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Laparoscopic Vaginal-Assisted Hysterectomy with Complete Vaginectomy for Female-to-Male Genital Reassignment Surgery

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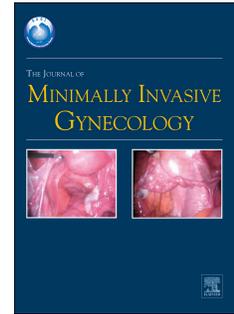
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1 **Laparoscopic Vaginal-Assisted Hysterectomy with Complete**
2 **Vaginectomy for Female-to-Male Genital Reassignment Surgery**
3

4 **Clinical Article**

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26

27 Keywords: Vaginectomy, laparoscopic, genital reassignment surgery

Abstract1
2

Introduction: Total hysterectomy with bilateral salpingo-oophorectomy and vaginectomy for genital reassignment surgery is a complex procedure, usually performed with a combined vaginal and abdominal approach. The aim of this study was to describe the feasibility of laparoscopic vaginectomy in sex reassignment surgery.

Methods: We reviewed the relevant medical history, intra/post-operative complications and surgical results of all patients diagnosed with gender dysphoria and submitted to totally laparoscopic gender confirmation surgery in our Department between January 2007 and March 2015. In total, twenty-three patients underwent total hysterectomy with bilateral salpingo-oophorectomy and vaginectomy in a single intervention. The vaginal mucosa was conserved to be used for the penile neo-urethra during the subsequent phalloplasty.

Results: The surgeries had an average operating time of 155 ± 42 minutes. No intraoperative complications were registered. In all patients the vagina was totally removed and, in most cases ($n=20$), we were able to remove laparoscopically more than 50% of the vagina. Three patients had postoperative complications. One patient presented with hemoperitoneum on the second postoperative day; another with prolonged urinary retention and a third patient developed a perineal hematoma one month after surgery. Patients were discharged less than 72 hours after surgery, except the patient who developed a postoperative hemoperitoneum. For all patients, we obtained an adequate specimen of vaginal mucosa to reconstruct the penile neo-urethra, for the subsequent phalloplasty.

Conclusion: This study suggests the feasibility of laparoscopic vaginectomy in genital reassignment surgery. The procedure can be executed as continuation of the hysterectomy with the potential advantage of the laparoscopy providing better exposure of the anatomic structures while remaining with low blood losses (less than 500 mL) and few complications. Furthermore, using this approach, adequate sized vaginal mucosa flaps were obtained for the urethral reconstruction.

1

Introduction

2

3 Gender dysphoria is a medical condition where patients have the conviction
4 that their gender is different from the one they were phenotypically assigned
5 at birth. Its prevalence varies between 1:30 400 to 1:200 000, although a
6 higher prevalence has been reported in more recent studies (1,2,3). The
7 management of gender dysphoria is individualized and may include both
8 hormonal therapy and surgery. Following the evaluation of a multidisciplinary
9 team, which includes psychiatrists, psychologists, endocrinologists,
10 gynecologists and plastic surgeons, patients can be assigned for genital
11 surgery, a rare and complex procedure (1,2,3).

12 Although there may be variations to the procedures sought by patients, genital
13 reassignment surgery generally requires several invasive operations, which
14 may include a hysterectomy with bilateral adnexectomy, vaginectomy,
15 reconstruction of the penile urethra, scrotoplasty and phalloplasty or
16 metoidioplasty (1). The neo-phallus should be functional (to enable micturition
17 in a standing position and sexual function) and cosmetically acceptable.
18 Usually, the total hysterectomy, bilateral salpingo-oophorectomy and
19 vaginectomy are performed with a combined laparoscopic and vaginal
20 approach (4,5).

21 A vaginectomy is a difficult surgery with a high risk of post-operative bleeding.
22 This procedure is typically performed by vaginal approach, which can hinder
23 the control of hemorrhaging due to the limited access. Following removal, the
24 mucosal lining of the vaginal cavity may be used for the reconstruction of the
25 neo-urethra (1,6). Although a variety of flaps are available, the vaginal
26 mucosa may be one of the best materials for urethral reconstruction in a total
27 phalloplasty since its non-keratinized stratified squamous epithelium is highly
28 similar to the urethra (1,2,4,5).

