

Perspective on the Advances in Surgical Gynecologic Oncology

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Abstract

In the management of women with gynecological malignancies, surgery remains the cornerstone. Gynecological oncology is a well-established sub-specialty of cancer care due to a well-defined training program for doctors and centralized patient referrals in most countries. Throughout time, gynecological oncologists have collaborated across disciplines to improve treatment approaches. Aside from our abdominal colleagues, our hepatobiliary and thoracic colleagues have joined this inter-professional effort as the anatomic fields of gynecologic oncology surgery expanded. A complex clinical scenario has led to major changes in the surgical approach in gynecological oncology. Early-stage cancer patients have generally been treated with minimal-access surgery rather than open surgery. The goal of adjuvant treatment has been to reduce the tumor load in women with advanced-stage disease by performing multivisceral surgery and staging the extent of the disease. Additionally, surgical options have been evaluated for women with recurrent disease or as part of symptom palliation. To describe recent advances in surgical gynecologic oncology, the authors tried to provide examples of key contributions.

Keywords: Cervical cancer, Ovarian cancer, Endometrial cancer, Gynecologic cancer, Surgery

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Introduction

We have seen a major paradigm shift in the surgical management and multidisciplinary care of patients with gynecologic cancers of all primary sites, including endometrial, cervical, and ovarian cancers. As laparoscopic surgery became more popular in the late 1980s, the concept of minimal access surgery became a reality. A laparoscope is traditionally used directly through a few ports using straight instruments. Laparoscopic surgery, in which instruments rotate and are activated by electric arms, is currently being replaced by robotic surgery and single-port surgery [1]. Based on GLOBOCAN 2023 data, there were 746,579 new cancer cases in women on the Indian subcontinent. Nearly 210,646 of these cases were gynecological cancers. Family physicians, general practitioners, and gynecologists are often women's first points of contact with health care. Most countries have traditionally treated gynecological cancer with generalists. As the management of these women has become more complex and challenging, a new sub-specialty has emerged-gynecologic oncology. Medical oncologists specializing in gynecological oncology, working in multidisciplinary settings, provide better treatment outcomes for women with gynecological cancers than physicians with less specialized training [2]. The reproductive age group makes up about one-fifth of all women with gynecological cancers. The multidisciplinary approach to gynecologic oncology can include tailored surgical techniques, fertility preservation, hormone modulators, targeted therapy, and immunotherapy to treat these cancers holistically. The subspecialty originated in the 1970s in the USA and has spread to middle-income countries such as India, where the burden of cancer is a major factor.

In the following section, we discuss surgical management and

multidisciplinary care of patients with gynecologic cancers, including cervical, ovarian, and endometrial cancers [3].

Cervical Cancer

It is now less common for women to suffer from advanced-stage cervical cancer and more common for them to suffer from apparent stage I cervical cancer in different hospitals, primarily due to improvements in cervical cancer screening (Papanicolaou test) and early detection and treatment of precancerous lesions [4]. During the past few decades, adenocarcinomas have increased in frequency, now accounting for nearly 50% of newly diagnosed cases, while squamous cell carcinomas have decreased. As precancerous squamous lesions are detected and treated, cervical squamous cell carcinomas and adenocarcinomas are more likely to occur (Figure 1).

Several facilities offer radical pelvic surgery for recurrent and persistent cervical, uterine, and vulvovaginal malignancies, focusing on improved reconstruction and decreased morbidity [5]. Through advances in urinary tract reconstruction, plastic myocutaneous flap reconstruction, and postoperative support and recovery, pelvic exenteration surgery has become a much more successful procedure, treating 45% of select patients with otherwise incurable pelvic diseases with cures. During the past few years, the facilities have improved and expanded the eligibility criteria for pelvic exenteration beyond the classic small pelvic recurrence to include more complex sidewall recurrences and select pelvic vessel lesions. We were able to accomplish this in close collaboration with our orthopedic and vascular surgery departments, which has provided patients with the option of radical pelvic surgery who would have been unable to undergo it otherwise [6-8].



