

# Transvaginal laparoscopy proposed as an investigation procedure for patients at high-risk for ovarian cancer

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## Summary

Transvaginal laparoscopy (TVL) was performed in 23 patients at high risk for ovarian cancer (OC). The patients were placed in the lithotomy position after sedation and a veres needle was inserted in the posterior vaginal vault. A trocar followed and warm normal saline was injected into the pelvis. The needle was removed and a telescope connected to a light source and monitor was introduced. Excellent visualization was achieved in all cases examined and the average time of TVL was 30 min. All patients except one found TVL a simple and painless procedure. TVL helped in the diagnosis of six benign ovarian lesions and ruled out OC in the other 17 cases. TVL is an easy method to learn with reliable results. TVL can reduce the number of unnecessary laparoscopies and/or laparotomies and it seems to be useful in ruling out OC.

*Key words:* Ovarian cancer; Transvaginal laparoscopy.

## Introduction

The high-risk patients for developing ovarian cancer (OC) are postmenopausal women and patients with breast/ovarian cancer (BOC) syndrome [1]. Vaginal sonography accompanied with color Doppler studies and serum CA125 as a screening measure on asymptomatic patients has failed to significantly reduce OC mortality [2]. Similarly patients diagnosed with ovarian lesions after imaging most of the time have to undergo unnecessary operations to rule out OC. According to the latest reports for every seven postmenopausal women identified with abnormal ultrasound (US) and/or elevated CA125 undergoing laparoscopy/laparotomy, only one had OC [1-3].

The great majority (> 95%) of women with suspected ovarian cancer are usually postmenopausal women with abnormal pelvic sonography. When a pelvic mass is found, computerized tomography and/or magnetic resonance imaging and serum CA125 usually follow to help in the diagnosis [4]. However, in more than 70% of the cases benign pathology is reported. As a result, many unnecessary laparotomies or laparoscopies are performed in fear of ovarian cancer [3].

The number of first and/or second-degree relatives with BOC increases the risk for the other women in the family (familial cancer) [5, 6]. A young age (< 50) of disease diagnosis is also important and puts the family at higher risk of developing BOC [7]. Hereditary BOC present carriers of BRCA1 and BRCA2 mutated genes [5]. Six-monthly serum CA125 and vaginal sonography has been recommended for these women as routine follow-up for early diagnosis, however, this approach is still ineffective with a high percentage of false negative results [8]. Oral contraception has been proven to prevent ovarian cancer after four years of use, however its value in high-risk patients has been disputed [9].

Prophylactic oophorectomy has been recommended for high-risk BOC patients. The National Institute of Health (NIH) consensus in 1995 advises prophylactic oophorectomy to women with  $\geq 2$  first degree relatives with ovarian cancer, after completion of childbearing or at age 35 [7]. The Gilda Radner Familial Ovarian Cancer Registry studied 658 families, 2,221 cases over ten years follow-up. Of those women 324 had prophylactic oophorectomy and 1.8% developed peritoneal carcinomatosis [10]. Oophorectomy at age 30 may delay ovarian cancer for ten years with little loss of life expectancy [11]. However, many women in developed countries start their families between 30-40 years of age and they want to preserve their fertility. Also, there is no data on the effect of HRT on BRCA mutation carriers while the long-term use of HRT is controversial.

Transvaginal laparoscopy (TVL) using a 2.8 mm in diameter telescope is a new method, which is primarily used to diagnose infertility problems such as endometriosis, pelvic adhesions and other pelvic pathology with great success [12-14]. TVL was performed on high-risk patients for ovarian cancer (with BOC syndrome and patients with suspected ovarian/pelvic pathology visualized by ultrasound) to evaluate the effectiveness of this method in ruling out OC and to save those patients from unnecessary general anesthesia and operations.

## Patients and Method

### Patients

Two types of patients were recruited in this study. Group A – eight postmenopausal women found to have pelvic pathology by vaginal sonography and Group B - 15 patients with BOC syndrome. These patients were emotionally upset and they felt insecure with regard to their follow-up and current available screening methods for ovarian cancer. Moreover, these patients wanted to preserve their fertility and refused prophylactic oophorectomy. All patients accepted and realized that the

