Reproductive Issues in the Gynecologic Cancer Patient

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For women with a gynecologic cancer, reproductive concerns may vary not only by site of disease but also by the presentation and manifestation of the disease. Gynecologic cancer can present before childbearing has been started or completed, during pregnancy, or can even arise out of pregnancy.

Recent guidelines published by the American Society of Clinical Oncology highlight the lack of research on the reproductive concerns of cancer survivors[1]. Clinicians, researchers, and survivorship communities are beginning to recognize infertility as a late effect of cancer treatment negatively impacting cancer survivorship, as well as the importance of family-building options. For women with a gynecologic cancer, reproductive concerns may vary not only by site of disease but also by the presentation and manifestation of the disease. Gynecologic cancer can present before childbearing has been started or completed, during pregnancy, or can even arise out of pregnancy.

Cervical cancer is one of the most common cancers in women under 40 years of age[2-5]. Approximately 25% to 35% of all endometrial cancers occur in premenopausal women,[6-10] with a diagnosis of ovarian cancer being less common.[11-13] A cancer diagnosis during pregnancy or arising from pregnancy is rare but possible.

Reproductive concerns that emerge within cancer experiences have been shown to be negatively associated with quality of life.[14] Parenthood has been cited as an important aspect of cancer survivorship.[15,16] As a result, interest concerning fertility preservation, reproductive concerns, and family-building options in cancer survivorship has increased. When cancer-related infertility occurs, the emotional ramifications can be viewed as a "double trauma"[17] or as "adding insult to injury,"[18] particularly if the site of disease directly affects the reproductive organs.

Fertility Preservation

Surgical Options

Fertility-preserving surgery has become a priority for many young cancer patients, when medically possible. As a result, the emerging trend in delivering adequate cancer treatment also encompasses the goal of reducing long-term negative consequences.

• Cervical Cancer—For women with early-stage cervical cancer, radical hysterectomy is suggested. Radical trachelectomy is a surgical option that has been established in the field of gynecologic oncology, with promising gynecologic and obstetric outcomes. This procedure provides adequate tumor control while allowing for the preservation of the uterus and is viewed to be a safe alternative for treatment of early-stage cervical cancer. Surgical criteria are specific, and this procedure is only offered to women with a strong desire to preserve fertility. In the past, radical trachelectomy was only available at a select number of institutions. However, an increasing number of surgeons are being trained to perform this procedure, and its accessibility has rapidly grown over the past decade.

It has been estimated that 48% of women of reproductive age diagnosed with early-stage cervical cancer would meet the criteria for a trachelectomy.[19] Radical trachelectomy has been evaluated using medical endpoints of recurrence, survival, and conception.[4,19,20-28] Radical trachelectomy is associated with an overall recurrence rate of less than 5%, and a death rate of 2.5%—rates comparable to those of radical hysterectomy.[4,20,23,28,29] In a series of 334 radical vaginal trachelectomy patients,[2] researchers found that 148 cervical cancer survivors attempted to conceive, with 70% achieving successful conception. Plante and colleagues reported 50 pregnancies in 31 women who underwent trachelectomy, with 16% first-trimester miscarriages and 4% second-trimester miscarriages.[4] Infertility data presented on six trachelectomy series[4] revealed an overall infertility rate of 13% (40 of 310 patients). Fourteen of these women were able to conceive with the assistance of reproductive technology, for an adjusted infertility rate of 8% (26 of 310 patients).

Investigational research into the emotional impact of this fertility-preserving technique has recently...
been published.[30] Women who have undergone radical vaginal trachelectomy have reproductive concerns related to conception, pregnancy, and childbirth, and unlike women who have undergone radical hysterectomy, this cohort is highly aware and anxious about building a family. This growing body of survivors who have taken great measures to preserve their fertility are encountering difficulties. The extent and nature of these difficulties need to be further investigated.

