



# Understanding Limits of Parametrial Resection in Radical Hysterectomy: A Randomized Controlled Trial

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## Abstract

**Objective:** It is well known that the complexity of pelvic anatomy, although the large number of educational resources, sometimes makes it difficult for gynaecologists, not trained in surgical oncology, to understand operations performed for oncological indications. The purpose of this study is to evaluate if adding specific educational materials (medical illustrations realized ad hoc) to the reading comprehension alone of the latest Querleu-Morrow Classification of radical hysterectomy (2017) may help Ob-Gyn residents and general ob-gyn attendings to better understand limits of parametrial resection in radical hysterectomy from type A to type C2.

**Study Design:** randomized controlled trial.

**Setting:** Institute of Obstetric and Gynecologic Pathology, University of Catania, Italy.

**Materials and methods:** 30senior Ob/Gyn residents and 30 general Ob/Gyn attending were enrolled to the study, and randomly allotted in two groups, each made up by an equal number [15] of residents and attending, defined as group A and group B. The group A and B participants were both given copy of the article (2017 Update on the Querleu-Morrow Classification of Radical Hysterectomy) for reading comprehension. The group B participants, were given, beside the copy of article, 10 inedited medical illustrations, realized on the basis of this paper, as an educational aid to enhance the reading comprehension of the article. After a maximum of 1 month, allowed to both groups to review article and/or article and drawings, the level of self-perceived understanding related to parametrectomy limits in radical hysterectomy was ascertained in both groups using a numeric visual analog scale, graduated from 0 to 10, where each participant was asked to rate his degree of comprehension. The data obtained were statistically analyzed using a Mann-Whitney U test.

**Results:** Group A participants (only article) had a lower level of comprehension of parametrectomy limits compared to group B participants (article plus drawings). The difference between the average scale score, reported by group A, equal to  $5,9 \pm 1,4$  and that reported by group B, equal to  $7,2 \pm 1,5$  was statistically significant ( $p < 0,01$ ).

**Discussion and Conclusions:** The result of the present study, suggest, that beside the large body of Literature on the subject, educational materials such as , the proposed drawings may help both the general Ob/Gyn , to whom the patient may return for follow up after surgery and the Ob/Gyn resident, who is still in the learning process, to better comprehend the relationship between the extent of parametrial resection and cervical disease severity, and therefore the related post operative complications and long term sequelae.

**Keywords:** Radical Hysterectomy; Parametrium; Paracervix; Parametrectomy; Subperitoneal Spaces; Numeric Visual Analog Scale; Understanding; Pelvic Anatomy; Terminologia Anatomica

## Introduction

Cervical cancer treatment has always represented a challenge for surgeons, radiotherapist, radiologist and medical oncologist [1]. The purpose of the surgical treatment is that of removing, with the exception of microinvasion, beside the cervix the connective tissue around it and the upper vagina, known as paracolpos or paracolpium, in a measure progressively greater depending on the size and aggressiveness of the tumor [1]. Such connective tissue in the present paper is called in general parametrium, which may not be anatomically correct, but since this term has gained an unreplaceable place in the mind of most gynaecologic surgeons, the Authors continue to use it in its extensive meaning. At the same time it is important to precise that according to the Terminologia Anatomica [2] the term parametrium should be referred to the cranial portion (above the ureter) of the cardinal ligament (unofficial term), instead paracervix should be related to the caudal portion (below the ureter) of the same ligament. The reason to extend the resection to the surrounding parametrium is based on the fact that the more voluminous and poorly differentiated is the tumor, the higher is the chance that the tissue around the cervix and upper vagina is infiltrated by neoplastic cells [1]. In order to define and standardize the limit of such a resection in relationship with tumor grade and stage, clinicians had to balance the risks of surgery with the necessity to excise an amount of parametrium adequate to ensure clear margins (>3 mm) [3]. Based on the amount of resected parametrium various classes of radical hysterectomy have been developed, starting from the old Piver-Rutledge-Smith [4] to the most recent Querleu-Morrow classification [5]. Recent recommended clinical indications [1], for such operation as those reported in Table 1. The description of radical hysterectomy given in the current Literature, is more or less directed to surgeons specialized in gynaecologic oncology. The aim of the current study was to evaluate if adding specific educational materials (medical illustrations realized ad hoc) to the reading comprehension of the latest Querleu-Morrow Classification of radical hysterectomy [6] help Ob-Gyn residents and general ob-gyn attending to better understand limits of parametrial resection in radical hysterectomy from type A to type C2.

