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Women's sexual quality of life after ectopic pregnancy surgery — vNOTES vs conventional laparoscopy — a retrospective cohort study

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ABSTRACT

Objectives: This study aims to compare the postoperative sexual function and recovery outcomes between women who underwent vNOTES (vaginal natural orifice transluminal endoscopic surgery) and those who underwent conventional laparoscopy (CL) for ectopic pregnancies.

Material and methods: A retrospective cohort study was conducted with data from 98 patients who underwent CL or vNOTES for ectopic pregnancy. Postoperative sexual function and genital self-image were evaluated using the Female Sexual Function Index (FSFI) and Female Genital Self-Image Scale (FGSIS) surveys, respectively. Patients were divided into the vNOTES group (n = 40) and the CL group (n = 58).

Results: The postoperative FSFI total scores did not significantly differ between the vNOTES group and the CL group (p = 0.384). However, the lubrication subgroup score of the FSFI was significantly higher in the CL group compared to the vNOTES group (p = 0.001). The FGSIS total score was significantly higher in the vNOTES group compared to the CL group (p = 0.009).

Conclusions: While vNOTES surgery may offer some postoperative benefits in terms of genital self-image, it is associated with lower lubrication scores compared to conventional laparoscopy. These findings highlight the potential impact of vNOTES on sexual function, emphasizing the need for further research to optimize surgical approaches that balance sexual function and recovery outcomes.

Keywords: gynecologic surgery; minimally ınvasive surgery; natural orifice transluminal endoscopic surgery; sexual function

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INTRODUCTION

Ectopic pregnancy (EP) is a common and serious medical condition that can lead to mortality during pregnancy. Around 1–2% of all pregnancies are located outside of the uterine cavity, with the incidence steadily increasing worldwide [1]. EP surgeries requires meticulous attention, with laparoscopy being the preferred surgical approach [2]. By advance in the technique and instruments, minimally invasive surgeries have undergone significant advancements in recent decades [3].

An innovative minimally invasive technique called "vaginal Natural Orifice Transluminal Endoscopic Surgery (vNOTES)" has arisen in recent years. The vNOTES provides to access the abdominal cavity without any abdominal wall incisions, reducing incision related pain and faster postoperative recovery [4]. Several studies have reported that vNOTES is an feasible surgical option for the treatment of EP [5].

There are several studies in the literature comparing CL and vNOTES techniques for the treatment of EP [6, 7]. Overall conclusion of these studies are that vNOTES provides better cosmesis, less postoperative pain scores, and hospital stay, with analgesic requirement [8]. The evaluation of sexual function of women before and after vNOTES has been

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investigated in non-gynecological surgeries so far. Although one literature review concluded that vNOTES gynecological surgeries did not pose a risk for sexual health, there is still a lack of data evaluating women's sexual function after vNOTES technique [9].

Objectives

The aim of this study is to evaluate the postoperative sexual function and genital body image in sexually active women who underwent CL or vNOTES surgery for the treatment of EP.

MATERIAL AND METHODS

A prospectively collected retrospective data of patients who were admitted to the outpatient gynecology clinic of Bakirkoy Dr. Sadi Konuk Training and Research Hospital of the University of Health Sciences in Istanbul, Türkiye between February 2022 to January 2023. Ethical approval was obtained from both the Institutional Review Board and the Local Ethics Committee with "Approval No: 2023/187". The study included women who had ectopic pregnancies and received either CL or vNOTES. Three participants from the study group and eight participants from the control group who could not be contacted to administer the surveys were excluded from the study. The study comprised 40 participants in the vNOTES group and 58 participants in the CL group.