**Endometrial Cancer**—The standard treatment for early-stage endometrial cancer is hysterectomy, bilateral salpingo-oophorectomy, and lymph node sampling. However, this option may not be viewed as acceptable for the estimated 25% of endometrial cancer patients who are premenopausal.[6-8,10] Conservative management may be an alternative for young women in their childbearing years. Hormonal therapy can be utilized in the treatment of the precancerous condition of complex atypical hyperplasia and low-risk endometrial cancer. In general, complex atypical hyperplasia of the endometrium is often treated with hysterectomy due to the high risk (29%) of progressing to endometrial cancer,[31] as well as the 25% to 42% risk of having unidentified endometrial cancer within the specimen.[32-34]

Prognosis of endometrial cancer is based on several factors including stage, histologic grade, depth of myometrial invasion, cervical involvement, vascular space involvement, and nodal involvement.[35,36] Therefore, women should only be considered for conservative management after careful evaluation, which should include a dilatation and curettage (D&C) and radiologic imaging.[12,13]

Data on conservative therapy with hormonal treatment instead of surgical treatment are limited. One review identified 81 patients who underwent nonsurgical hormonal treatment (predominantly with medroxyprogesterone acetate or megestrol acetate) between 1961 and 2003, demonstrating a 76% response rate to hormonal treatment, with no evidence of disease.[37] Another review published obstetrical outcomes of 101 patients treated with nonsurgical hormonal treatment instead of standard surgical treatment, with 56 children born from this survivorship cohort.[38] Conservative management of precancerous and low-risk endometrial cancer in young women with a strong desire for fertility preservation can be an acceptable short-term alternative to definitive surgical treatment. Extensive counseling regarding the limited data on conservative therapy, risk of disease progression both during and after progestin therapy, duration of treatment, and follow-up procedures should be explored prior to conservative management. Additionally, discussions should address the 5% risk of metastases to the ovaries[35,39] and the 10% to 29% risk of synchronous ovarian malignancy in this patient population.[7,39-42] Specific criteria must be met prior to declining standard of care. In order to be viewed as an acceptable candidate for this procedure, a woman must be viewed as low risk, ie, grade 1 histology with no myometrial invasion.[6,7,35,43-46] Conservative management of endometrial cancer also requires a highly motivated and compliant patient since surveillance is essential. Patients undergoing conservative nonsurgical treatment for early endometrial cancer should have regular follow-ups, with endometrial sampling every 3 to 6 months.[12]

Some experts advocate definitive surgical treatment upon completion of childbearing or tumor recurrence.[39,47-49] The increased risk of ovarian cancer has also led to the recommendation of bilateral salpingo-oophorectomy,[40] but others have questioned the necessity of this procedure.[37,38] Little research exists documenting the experience or outcomes of undergoing fertility-preserving treatment, and patients undergoing conservative management should be encouraged to enroll in tumor registries or clinical trials, when possible, to answer these important questions.

**Ovarian Cancer**—Ovarian cancer is less common in premenopausal women. However, some types of ovarian cancer will occur in a small subset (15%) of young women.[12] Women who may be appropriate for fertility-sparing treatment include those with a diagnosis of malignant germ cell tumors, sex cord tumors, tumors of low malignant potential, or stage IA invasive ovarian cancer.[9,11-13,50,51]

The majority of ovarian tumors seen in young women will fall into the subtype of malignant germ cell tumors. These tumors have an excellent prognosis and tend to be confined to one ovary, with the exception of dysgerminoma, which can be bilateral in a small percentage (15%).[12] One of the largest series on the experience of treating young women with fertility-sparing surgery for malignant germ cell tumors showed 81% of the women undergoing unilateral salpingo-oophorectomy with staging and demonstrated a 90% to 100% survival rate.[11]

Sex cord stromal tumors of the ovary can occur at any age, with the most common type—the adult granulosa tumor—occurring in the perimenopausal or early postmenopausal period. Despite adult granulosa cell tumors accounting for 70% of the sex cord stromal tumors, it is still a rare cancer, representing only 2% to 5% of all ovarian cancers.[52,53] Adult granulosa cell tumors have a
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favorable prognosis but some variation has been shown based on stage of disease, with higher survival rates associated with less advanced disease.[54,55] A conservative fertility-sparing approach can be considered in a young woman with stage IA disease, but an endometrial biopsy should be performed to rule out concomitant uterine cancer. Overall, adult granulosa cell tumors of the ovary exhibit disease unilaterally, yet 2% to 8% of these tumors may present bilaterally in the ovary.[56,57] Therefore, it is reasonable to consider removal of the other ovary and completion hysterectomy in women treated conservatively after childbearing has been completed—a controversial issue.