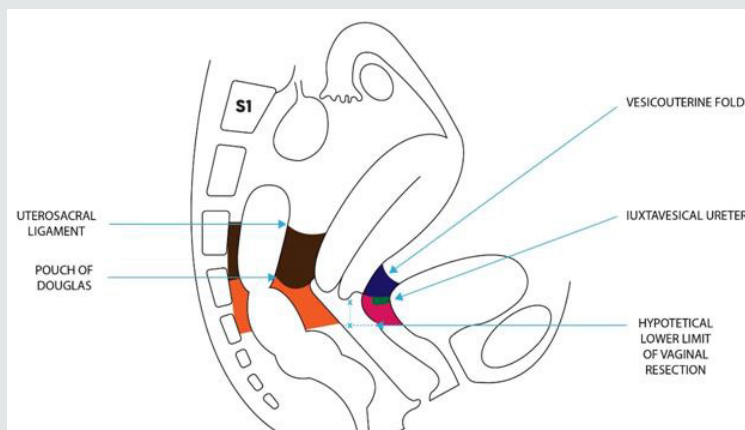
## Materials and Methods

On the basis of the necessary anatomical premise (see Appendix 2), the Authors asked a medical illustrator to realize two schematic topographic pictures of the female pelvis (Figure 1 and 2), where ideally all sub-peritoneal spaces are dissected and all parametrium components, either dorsal (posterior), ventral (anterior) and lateral (paracervix) are represented and

differentiated from each other using a color code for each of them. The extent of parametrial resection, which characterizes each type of radical hysterectomy taken in considerations: A, B1 and B2, C1 and C2, according to latest Querleu-Morrow classification of radical hysterectomy [6], is indicated in figure 3 to 10 by coloring in gray the corresponding portions of ventral, dorsal and lateral parametrium, which needs to be removed.

In order to establish if these 10 drawings (figure 1 to 10) may have a didactic value, 30 senior Ob/Gyn residents and 30 general Ob/Gyn attending were enrolled as participants to a randomized controlled trial. The participants were randomly allotted in two groups, each made up by an equal number of residents and attending, defined as group A and group B. The recruitment and randomization process required 2 months, from July 1st to August 30, 2020. The group A participants, were emailed a letter (see Appendix 1) with attached only a copy of the article (2017 Update on the Querleu-Morrow Classification of Radical Hysterectomy) [6] for reading comprehension, while the group B participants received beside the copy of the article, the 10 inedited medical illustrations realized on the basis of the article, as a supposed didactic aid. A brief review of the pertinent pelvic anatomy provided by the Authors for prompt consultation (see Appendix 2) was also attached to the mail sent to both groups. The level of understanding parametrectomy limits in various types of radical hysterectomy, was tested in both groups by asking the participants to rate their self-perceived comprehension on a numeric scale graduated from 0 to 10, enclosed to the mails (Figure 11) in Appendix 1) sent to both groups.

It is true that in general the level of comprehension in students, is tested by administering them multiple choice questionnaires on specific subjects [7] and that VAS (Visual Analog Score), instead are generally used to self-assess pain [8], and or to measure anxiety or pruritus [9,10]. However, there are examples in Literature in whom a visual analog scale has been used for self-assessment of a specific subject understanding [11-13]. Each study participant, after filling out the scale (see word file 1 in Appendix 1), was invited to send it back to the Authors within a month from its receipt (sometimes a telephone call, about ten days before the end of the allowed month, was made to solicit an answer). All answers were received within October 30<sup>th</sup> 2020. Furthermore, in order to compare results also between homogeneous categories of participants group A was divided in 2 subgroups, identified as subgroup Ar (made only by senior Ob/Gyn residents) and subgroup Aa (made only by general Ob/Gyn attending), similarly group B was divided in subgroup Brand subgroup Ba. The data obtained were statistically analyzed using the Mann-Whitney U test. The level of statistical significance was defined by a p value  $\leq 0.01$ .



**Figure 1:** Schematic representation of dorsal and ventral parametrium in a paramedian sagittal section of the female pelvis (imagined after dissection of all subperitoneal spaces and going approximately through one of the bladder pillar and the omolateral uterosacral ligament).

