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CLINICAL ARTICLE

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Sexual quality of life and postoperative deep dyspareunia after vNOTES benign adnexal procedures

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Abstract

Objective: This study aimed to investigate the impact of vNOTES on postoperative sexual dysfunction in patients undergoing adnexal procedures.

Methods: We analyzed data from patients who underwent vNOTES adnexal surgeries for benign conditions between May 2020 and May 2023. The primary outcome was the presence of new postoperative deep dyspareunia (DD) or other sexual dysfunctions, which were assessed through a phone survey conducted 6 to 24 months after surgery. Secondary outcomes included surgical feasibility, operative times, complications rate, and postoperative pain evaluation.

Results: We included 103 patients for primary and secondary outcomes and 111 patients for secondary outcomes analysis only. Newly postoperative DD was reported by three patients (2.9%), remained present at 12 postoperative months in one case (1.0%), and spontaneously disappeared in two cases (1.9%) after four and 10 postoperative months, respectively. In the remaining 100 patients (97.1%), no new DD or other sexual function disorders were reported after surgery. vNOTES procedures were successfully performed in all cases, with a mean operative time of 38.2 ± 19.6 min and a conversion rate to conventional laparoscopy of 0.9%. No significant complication was observed.

Conclusion: This study suggests a very limited risk of developing postoperative sexual dysfunction after vNOTES benign adnexal procedures.

KEYWORDS

adnexal surgery, dyspareunia, natural orifice transluminal endoscopic surgery, sexual disorders, sexual dysfunction, sexual quality of life, vNOTES

Laura Berisha and Yannick Hurni both contributed equally to this work.

1 | INTRODUCTION

In gynecologic surgery, adnexal procedures for benign conditions are generally performed by minimally invasive techniques such as conventional laparoscopy (CL), laparoendoscopic single-site surgery (LESS), and more recently, transvaginal natural orifice transluminal endoscopic surgery (vNOTES). Over the past few years, vNOTES has increasingly been used for adnexal procedures, generally showing better perioperative outcomes when compared to CL and LESS. vNOTES appears to be associated with reduced blood loss, shorter operative time, less postoperative pain, and better cosmetic results.[1–3] Despite these promising results, little is known about the impact of vNOTES adnexal surgery on women's sexual quality of life and the risk of developing postoperative dyspareunia.[4]

During vNOTES adnexal procedures, access to the peritoneal cavity is achieved with an Alexis vaginal retractor inserted into the Douglas pouch through a posterior colpotomy. This involves vaginal distension during the procedure and a colpotomy scar. Although previous data suggest that transvaginal surgical accesses do not represent a risk for postoperative sexual dysfunction,[5–7] there is a lack of data concerning women undergoing vNOTES adnexal procedures.

In the present study, we assessed the risk of developing dyspareunia and other sexual dysfunctions following vNOTES procedures for benign adnexal conditions.

2 | MATERIALS AND METHODS

2.1 | Patient selection, data collection, and methods

This prospective observational study was based on patients identified from a database, including prospectively and retrospectively collected data. Since May 2020, vNOTES has been introduced in our institution (Valais Hospital in Sion, Switzerland). From January 2022, we started collecting, both retrospectively and prospectively, data concerning patients who underwent vNOTES procedures to create an institutional database. This database was created using Research Electronic Data Capture (REDCap) software. All patients gave written informed consent, and the project received approval from the local ethical committee "Commission cantonale d'éthique de la recherche sur l'être humain du canton de Vaud" (CER-VD) (registration no. 2021-02346). From this database, we identified all consecutive patients who had undergone vNOTES interventions for benign adnexal conditions between May 2020 and May 2023. We included patients aged >18 years who underwent uni- or bilateral oophorectomy, salpingectomy, ovarian cystectomy, salpingostomy, or tubal ligation in both elective and emergency settings. We excluded patients who underwent a concomitant hysterectomy, conization, or interventions for pelvic organ prolapse or urinary incontinence. Patients with an adnexal malignant disease, history of perineal/rectal surgery, history of previous total hysterectomy, history of previous vNOTES procedures, history of pelvic radiation, suspected rectovaginal or retrocervical endometriosis, pelvic inflammatory disease, lower genital tract infection, pregnancy, virgin patients, and who do not speak fluent French, English, Italian, German, Portuguese, or Spanish, were also excluded.