Borderline tumors of the ovary account for 10% to 20% of epithelial ovarian tumors, and many of these are diagnosed in premenopausal women.[58] In a series of 339 women diagnosed with borderline tumors, there was a 12% recurrence rate in the 164 stage I patients who underwent fertility-sparing surgery. Although conservative surgery is associated with a higher incidence of recurrence than radical surgery, most of the recurrences can be salvaged by surgery without negatively impacting survival rates, given the indolent nature of borderline tumors.[58] In women diagnosed with borderline tumors with a strong desire to preserve fertility, conservative management can be a reasonable option.

Stage I epithelial ovarian cancer can be managed conservatively in some cases, if the cancer is confined to the ovary. However, preservation of the uterus and contralateral ovary needs to be conducted in the setting of a comprehensive surgical staging procedure with extensive discussions about the risk of recurrence and possible adjuvant therapy. Patients treated conservatively for stage I ovarian cancer should also be closely followed with CA-125 monitoring every 3 months and transvaginal ultrasounds for a minimum of 2 years. A large multisite series demonstrated that successful reproduction is possible with fertility-preserving surgery (71%), with 5- and 10-year survival rates of 98% and 93%, respectively.[51] Fertility-sparing surgery should be considered in women with early-stage disease who desire further fertility.[50,59] However, after completion of family building, definitive surgery may also be advised.

Reproductive Options

As medical technology advances, women diagnosed with and treated for cancer not only have an improved likelihood of survival, but also the availability of emerging assisted reproductive techniques. Schover and colleagues assessed the attitudes of individuals with a history of cancer and found that younger cancer survivors view parenthood as a positive experience. Participants also expressed the belief that their experience with cancer would make them better parents, and 60% indicated that being a parent would be an important life goal even if they died young.[16] Traditionally, women with gynecologic cancer are coping with treatment options that consist of total or partial removal of the reproductive organs. In some cases, individuals may be eligible for conservative fertility-preserving treatment, as described above, enabling reproductive capacity in survivorship.

• Third-Party Parenting—For many cancer survivors, however, family-building options will require the assistance of another individual or third-party reproduction. Third-party parenting is the involvement of a third person, beyond the parenting couple or single parent, in order to create a baby. Techniques can include egg (oocyte) donation, sperm donation, embryo donation, in vitro fertilization (IVF) with or without a gestational carrier (surrogacy), and/or adoption. When possible, preservation of the ovaries offers the possibility of a biological child through assisted reproduction with egg retrieval.

Gynecologic cancer survivors who undergo a hysterectomy as part of their treatment may not consider themselves as having fertility options, such as pursuing ovarian stimulation for oocyte retrieval and IVF with surrogacy. These techniques can offer hope to many cancer survivors, but awareness and access are necessary. For women who require the removal of their ovaries or are at high risk for treatment-induced acute ovarian failure,[60,61] oocyte donation can be a family-building option, allowing for pregnancy and childbirth. If treatment requires the removal of the uterus, a surrogate or gestational carrier would be necessary.