29 A laparoscopic approach for the vaginectomy may have several advantages
30 when compared to the vaginal approach, which include better visualization of
31 the tissues, anatomical access and control of the haemorrhage. This may be
32 helpful to obtain adequate sized flaps of vaginal mucosa, for the penile
33 urethral reconstruction. To our knowledge, total laparoscopic vaginectomy has

34 only been reported for oncologic surgery and has not been described in
35 gender reassignment surgery (7-9).

36 The aim of this study was to describe the feasibility of laparoscopic
37 vaginectomy during genital reassignment surgery and its influence on the
38 reconstruction of the neo-urethra using the vaginal mucosa in a second-stage
39 phalloplasty.

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Materials and Methods

Study Design

We present a case series of all patients who underwent genital reassignment surgery between January 2007 and March 2015 at our tertiary university center.

For all patients, the indication for surgery was gender dysphoria, according to the ICD-10 classification. All patients were evaluated by a multidisciplinary team, which included two psychiatrists, a psychologist, an endocrinologist, a gynecologist and a plastic surgeon. Ultimately, reassignment surgery was approved by the Portuguese Medical Association in all instances.

All patients were taking hormonal therapy for at least one year and were already living as a male (Testoviron Depot®, 250mg, IM, every 2-4 weeks).

The clinical files of the patients and all surgical reports were reviewed. Demographic and surgical data were collected, including the patient's age, duration of the hormone replacement therapy, preoperative and postoperative hemoglobin, length of surgery, extension of the vagina removed laparoscopically and intra/post-operative and postoperative complications.

All patients provided a written consent for the surgery and the use of clinical data for study purposes, as required by the Hospital's Ethics Committee.

Surgical Technique

A two-stage genital reassignment surgery was performed. The first intervention included a laparoscopic hysterectomy with bilateral adnexectomy and total vaginectomy. During this phase, a tubed vaginal mucosal graft was also created and placed in the circumflex iliac artery groin area. The second-stage included the phalloplasty, in which the vaginal mucosa graft was used to reconstruct the neo-urethra.

Both a senior gynecologist and plastic surgeon were present in the operation theatre during all the procedures and the same medical team performed all surgeries.

Patients were placed in the gynecological (lithotomy) position. A Foley catheter was inserted in the bladder and four-ports were used for the laparoscopy; one 11-mm trocar was placed in the umbilicus and three 5-mm

35 trocars were placed under laparoscopic guidance: one in each (left and right)
36 iliac fossa and one in the midline, above the symphysis. The patients were
37 then placed in the Trendelenburg position. The surgeries were performed
38 using ultrasonic energy - Harmonic® Scalpel (Ethicon Endo-Surgery,
39 Cincinnati, USA). Bipolar energy (Karl Storz, Tuttlingen, Germany) was used if
40 additional coagulation was needed. The abdomen was explored prior to
41 commencing the reassignment surgery procedure and in case of adhesions
42 adhesiolysis was performed first.

43 The surgery was performed according to the following steps:

- 44 1. The anterior leave of the broad ligament was opened and dissected
45 towards the posterior leave, just below the iliac vessels, and the ureter
46 and the internal iliac artery were identified in the retroperitoneal space
47 [supplementary video 1 – In this surgery, ureteral-illuminating catheters
48 were used to minimize the risk of iatrogenic lesions (Bush DL™
49 Ureteral Illuminating Catheter Set, Stents Cook Medical®, Bloomington,
50 Indiana)].
- 51 2. The vesicouterine peritoneal fold was identified and the dissection
52 continued anteriorly to mobilize the bladder off the lower uterine
53 segment and the superior third of the vagina.
- 54 3. The round ligaments of the uterus, the infundibulopelvic ligaments and
55 the uterosacral ligaments were cauterized and sectioned, followed by
56 the dissection of the posterior leave of the broad ligament towards the
57 rectovaginal space.
- 58 4. The uterine vessels were identified and ligated at the level of the
59 crossing with the ureter, and the cardinal ligaments were cauterized
60 and cut. The bladder pillars and the rectal pillars were identified and
61 ligated at the level of the cervix.
- 62 5. To perform the vaginectomy, the vesicovaginal and the rectovaginal
63 spaces were identified and dissected. The paravaginal planes were
64 isolated bilaterally and the paracolpos were sectioned. An adequate
65 hemostasis was achieved by identifying the vaginal arteries followed by
66 careful ligation. If necessary, a hemostatic agent was used (FloSeal®;
67 Baxter Inc, Deerfield, IL, USA).