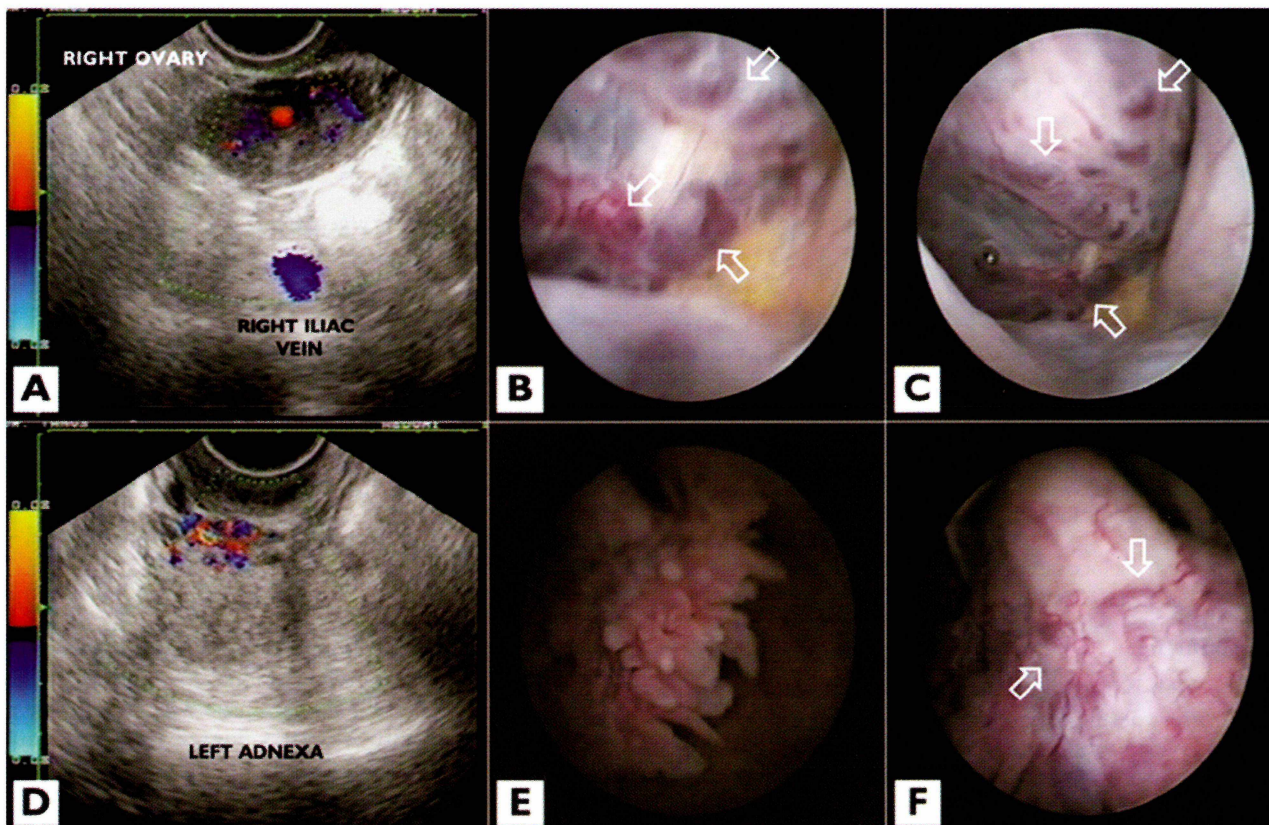


Figure 1. — A patient with bilateral adnexal neoangiogenesis.

A) Left ovary with low resistance blood flow; B & C) Arrows show varicose veins that formed on the left ovary; D) The right ovary with low resistance flow on its top, which eventually was found at TVL in the fibrina in the right adnexal covered with varicose veins; E) Panoramic view of fibrina in the right salpinx; F) Close-up view of fibrina in the right salpinx. Arrows show distended veins.

method of TVL proposed was within research purposes as a pilot study and signed a consent form. In all cases pelvic ultrasound accompanied by color Doppler studies and serum Ca125 was performed prior to TVL.

#### Method

Pethidine 1 mg/Kg, was injected IM 30 min before the procedure. The patient was placed in the lithotomy position and local anesthesia was applied at the insertion point. A tenaculum was applied on the posterior cervical lip pulling the cervical os. A long veres needle (diameter 1.5 mm) was inserted in the posterior vaginal wall 1-2 cm above the cervical-corpori uteri junction while a bigger trocar, 3.4 mm in diameter, followed (Circon ACMI, USA). About 300-500 ml of warm normal saline was injected into the pelvis, the needle was removed, the trocar remained, and a 2.7 mm telescope was then introduced, connected to a light source and a monitor. At the end of the procedure, the normal saline injected was drained and sent for cytology while biopsies were sampled through a working channel from suspected areas. All our cases were selected based on not having had vaginal or pelvic operations in the past.

#### Results

In all 23 cases excellent visualization was noted and the examiner had no difficulty identifying any pathology. All patients except one found TVL to be a simple and pain-

less procedure and they were ready to repeat it in one year. The average time of TVL was 30 min while the discomfort of the patient can be compared to that of colonoscopy. Eight postmenopausal women with no family history, presented pathological findings at vaginal sonography while four also had elevated CA125. One woman had adnexal varicose veins bilaterally, three women were diagnosed with benign ovarian pathology and the other four were within normal limits. Among the other 15 women investigated there were nine breast cancer patients below 50 years of age with a family history and another six patients with a strong family of BOC history only. In three patients benign lesions were noted and confirmed at histopathology. Up to now no ovarian cancer case has been diagnosed in our investigated series. In three women this method was repeated after one year for screening purposes after patient requests and consultations with their psychologists in order to alleviate their fear of OC.