Even in the case of a woman needing a hysterectomy and oophorectomy as part of cancer treatment, advances in reproductive technology have given these women multiple options and alternatives to create a family, such as embryo donation, oocyte donation with a partner's sperm (or donor sperm) with IVF, and surrogacy. The practice of gestational surrogacy can be a controversial procedure in the field of assisted reproduction, with legal issues varying by state. Nonetheless, it is a successful treatment option for women who would otherwise be unable to have a child.[62] That said, cancer survivors with impaired fertility may not view themselves as appropriate candidates for reproductive services or as having family-building options, such as third-party parenting.
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It is not uncommon for infertility to be coupled with sexual dysfunction and menopause secondary to and negatively impact quality of life in survivorship.\[14\] that many grieve their lost fertility. These grieving symptoms can contribute to greater distress\[70\] physical, emotional, and financial resources. Our clinical experience with these women has revealed traumatic. Additionally, the available assistive reproductive treatments are strenuous on a woman's egg donation, and adoption, the sense of not having one's own biological child can be very Fertility options are a critical consideration in the context of both having a first child and expanding having a biological child, and the availability of reproductive assistance or willingness to adopt. Although infertility is a common consequence of some cancer treatments, it is usually a secondary concern in relation to survival in the initial phases of treatment.\[18\] For some women, infertility may be unexpected because they were unable to process or retain information about the side effects of treatment outlined by the oncologist during the discussion of treatment. Baider et al\[17,71\] described the phenomenon of double trauma while studying second-generation Holocaust survivors with a cancer diagnosis. Therefore, one could propose that the experience of both cancer and infertility would be a risk factor for prolonged grief reactions and poor coping. Survivors must confront both a perceived and real physical threat of infertility as they attempt to form families in the posttreatment period. The emotional, psychosexual morbidity and quality-of-life impact of cancer-related infertility is not well documented. However, clinical observations have documented that these women experience severe psychological distress.\[15\] A number of factors may be responsible for the high level of emotional turmoil related to infertility associated with cancer. Women are forced to make treatment choices for survival that have a negative impact on fertility and decisions of childbearing. Although infertility is a common consequence of some cancer treatments, it is usually a secondary concern in relation to survival in the initial phases of treatment.\[18\] For some women, infertility may be unexpected because they were unable to process or retain information about the side effects of treatment outlined by the oncologist during the discussion of treatment.\[15\] Corney and colleagues\[72\] found that women experiencing infertility following treatment for gynecologic malignancies felt deprived of choice, and that medical professionals tended to minimize the sense of loss experienced by older women.\[72\]

A recent study in a small sample of gynecologic cancer survivors found that women with infertility as a result of their cancer treatment experienced persistent feelings of sadness and grief lasting more than 1 year posttreatment.\[70\] The psychological experience, however, varies from woman to woman, depending on the cause, the degree of fertility impairment, the importance placed on having a biological child, and the availability of reproductive assistance or willingness to adopt. Fertility options are a critical consideration in the context of both having a first child and expanding family size. While there are more reproductive options today, such as egg retrieval with a surrogate, egg donation, and adoption, the sense of not having one's own biological child can be very traumatic. Additionally, the available assistive reproductive treatments are strenuous on a woman's physical, emotional, and financial resources. Our clinical experience with these women has revealed that many grieve their lost fertility. These grieving symptoms can contribute to greater distress and negatively impact quality of life in survivorship.\[14\] It is not uncommon for infertility to be coupled with sexual dysfunction and menopause secondary to cancer treatment.\[70,73\] These problems are often not discussed due to the stigma of gynecologic

• Emotional Issues—Treatments for infertility can create a host of emotional issues as well as tax women and couples physically and financially.\[63\] Female survivors may also struggle with concerns about the health risks of pregnancy and risks to genetic offspring.\[15\] While adoption exists as an alternative, this option may entail a difficult and emotionally painful process for survivors who confront the loss of their own reproductive ability as well as the possibility of a hostile legal environment that may question the role of a cancer survivor as a parent. A recent study found that adoption agencies may be reluctant to consider cancer survivors as potential parents. Growing concern over the late health risks after cancer treatment may also present barriers to the adoption process.\[15,64\]