Demographic features, perioperative information, and data concerning short- and long-term outcomes were analyzed from the database. Intraoperative data included total operating time (from the initial incision to vaginal closure), time to insert the vNOTES port, estimated blood loss, intraoperative complications, and the need to convert to CL or laparotomy. Postoperative data included pain evaluation with the visual analog scale (VAS) graded from 0 to 10 at 12, 24, and 48 h after surgery, the use of opioid analgesics, complications that occurred up to 6 months after surgery, and final histopathologic diagnosis. Postoperative complications were graded using the Clavien-Dindo (CD) classification.[8]

In addition, patients were contacted once by phone between 6 and 24 months after surgery to evaluate the eventual appearance of postoperative deep dyspareunia (DD) or other sexual dysfunction observed 6 weeks after the intervention or later (Table S1). DD was defined as discomfort or pain deep in the vagina or lower abdomen during or immediately after vaginal intercourses. Patients were asked (1) if they had sexual intercourse with vaginal penetration after the intervention; (2) if they presented any newly postoperative DD; (3) to evaluate the intensity of the dyspareunia from 0 to 10; (4) to evaluate the frequency of the dyspareunia as (a) almost always or always, (b) most times (more than half the time), (c) sometimes (about half the time), (d) a few times (less than half the time), (e) almost never or never; (5) and in the case of the presence of preoperative DD, to evaluate the current symptoms as similar, better or worse compared to before the surgery. In addition (6) patients were asked to report any other newly appeared sexual function disorder concerning sexual desire, sexual arousal, vaginal lubrication, and sexual pleasure. Patients presenting any sexual function disorder were followed up with regular telephone contacts and were proposed to consult in case of persistence of symptoms.

The primary outcome was the presence of newly postoperative DD or any other sexual dysfunction. Secondary outcomes included (1) the feasibility of performing vNOTES adnexal interventions as planned, (2) the duration of the entire surgery, the time to install the vNOTES platform, (3) the intraoperative complication rate and type, (4) the conversion rate to CL or laparotomy, (5) the postoperative complication rate, type, and assessment using the CD classification, (6) the length of hospital stay in days and (7) the postoperative pain evaluation using a VAS and by the postoperative use of opioid analgesics.

Continuous variables are presented as mean and standard deviation, while dichotomous variables are presented as absolute numbers and percentages (%).

Multiple logistic regression analysis was performed to identify factors associated with the primary outcome. Age, menopausal status, body mass index (BMI, calculated as weight in kilograms divided by the square of height in meters)>35 kg/m^2, type of surgery (uni- or

bilateral salpingectomy and/or oophorectomy vs other procedures), and the history of no previous vaginal delivery were chosen as possible independent predictors for postoperative sexual dysfunctions. A *P* value less than 0.05 was considered statistically significant. Statistical analyses were performed using IBM SPSS version 20 (IBM Corporation, Armonk, NY, USA).

2.2 | Surgical technique

Patients were placed in a dorsal lithotomy position under general anesthesia and received prophylactic intravenous antibiotics with cefuroxime 1.5 g and metronidazole 500 mg. A Foley catheter was placed to keep the bladder empty. Access to the peritoneal cavity was gained through posterior colpotomy to the Douglas pouch. A vNOTES port (GelPoint vPath, Applied Medical, Rancho Santa Margarita, CA, USA) was placed in the abdominal cavity. Carbon dioxide was insufflated to create a pneumoperitoneum with an intraperitoneal pressure of 10–15 mm Hg. Three trocars were used to insert a 10-mm rigid 30° camera and 5-mm laparoscopic instruments such as Johan and bipolar graspers, scissors, and sealing and cutting devices.