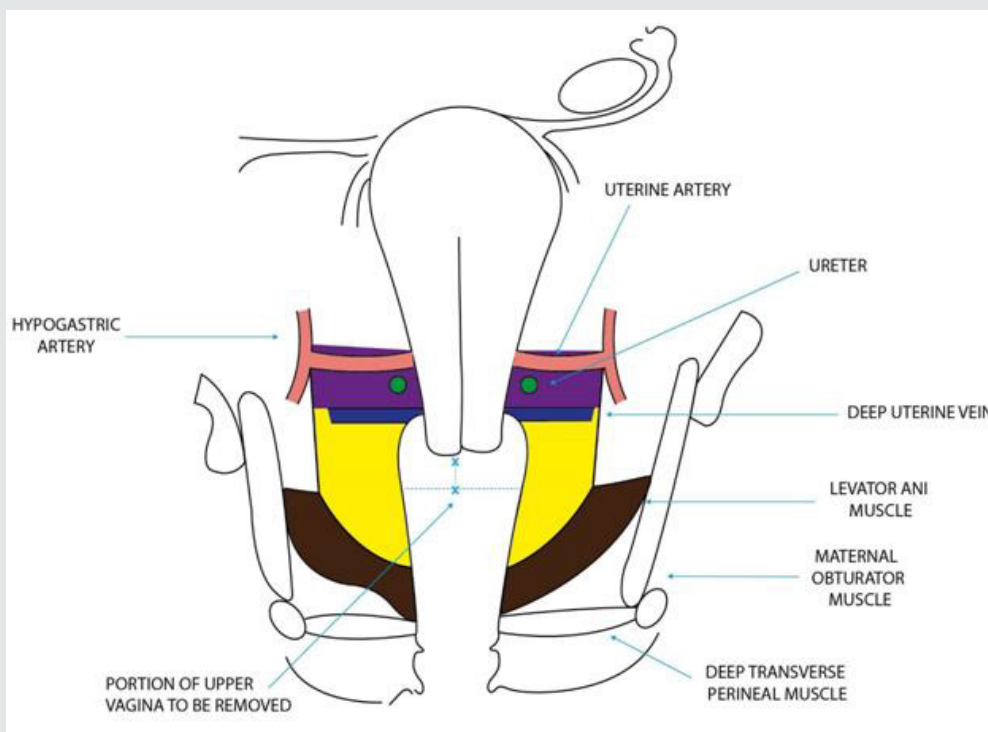
**Dorsal Parametrium**

- Cranial portion: retto-uterine ligament (from the utero-sacral ligament to the pouch of Douglas) with its sacral attachments.
- Caudal portion: retto-vaginal ligament (from the pouch of Douglas to the pelvic floor) with its sacral attachments.

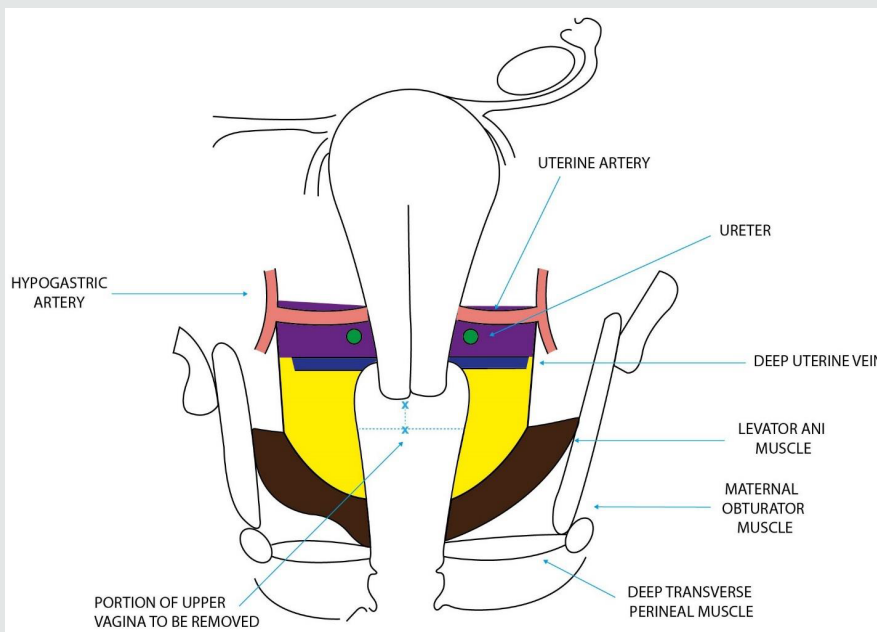
**Ventral Parametrium**

- Cranial portion: vesico-uterine ligament medial and above the iuxtavesical ureter (from the vesicouterine fold to the upper limit of the iuxtavesical ureter).
- Caudal portion: vesico-vaginal ligament lateral and below the iuxtavesical ureter (from the ureter to the upper limit of the vesical trigon).