- 68 6. After dissecting the largest possible length of the vagina, and
69 successfully separating the vagina from the bladder, a Clermont-
70 Ferrant uterine manipulator (Karl Storz, Tuttlingen, Germany) was
71 inserted and a circumferential vaginal incision around the cuff was
72 made, using ultrasonic energy. The uterus and vagina were then
73 carefully extracted, to avoid damaging the vaginal mucosa (Fig 1, 2).
- 74 7. Then, the remainder of the vagina was removed by a vaginal approach
75 and a pelvic floor reconstruction was performed according to the
76 DeLancey levels (10-11). The DeLancey level I apex support was
77 repaired laparoscopically with Vicryl 0. The uterosacral ligaments and
78 the remaining fibers of the cardinal ligaments were attached to each
79 other in order to provide an anatomic support to the pelvic structures
80 (bladder and bowel). The second DeLancey level was reconstructed by
81 a combined laparoscopic and vaginal approach. The rectovaginal and
82 endopelvic fascia were attached providing additional anatomic support.
83 The third level (perineal body and genital hiatus) was repaired and
84 closed vaginally at the hymenal ring. Furthermore, a perineoplasty and
85 closure of the genital hiatus was also performed.
- 86 8. After extracting the uterus, adnexa and vagina, the plastic surgeon
87 dissected the vaginal mucosa and rolled it over a catheter to construct
88 the neo-urethra (Fig. 3). Then, the plastic surgeon delineated a
89 rectangular flap with 10-11 cm width and 15-18 cm length on the area
90 of the groin irrigated by the circumflex iliac artery. The tubed graft with
91 the vaginal mucosa was introduced along a subcutaneous tunnel,
92 within the circumflex iliac artery groin flap area, and fixed in place. Both
93 extremities were sutured to the skin. Three months latter, in the
94 second-stage procedure, this graft, along with the prefabricated neo-
95 urethra was used for the phallic reconstruction (Fig. 4).

96
97 The total blood loss was estimated from the contents of the suction devices
98 and the sterilized gauzes and only registered if over 500 mL. The extension of
99 the vaginectomy performed by laparoscopy was subjectively evaluated
100 through the comparison to the remainder of the vagina removed by the
101 vaginal approach.

102 A cephalosporin was administered prior to the beginning of the surgery
103 (usually cefoxitin, 2g, *ev*). Venous thromboembolic prophylactic measures
104 included mechanical prophylaxis with elastic stockings, early ambulation and
105 low-molecular-weight heparin. The Foley-catheter was usually removed in the
106 second or third post-operative day, to minimize the risk of urinary retention.

107

108 SPSS software version 20.0 (SPSS Inc., Chicago, IL, USA) was used for the
109 descriptive analysis. Continuous data are presented as mean \pm standard
110 deviation, while categorical data is presented as proportions.

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Results

During the study period, 23 patients underwent genital reassignment surgery at our Department.

The mean age of the patients was 31.8 ± 8 years. All patients had previously undergone mastectomy and were taking hormonal therapy for at least one year. The average operative time for laparoscopic hysterectomy, bilateral salpingo-oophorectomy and vaginectomy was 155 ± 42 min. In all cases, the total blood loss did not exceed 500mL. There were no operative complications and no need for blood transfusions.

The extension of the vagina removed by the laparoscopic approach was evaluated subjectively. Three patients had less than 50% of the vagina removed laparoscopically, while 13 patients had between half and three-quarters. In 6 patients, we were able to remove 75-90% of the vagina and in one patient almost the whole vagina was removed by laparoscopy. The surgical team verified that, between 2007 and 2015, a progressively larger extension of vagina was removed by laparoscopy (Fig. 5).

In the first post-operative day, one patient had a clinical suspicion of pulmonary thromboembolism and was medicated with low-molecular weight heparin in therapeutic doses. In the second postoperative day, the patient presented with a hemoperitoneum. A second-look laparoscopy was performed and bleeding from small pelvic vessels was controlled using bipolar coagulation (grade IIIa complication, according to the Clavien complications grade [17]). Except the above patient, all patients were discharged less than 72 hours after surgery (8 patients were discharged in the second post-operative day).

We registered two grade II complications. One of the patients developed a 5-cm perineal hematoma that infected, treated expectantly with prophylactic antibiotics. Another patient developed immediate urinary retention which warranted urinary catheterization and resolved within one week after surgery.

For all patients, adequate vaginal flaps were obtained for the reconstruction of the neo-urethra for the subsequent phalloplasty.