Oophorectomies were realized by sealing and cutting the utero-ovarian ligament and the infundibulopelvic ligament about 2 cm proximally to the ovary. Salpingectomies were performed in a retrograde fashion. To remove large or suspicious specimens, samples were extracted through the vagina using an Alexis Contained Extraction System (Applied Medical, Rancho Santa Margarita, CA, USA). Tubal ligations were realized by occluding fallopian tubes by applying Filshie clips on their middle third. At the end of the procedure, the vaginal cuff was closed under direct vision with a running suture using Vicryl 0. Clindamycin vaginal cream was administered once a day on the evening before the surgery, the day of the surgery, and for the first seven postoperative days to reduce the risk of postoperative vaginal suture infections associated with eventually unrecognized bacterial vaginosis.[9] Patients were asked to avoid sexual intercourse for the first six postoperative weeks.

3 | RESULTS

Between May 2020 and May 2023, 111 patients underwent benign adnexal procedures by vNOTES and were included in this study. All patients agreed to participate in the telephone survey to assess postoperative sexual function. Patients were contacted after a mean period of 10.6 ± 4.7 months after surgery. Seven patients were excluded from the primary outcome analysis because they had no sexual intercourse after the intervention, and one patient was excluded because she underwent a subsequent transvaginal/perineal intervention. We finally included 103 patients for primary and secondary outcomes analysis and 111 patients for secondary outcomes analysis only. A flow chart showing the inclusion and exclusion of patients is provided in Figure 1.

Tables 1 and 2 summarize the demographic characteristics of patients and indications for surgery. The mean age was 49.2 ± 13.8 years, and the mean body mass index was 25.8 ± 6.6 kg/m^2. Patients underwent uni- or bilateral salpingectomy and/or oophorectomy in 79 cases (71.2%), tubal ligation in 20 cases (18.0%), and ovarian cystectomy in 12 cases (10.8%). The mean operative time was 38.2 ± 19.6 min, including a mean time for vNOTES port installation of 6.4 ± 3.2 min. All procedures were successfully performed, but conversion to CL was necessary to complete the intervention in one case (0.9%). The reason for conversion was the impossibility of adequately installing the vNOTES port in a morbidly obese patient. In one case (0.9%), a hybrid approach combining vNOTES with a transumbilical trocar was used to allow secure extraction of a 15-cm ovarian lesion after a salpingo-oophorectomy. The transumbilical trocar allowed easy mass insertion into a retrieval bag, reducing the risk of eventual tumor cell spilling during its extraction, given that the exposure and space were deemed too limited to perform it with enough safety exclusively by vNOTES. Intraoperative complications were observed in four patients (3.6%), presenting superficial rectal serosal tears of approximately 1 cm in three cases (2.7%), and a superficial thermal lesion of the small bowel serosa of <1 cm in one case (0.9%). Rectal serosal tears were observed after vNOTES port insertion and were probably associated with traction forces caused by the Alexis retractor. All four superficial lesions were repaired by vNOTES with absorbable sutures, and patients presented no subsequent complications. Interventions were performed as a one-day surgery in 50 cases (45.0%), while 61 patients (55.0%) remained hospitalized for a mean time of 1.9 ± 0.9 days. Mean VAS values for postoperative pain evaluation were 1.0 ± 1.5, 1.3 ± 1.6, and 1.1 ± 1.6 at 12, 24, and 48 postoperative hours, respectively. Two patients (1.8%) presented postoperative complications, with a bladder globe in one case (0.9%) and postoperative nausea and vomiting in one case (0.9%). Both postoperative complications were defined as grade I on the CD classification. Final histopathologic diagnoses and perioperative outcomes are summarized in Tables 2 and 3, respectively.