x-x: portion of upper vagina to be removed



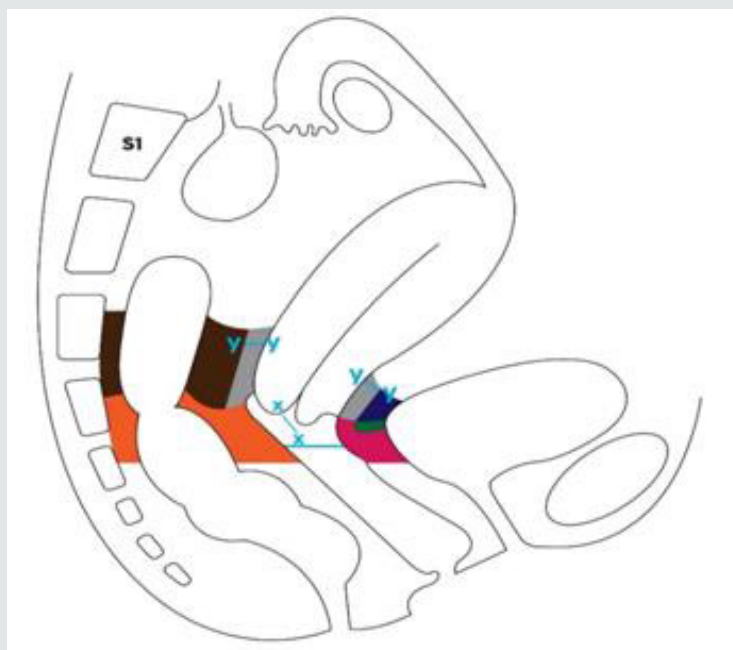
**Figure 2:** Schematic representation of lateral parametrium (both sides) in a coronal section of the female pelvis going through the crossing of the uterine artery with the ureter (imagined after dissection of all subperitoneal spaces with the uterus placed in upward traction).



**Figure 3:**

**Lateral Parametrium (Paracervix)**

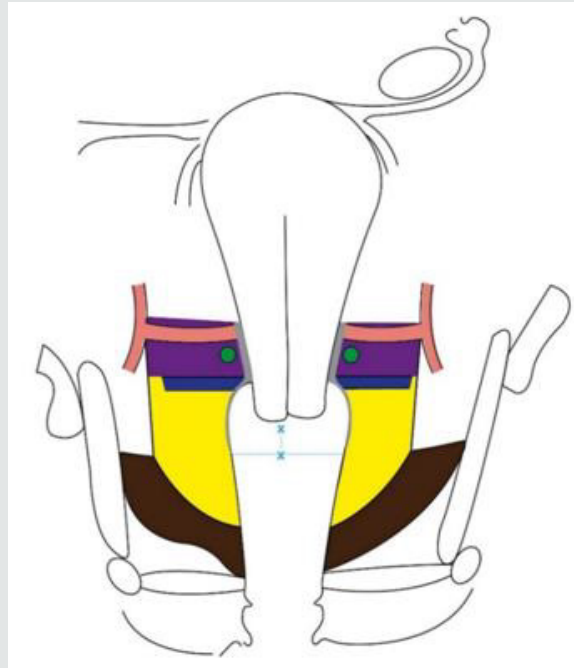
- Cranial portion: connective tissue from the uterine artery at its origin, included, to the deep uterine vein, not included.
  - Caudal portion: connective tissue from the deep uterine vein, included, to the pelvic floor.
- x-x: portion of upper vagina to be removed



**Figure 4:** Limits of resection of the dorsal and ventral parametrium in type A radical hysterectomy (the area of parametrium to be excised is colored in grey, the dissection of the Okabayashi space is not necessary).

**Parametrium to be Excised**

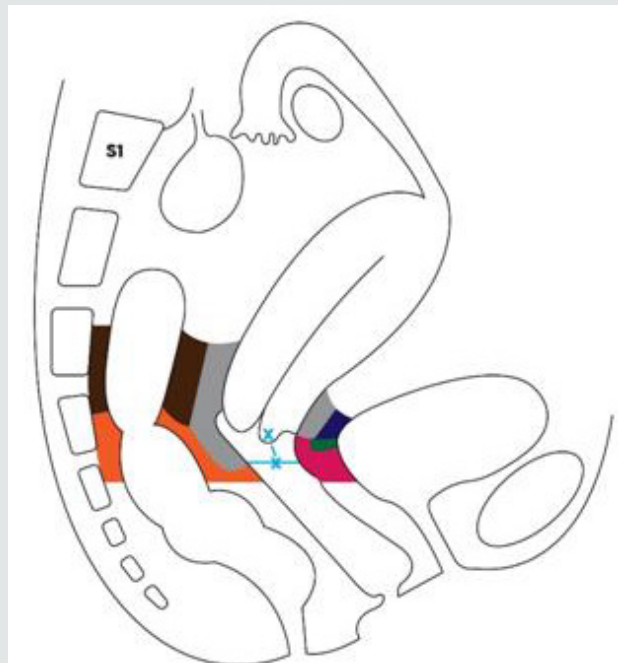
- y-y: 5 mm is the dorso-ventral length of parametrium to be removed.
- x-x: < 10 mm from the caudal edge of the cervix.



