Commentary (Horowitz): Laparoscopy in Gynecologic Malignancies

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By Ira R. Horowitz, MD, FACOG, FACS

Laparoscopy dates back to 1901 when Kelling inspected a dog’s abdominal cavity with a cystoscope introduced transcutaneously. This technique was subsequently applied to humans in 1923.[1] Jacobaeus, in 1910, developed instruments using a sheath trocar technique and used air and water as distending mediums to evaluate the peritoneal and pleural cavities.[2]

It was not until 1951 that Kalk and Bruhl reported their experience with purpose-specific instruments employed in over 2,000 patients.[3] Initially used for tubal sterilization, evaluation for ectopic pregnancy, and treatment of endometriosis, the role of laparoscopy was expanded by Semm to include appendectomy in 1983.[4] This set in motion a decade marked by advances in endoscopic procedures in all surgical specialties, including thoracic surgery and neurosurgery. Benefits derived from these advances included rapid diagnosis, decreased morbidity, shorter hospital stays, and significant health care savings.

Endoscopic surgery has many benefits. These benefits must be balanced against the increased morbidity associated with the use of laparoscopy in the oncology patient. Port site implantation and potential spread of cancer cells through the pneumoperitoenum continue to be a concern for the oncologic surgeon. Multiple case reports of tumor implantation of port sites have been published during the past several years. Drainage of ascites through percutaneous aspiration, as well as thoracentesis, has resulted in tumor implantation in the needle track. It appears from the literature that seeding of the laparoscopic or needle track is most likely to occur in patients with advanced disease.

Pearlstone et al at the University of Texas, M. D. Anderson Cancer Center reported on 533 patients with nongynecologic malignancies who underwent laparoscopic procedures, 71 of whom had advanced intraabdominal disease at the time of laparoscopy.[5] Of these 71 patients, 3 developed a recurrence at the port site, as compared with 1 of 462 patients with minimal disease. Several in vivo animal studies have suggested that carbon dioxide pneumoperitoneum may result in increased peritoneal tumor dissemination. Canis et al at the Polyclinique de l’Hotel Dieu in Clermont-Ferrand, France, evaluated tumor growth and dissemination after laparotomy and carbon dioxide pneumoperitoneum in a rat model.[6] Although carcinomatosis was more prevalent in the pneumoperitoneum group, wound implantation was identified in animals undergoing laparotomy. Again, this finding illustrates the potential risks of laparoscopic procedures in advanced ovarian carcinoma.

Management of the Ovarian Adnexal Mass

It is imperative that patients felt to be at high risk for an ovarian carcinoma be referred to a surgeon who has expertise in the surgical management of this malignancy, such as a gynecologic oncologist. Lehner et al found the timing of laparotomy to be a predictive factor in the distribution of disease stage.[7] In their study, 24 of 48 patients had a delay of more than 17 days between laparoscopy and laparotomy. Rupture of an adnexal mass in a patient who would otherwise have an early stage IA or IB ovarian carcinoma will result in that patient receiving three to four courses of chemotherapy even if the rest of her staging does not reveal any disease. If that patient had instead undergone exploratory laparotomy, the mass might have been removed in toto without spillage into the peritoneal cavity and she may not have required chemotherapy.

Even in low-risk patients, it is sometimes difficult to rule out the presence of malignancy. Determination of CA-125 level and ultrasonography have very low sensitivity and specificity in identifying ovarian carcinomas. If a malignancy is identified laparoscopically, prompt referral to a
surgeon trained in the treatment of ovarian cancer, such as a gynecologic oncologist, should occur. The performance of a second-look laparotomy in patients with no clinical disease continues to remain controversial in gynecologic oncology. The ideal patient for this procedure is one who initially presented with advanced disease and appears to have a complete clinical remission after her initial chemotherapy.

Laparoscopy has a false-negative rate of between 40% and 50%. It is therefore recommended that patients who have a negative laparoscopy undergo a laparotomy to rule out the presence of persistent disease. I concur with Dr. Chi that recent advances in endoscopic instrumentation may decrease false-negative second-look laparoscopies.

In a multicenter study, Gadducci et al at the University of Pisa, Italy, retrospectively followed 192 patients with advanced ovarian cancer after a negative second-look laparotomy or laparoscopy.[8] These patients had had complete clinical pathologic and clinical responses. As would be expected, disease-free survival was related to International Federation of Obstetrics and Gynecology (FIGO) stage ($P = .008$), tumor grade ($P = .0021$), residual disease after surgical debulking ($P = .0038$), and type of second-look procedure (laparoscopy vs laparotomy; $P = .0061$). Cox proportional hazard modeling showed tumor grade, residual disease, and type of second-look laparotomy to be independent prognostic variables. The risk ratio for relapse in patients undergoing second-look laparoscopy vs laparotomy was 1.826 (95% confidence interval [CI], 1.121 to 2.973). This study demonstrated that a negative second-look laparoscopy that is not followed by laparotomy is not as efficacious as exploratory laparotomy. Consolidation chemotherapy, if given, may have narrowed the difference between these two groups.

Although not presently the standard of care, consolidation therapy is currently being evaluated in several multicenter trials. With the exception of determining the need for consolidation chemotherapy, the role of second-look laparotomy or laparoscopy may further diminish in patients who are clinically disease-free.

**Role of Laparoscopy in Cervical Cancer**

The International Federation of Obstetrics and Gynecology continues to recommend FIGO clinical staging for cervical cancer. Women with early-stage disease can be treated with either surgery or radiation. Patients with advanced-stage disease require radiation therapy or chemoradiation, however. Staging laparotomies and now laparoscopies have been used in the latter group of patients to identify those who require an extended radiation field and, possibly, chemotherapy for metastatic disease.

