mesenteric PAL in terms of surgical complications [30]. In their study, 18 of 56 patients in the infra-mesenteric group had a postoperative complication versus 19 of 63 patients in the infra-renal group ($p = 0.82$). The rate of metastases above the inferior mesenteric artery is very low: Leblanc and al. Showed that 15% of patients had positive lombo-aortic lymph node metastases, and only one of those was positive above the supra-mesenteric artery [3]. The advantages of PAL over the inferior mesenteric artery and up to the renal vein are debated by surgeons, although the 2018 ESGO recommendations suggest the inferior mesenteric artery as the upper limit for PAL in cervical cancers IB3–IVA [12].

Although no minimum quantity is specified, removal of less than 10 lymph nodes may call into question the quality of the PAL [31], especially since a 2006 randomized study found that lymph node picking could lead to under-staging without reducing the morbidity of the surgical procedure [32]. In our study, we found no difference between the two surgical routes in terms of the number of lymph nodes removed. This result is comparable to that of Dargent and al.

[22]. However, the ratio of positive lymph nodes to the total of lymph nodes removed shows a significant difference for the transperitoneal approach. This result should be qualified due to the lack of precision on the extent of the lymphadenectomy in our study.

Our study has certain limitations that should be noted: it is a retrospective study, and during the 19 years of inclusion some changes in medical practices must be considered, in particular the place of PET-CT. Finally, although the multicentric character of the study adds statistical power, it is also a limitation due to differences in the proportions of the two techniques performed in all centers.

4. Conclusion

Patients who underwent a transperitoneal PAL did not present with more complications (intra- or postoperative) than those who underwent a retroperitoneal PAL. However, transperitoneal PAL patients had a longer hospital stay than those who underwent lombo-aortic lymphadenectomy by the retroperitoneal route. No significant difference was found between the two types of lumbar-aortic lymphadenectomy for advanced cervical cancers (stages IB3 to IVA) in terms of recurrence-free survival or overall survival.

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CRedit authorship contribution statement

Marie Pécout: Research and, Investigation, Communication, Writing – original draft, preparation, Conceptualization. **Jérôme Phalippou:** Writing – review & editing, Communication, Reviewing. **Henri Azaïs:** Writing – review & editing, Data collection, Reviewing. **Lobna Ouldamer:** Writing – review & editing, Data collection, Reviewing. **Pierre Adrien Bolze:** Writing – review & editing, Data collection, Reviewing. **Marcos Ballester:** Writing – review & editing, Data collection, Reviewing. **Cyrille Huchon:** Writing – review & editing, Data collection, Reviewing. **Camille Mimoun:** Writing – review & editing, Data collection, Reviewing. **Cherif Akladios:** Writing – review & editing, Data collection, Reviewing. **Lise Lecointre:** Writing – review & editing, Data collection, Reviewing. **Emilie Raimond:** Writing – review & editing, Data collection, Communication, Reviewing. **Olivier Graesslin:** Writing – review & editing, Data collection, Reviewing. **Xavier Carcopino:** Writing – review & editing, Data collection, Reviewing. **Vincent Lavoué:** Writing – review & editing, Data collection, Reviewing. **Sofiane Bendifallah:** Writing – review & editing, Data collection, Reviewing. **Cyril Touboul:** Writing – review & editing, Data collection, Reviewing. **Yohan Dabi:** Writing – review & editing, Data collection, Reviewing. **Geoffroy Canlorbe:** Writing – review & editing, Data collection, Reviewing. **Martin Koskas:** Writing – review & editing, Data collection, Reviewing. **Pauline Chauvet:** Writing – review & editing, Data collection, Reviewing. **Pierre Collinet:** Data collection, Methodology, Reviewing, Writing – original draft, Original draft preparation, Supervision. **Yohan Kerbage:** Data collection, Visualization, Supervision, Investigation, Conceptualization, Methodology, Reviewing, Original draft preparation, Writing – original draft.