Figure 1: Cervical carcinoma with adnexa (Source: Medscape).

For women with cervical cancer, precision surgery, patient preferences, and fertility-sparing surgery have become more prominent over the past two decades. It was gynecology service facilities that helped standardize fertility-sparing surgery for pediatrics and adults with stage I cervical cancer, disseminating and popularizing it throughout the US and abroad. It pioneered several approaches to treating young patients with embryonal rhabdomyosarcoma and preserving the uterus and reproductive function through collaboration with pediatric oncologists [9-11]. In the initial management of this disease, transvaginal conization and abdominal trachelectomy are common procedures. Multidisciplinary collaborations with radiology departments have also led to refined criteria for determining if patients should undergo fertility-saving radical trachelectomy based on preoperative magnetic resonance imaging. Preoperative imaging criteria include measuring the extent of the cervical malignancy to the internal cervical, as well as predicting the success of fertility-sparing surgery based on a suggested treatment algorithm. In addition, gynecologic pathologists have established objective scoring systems for cervical adenocarcinomas at the time of radical trachelectomy. A number of American facilities began performing uterine-preserving surgery on young women with cervical cancer in 2001. This new approach to surgery has been popularized and disseminated by most large institutions in the US [2, 12].

Our understanding of both HPV-associated and non-HPV-associated lesions (particularly gastric cervical carcinomas) has improved thanks to multidisciplinary teams of gynecologic pathologists and surgeons [13]. These rare tumors have a molecular profile that can be used to predict prognosis and recommend tumor staging recommendations. A national and international group of gynecology oncology disease management teams, working with expert gynecologic pathologists, developed a new classification system for cervical adenocarcinomas. As a result of favorable invasion pattern A, there is a very low risk of nodal metastasis, recurrence, and death from disease, and the clinician may be more confident to recommend de-escalation of surgical resection, particularly if fertility is important. As a result of these close collaborations between gynecologic oncologists and pathologists, we are now able to deliver more precise surgery, preserve body image, and improve quality of life in stage I cervical cancer surgery.

Ovarian Cancer

Atop the list of gynecologic malignancies is advanced ovarian and fallopian tube carcinoma, which is the most lethal [14]. Clinical researchers have developed a novel approach to gynecologic oncology that combines surgical oncology, medical oncology, radiology, translational research, and dedicated research for the care of women

with ovarian malignancies. As a result of the service's contributions to ovarian cancer care over the last three decades, the following were accomplished: Increasing the scope, standardization, and popularity of radical debulking surgery. Once clinicians realized the benefits of advancing cytoreduction beyond the abdominal cavity, radical upper abdominal complex surgical procedures began to be readily implemented, along with advanced pelvic and retroperitoneal resections for treating ovarian cancer [15]. Several doctors have published extensively on their multimodality approaches to improve cytoreduction outcomes and participated in an international collaboration to study the role of primary debulking surgery versus neoadjuvant chemotherapy in the treatment of advanced ovarian cancer. Our group has contributed to the advancement of radical debulking surgery for advanced peritoneal malignancies nationally and internationally, often working in conjunction with hepatobiliary and thoracic surgeons (Figure 2).

The standardization of criteria and the establishment of guidelines for secondary cytoreductive surgery for recurrent ovarian cancer. Patients with ovarian cancer rarely undergo reoperation to resect the cancer. Many western countries have developed and published guidelines used to determine which patients should be reoperated when a recurrence occurs [16]. Recurrent ovarian cancer is typically treated with chemotherapy, but patients with limited or isolated recurrences, or recurrences that are very distant from their last treatment, may benefit from complete resection. The US and European researchers developed secondary cytoreduction criteria in this setting for the treatment of ovarian cancer. Recurrent ovarian cancer: definition of heated intraperitoneal chemotherapy (HIPEC). The first phase 2 study on secondary cytoreduction and carboplatin HIPEC for platinum-sensitive recurrent ovarian cancer was conducted. According to the study, HIPEC is not recommended in this situation. There are, however, some European studies that identify specific applications for this technology. Understanding molecular profiles of ovarian cancers and the origins of synchronous ovarian and uterine malignancies through multidisciplinary approaches in pathology and molecular biology. To improve diagnostic accuracy and clarify criteria for systemic treatment with novel chemotherapeutic agents, molecular characterization of ovarian cancer has become standard of care. Researchers continue