We present two interesting cases in which TVL helped establish the diagnosis, thus saving patients from undergoing more invasive procedures.

*Case One:* A 60-year-old woman, married with two children, obese (110 kg) but generally healthy. She had



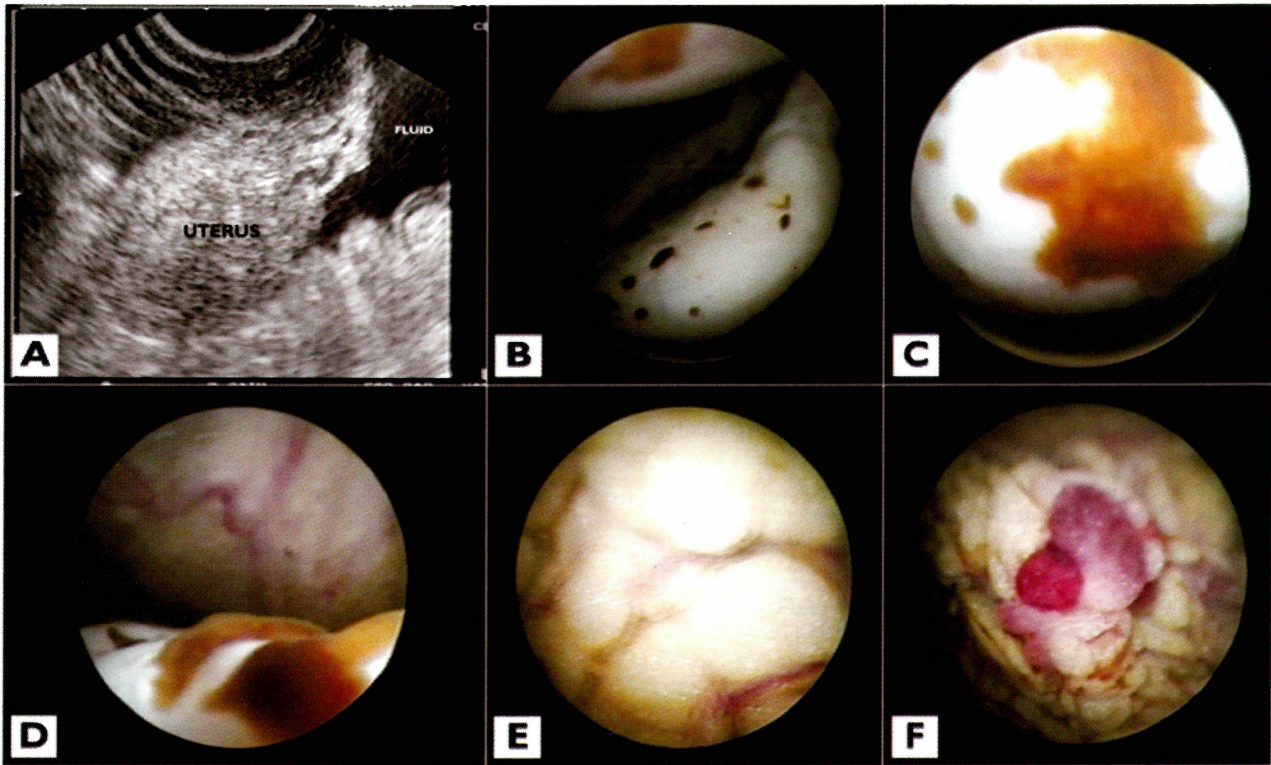


Figure 2. — A patient with persistent free fluid in the pelvis.

A) Uterus floating in free fluid as seen at vaginal ultrasound; B) Panoramic view of the left ovary - dark spots can be seen on the surface; C) Close-up view showing red deposits - like blood clots; D) Deposits are elevated from the ovarian surface and are not formed from ovarian tissue; E) Foamy appearance of the omentum; F) Omental edema - the biopsy showed benign omentum.

gained 15 kg in the previous 14 months. During a routine check-up vaginal sonography and color Doppler studies revealed neoangiogenesis with low resistance in both sides. The left ovary was slightly enlarged and increased blood vessels were seen in the center and in the periphery of the left ovary (Figure 1A). In the right adnexa increased vascularity with low resistance flow was seen adjacent to the right ovary (Figure 1D). When TVL was performed varicose veins were visualized in both ovaries (congested ovaries) more prominent in the left ovary (Figures 1B & C) and in the right fibria (Figures 1E & F). The warm normal saline used to visualize the pelvis was collected and sent for cytology. Normal cytology was reported. The etiology of these findings seem to be the increased peripheral estrogens due to an increased body mass index. The TVL was uneventful and the patient was discharged home after two hours.