Declaration of competing interest

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References

- [1] Marth C, Landoni F, Mahner S, McCormack M, Gonzalez-Martin A, Colombo N, et al. Cervical cancer: ESMO Clinical Practice Guidelines for diagnosis, treatment and follow-up. *Ann Oncol Off J Eur Soc Med Oncol.* 1 juil 2017;28(suppl_4):72–83.
- [2] Chemoradiotherapy for Cervical Cancer Meta-Analysis Collaboration. Reducing uncertainties about the effects of chemoradiotherapy for cervical cancer: a systematic review and meta-analysis of individual patient data from 18 randomized trials. *J Clin Oncol Off J Am Soc Clin Oncol.* 10 déc 2008;26(35):5802–12.
- [3] Leblanc E, Katdare N, Narducci F, Bresson L, Gouy S, Morice P, et al. Should systematic infrarenal para-aortic dissection be the rule in the pretherapeutic staging of primary or recurrent locally advanced cervix cancer patients with a negative preoperative para-aortic PET imaging? *Int J Gynecol Cancer Off J Int Gynecol Cancer Soc.* janv 2016;26(1):169–75.
- [4] Stehman FB, Bundy BN, DiSaia PJ, Keys HM, Larson JE, Fowler WC. Carcinoma of the cervix treated with radiation therapy. I. A multi-variate analysis of prognostic variables in the Gynecologic Oncology Group. *Cancer.* 1 juil 1991;67(11):2776–85.
- [5] Nelson JH, Boyce J, Macasaet M, Lu T, Bohorquez JF, Nicastrì AD, et al. Incidence, significance, and follow-up of para-aortic lymph node metastases in late invasive carcinoma of the cervix. *Am J Obstet Gynecol.* 1 juin 1977;128(3):336–40.
- [6] Vandepierre A, Van Limbergen E, Leunen K, Moerman P, Amant F, Vergote I. Para-aortic lymph node metastases in locally advanced cervical cancer: comparison between surgical staging and imaging. *Gynecol Oncol.* août 2015;138(2):299–303.
- [7] Gouy S, Morice P, Narducci F, Uzan C, Martinez A, Rey A, et al. Prospective multicenter study evaluating the survival of patients with locally advanced cervical cancer undergoing laparoscopic para-aortic lymphadenectomy before chemoradiotherapy in the era of positron emission tomography imaging. *J Clin Oncol Off J Am Soc Clin Oncol.* 20 août 2013;31(24):3026–33.
- [8] Marnitz S, Tsunoda AT, Martus P, Vieira M, Affonso Junior RJ, Nunes J, et al. Surgical versus clinical staging prior to primary chemoradiation in patients with cervical cancer FIGO stages IIB-IVA: oncologic results of a prospective randomized international multicenter (Uterus-11) intergroup study. *Int J Gynecol Cancer Off J Int Gynecol Cancer Soc.* déc 2020;30(12):1855–61.
- [9] Cibula D, Pötter R, Planchamp F, Avall-Lundqvist E, Fischerova D, Haie-Meder C, et al. The European society of gynaecological oncology/European society for radiotherapy and oncology/European society of pathology guidelines for the management of patients with cervical cancer. *Virchows Arch Int J Pathol.* juin 2018;472(6):919–36.
- [10] Leblanc E, Bigotte A, Collinet P, Darloy F, Drain A, Fournier A, et al. Référentiel Régional de RCP - prise en charge des cancers gynécologiques. *Onc Nord Pas de Calais;* 2016.
- [11] Cartron G, Leblanc E, Ferron G, Martel P, Narducci F, Querleu D. [Complications of laparoscopic lymphadenectomy in gynaecological oncology. A series of 1102 procedures in 915 patients]. *Gynecol Obstet Fertil.* mai 2005;33(5):304–14.
- [12] ESGO. Guidelines for the management of patients with cervical cancer. 2018.
- [13] Ghezzi F, Cromi A, Serati M, Uccella S, Formenti G, Bogani G, et al. Radiation-induced bowel complications: laparoscopic versus open staging of gynecologic malignancy. *Ann Surg Oncol.* mars 2011;18(3):782–91.
- [14] Bentivegna E, Morice P, Uzan C, Scherier S, Gouy S. CNGOF - curage lombo aortique par coelioscopie.
- [15] Leblanc E, Narducci F, Gouy S, Morice P, Ferron G, Querleu D. Lymphadénectomies laparoscopiques dans les cancers gynécologiques. *EMC - Tech Chir - Gynécologie.* 2013;8(1):1–15. Article 41-734.
- [16] Bhatla N, Berek JS, Cuello Fredes M, Denny LA, Grenman S, Karunarathne K, et al. Revised FIGO staging for carcinoma of the cervix uteri. *Int J Gynaecol Obstet Off Organ Int Fed Gynaecol Obstet.* avr 2019;145(1):129–35.
- [17] Dindo D, Demartines N, Clavien P-A. Classification of surgical complications: a new proposal with evaluation in a cohort of 6336 patients and results of a survey. *Ann Surg.* août 2004;240(2):205–13.
- [18] Souadka A, Gouy S, Debaere T, Duclos J, Lumbroso J, Haie-Meder C, et al. [Laparoscopic para-aortic lymphadenectomy in advanced cervical cancer: morbidity and impact on therapy]. *Gynecol Obstet Fertil.* mars 2012;40(3):153–7.
- [19] Chung HH, Lee S, Sim J-S, Kim J-Y, Seo SS, Park S-Y, et al. Pretreatment laparoscopic surgical staging in locally advanced cervical cancer: preliminary results in Korea. *Gynecol Oncol.* mai 2005;97(2):468–75.
- [20] Ramirez PT, Jhingran A, Macapinlac HA, Euscher ED, Munsell MF, Coleman RL, et al. Laparoscopic extraperitoneal para-aortic lymphadenectomy in locally advanced cervical cancer: a prospective correlation of surgical findings with positron emission tomography/computed tomography findings. *Cancer.* 1 mai 2011;117(9):1928–34.
- [21] Akladios C, Ronzino V, Schrot-Sanyan S, Afors K, Fernandes R, Baldauf JJ, et al. Comparison between transperitoneal and extraperitoneal laparoscopic para-aortic lymphadenectomy in gynecologic malignancies. *J Minim Invasive Gynecol.* févr 2015;22(2):268–74.
- [22] Dargent D, Ansquer Y, Mathevet P. Technical development and results of left extraperitoneal laparoscopic paraaortic lymphadenectomy for cervical cancer. *Gynecol Oncol.* avr 2000;77(1):87–92.