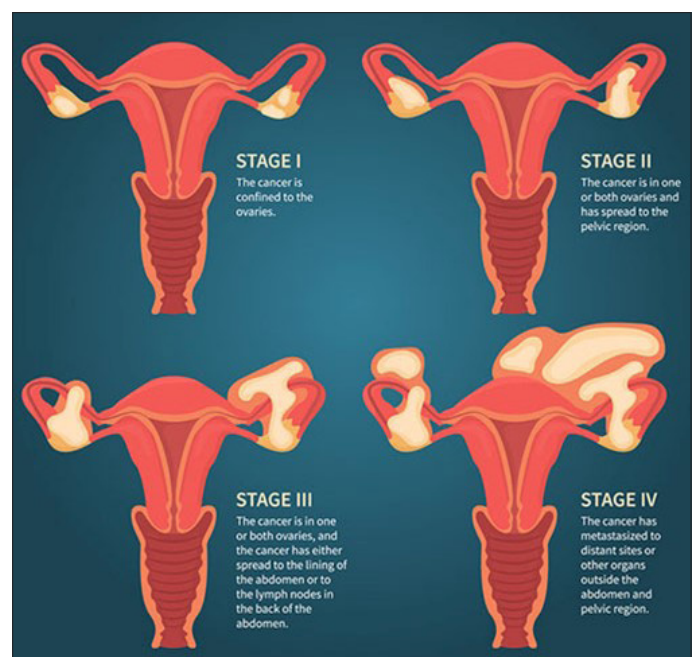


Figure 2: Stages of ovarian cancer.



to make advances in the diagnosis and categorization of high-grade ovarian malignancies [17-19]. Recent years have seen an increase in interest in understanding the relationship between endometrial cancer and ovarian cancer.

Advances in surgery aimed at reducing risk and preventing complications. Since the introduction of genetic testing for the general population, especially women with a family history of gynecological, breast, or colorectal cancer, the number of women with actionable gene mutations has increased, including BRCA1/2, Lynch syndrome, RAD51C, RAD51D, and others. To reduce the risk of gynecologic malignancy in high-risk patients, the researchers studied minimally invasive prophylactic surgery of the ovaries, fallopian tubes, and sometimes the uterus. When new patients with these mutations are referred to our weekly clinics, our Clinical Genetics Service, genetic counselors, and high-risk surveillance clinics work closely with us to determine the best timing for risk-reduction surgery. To preserve more endocrine function, several teams are exploring risk-reducing salpingectomy and delayed oophorectomy [20]. By expanding prophylactic surgery, based on sound scientific and genetic evidence, with appropriate counseling, gynecologic malignancies will undoubtedly decrease in incidence, reducing the burden of these deadly diseases.