Inclusion criteria of the study were patients who underwent surgery due to conditions such as, hemodynamic instability, initial beta human chorionic gonadotropin levels above 5000 IU, ultrasonographic detection of fetal cardiac activity outside of the uterus, or contraindications to medical treatment. The individuals who were excluded from the vNOTES were those who met any of the following criteria: those with a systemic disease, prior pelvic or rectal surgery, a history of brachytherapy or pelvic radiation, severe pelvic inflammatory disease, suspected malignancy, suspected rectovaginal/retrocervical endometriosis, those who were not sexually active, or those with a sexual disorder.

Prior to the surgery, all patients were informed about both the advantages and potential drawbacks of vNOTES and CL procedures. In addition, the patients were provided with information regarding the likelihood of transitioning from vNOTES to either CL or laparotomy. The selection of the surgical procedure was determined according to the patient's personal choice. All procedures were performed under general anesthesia and were successfully completed using the initially selected technique, with no additional perioperative or postoperative complications observed.

Over the 12 months of follow-up period, women who were sexually active and had undergone surgery were completed validated FSFI and FGSIS questionnaires six months after the surgery. This was accomplished with the assistance of the same research assistant in a quite setting.

Surgical technique

Laparoscopy: A CL procedure was conducted with three ports after creating a pneumoperitoneum using high-flow carbon dioxide insufflators. A 10 mm primary port was created either umbilically or supra-umbilically, along with two 5 mm secondary ports on the same side. Upon diagnosis, the patient underwent a diagnostic laparoscopy procedure using either monopolar or bipolar coagulation. Tissue extraction was performed using an "Endobag".

vNOTES: The vaginal cavity and cervix were exposed to vaginal retractors during lithotomy position under general anesthesia. A "Pozzi forceps" is used on the back of the cervix to examine the posterior vaginal cul-de-sac. A 3 cm posterior colpotomy was performed to introduce a "Alexis's retractor" with a 7 cm inner ring. Three trocars were meticulously set at the "GelPoint" Platform at 2, 6, and 10 o'clock positions. After visualization of the pathology a salpingectomy was performed with a sealing device. After removal of the affected tube the posterior colpotomy opening was closed continuously with an absorbable "Monocryl 0" suture. The study cohort's sociodemographic data, including age, parity, marital status, BMI index, and duration of follow-up (in months), were recorded.

Female Sexual Function Index (FSFI)

The sexual functions of patients were assessed using the self-administered FSFI questionnaire, which was validated specifically for our study population [10]. The survey comprises six categories, namely desire, lubrication, arousal, orgasm, satisfaction, and pain, with a total of 19 questions [11].

On a scale of 0 to 5 for arousal, lubrication, orgasm, and pain, and 1 to 5 for satisfaction and desire, the responses to the inquiries are assessed. Multiplying the obtained section scores by the following coefficients yielded the main section scores: 0.3 for arousal and lubrication, 0.4 for satisfaction, orgasm, and pain, and 0.6 for desire. A higher FSFI score is indicative of a more favorable sexual function in the patient. The classification of FSFI scores includes normal sexual function (total score ≥ 26.55), mild risk for female sexual disorder (total score between 18 and 26.55), moderate risk for female sexual disorder (total score 11–17), and severe risk for female sexual disorder (total score < 10).

Female Genital Self-Image Scale (FGSIS)

The survey comprises a set of seven questions, and respondents are requested to provide their responses on a scale ranging from one to four [12]. The possible responses include "strongly disagree (score of 1)", "disagree (score of 2)", "agree (score of 3)", and "strongly agree (score of 4)".