- [23] Fichez A, Lamblin G, Mathevet P. [Left extraperitoneal laparoscopic para-aortic lymphadenectomy: morbidity and learning curve of the technique]. *Gynecol Obstet Fertil* oct 2007;35(10):990–6.
- [24] Gouy S, Uzan C, Scherier S, Gauthier T, Bentivegna E, Kane A, et al. Single-port laparoscopy and extraperitoneal para-aortic lymphadenectomy for locally advanced cervical cancer: assessment after 52 consecutive patients. *Surg Endosc*. janv 2014;28(1):249–56.
- [25] Weiser EB, Bundy BN, Hoskins WJ, Heller PB, Whittington RR, DiSaia PJ, et al. Extraperitoneal versus transperitoneal selective paraaortic lymphadenectomy in the pretreatment surgical staging of advanced cervical carcinoma (a Gynecologic Oncology Group study). *Gynecol Oncol*. juin 1989;33(3):283–9.
- [26] Kusunoki S, Huang K-G, Magno A, Lee C-L. Laparoscopic technique of para-aortic lymph node dissection: a comparison of the different approaches to trans- versus extraperitoneal para-aortic lymphadenectomy. *Gynecol Minim Invasive Ther*. juin 2017;6(2):51–7.
- [27] Achouri A, Huchon C, Bats AS, Bensaid C, Nos C, Lécuru F. Complications of lymphadenectomy for gynecologic cancer. *Eur J Surg Oncol EJSO*. janv 2013;39(1):81–6.
- [28] Occelli B, Narducci F, Lanvin D, Coste E, Legoupils E, Castelain B, et al. [Comparison of transperitoneal versus extraperitoneal laparoscopic para-aortic lymphadenectomy: randomized experimental study]. *Ann Chir*. janv 2000;125(1):9–17.
- [29] Morales S, Zapardiel I, Grabowski JP, Hernandez A, Diestro MD, Gonzalez-Benitez C, et al. Surgical outcome of extraperitoneal paraaortic lymph node dissections compared with transperitoneal approach in gynecologic cancer patients. *J Minim Invasive Gynecol* oct 2013;20(5):611–5.
- [30] Petitnicolas C, Azaïs H, Ghesquière L, Tresch-Bruneel E, Cordoba A, Narducci F, et al. Morbidity of staging inframesenteric paraaortic lymphadenectomy in locally advanced cervical cancer compared with infrarenal lymphadenectomy. *Int J Gynecol Cancer Off J Int Gynecol Cancer Soc* 2017;27(3):575–80.
- [31] Estrade J-P, Lazard A, Gurriet B, Agostini A, Blanc B. [Laparoscopic ways of para-aortic lymphadenectomy]. *Gynecol Obstet Fertil*. févr 2010;38(2):135–41.
- [32] Maggioni A, Benedetti Panici P, Dell'Anna T, Landoni F, Lissoni A, Pellegrino A, et al. Randomised study of systematic lymphadenectomy in patients with epithelial ovarian cancer macroscopically confined to the pelvis. *Br J Cancer* 18 sept 2006;95(6):699–704.