• Economic Issues—The prohibitive expense of assisted reproduction generally limits its availability to those of higher socioeconomic status. Thus, reproductive assistance is far more prevalent among married, older, more educated, and more affluent women than in the general population of women with impaired fertility.\[65,66\] Moreover, most infertility services are not covered by insurance policies. Additional obstacles to accessing reproductive services may include low literacy or educational limitations, language barriers, and a lack of culturally sensitive information, all of which are more prevalent among patients of lower socioeconomic status.\[67\] Many young cancer survivors experience financial constraints as a result of their cancer treatment. To compound such preexisting financial burdens with the added cost of assisted reproductive services may deter many from seeking treatment. Research suggests that having insurance coverage is significantly associated with the utilization of infertility services.\[67,68\] The lack of insurance coverage for infertility treatments raises several ethical considerations, particularly in the context of cancer care and impaired fertility secondary to treatment.\[16\]

Cancer-Related Infertility

Research has shown that infertility as a singular health concern can have distress levels comparable to those of coping with a life-threatening illness such as cancer.\[69\] The turmoil experienced by women simultaneously facing a cancer diagnosis and the possibility of infertility has been proposed to be a compounding event.\[15,70\] described as "adding insult to injury"\[18\] or a double trauma.\[17,71\] The synergistic effect of coping with two traumas increases vulnerability to psychological distress. Baider et al\[17\] described the phenomenon of double trauma while studying second-generation Holocaust survivors with a cancer diagnosis. Therefore, one could propose that the experience of both cancer and infertility would be a risk factor for prolonged grief reactions and poor coping. Survivors must confront both a perceived and real physical threat of infertility as they attempt to form families in the posttreatment period.
cancer, the sense of being "different" or "damaged goods," and the anger of being subjected to such an unfortunate fate. Many women experience social isolation concurrent with psychological, psychosocial, and at times psychiatric disorders, such as anxiety and depression—significant problems that would benefit from recognition and treatment.[18] Ideally, these issues should be identified during treatment with the hopes that early intervention might be able to prevent more serious long-term sequelae.

Diagnosis of Cancer During Pregnancy

The identification of incidental adnexal masses in pregnancy has increased with the utilization of routine prenatal ultrasound. It has been estimated that 1% to 4% of pregnant women will be found to have an adnexal mass.[74,75] The majority of these masses will resolve on their own, but for the persistent adnexal masses, approximately 1% to 8% will be malignant.[76-79] Although a diagnosis of cancer during pregnancy is uncommon, it is a situation that requires extensive counseling concerning the risks and benefits of possible treatment options, ideally with a multidisciplinary team approach.[80]

Many institutions do not have mental health professionals on staff as part of their routine care for oncology patients. Nevertheless, a psychological consultation and/or mental health support should be offered to a pregnant woman found to have cancer.[81] The opportunity for a woman to process the meaning and significance of her medical condition during the initial adjustment and treatment-planning phase can be an essential component of the informed decision-making process. Ultimately, this emotional challenge is a conflictual crisis, with the joy of creating a life intertwined with the fear of a life-threatening condition. Treatment choices influence not only the future of the cancer patient but also the health and welfare of her unborn child.

The management of asymptomatic adnexal masses persisting in pregnancy is a controversial issue. Surgery during pregnancy has many risks associated with complications of miscarriage, rupture of the membranes, preterm labor, and preterm birth.[82] Conservative treatment is usually recommended for the management of early-stage malignant ovarian cancers.[51,79,83-85] An adnexectomy with staging is most commonly performed, followed by hysterectomy, and in some cases chemotherapy.[79]

For the diagnosis of cervical cancer in pregnancy, conservative management is the rule, with careful surveillance of dysplasia and small lesions during gestation to ensure the optimal outcome for mother and baby.[86] Cervical conization during pregnancy is usually reserved for the patient with suspected invasive cancer since complications, including significant hemorrhage, miscarriage, fetal loss, and increased perinatal deaths, can be disastrous.[87,88] Additionally, conization should not be performed within 4 weeks of expected delivery, to reduce childbirth and postpartum complications. There is significant evidence favoring the delay of treatment until fetal maturity as a reasonable course of action without deleterious effects on the mother.[89,90] Cesarean radical hysterectomy with pelvic lymphadenectomy is an option, but with attention to potential blood loss.