All patients were followed for the first 2 months after surgery (usually with just one follow-up appointment) and after 3 months, the plastic surgeon performed

35 the phallic reconstruction. To date, only 10 patients underwent the second
36 stage phallic reconstruction and we did not have any case of neourethra-
37 vaginal fistulae or stricture.

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Discussion

Laparoscopic vaginectomy seemed to have presented several advantages over the vaginal approach. It provided a better exposure of the tissues and vessels, which also allowed an improvement in haemostasis during the surgery. With the presented surgical technique, the round ligaments were not ligated at the beginning of surgery. This provided uterine support, as we did not use any uterine manipulator during the hysterectomy. We were able to access the retroperitoneal space and better identify and isolate the ureter on its terminal pathway to the bladder. Therefore, we could safely access the parametrium, the paracolpos and the vaginal vessels. The vaginal approach in these patients, who had no sexual intercourse and were under therapy with testosterone, may lead to fragmented vaginal flaps more prone to urethrocuteaneous fistulas, stenosis and strictures (2,6,12).

Genital reassignment surgery refers to numerous procedures in which a vaginectomy may be included. Total vaginectomy is a complex surgery that may present several advantages to these patients. Firstly, it avoids posterior vaginal cyst formation or neourethr-vaginal fistulae. Furthermore, future genital complaints associated with the presence of atrophic changes of the vaginal lining (such as pruritus or burning) are also prevented. The vaginal mucosa is a good choice for the reconstruction of the penile neo-urethra, as it resembles the urethral epithelium more closely than the forearm skin, with low rates of urethral fistula and stricture (6).

The size of the neo-urethra should be 15 cm and for the urethral reconstruction, the plastic surgeon used the vaginal mucosa that was rolled over a catheter. Since the vaginal mucosa was totally removed, there was always enough tissue available for the reconstruction. Furthermore, since the operative piece was removed in one large block, better vaginal flaps were obtained.

According to our series, laparoscopic hysterectomy with bilateral adnexectomy and total vaginectomy, in genital reassignment surgery, appears to be a safe procedure, with an estimated blood loss below 500 mL and a low rate of post-operative complications. A previous study, regarding laparoscopic assisted vaginal hysterectomy, bilateral adnexectomy and total vaginectomy,

35 reported an average operative time of 2h and 20min (Table 1) (13). With this
36 technique there was no need for blood transfusions and the operative time
37 was not increased.

38 In a second-stage procedure, the plastic surgeon used the circumflex iliac
39 artery groin flap for the phallic reconstruction, which provided an adequate
40 vascular pedicle and a large amount of soft tissue for a suitable neo-phallus
41 with a functional neo-urethra. The free graft in the circumflex iliac artery area
42 favours a good revascularization of the vaginal mucosa and an adequate
43 specimen for the phalloplasty. Also, the free flap appears to be less prone to
44 stenosis and fistulae. With the extensive use of laparoscopy, injuries to the
45 structures essential for the phalloplasty may be prevented (12,13,14).

46 The only studies previously published on laparoscopic vaginectomy report the
47 use of this technique in the treatment of gynaecologic cancers. In general, the
48 authors present similar advantages and report low surgical morbidity, as the
49 intra-operative blood loss and post-operative complications are minimal (7-9).
50 As with radical hysterectomy, we isolated and dissected both ureters from all
51 the surrounding tissues and the uterine artery. The bladder was anteriorly
52 dissected, and then, the bladder and ureters were pushed further away from
53 the vagina (15,16).

54 To the best of our knowledge, this study is the first to evaluate the outcomes
55 of this technique outside the field of gynecological oncology, specifically in
56 genital reassignment surgery (8, 9). The surgical team and technique were
57 always the same, which enabled us not only to obtain a progressively larger
58 specimen of vaginal mucosa for the subsequent phalloplasty, but also to
59 minimize the potential for confounding factors in interpreting the outcomes for
60 this study. Furthermore, the group of patients included in the study is
61 homogenous, as only patients diagnosed with gender dysphoria were
62 included. The sample size (n=23) is also another of the strengths of our study.
63 As this is a one-armed case series, the main limitation of our study is the
64 impossibility to compare our surgical results to the ones arising from the
65 vaginal approach. Furthermore, an objective evaluation of the size of the
66 vaginal flap laparoscopically removed was not always obtained, which does
67 not allow us to objectively present these results.