**Figure 5:** Limits of resection of the lateral parametrium (paracervix) in type A radical hysterectomy (the area of parametrium to be excised is colored in grey).

Parametrium to be excised.

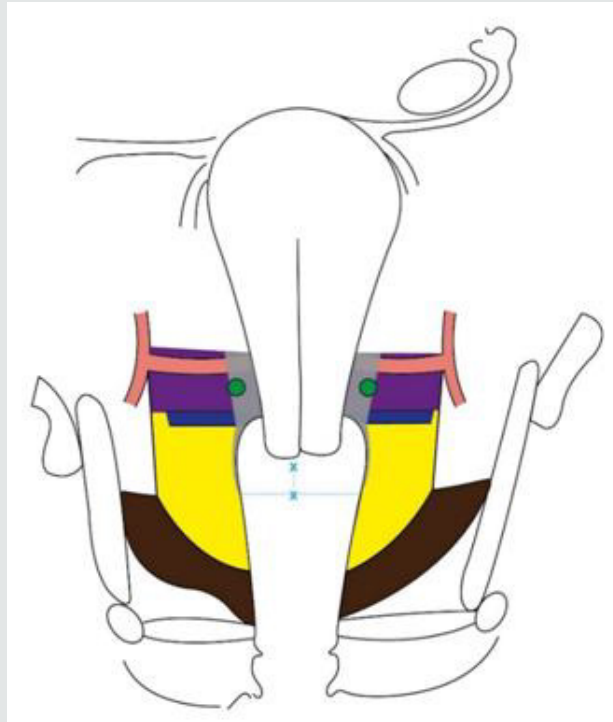
x – x: < 10 mm from the caudal edge of the cervix.



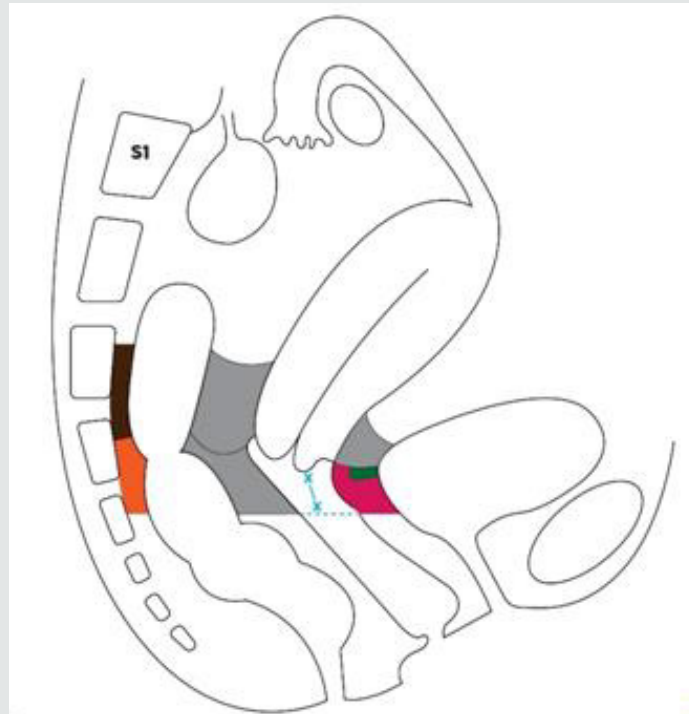
**Figure 6:** Limits of resection of the dorsal and ventral parametrium in type B1 and B2 radical hysterectomy. Approximately half of the dorso-ventral length of the dorsal (except sacral attachments), and ventral parametrium (only upper portion) should be removed.