Cancer Arising From Pregnancy

Gestational trophoblastic disease (GTD) is a unique type of women's cancer arising from pregnancy, specifically the abnormal development of placental tissue. GTD ranges from the benign form (complete or partial hydatidiform mole) to malignancies of various pathologic types. Clinically, women believe they are pregnant but experience unexpected vaginal bleeding and demonstrate an elevated blood pregnancy level (ie, human chorionic gonadotropin, or beta-hCG) with an abnormal ultrasound. The worldwide incidence of GTD is approximately 1 to 2 per 1,000 pregnancies.[91]

These tumors respond extremely well to chemotherapy, and cure is possible in the presence of widely metastatic disease.

The abrupt psychological shift experienced by a woman facing a diagnosis of GTD can be traumatic.[92] The swing from excitement and anticipation of a future child to the sadness associated with the loss of a viable pregnancy to the anxiety and fear connected with a potentially malignant and life-threatening condition is profound and certainly unique to this disease entity. The majority of women diagnosed with GTD are at the height of their reproductive potential, so issues concerning future fertility and pregnancy outcomes as well as overall sexual health are of paramount importance. Women are counseled to abstain from pregnancy for at least 1 year during the extended surveillance period. During this time, blood beta-hCG levels are followed, much like CA-125 or prostate-specific antigen levels in ovarian or prostate cancer. A concurrent pregnancy, which normally causes beta-hCG levels to rise, can mimic a cancer recurrence. A survivor's reproductive capacity is therefore delayed. Moreover, when a new pregnancy does occur, the woman will likely have significant anxiety over the rising beta-hCG levels and subsequent pregnancy. As survival from this disease is generally expected, psychosocial, fertility, and sexual health issues have
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a key role in the quality of life of survivors.[93]

Although treatment outcomes from chemotherapy and surgery in this setting have been described in some detail, the psychosocial aspects and long-term health consequences have rarely been explored. A few studies have described the psychosocial impact of GTD. Researchers from the New England Trophoblastic Disease Center—one of the specialized treatment centers in the United States—retrospectively surveyed 111 patients who had been diagnosed with GTD 5 to 10 years earlier.[94] More than half of the survivors were fearful of a secondary malignancy and of future testing despite being 5 to 10 years from their initial diagnosis.[94] Moreover, 40% of the respondents had significant concerns over their reproductive future; nearly 20% felt angry that their fertility had been compromised; and more than 30% mourned their pregnancy loss.[94] Patients reporting the highest quality-of-life scores had less disease-specific distress, greater social support, and were more likely to have had children following their treatment.[94] Interestingly, 75% of the survivors indicated that if a counseling program or support group were available following their diagnosis, they would have participated, and more than 50% would have enrolled in such a program 5 to 10 years after their diagnosis and cure.[94] These data provide powerful evidence that cancer-specific distress continues to affect women years after the completion of treatment.

A large Australian study by Petersen et al analyzed responses from 74 patients with molar pregnancies. Sixty percent of the survivors expressed severe anxiety and depression, in addition to significant levels of sexual dysfunction independent of time from diagnosis, age, children, or chemotherapy requirement.[93] Psychosocial issues were studied among patients over time, and more pronounced psychosocial distress was noted during the initial months following diagnosis.[93] The authors recommended a "multidisciplinary approach to care" addressing the medical, emotional, and social issues surrounding this unique disease entity, to improve survivors' well-being.[93]

While these studies highlight some significant psychosocial effects experienced by GTD survivors, many unanswered questions remain about the immediate and long-term health consequences of GTD treatment—in particular, issues of secondary malignancies and premature menopause. No research has assessed anxiety related to beta-hCG levels and its impact on family-building methods or whether treating physicians address fertility and quality-of-life concerns with survivors.

Furthermore, no studies have compared levels of cancer-related distress and sexual health status in GTD survivors to those of other gynecologic cancer survivors or women without cancer but with reproductive concerns. Unique survivorship issues ensue when young women are faced with a cancer arising from a pregnancy.