*Case Two:* A 33-year-old woman, married with three children. Two months after a successful bone marrow transplantation due to relapse of acute myeloplasic leukemia, she visited our clinic for a routine gynecological check-up and cervical smear test. Vaginal ultrasound revealed about 300 ml of free fluid in the Douglas' pouch. The patient was advised to repeat the ultrasound scan after three weeks. Repeated sonography revealed no changes as demonstrated in Figure 2A. The patient was feeling good and her clinical condition was normal.

However, her hemoglobin was 9.0 mg/dl and her platelets were just 150,000/mcl. TVL was considered as a good option to this rather wretched patient in order to investigate the reason for the pelvic fluid collection. TVL demonstrated fibrin deposits in both ovaries (Figures 2B-D). These deposits were easily detached from the ovarian surface and they were floating in the pelvic cavity (Figure 2D). The omentum was edematous with a foamy appearance (Figures 2E & F). Cytology reported scanty degenerating singly shed mesothelial cells and abundant mature and immature lymphocytes, red blood cells, aggregating neutrophils in some places and histiocytes. Pelvic effusion was dominated by mature and immature lymphocytes but no malignant cells were evident. The procedure was uneventful and the patient received broad-spectrum antibiotics intravenously. She was discharged home after four hours.

## Discussion

The anatomical position of the ovaries and the delayed onset of symptoms in ovarian cancer are the main reasons for the high mortality rate. The application of vaginal sonography alone or in combination with CA125 does not seem to significantly reduce the OC mortality rate, while the number of unnecessary laparoscopies/laparotomies has increased [2, 3]. Hence, the need for a better method of detection of OC at early stage is necessary. At

this stage, the application for an OC detection screening program, looks remote. Today however, we are able to identify the patients at high risk for OC [5]. Studies have shown that the application of vaginal sonography and CA125 serum levels are more efficient in this special group of patients [2] but again in order to establish the diagnosis at least with a biopsy, implies an invasive procedure with anaesthesia with a substantial cost of money and psychological distress for the patient.

Imaging procedures like 3D-ultrasound, color Doppler studies, computerized tomography scanning or magnetic resonance imaging give excellent resolution and are very helpful in identifying an ovarian lesion, however, for the final diagnosis an open biopsy is still necessary. Recently the fractal dimensions of outlines of sonographically depicted solid components in 160 ovarian tumors were measured using a box-counting method. This study showed that the surface of solid components in cystic epithelial ovarian cancers has a fractal structure and may require different treatment strategies [15]. Of course there is still the question as to whether ovarian cancer initiates from the ovarian core or from the surface. The two basic theories generally accepted by the majority of the gynecologists worldwide are: A) The theory of "incessant ovulation" i.e., switching on and off of cell growth inducing the potential of uncontrolled growth [16]; and B) The theory of "ovulatory age", the more ovulations the greater the risk ovarian cancer can develop [17]. Both these theories support the fact that OC initiates from the ovarian cortex-surface. The chance to depict ovarian lesions at the very early stage, before even Stage I, by imaging techniques has not been tried because it seems unrealistic.

Recently, Leeper *et al.* reported an increased frequency of occult ovarian carcinomas after prophylactic oophorectomy specimens in high-risk women and concluded that a) the fallopian tubes and the ovaries should be entirely submitted for histopathological serial sections and b) that laparoscopy and laparotomy are the surgical modalities of choice to allow inspection of the peritoneal surfaces at the time of prophylactic oophorectomy and collect fluid for cytologic evaluation [18].

Under these circumstances TVL seems to be the most minimally invasive and effective approach in examining the adnexae but also the whole pelvis of women at high risk of OC. In TVL the tissues inspected are floating in the normal saline thus providing better and more accurate visualization since pelvic lesions that can not be identified by laparoscopy or laparotomy can be demonstrated. Brosens *et al.* in 2001 reported the diagnosis of micro, filmy adhesions and endometriosis foci within the fallopian tubes and the ovaries that could not be diagnosed by laparoscopy [19].

The problem of spreading the disease after biopsy of a suspected OC lesion during TVL is of primary importance. However, frozen section or switch to laparotomy in these cases can be an option. More patients need to be recruited in order to introduce TVL as a routine procedure for high-risk patients for OC.

In this pilot study we conclude that the method of transvaginal laparoscopy enables direct visualization of

the ovaries and pelvis. Also cytology and biopsies can be obtained ruling out pelvic/ovarian malignancies. It can also be an office procedure, reproducible like colonoscopy, performed under sedation and local anesthesia, of low cost, and easy to learn with excellent patient compliance.

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