A new postoperative DD was reported by three patients (2.9%) (Table 4), appeared from the first postoperative sexual intercourses, and was described as almost always or always present in all three cases. The median intensity of DD was evaluated as 7 (range 7–8) over 10. These patients also reported a negative impact on their sexual desire, sexual arousal, vaginal lubrication, and sexual pleasure. In two cases, the symptoms gradually and spontaneously resolved in 4 and 10 postoperative months, respectively, and patients described a return to a sexual quality of life comparable to before the intervention. DD persisted over 12 postoperative months in one case (1.0%) but presented a gradual reduction in the frequency (from always to less than half the time) and intensity (from 8 to 4 over 10). These patients underwent clinical and sonographic examinations in our institution or by their private gynecologist, but no signs suggesting a clear correlation between the intervention and postoperative sexual dysfunction were observed (e.g., vaginal/pelvic infection, vaginal scar dehiscence, and so on). In the case presenting a postoperative

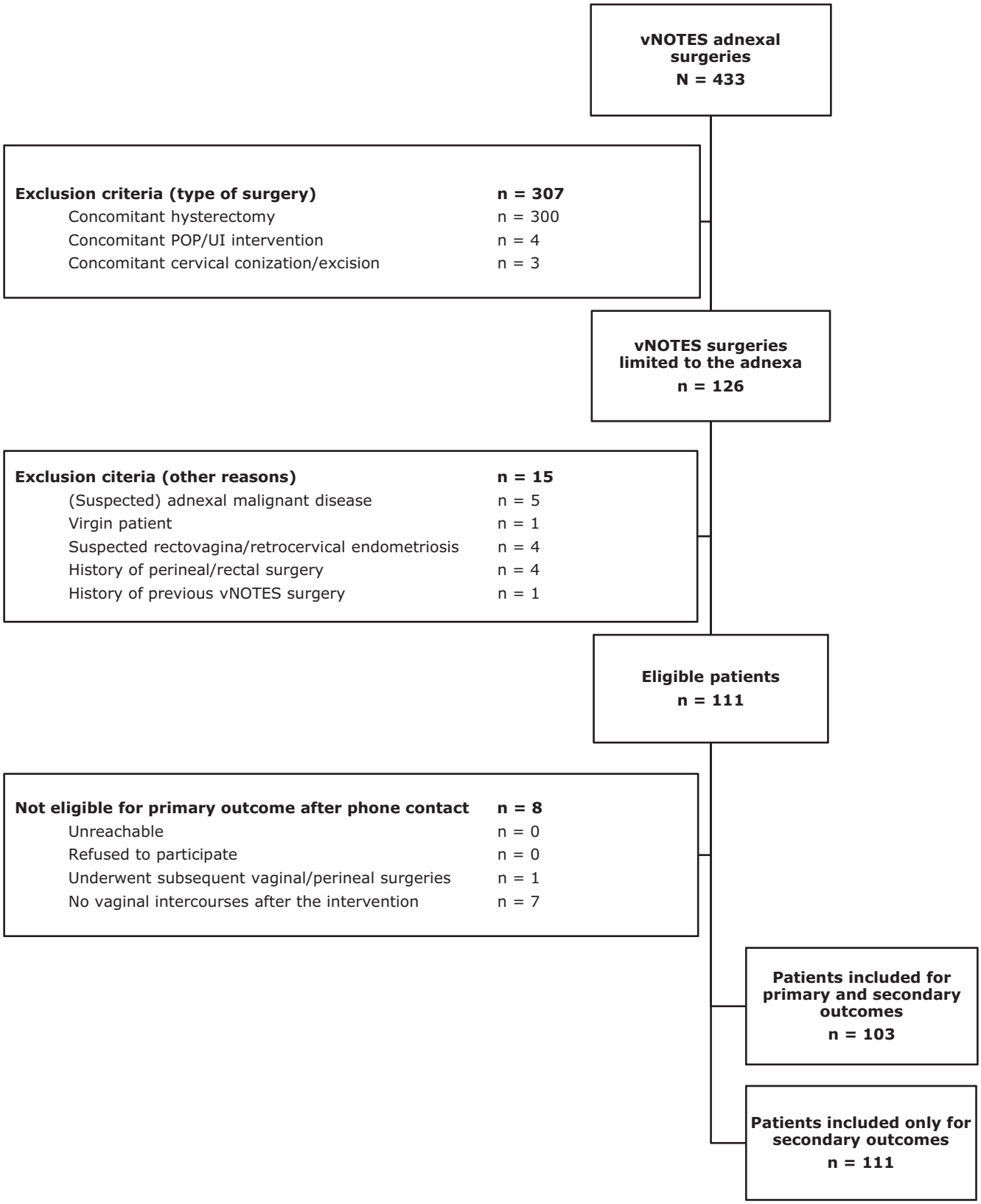

FIGURE 1 Flow chart of inclusion and exclusion.

DD with spontaneous resolution after 10 months, the symptoms appeared associated with the formation of multiple symptomatic ovarian cysts correlated with the use of a hormonal intrauterine contraceptive device. This relation was suggested by the resolution of DD following the removal of the intrauterine device and the resolution of the ovarian cysts. No clear correlation was found

TABLE 1 Demographic data and medical history.

Age (years)	49.2 ± 13.8 (23–81)
BMI (kg/m^2)	25.8 ± 6.6 (15.9–43.0)
Previous vaginal delivery	73 (65.8)
Previous cesarean section	18 (16.2)