Table 1. Demographic characteristics of vNOTES and CL groups

n (%)		CL (n = 58)	vNOTES (n = 40)	p value
		n (%)	n (%)	
Age [year]		29.14 ± 4.46 (29) (18–39)	29.15 ± 4.99 (29.5) (20–39)	0.990*
BMI [kg/m²]		26.89 ± 3.49 (26.4) (20.6–37.8)	27.38 ± 3.00 (27.5) (21.3–34)	0.471*
Sexual intercourse		20.95 ± 3.67 (21) (15–31)	20.33 ± 3.05 (19.5) (16–29)	0.464
Gravida	0	5 (8.6)	3 (7.5)	0.528
	1	13 (22.4)	8 (20.0)	
	2	13 (22.4)	13 (32.5)	
	3	20 (34.5)	7 (17.5)	
	4	4 (6.9)	5 (12.5)	
	5	2 (3.4)	3 (7.5)	
	6	1 (1.7)	1 (2.5)	
Parity	0	13 (22.4)	10 (25.0)	0.913
	1	23 (39.7)	13 (32.5)	
	2	17 (29.3)	13 (32.5)	
	3	5 (8.6)	4 (10.0)	
Education	Primary school	16 (27.6)	12 (30.0)	0.528
	Middle school	28 (48.3)	15 (37.5)	
	High school	14 (24.1)	13 (32.5)	
Prior operation	Yok	55 (94.8)	40 (100.0)	0.344
	Cesarian	1 (1.7)	0 (0.0)	
	Cystectomy	2 (3.4)	0 (0.0)	

*t-test was used; BMI — body mass index; CL — conventional laparoscopy; SD — standard deviation

The FGSIS total score is determined through the summation of the scores obtained from the seven answers. A higher total FGSIS score indicates a more favorable genital self-image, with a scale ranging from 7 to 28 points. In 2019, the questionnaire administered to Turkish women was validated [13].

Statistical analysis

Continuous data descriptive statistics include mean, standard deviation, median, minimum, and maximum. Categorical data includes percentages and amounts. Kolmogorov–Smirnov and Shapiro–Wilk tests assessed continuous data normality. The Mann–Whitney U test compared two non-parametric groups, while the t-test compared two parametric groups. The chi-square test compared categorical data. The relationship between two numerical variables was evaluated using Spearman correlation analysis.

P values under 0.05 within the 95% confidence interval were accepted as statistically significant. IBM SPSS Version 21.0 (Chicago, IL, USA) was used for statistical analysis.

RESULTS

The research population comprised 98 cases of EP. CL was performed in 58 cases, while vNOTES was performed in 40 cases. There was no statistically significant difference between the patients in the CL and vNOTES groups with regards to age, BMI index, marital status, gravidity, parity, educational status, prior abdomino-pelvic surgery, or age of first sexual intercourse (p = 0.528; p = 0.913; p = 0.528; p = 0.344) (Tab. 1).

A statistically significant difference was found in the lubrication scores of patients assigned to the CL and vNOTES groups, with the CL group exhibiting higher mean scores (p = 0.001) (Tab. 2). No statistically significant difference was determined in FSFI total scores between the CL and vNOTES patient groups (p = 0.384). A statistically significant difference was observed in the FGSIS total scores between the CL and vNOTES groups, with the vNOTES group exhibiting higher mean scores (p = 0.009) (Tab. 2).

DISCUSSION

The literature indicates that vNOTES, a novel surgical method, has been successfully applied in various procedures, including myomectomy, tubal anastomosis, and salpingo-oophorectomy [14, 15]. Xu et al. [16] demonstrated that transvaginal endoscopic salpingectomy is a safe and effective treatment option for tubal ectopic pregnancy, offering benefits comparable to CL, such as lower postoperative discomfort and better cosmetic results.