Parametrium to be excised

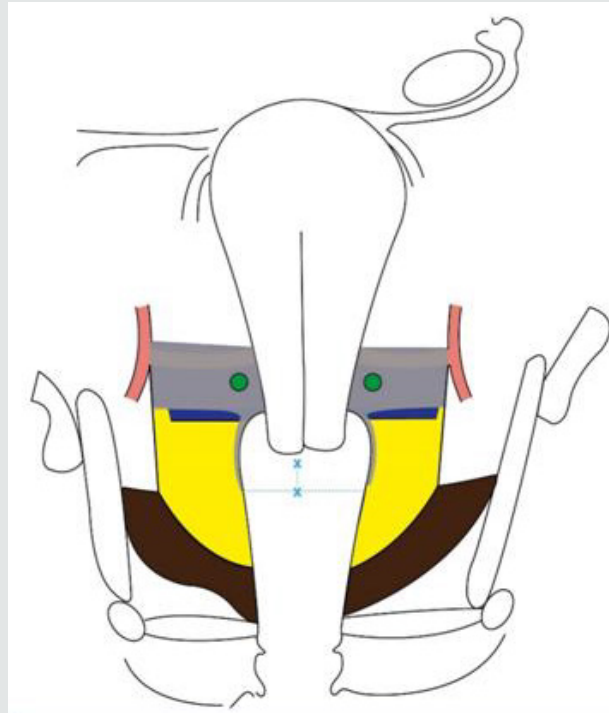
x – x: at least 10 mm from the caudal edge of the cervix.



**Figure 7:** Limits of resection of the lateral parametrium (paracervix) in type B1 and B2 radical hysterectomy.  
 Parametrium to be excised  
 x – x: at least 10 mm from the caudal edge of the cervix.



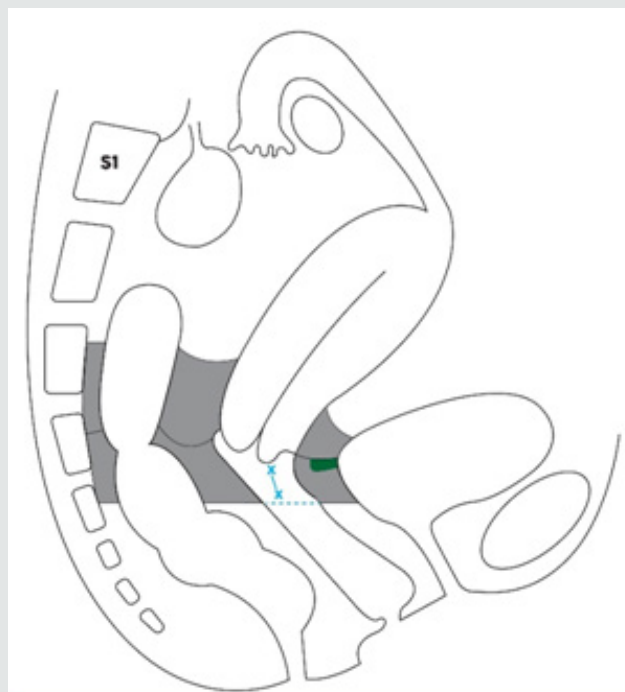
**Figure 8:** Limits of resection of the dorsal and ventral parametrium in type C1 radical hysterectomy.  
 Parametrium to be excised  
 x – x: as necessary from the caudal edge of the cervix.



**Figure 9:** Limits of resection of the lateral parametrium (paracervix) in type C1 radical hysterectomy.

Parametrium to be excised

x – x: as necessary from the caudal edge of the cervix.



**Figure 10:** Limits of resection of the dorsal and ventral parametrium in type C2 radical hysterectomy (the area of parametrium to be excised is colored in grey, the dissection of the medial pararectal space, Okabayashi space, is omitted).

Parametrium to be excised

x – x: as necessary from the caudal edge of the cervix.

**Table 1:** Indications to different classes of radical hysterectomy - Guidelines 2018 ESGO.

Risk group	Tumor size	LVSI	Stromal Invasion	Type of radical hysterectomy
Low risk	< 2 cm	Negative	Inner 1/3	B1 (A)
Intermediate risk	≥ 2 cm	Negative	Any	B2 (C1)
Intermediate risk	< 2 cm	Positive	Any	B2 (C1)
High risk	≥ 2 cm	Positive	Any	C1 (C2)