68 Although this is not the focus of our article, the free graft technique appeared
69 to be a safe technique with good outcomes. However, future studies should
70 be conducted to evaluate the potential advantages of applying this technique.
71 We present a new laparoscopic technique in genital reassignment surgeries,
72 which has several advantages for the phallic reconstruction. Our results are
73 important since they suggest the feasibility and safety of the laparoscopic
74 vaginectomy in this surgery. The surgery may be performed as a continuous
75 procedure and the pelvic structures are better visualized. It is also an
76 appropriate method for patients with vaginal atrophy, such as those using
77 testosterone (9). Furthermore, adequate haemostasis may be obtained easier
78 than when compared with the vaginal approach. According to our experience,
79 the laparoscopic approach for vaginectomy allows for a better and longer
80 specimen of vaginal mucosa to construct the penile neo-urethra, for the
81 second-stage phalloplasty.

82

83

84 Figure Legends

85

86 Fig. 1, 2

87 The surgical piece excised in block that includes the vagina, the uterus, the
88 tubes and the ovaries.

89

90 Fig. 3

91 Construction of the penile urethra using the vaginal mucosa. Tubulisation
92 around catheter.

93

94 Fig. 4

95 Phalloplasty using the circumflex iliac artery groin flap.

96

97 Figure 5

98 Size of vagina excised by laparoscopy from 2007-2015.

99 Data are presented as percentage.

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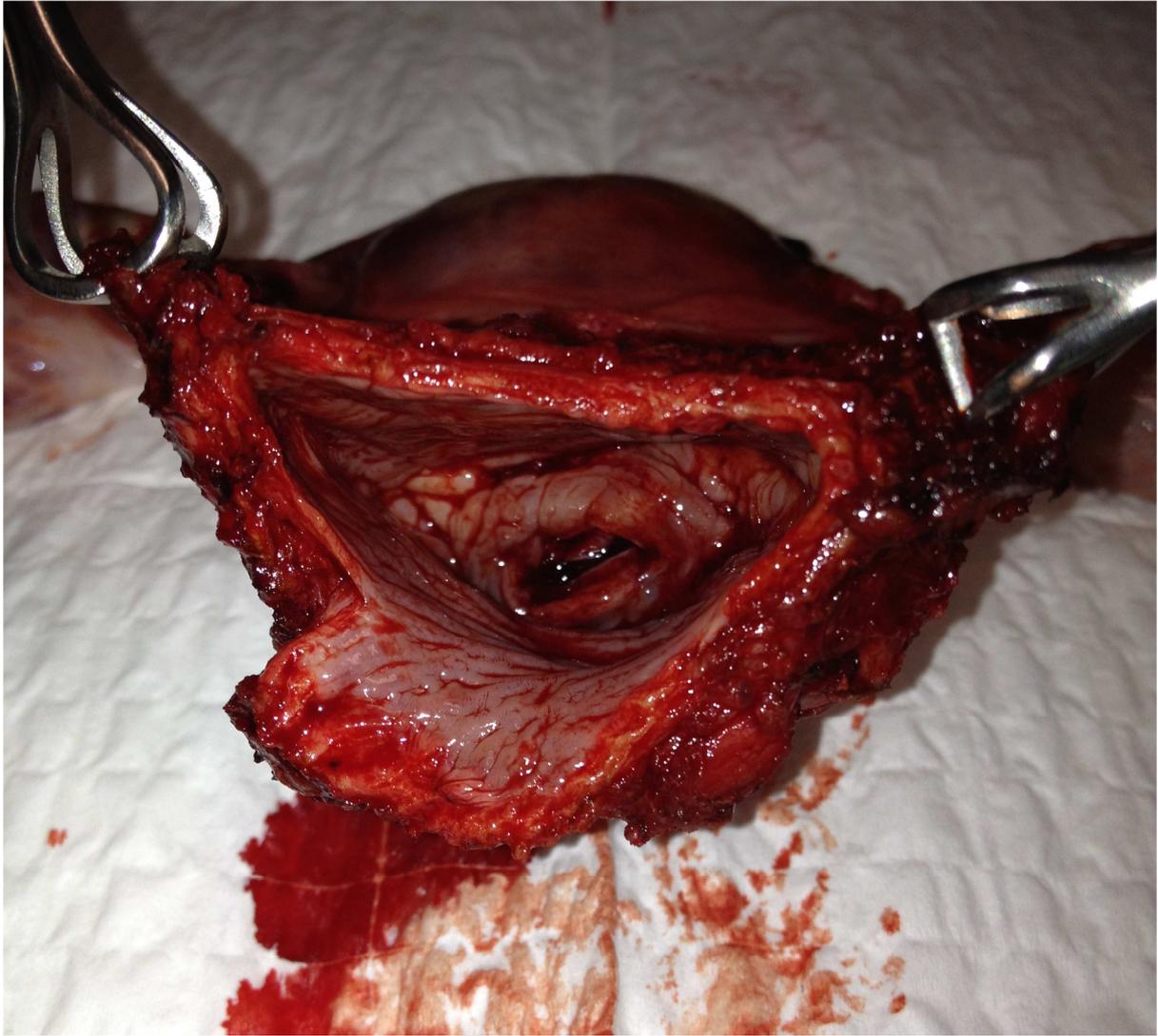
Table 1 - Summary of cases of laparoscopic hysterectomy and bilateral salpingo-oophorectomy, with or without vaginectomy, in genital reassignment surgery