Previous pelvic/abdominal surgery	49 (44.1)

Note: Continuous variables are presented as mean ± standard deviation and range (min–max values), and dichotomous variables as absolute numbers and percentages (%).

Abbreviation: BMI, body mass index.

TABLE 2 Indications for surgery and postoperative diagnosis.

Indications for surgery	
Benign adnexal lesion	73 (65.8)
Sterilization	21 (18.9)
Preventive surgery in patients with BRCA mutation	8 (7.2)
Tubal ectopic pregnancy	6 (5.4)
Adnexal torsion	3 (2.7)
Postoperative histopathologic diagnosis	
Ovarian	
Endometrioma	5 (4.5)
Serous cystadenoma	14 (12.6)
Mucinous cystadenoma	4 (3.6)
Seromucinous cystadenoma	3 (2.7)
Serous cystadenofibroma	5 (4.5)
Fibroma	4 (3.6)
Dermoid tumor	9 (8.1)
Tubal	
Endometriosis	1 (0.9)
Ectopic pregnancy	6 (5.4)
Mesothelial cyst	1 (0.9)
Chronic salpingitis	1 (0.9)
Others	
Normal histopathologic analysis	38 (34.2)
No histopathologic analysis	20 (18.0)

Note: Data are presented as numbers and percentages (%).

for the two other cases. In the remaining 100 patients (97.1%), no new DD or other sexual function disorders were reported after surgery. Four patients (3.9%) reported temporary strange vaginal sensations during the first 2–3 sexual intercourses with no subsequent discomfort. The delayed surgical thread reabsorption seemed to cause these temporary symptoms. One patient (1.0%) reported preoperative DD with no significant change after the intervention. None of the six patients with a postoperative diagnosis of endometriosis (tubal or ovarian) presented deep dyspareunia or another sexual disorder either before or after surgery. In the multivariable analysis, we observed no independent predictors of a higher rate of postoperative sexual dysfunction (Table S2).

TABLE 3 Surgical procedure, operative characteristics, and perioperative outcomes.

