



# Percutaneous approach in early-stage ovarian cancer staging

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**Abstract:** Epithelial ovarian cancer (EOC) is still considered the most lethal oncological disease in gynecology. Surgery alone or surgery plus adjuvant chemotherapy are considered potentially curative for EOC early stage, with a 5-year survival rate close to 90%. In the last decades, the feasibility and the adequacy of laparoscopic (LPS) surgical staging in early-stage EOC were assessed and described in several studies. The endoscopic approach, maintaining oncological adequacy, seems to provide better quality of life, reducing the effects of surgical experience on the patient’s body. In the last few years, minimally invasive surgery (MIS) has shown remarkable progress, leading to the development of increasingly less invasive surgeries such as the Percutaneous Surgical System (PSS). In this surgical video article, we performed a percutaneous-surgical staging for early-stage ovarian cancer patient. Perioperative outcomes were described: the total operative time was 180 min and the intraoperative estimated blood loss was 100 mL. No early or late postoperative complications were recorded. After 24 months of follow-up, no evidence of recurrence was detected. This surgical video aims to show the feasibility and safety of the PSS in early-stage ovarian cancer surgical staging.

**Keywords:** Ovarian cancer; ovarian cancer staging; percutaneous approach; ultra-minimally invasive surgery (MIS)

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## Introduction

Epithelial ovarian cancer (EOC) is still considered the most lethal gynecological cancer. In 2019, 14,000 ovarian cancer EOC correlated deaths occurred in the United States (1). While advanced-stage has a poor prognosis, the 20–25% of patients diagnosed with early-stage disease are potentially cured by the surgery alone or surgery plus adjuvant chemotherapy, with a 5-year survival rate close to 90% (2).

In the last decades, the feasibility and the adequacy of laparoscopic (LPS) surgical staging in early-stage EOC were assessed and described in several studies (3–7). The endoscopic approach, maintaining oncological adequacy, seems to provide better quality of life, reducing the effects of surgical experience on the patient’s body (4,8).

The last innovation in minimally invasive surgery (MIS) is the Percutaneous Surgical System (PSS). PSS includes 2.9-mm percutaneous instruments (Percuvance™,

Teleflex Inc., USA) locked with 5-mm tips through the trocar. Another tool in the percutaneous instrumentation is the MiniGrip Handle (MiniLap® Percutaneous Surgical System) (M-PSS): 2.4-mm shaft multi-functional instruments. These innovative surgical systems were already studied, and their safety, feasibility, and adequacy were demonstrated in benign and malignant gynecological pathologies (9–12). The PSS, differently by other ultra-MIS approaches (13,14), reproduces the standard LPS setting in terms of the instruments’ dimensions (5-mm operative tip locked on the 2.9-mm shaft), position and dexterity, as described in previous studies (12,15).

In this video article, we present a 41-year-old woman case with a 30-mm, unilocular-solid right adnexal mass, not vascularized, with negative CA 125 and computed tomography scan negative for distant lesions. This patient was nulliparous, strongly motivated to have a pregnancy, and initially underwent a percutaneous conservative borderline



**Video 1** Percutaneous radical hysterectomy, bilateral salpingo-oophorectomy, omentectomy, pelvic and lumboaortic lymphadenectomy for ovarian cancer surgical staging.

ovarian tumor staging, performed using the M-PSS. Frozen section analysis showed a borderline ovarian tumor, thus a fertility-sparing surgical staging was performed. Unfortunately, definitive pathological report described a focal low-grade serous ovarian cancer in borderline ovarian tumor context. Consequentially, the patient underwent comprehensive surgical staging performed with PSS.

In the era of MIS technological advancement, this video article (*Video 1*) aims to show the feasibility and the safety of the PSS surgical staging for early-stage ovarian cancer patients.

## Surgical technique

### *M-PSS conservative staging for borderline ovarian tumor*

Reproducing a standard LPS setting, a transumbilical open-laparoscopy incision was performed to reach the abdominal cavity and a 5-mm Hasson trocar was used. An additional 5-mm trocar was inserted in suprapubic area. Then, two MiniGrip, 2.4-mm needleoscopic instruments, were percutaneously inserted as lateral graspers. The suprapubic 5-mm port was used for suction/irrigation, bipolar energy grasper, and scissor.

After the trans-peritoneal visualization of the right ureter, the surgeon coagulated and cut the ovarian pedicle, the uterus-ovarian ligament, and the first portion of the right tube, to complete the right salpingo-oophorectomy. The specimen was extracted using an endo-bag through the umbilicus, without spillage in the abdominal cavity. Moreover, the conservative staging procedure was completed performing an endometrial biopsy, appendectomy, multiple peritoneal biopsies, and infracolic omentectomy. A multifunctional instrument through the

5-mm trocar was used to perform the omentectomy.

### *PSS comprehensive surgical staging for early-stage ovarian cancer*

After definitive pathological report, patient underwent radical surgical staging for early-stage ovarian cancer performed using PSS. Replicating the hybrid setting described in the previous surgical procedure, the pneumoperitoneum was achieved using a 10-mm Hasson trocar through the umbilicus. A 5-mm trocar was placed in the suprapubic position, and two Percuance laterally for both sides. For this procedure, the multifunctional instrument was constitutively used.

### Surgical step

- (I) Bilateral coagulation of round ligaments and opening of the broad ligaments;
- (II) Principal vascular structures and ureters identification. Uterine artery closure at their origin with hemostatic endoclips;
- (III) Coagulation and section of the left ovarian vessel keeping the ureter under visual control;
- (IV) Ventral development of the vesicouterine septum, up to the Halban's fascia (pubocervical fascia);
- (V) Coagulation and section of the uterine vascular pedicles;
- (VI) Colpotomy and transvaginal extraction of the uterine and left adnexa. Vaginal cuff closure with a single-layer endoscopic running suture;
- (VII) Para-vesical and para-rectal spaces development with external iliac, internal iliac vessels, and obturator nerve identification. Bilateral systematic pelvic lymphadenectomy;
- (VIII) Through the presacral fascia incision, visualization of the cava, aorta, and the origin of the inferior mesenteric artery. Infrarenal lumboaortic lymphadenectomy.

### Perioperative-outcomes

The total operative time was 180 min and the intraoperative estimated blood loss was 100 mL. No early or late postoperative complications were recorded. After 24 months of follow-up, no evidence of disease recurrence was detected.

### Comments

In this video article (*Video 1*), we demonstrated, for the first

time, the feasibility of the percutaneous approach in early-stage ovarian cancer surgical staging. PSS approach is the last novelty in the MIS world. The rapid technological development of the last decade allowed the MIS to be comparable to the classic surgical approach with overlapping surgical and clinical safety but with less invasiveness.

The percutaneous approach was introduced and studied as a valid alternative in the surgical treatment of benign and malignant gynecological diseases (9-11). This surgical video article represents the first step to assess the potential scientific study of this new tool in the early-stage ovarian cancer surgical management.

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