



The Evolution of Laparoscopy in the Management of the Ovarian Mass: Challenges Overcome, Challenges Remaining

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While laparotomy and ultrasound guided aspiration were still the common approaches for the management of ovarian cysts in the late 20th century, the introduction of laparoscopy in the surgical armamentarium has begun changing this approach as early as the late 1960's. In his publication dated 1969, Dr Stepto from the royal college of obstetrics and gynecology describes his own techniques using laparoscopy to diagnose the type of the ovarian cyst by aspirating its content or by biopsy of the cysts in his first recorded laparoscopic series of 24 different types of ovarian cysts compiled from 1967 [1]. During the same period, Doctor Palmer [2] was using laparoscopy for aspiration and cauterization of endometriomas. Many other investigators were using laparoscopic aspiration of cysts as a diagnostic tool, and sometimes for treatment. However this technique was found to have a high recurrence rate of the cyst as high as 40% [3]. To overcome this obstacle, Klepinger suggested a new technique called fenestration. In his small series published in 1978, comparing simple cyst aspiration versus aspiration biopsy and fenestration, he suggested this latter technique could decrease cyst recurrence [3]. Subsequently several authors published articles about ovarian cyst fenestration, which showed lower recurrence rate. In the early 70's the role of operative laparoscopy was expanded and was being used for cauterization of endometriosis cysts, and for wedge resection for Stein levanthal syndrome.

It wasn't until late in the 1980's when Videolaparoscopy was introduced by C Nezhat [4], that laparoscopy has started to include more advanced operative management of ovarian masses such as cystectomy and oophorectomy, especially with the magnification of pictures it offered by the addition of a 19 inch video monitor allowing surgeons to operate in an upright position, and allowing better assistance now that the other members of the surgical team could follow the procedure on the monitor.

The concerns with the laparoscopic approach for management of ovarian masses has always been related to difficulty of surgery due to special needed skills, concern about inadvertent discovery of malignancy and subsequent rupture and upstaging, peritonitis in the case of dermoid cysts, obstetrical complications in the case of pregnancy and fertility repercussions in the case of endometriomas. Those concerns have been addressed through history by several

means resulting from advancements in technology and surgical knowledge.

The first 2 reports of laparoscopic treatment of ovarian mass in pregnancy was reported by Mage and Shalev in 1989 and 1990 when they reported 3 cases of laparoscopic ovarian detorsion and drainage in the first trimester of pregnancy. Ever since, many studies have been published and suggested that laparoscopic surgery may be performed safely during pregnancy at any gestational age but non emergent cases should optimally be scheduled at 16-20 weeks. Multiple technical details have been resolved through the years, and rules such as placing patient in left or right tilt to decrease compression on the vena cava and improve cardiac return, Intraoperative CO₂ monitoring by capnography, the use of open Hassan technique for initial laparoscopic entry or [5] use of the Veress needle in palmer point alone or in conjunction with ultrasound guidance, maintaining Intraoperative abdominal pressure less than 15mm Hg while in Trendelenberg position to ensure adequate venous return and uteroplacental sufficiency. The laparoscopic approach for ovarian mass in pregnancy has proven to be a safe approach with minimal surgical and obstetrical complications, in all trimesters of pregnancy, as long as it is performed by a surgeon experienced in laparoscopic surgery [6]. Compared to traditional surgery, it provided a shorter hospital stay and reduced risk of complications both for the mom and the fetus.

In the case of dermoid cyst, the first case series of management of dermoid cyst by video laparoscopy was published in 1989 by C Nezhat et al. In their series 9 women who presented with pelvic pain and mass had laparoscopic cystectomy. There was minimal spillage in 3 cases, which was managed with copious lavage using a mixed solution of lactate ringer and heparin. There were no intra or post operative complications after follow up for at least 12 months [7]. While the main concern with laparoscopic handling of dermoid cysts was the higher risk of spillage, and subsequent risk of chemical peritonitis in the laparoscopic approach compared to laparotomy, the risk of chemical peritonitis remained almost theoretical and described in only very few case reports [8-11] and many techniques have been developed over the years to minimize such including controlled spillage [12], profuse irrigation suction [5] the use of

endobag or by laparoscopic assisted minilaparotomy techniques and hydrodissection [5], or use of colpotomy after laparoscopy for removal of the cyst. Laparoscopic dermoid cystectomy has proven by multiple subsequent studies to be a safe procedure with shorter hospital stay, less blood loss, earlier recovery, and minimal risk of complications compared to the laparotomy approach [13].

In the case of Endometriomas, laparoscopic cystectomy has been established as the mainstay for treatment; however the debate in this regard that hasn't been resolved over the years is the effect of cystectomy on ovarian reserve and subsequently on fertility. The first case series of laparoscopic cystectomy for endometrioma was published by C Nezhat et al. in 1986. In their series of 102 patients with endometriosis and infertility, carbon dioxide laser was used laparoscopically for the removal of endometriotic implants, excision of endometrioma capsules, and lysis of adnexal adhesions. Of the patients presenting with infertility attributed to endometriosis, 60.7% conceived within 24 months after laser laparoscopy. No immediate or subsequent laparotomy was required before conception was achieved, nor was hormonal therapy enacted during the study period after surgery [14]. While some subsequent studies have shown a decrease of ovarian reserve and fertility associated with endometrioma cystectomy, others have found a rather increase in fertility after cystectomy [15-18]. This still needs to be resolved, and some new approaches including sclerotherapy and ablative procedures might be promising for the resolution of this conundrum [19].

While laparoscopy has been adopted as the gold standard for management of the benign ovarian mass, malignant ovarian mass still poses a challenge for the laparoscopic approach. In 1991 Harry Reich reported the first case of ovarian cancer treated laparoscopically. A woman with stage I ovarian cancer refused traditional treatment and was managed laparoscopically. Both ovaries were removed intact via a culdotomy incision. She underwent a vaginal hysterectomy; omentectomy and laparoscopic lymphadenectomy (1991 Reich H). There are several concerns regarding the use of laparoscopy for pelvic masses where diagnosis is uncertain. These include technical feasibility due to adhesions or size, port-site metastasis [20], possible cyst rupture, repeat surgery to adequately stage the disease and impact on survival if the cyst is indeed found to be malignant. Finally, a principal argument used by the school against the laparoscopic approach in cases of an ovarian tumor with a risk of malignancy is the necessity to provide adequate surgical staging once a diagnosis of malignancy has been made. Many techniques have been suggested to overcome spillage or inadvertent rupture including use of endobags [21], removal through a culdotomy [22,23], extraperitoneal removal [24] and others. Many recent studies have found no statistical difference in survival rates between patients undergoing a laparoscopy versus laparotomy in women with apparent early ovarian cancer or borderline tumours [25-30]. More recently some have even used operative laparoscopy in advanced ovarian cancer cases [31].

As operative laparoscopy has become the standard for the management of benign ovarian masses, we are witnessing more and more advances in its use for ovarian cancer. And just like the progression witnessed in the field of benign ovarian masses, we might be at the edge of witnessing the same role for advanced ovarian cancer in the near future. However more studies are still needed and more technicalities are still to be addressed prior to this becoming a definitive standard of care reality.

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