In the treatment of early disease, an extended radical hysterectomy with bilateral pelvic lymphadenectomy has been the standard surgical procedure in the United States. In Asia and Europe, the Schauta radical vaginectomy is also frequently performed with a retroperitoneal pelvic lymph node dissection.

The use of advanced endoscopic techniques allows the surgeon to remove the pelvic and periaortic lymph nodes laparoscopically. This technique can be performed either transperitoneally or retroperitoneally. If the lymph nodes are negative, the patient can then undergo a Schauta radical vaginal hysterectomy. If a transperitoneal laparoscopic approach is chosen, the upper uterine attachments and vessels can be divided laparoscopically and a modified Schauta procedure can be performed.

Some gynecologic oncology fellowship programs in the United States are beginning to train fellows in the performance of the Schauta operation. As with any other procedure, there is a significant learning curve, with increased morbidity until this procedure is mastered.

**Laparoscopic Radical Hysterectomy vs Laparoscopic-Assisted Radical Vaginal Hysterectomy**

I disagree with Dr. Chi’s suggestion that we should consider performing a laparoscopic radical hysterectomy rather than a laparoscopic-assisted radical vaginal hysterectomy. Although the laparoscopic procedure is quite similar anatomically to the open operation, the use of endoscopic instruments does not, at this time, lend itself to the same operation as would be performed via laparotomy.

Furthermore, I feel that a laparoscopic radical hysterectomy is more likely to result in complications than is a laparoscopic-assisted radical vaginal hysterectomy. It should be noted that, in Table 1, the author cites a paper by Averette et al focusing on 978 abdominal radical hysterectomies that took an
average of 300 minutes with a blood loss of 1,724 mL and a urinary tract injury rate of 2%. It should also be noted that these patients underwent surgery in a training institution where fellows performed a significant proportion of these procedures.

In contrast, the average gynecologic oncologist spends between 120 and 180 minutes performing an abdominal radical hysterectomy with bilateral pelvic lymphadenectomy. Furthermore, length of stay with an abdominal approach has decreased markedly to 2 to 4 days.

**Laparoscopic Pelvic Lymphadenectomy and Radical Vaginal Trachelectomy**

Even more controversial is the role of laparoscopic pelvic lymphadenectomy and radical vaginal trachelectomy. A total of 62 cases of this procedure have been reported in the world's literature; 12 infants have been born to these women, and 4 recurrences have been documented. One can argue that if these were very small lesions, even 4 recurrences in 62 patients is significant during such a short period of follow-up.

The surgical expertise required to perform laparoscopic pelvic lymphadenectomy and radical vaginal trachelectomy is significantly greater than that required to perform a laparoscopic-assisted radical vaginal hysterectomy. I sympathize with the young, nulliparous patient who has recently been diagnosed with early cervical cancer. It is, however, important for such a patient to understand the potential increased risk of recurrence associated with this laparoscopic procedure, as well as the markedly increased risk of premature labor and fetal loss.

Initial studies suggested that the transperitoneal abdominal approach, followed by postoperative radiation therapy, increased the risk of fistula formation in patients with advanced cervical carcinoma. As Dr. Chi states, laparoscopic pelvic and periaortic lymph node dissection may decrease the morbidity of the transperitoneal approach, as well as the time between node dissection and initiation of definitive radiation therapy. Laparoscopic transperitoneal and extra peritoneal approaches have both been shown to be efficacious in performing this staging lymphadenectomy.

**Laparoscopic Procedures in Endometrial Cancer**

Endometrial cancer continues to be the most common gynecologic malignancy. This disease is usually confined to the uterus, however, and is treated surgically with an extrafascial hysterectomy and pelvic and periaortic lymph node sampling.

Laparoscopic-assisted vaginal hysterectomy and lymph node dissection can be performed in patients with high-grade tumors or tumors invading the outer half of the myometrium. Unfortunately, one of the risk factors for endometrial cancer is obesity, and its accompanying endogenous estrogen production. Obesity further complicates the difficulties of performing laparoscopic staging in these patients and increases morbidity.

However, in the thin patient, laparoscopic sampling with a laparoscopic-assisted vaginal hysterectomy can be performed and can adequately treat this malignancy. Needless to say, the same learning curve that applies to physicians performing laparoscopic lymph node dissection pertains to this malignancy as well.

We eagerly await the Gynecologic Oncology Group (GOG) randomized phase II trial comparing laparoscopic-assisted surgical staging vs laparotomy in the management of patients with early endometrial cancer. In patients who have not been staged but who have undergone a hysterectomy, and in whom the resultant pathology reveals a poorly differentiated and/or deeply invasive uterine carcinoma, laparoscopic lymph node sampling, in skilled hands, can be safely used for staging.

**Summary**

I congratulate Dr. Chi for his comprehensive review of the role of laparoscopy in gynecologic malignancies. It was not that long ago that many members of the Society of Gynecologic Oncologists (SGO) believed that there would be no role for laparoscopy in the treatment of gynecologic malignancies. Over the last decade, we have seen a proliferation of case reports and, more recently, series of patients treated adequately with this technique. Papers focusing on laparoscopic techniques are now routinely presented at the SGO annual meetings.

During the next several years, we will see the culmination of several multicenter, randomized, prospective trials that will permit us to determine the role of laparoscopy in gynecologic oncology. It behooves all gynecologic oncologists to continue developing the expertise required to perform these procedures. The instrumentation used in endoscopy has also markedly improved during the past decade. As surgeons, we must continue to direct and assist in the development of new
instrumentation that will enable us to treat patients with less invasive surgery.

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