Endometrial Cancer

A number of research organizations have developed, standardized, and popularized minimally invasive surgery for the surgical management of endometrial cancer. Findings from the largest US-based prospective randomized trial of laparoscopy versus laparotomy in endometrial cancer, which was spearheaded, led to the adoption of laparoscopy as a standard of care in most patients with this disease. Innumerable women have been spared unnecessary postoperative complications and hospitalizations as a result of this paradigm shift [21]. In addition to revolutionizing surgical staging for endometrial cancer, these facilities have standardized sentinel lymph node (SLN) mapping algorithms for all cases of apparent uterine-confined disease, thus sparing patients from unnecessary morbidity caused by nonstandard pelvic nodal assessments. An MSK SLN mapping algorithm for endometrial and cervical carcinomas was developed and published after a clinical trial for SLN mapping in uterine malignancy [22]. National Comprehensive Cancer Network guidelines include these algorithms as an option for surgical staging and have become standards of care in many practices nationally and internationally. In contrast to historic metrics of “quantity”, which relied on the number of lymph nodes resected as a surrogate indicator of surgical quality, this shift in surgical staging culture now emphasizes the “quality” of pelvic lymph node dissection, with increasing precision by intraoperative bilateral pelvic nodal mapping [23]. It has been proposed that we should classify endometrial cancer into four distinct subtypes (polymerase (POLE), copy number low, copy number high, and microsatellite instability high) based on histology and patient characteristics, rather than binary Type I and Type II diseases. It is believed that these 4 subtypes have distinct molecular characteristics and behaviors, and gynecological pathologists are working on including these molecular profiles into diagnosis. P53, mismatch repair status, and POLE are now routinely evaluated for endometrial cancer for appropriate classification, guiding adjuvant therapy for this predominantly surgical disease. With our increasing understanding of molecular subtypes of endometrial cancer and the use of safe, minimally invasive surgery, we will hopefully continue to improve outcomes for patients with this most common gynecologic cancer [24]. Women dealing with this issue now receive multidisciplinary treatment from gynecologic oncologists and other cancer care experts over the

past few decades. Through these contributions, countless women with gynecologic cancers have had their lives improved.

Surgery

Taking Minimal-access surgery as a consideration, with the advent of laparoscopic surgery in the late 1980s, minimal access surgery was introduced. In traditional laparoscopy, straight instruments are used directly over a few ports. In addition to laparoscopic surgery, robotic surgery (i.e., instruments that rotate and are activated by electric arms) is currently a variant of laparoscopic surgery [25-27].

Radiation surgery is reserved for patients who have failed radiation therapy or who have received previous pelvic radiation therapy. In addition to APR, patients may undergo more extensive multivisceral resections (e.g., pelvic exenteration). One study found that salvage procedures caused a 72% morbidity and 5% mortality rate. However, 69% of patients with this radical approach had negative margins, and 39% of patients survived for five years [28-33]. Whereas radical multivisceral surgery refers to the concept of 'debulking surgery' for women with ovarian cancer. However, the extent of the operation has evolved significantly over the past few years. After surgery, residual disease is the single most important prognostic factor for survival in women with ovarian cancer. It is associated with the best outcome for women with 'no visible disease' [34].

Fertility-sparing options

In gynecological oncology, fertility preservation is one of the most controversial topics. There is still debate about potentially jeopardizing a woman's survival outcome for the sake of preserving fertility [35]. For women with cervical cancer in early stage, conventionally treated with a radical hysterectomy, a radical trachelectomy is a paradigmatic example of how a radical trachelectomy can be used [36].

Future Perspectives

In order to deliver high quality care to patients and conduct research relevant to the local community, a multidimensional approach is necessary, including strengthening preventive services, building a network of well-trained gynecologic oncologists, and setting up a referral system. To decrease morbidity and mortality of malignancies, gynecologic oncologists, other oncologists, and medical staff need to be trained in facilities that have adequate infrastructure and caseloads [37]. Gynecologic oncology courses should have a well-designed curriculum and skills training. Meanwhile, Minimal access surgery has made significant advancements in reducing treatment-associated morbidity and discharge times. Minimal access surgery has been made possible by the introduction of robot assisted surgery. Current practice supports fertility sparing surgery and safety. As a result of the application of radical surgery for ovarian cancer, the surgical management of this disease has changed dramatically [38]. However, most other centers still lack sufficient exposure to modern practices in gynecological oncology surgery, chemotherapy, and radiation oncology, despite a few well-structured training programs. It is necessary to take political, administrative, and academic initiatives to train physicians and other paramedical staff able to serve at all levels of the community. This complex nature of gynecological malignancies necessitates a multidisciplinary approach that integrates physiotherapists, occupational therapists, psycho-oncologists, palliative care providers, and other relevant disciplines in a centralized care process.

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Conflict of Interest

None.

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