Authors	Number of cases	Procedure	Operative time	Operative complication rate	Blood loss (mL)	Postoperative stay (days)
Ergeneli ¹³	8	Vaginectomy, laparoscopically assisted vaginal hysterectomy and bilateral salpingo-oophorectomy	140 min	1/8	250 ± 100*	-
Ott ¹⁸	31	Laparoscopic hysterectomy and bilateral salpingo-oophorectomy	222.25 min [IQR] 190-270 minutes	1 conversion to laparotomy	No need for transfusion	8 [7-9]
O'Hanlan ¹⁹	41	Laparoscopic hysterectomy, bilateral salpingo-oophorectomy, and incidental appendectomy	74.08 ± 35.4*	5/41	26.88 ± 27.7*	1.07 ± 0.3*
Weyers ²⁰	83	Laparoscopic hysterectomy and bilateral salpingo-oophorectomy	64 (30–150) min	3/83	86 (25–600)	-

IQR – Interquartile rate

* Data are expressed as mean ± standard deviation





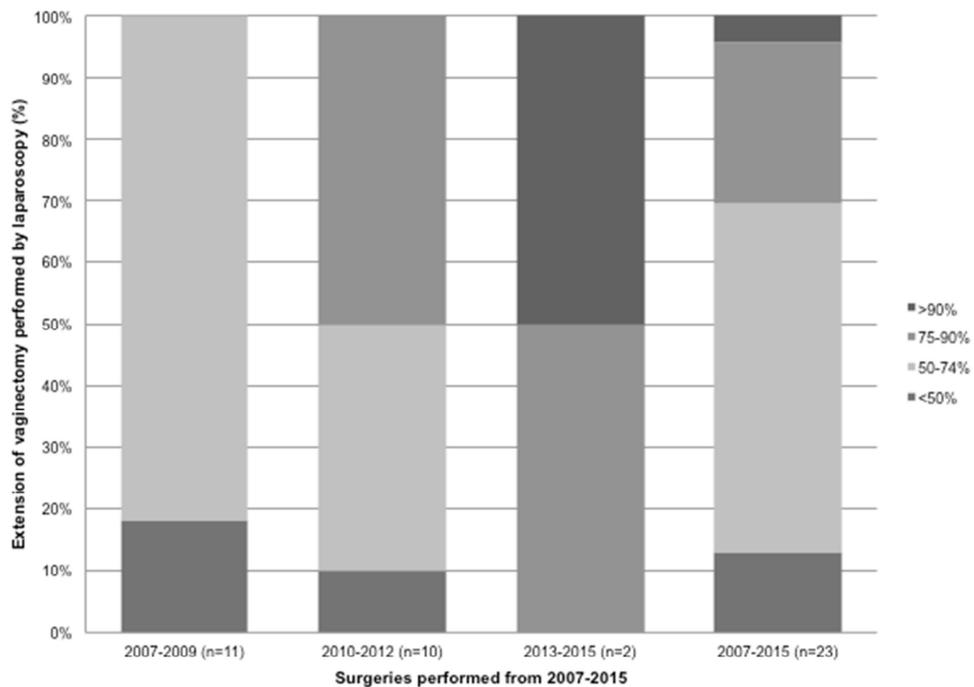
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Laparoscopic Vaginal-Assisted Hysterectomy with Complete Vaginectomy for Female-to-Male Genital Reassignment Surgery

Précis

This study suggests the feasibility of laparoscopic vaginectomy in genital reassignment surgery, which provides better exposure of the anatomic structures and has the advantages associated to a laparoscopic approach.