ESGO = European Society of Gynaecologic Oncology

LVSI = Lymphovascular Space Invasion

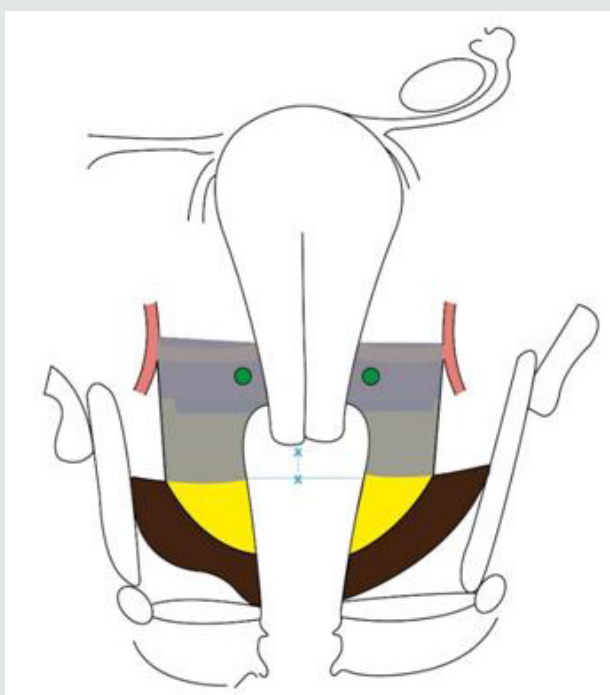
**Results**

All the recruited participant adhered to the protocol and mailed their answer to the Authors within the allowed month. The numeric analogue scale scores, obtained by each participant to the study, are reported for every different subgroup in (Figure 11, 12). As shown in (Figure 13) (Table 2), the average understanding value for both

attending (5,4±1,2) and residents (6,3 ±1,3) is significantly lower (p<0.01) in subgroups Aa and Ar compared with that in subgroups Ba (6,7 ±1,2) and Br (7,8 ±1,5). Similarly, the cumulative average score of residents and attendings, taken together, seen in group A (5,9±1,4) is also significantly lower (p<0.01), than that found in group B (7,2±1,5).

**Table 2:** Average score comparison between subgroups Aa and Ba, Ar and Br, and groups A and B

Subgroup Aa average score	Subgroup Ba average score	p
5,4 ±1,2	6,7 ±1,2	0,007
Subgroup Ar average score	Subgroup Br average score	p
6,3 ±1,3	7,8 ±1,5	0,007
Group A average score	Group B average score	p
5,9 ±1,4	7,2 ±1,5	0,0005



**Figure 11:** Limits of resection of the lateral parametrium (paracervix) in type C2 radical hysterectomy (the area of parametrium to be excised is colored in grey).

Parametrium to be excised

x – x: as necessary from the caudal edge of the cervix.



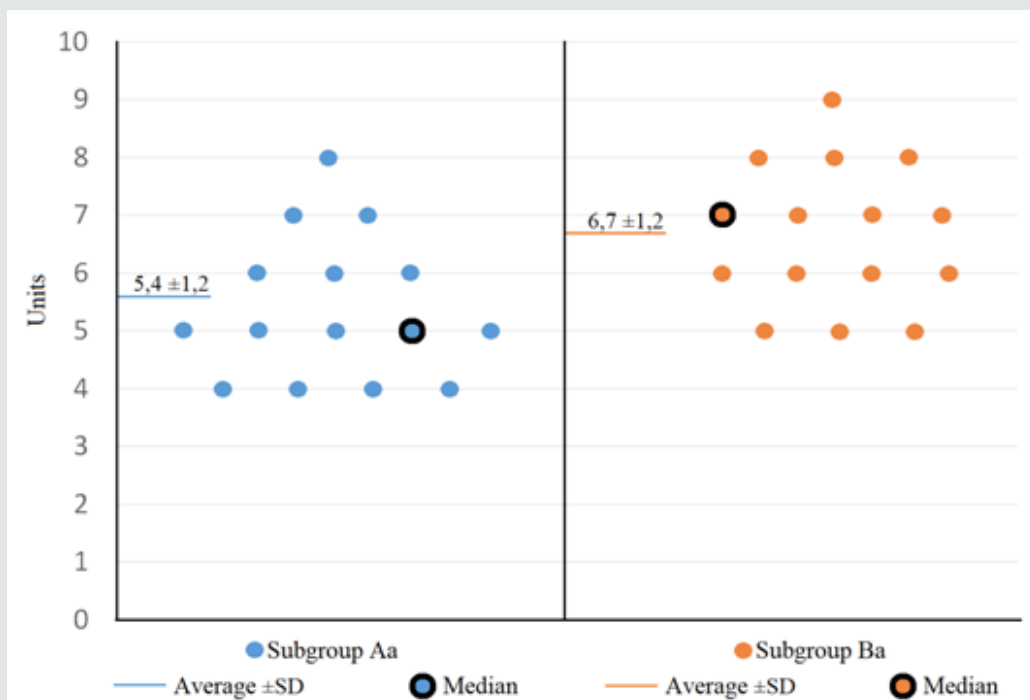


Figure 12: Scores distribution and comparison between the 2 subgroups of Ob/Gyn attendings.