Procedures	
Salpingectomy and/or oophorectomy	79 (71.2)
Unilateral	13 (11.7)
Bilateral	66 (59.5)
Tubal ligation	20 (18.0)
Ovarian cystectomy	12 (10.8)
Specimens	
Adnexal largest diameter (mm)	49.2 ± 26.2 (20–150)
Operative time	
Entire procedure (min)	38.2 ± 19.6 (13–106)
vNOTES port insertion (min)	6.4 ± 3.2 (2–25)
Estimated blood loss (mL)	23.6 ± 38.4 (0–300)
Conversion to conventional laparoscopy	1 (0.9)
Intraoperative complications	4 (3.6)
Rectal serosal tear	3 (2.7)
Thermal lesion of the small bowel serosa	1 (0.9)
Postoperative complications	2 (1.8)
Bladder globe (CD I)	1 (0.9)
Nausea and vomiting (CD I)	1 (0.9)
Hospitalization regimen	
One-day surgery	50 (45.0)
Hospitalization	61 (55.0)
Length of stay (days)	1.9 ± 0.9 (1–5)
Pain visual analog scale (1–10)	
12 h postoperative	1.0 ± 1.5 (0–7)
24 h postoperative	1.3 ± 1.6 (0–6)
48 h postoperative	1.1 ± 1.6 (0–5)
Use of opioids during the postoperative period	15 (13.5)

Note: Continuous variables are presented as mean ± standard deviation and range (min–max values), and dichotomous variables as absolute numbers and percentages (%).

Abbreviations: CD, Clavien-Dindo classification; vNOTES: transvaginal natural orifice transluminal endoscopic surgery.

4 | DISCUSSION

In the past few years, vNOTES has increasingly been used to perform gynecologic procedures such as hysterectomy, myomectomy, and different types of adnexal interventions.[10,11] Although recent studies published promising results, there are still some unresolved issues concerning vNOTES for the treatment of adnexal pathologies.[3,12,13] Unlike CL and LESS, vNOTES adnexal procedures imply intraoperative vaginal distension, a posterior colpotomy, and the opening of the pouch of Douglas. This can discourage surgeons and patients from choosing this surgical approach due to worries related to the potential negative effects of transvaginal access. This has been suggested by some surveys reporting patients' and healthcare workers' concerns about the impact of vNOTES approaches on sexuality and future pregnancies.[14–16]

TABLE 4 Characterization of cases presenting a new postoperative deep dyspareunia.

Case number	Age (year)	BMI (kg/m^2)	Previous vaginal delivery	Previous pelvic or abdominal surgery	Type and indication for surgery	New postoperative deep dyspareunia
43	39	19.3	Yes	No	Bilateral salpingectomy for sterilization	*Appearance*: first postoperative sexual intercourse. *Frequency*: always. *Intensity*: 7/10 *Follow-up*: resolution after 4 months.
73	41	23.1	Yes	No	Left ovarian cystectomy for a suddenly painful 5 cm cyst (hemorrhagic corpus luteum)	*Appearance*: first postoperative sexual intercourse. *Frequency*: always. *Intensity*: 7/10 *Follow-up*: resolution after 10 months.
77	32	23.0	Yes	No	Right salpingectomy for tubal ectopic pregnancy	*Appearance*: first postoperative sexual intercourse. *Frequency*: always. *Intensity*: 8/10 *Follow-up*: still present after 12 months, but less than half the time, and with a 4/10 intensity.

Abbreviation: BMI, body mass index.

Recent studies have demonstrated that fertility-preserving vNOTES procedures do not affect the mode of delivery, the risk of developing pregnancy-related complications, and the risk of extensive perineal tears following vaginal delivery.[17,18] Studies regarding vNOTES for non-gynecologic procedures suggested no influence of this surgical technique on women's sexual function.[5,19,20] Similarly, small retrospective observational studies on vNOTES for gynecologic procedures did not report any adverse impact of adnexal interventions on the development of new postoperative dyspareunia.[13,21] Recently, Xu et al. published a prospective cohort study comparing pre- and postoperative female sexual function index scores of 61 patients operated by vNOTES to 63 patients operated by CL or LESS for benign uterus-conserving surgeries and concluded that vNOTES has no significant adverse effect on female sexual function.[22] Although these studies suggest the absence of negative effects of vNOTES on women's sexuality, limited data and a restricted number of research projects conducted in the gynecologic field entail the lack of evidence required to properly counsel patients regarding the risk of developing sexual dysfunctions after vNOTES adnexal procedures.