Table 2. Comparison of FSFI and FGSIS scores of the groups

	Laparoscopy (n = 58)	vNotes (n = 40)	p value
	Mean ± SD (median) (min–max)	Mean ± SD (median) (min–max)	
Desire	4.71 ± 0.84 (4.8) (3.6–6)	4.59 ± 0.74 (4.8) (3.6–5.4)	0.499
Arousal	4.89 ± 0.74 (5.3) (2.7–6)	4.97 ± 0.73 (5.4) (3.6–6)	0.356
Lubrication	4.85 ± 0.88 (4.95) (2.7–6)	4.26 ± 0.85 (4.2) (2.7–6)	0.001
Orgasm	4.21 ± 0.72 (4) (2.8–5.6)	4.29 ± 0.69 (4.4) (3.2–5.6)	0.620
Satisfaction	4.50 ± 0.75 (4.8) (2.8–6)	4.61 ± 0.67 (4.8) (3.6–5.6)	0.532
Pain	4.14 ± 0.93 (4) (1.6–5.6)	4.06 ± 0.95 (4) (2.4–5.6)	0.730
FSFI total	27.30 ± 3.15 (28) (20.2–33)	26.78 ± 2.53 (27.1) (20.3–30.6)	0.384*
FGSIS total	22.31 ± 3.47 (22.5) (14–28)	24.28 ± 1.80 (24) (20–28)	0.009

*t-test was used; FGSIS — Female Genital Self-Image Scale; FSFI — Female Sexual Function Index; SD — standard deviation

In our study, the FSFI total scores showed no statistically significant difference between the vNOTES and CL groups six months after the surgery. This aligns with findings by Krull et al. [17], who reported no significant differences in sexual function between patients undergoing vNOTES and laparoscopy for benign gynecological reasons.

However, a notable finding in our study is that participants in the CL group had significantly higher scores in the "lubrication" FSFI category. Although vNOTES is less invasive, the transvaginal approach may cause more direct vaginal damage or localized irritation, potentially affecting vaginal lubrication due to changes in post-surgery blood flow or tissue sensitivity. Additionally, healing and soreness may discourage sexual activity, reducing natural lubrication.

Xu et al. [18] conducted a prospective cohort study to determine whether transvaginal natural orifice transluminal endoscopic surgery affects female sexual function. Their findings revealed that vNOTES did not negatively impact overall female sexual function, corroborating our results. However, they also noted that specific aspects of sexual function, such as lubrication, might be more adversely affected by the vNOTES approach, supporting our observations.

Additionally, a recent study by Yan et al. [19] reported significantly higher FSFI scores at 3- and 6-months post-operation in the vNOTES group compared to the CL group ($p < 0.05$). This result contrasts with our findings where the overall FSFI scores were not significantly different, although the lubrication scores were higher in the CL group.

Our study is unique in its use of the FGSIS questionnaire to assess genital self-image, setting it apart from previous research. We found that the FGSIS scores were significantly higher in the vNOTES group, suggesting that the absence of abdominal scars from CL may positively impact genital self-image.

While our study provides valuable insights, it has limitations. The FSFI and FGSIS questionnaires were not administered before the surgery, which limits our ability to compare pre- and post-surgery scores directly. Future studies should include baseline assessments to provide a more comprehensive understanding of the impact of these surgical techniques on sexual function and self-image.

CONCLUSIONS

The vNOTES procedure demonstrates a positive impact on female genital self-image without negatively affecting overall sexual functions. This finding highlights the potential benefits of vNOTES in improving patients' postoperative recovery and satisfaction.

Article information and declarations

Data availability statement

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Ethics statement

All procedures performed in studies involving human participants were accordance with the ethical standards of institutional and/or national research committees and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards. Ethical approval for this study was obtained from the Ethical Committee of Health Sciences University, Bakirkoy Dr. Sadi Konuk Training and Research Hospital (Approval No: 2023/187).

Author contributions

MCD: writing — original draft, writing-review & editing, project development, data collection, conceptualization, validation; KC: writing — original draft, writing-review & editing, project development, data analysis, methodology, validation; BG: writing — original draft, writing-review & editing, supervision, conceptualization, formal analysis, data analysis; OA: writing-review & editing, data analysis, data collection, supervision, conceptualization, formal analysis; SY: writing

— original draft, project development, data analysis, methodology, formal analysis; ME: writing-review & editing, project development, data collection, data analysis, supervision, conceptualization, validation.

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Conflict of interest

All authors are in agreement with the content of the manuscript. The authors have no financial or non-financial conflicts of interest regarding this article to disclose.

Supplementary material

None.

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