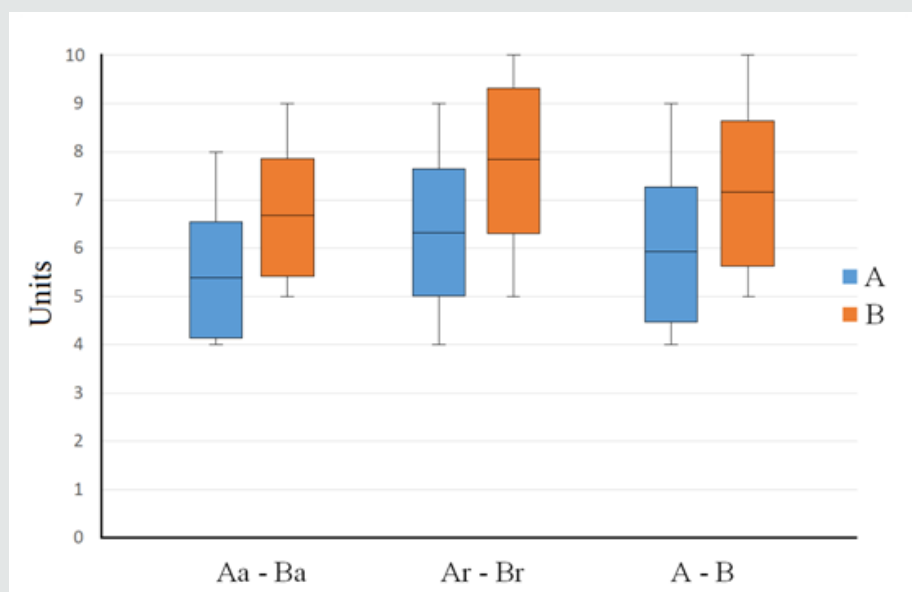


Figure 13: Comparison of score averages (± SD) between subgroups and groups A and B. SD = Standard Deviation.

### Discussion

It is true that in the Western Countries procedures such as radical hysterectomy today are generally performed by gynaecologic surgeons trained in gynaecologic oncology, and therefore such didactic illustrations, may be seen as pleonastic and superfluous in certain environments; however, considered that: parametrectomy is the main cause of postoperative complications[1,14], both the general Ob/Gyn attending and the Ob/Gyn residents, often deal

with the patient in the immediate and/or subsequent postoperative period, and that, sometimes, the patient return to them for clinical follow up, the Authors think that the 2 aforementioned professional figures deserve a clearer comprehension of the postoperative clinical implications correlated with the extent of parametrium removal, which characterized each type of radical hysterectomy. Undoubtedly the results of this study show that adding the 10 graphs to the simple reading of the article on the classification

of radical hysterectomy [6] ameliorates significantly the level of comprehension of parametrectomy extent in both residents and general attendings and this seems to, somehow, fulfil the Author's study objective.

Nevertheless the Authors are aware that the present study has a few limits, such as: the limited number of participants, the fact that the drawings are based on their interpretation of the Querleu's article, and that, in other words, the illustrations proposed, even if thought as faithful to the text, are not validated by the article's Authors, and, last but not least, the difficulty to objectively measure the level of understanding of the participants, measure simply based on a numeric analogous scale score. The study has at least two biases. The first one is that the self-perceived understanding of parametrectomy limits measured in both groups of participants with visual analog scales not necessarily reflect a real improvement in comprehension. The true of the matter is that this type of understanding is hard to test even all the correct answers to an hypothetical multiple choice questionnaires does not guarantee a real understanding of this specific subject; the Authors think that this particular type of comprehension probably could be better verified only by an expert gynaecologic oncology surgeon either in the operating room or in the cadaver dissection room.

The other bias, less relevant, is that an improving in comprehension is in general expected when the amount of educational material on a specific subject is increased. However, such improvement is not automatically achieved and sometimes the added educational resource not only does not ameliorate comprehension, but even it has a detrimental effect on it.

Although the aforesaid confounders and bias, the Authors retain that their results may, at least, encourage and stimulate future and better didactic efforts in the direction of making the anatomical and functional meaning of parametrectomy and its clinical relevance (in relation to the various class of radicality) more understandable for general gynaecologist or future professionals, not necessarily going to be specialized in gynaecologic oncology.

## Conclusion

the Authors, on the basis of the appreciation expressed by residents and attending for their didactic initiative, think that the improvement in knowledge triggered by the graphs will positively affect patient care and that further simplified educational models, either two or three-dimensional should be developed in the near future to better serve this purpose. Further illustrations are those presented could be used by clinicians at the time of informed consent to give also patients affected by cervical cancers a better idea of the type of surgery to whom they will undergo.

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