Here, we report the first study focused on the impact of vNOTES for benign adnexal procedures on the development of postoperative deep dyspareunia or any other sexual dysfunction. In a cohort of 103 patients, 97.1% reported no new sexual dysfunction after the intervention. Postoperative sexual dysfunctions associated with a DD were temporarily observed in two cases (1.9%) and were persistent over 12 postoperative months in only one case (1.0%), though showing a gradual improvement. We could not establish a clear correlation between the procedures and the appearance of sexual dysfunctions in any case. Temporary mild vaginal discomfort during the first sexual intercourses, probably due to incomplete surgical thread reabsorption, was observed in 3.9% of the cases.

Our results suggest that vNOTES adnexal procedures are associated with a very limited risk of developing sexual dysfunctions, regardless of patient age, menopausal status, body mass index, type of surgery, and parity. In addition, in the rare case of postoperative DD, symptoms could present a gradual and spontaneous improvement until complete resolution, and their persistency over 12 postoperative months seems very rare. During preoperative counseling, it seems, therefore, reasonable to reassure patients about the impact of vNOTES on sexual life. In the rare case of postoperative DD or vaginal discomfort after vNOTES adnexal procedures, patients should be reassured and managed in a conservative way if no vaginal scar complications are observed (e.g., infections, dehiscence, and so on).

Considering the secondary outcomes, we successfully operated on 111 patients with a mean operative time of 38.2 min, no severe perioperative complications, and a conversion rate to CL of 0.9%. Our results appeared similar to previous studies and reinforced evidence suggesting vNOTES as a valuable alternative to CL and LESS for benign adnexal procedures. Compared to CL and LESS, vNOTES for adnexal surgery seems to be associated with reduced blood loss, shorter operative times and hospitalizations, less postoperative pain, and better cosmetic results.[1,3,13,23,24] If future studies confirm our results, suggesting a very limited risk of developing postoperative sexual dysfunctions after vNOTES, this technique could become the surgical approach of choice for benign adnexal procedures.

Our study supports vNOTES as a safe and valuable technique for adnexal procedures, with a very limited risk of developing postoperative sexual dysfunctions. We acknowledge some limitations resulting from the single-institution character of this study, the use of a non-standardized questionnaire to assess postoperative sexual function, and the absence of its pre- and postoperative comparison. However, we observed an excellent participation rate in the survey, and this study represents the first reported evaluation of the impact of vNOTES for adnexal surgery on the development of postoperative sexual dysfunction. Our results are essential to understanding vNOTES impact on sexuality and represent valuable data for counseling patients in choosing their suitable surgical approach. To confirm our results and reinforce the level of evidence, future studies should assess sexual function with a standardized questionnaire before and after surgery, with a randomized trial comparing vNOTES, CL, and LESS for adnexal procedures.

5 | CONCLUSIONS

This study suggests a very limited risk of developing postoperative sexual dysfunction after vNOTES benign adnexal procedures and reports valuable data to counsel patients before choosing vNOTES as their eventual suitable surgical approach.

AUTHOR CONTRIBUTIONS

CS, MDS, RL, PB, SS, and DH performed the interventions and collected data. LB, YH, DH, and PM conceptualized and designed the study. LB, YH, and DH analyzed the data and drafted the article. CS, MDS, RL, PB, SS, PM, and DH revised the article critically for important intellectual content. All authors gave final approval of the version to be submitted.

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CONFLICT OF INTEREST STATEMENT

The authors have no conflicts of interest.

DATA AVAILABILITY STATEMENT

Research data are not shared.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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