Resources and Communication Suggestions

The American Society of Clinical Oncology formally released guidelines on fertility preservation[1] and called attention to issues of reproductive knowledge and access. Some researchers suggest that the period of diagnosis and treatment tends to focus on the cure and symptom management, and, as a result, quality-of-life issues may be ignored.[95] Wenzel and colleagues evaluated the relationship of infertility and long-term quality of life in female cancer survivors and found reproductive concerns are of great importance and centrally linked to psychosocial outcomes.[14]

• Informational Needs—The informational needs of young cancer survivors demonstrated that while fertility issues may not have been paramount at the time of diagnosis, they became increasingly important over time.[96] Many women reported insufficient or unavailable information about fertility and expressed a desire for more information either prior to or during treatment. Literature drawn from other populations (eg, breast cancer patients) indicates that most women feel that the information received on fertility and the sequelae of treatment (ie, menopause, sexuality, and mood) prior to treatment was either insufficient or unavailable.[97,98] Research conducted in young female breast cancer survivors found that 72% discussed fertility concerns with their doctor, but only 51% felt that their concerns were adequately addressed.[97] Zebrack and colleagues examined a cohort of young adult survivors of childhood cancer and found that nearly 60% reported uncertainty about their fertility status, and only half recalled a health-care provider discussing potential reproductive problems associated with treatment.[98] The need for more information about reproductive issues and options prior to or following treatment has been identified as an issue for cancer survivors.[15,96,99,100] When cancer directly affects the reproductive organs, discussions about treatment options become more complex, especially with the limited information available about the consequences of conservative management.

The lack of adequate information on fertility issues has received attention in the President's Cancer Panel, which states: "All people of reproductive age who are diagnosed with cancer should be given complete culture- and literacy-sensitive information, both verbally and in writing, about options for preserving fertility and on possible effects of treatment on pregnancy and offspring before cancer
therapy is selected or initiated."[101] There are, however, several barriers that may interfere with addressing the reproductive informational needs of younger cancer survivors, such as the urgency of treatment, insufficient doctor-patient communication, a lack of information regarding reproductive options, as well as geographic and economic constraints limiting access to a specialist or services. Even for women who are aware of reproductive options, research suggests that women undergoing infertility treatments may not be aware of the rates of successful pregnancy or the risks and benefits associated with treatment.[102]

Education and support are clearly an essential component of cancer survivorship, and research suggests that individuals who receive information have increased satisfaction with treatment choice[99] and decreased levels of anxiety and distress.[103] Furthermore, provision of information has been shown to successfully address late effects of cancer treatment.[104-107] Many nonprofit organizations can provide excellent information to help cancer survivors learn more about family-building options (Fertile Hope: www.fertilehope.org), cancer and intimacy (American Cancer Society: www.cancer.gov), and survivorship (Lance Armstrong Foundation: www.laf.org), to name just a few.

**Family-Building Options**—Advances in reproductive technologies have allowed for alternative family-building opportunities with the assistance of others (third-party parenting). Cancer survivors experiencing ovarian failure, the loss of their uterus, or both now have the ability to build a family through mechanisms other than adoption. Remarkably, very little is known as to whether cancer survivors have knowledge about such family-building options or even view themselves as appropriate candidates. Research is needed to investigate the extent to which this population pursues alternative forms of reproduction and parenting, such as assisted reproduction or adoption. Questions as to the level of knowledge regarding treatment options for assisted reproduction and desire to utilize services as well as to identify potential barriers to and facilitators of care, such as socioeconomic status, insurance coverage, and access to a specialist, should be addressed in order to understand the survivorship needs of this young cohort who have an excellent prognosis and outlook for long-term survival.

**Conclusions**

The President's Cancer Panel reported that nearly 10 million American cancer survivors were living beyond their initial diagnoses and coping with the side effects of treatment.[101] Many of these individuals were diagnosed in their childbearing years. However, the psychological and psychosexual morbidity of reproductive issues is not well documented. Often, at the time of treatment planning, the threat to life is such that reproductive concerns are not the priority,[15] but conservative surgical management may be appropriate for some women diagnosed with gynecologic cancer. For those women medically unable to have fertility-preserving treatment, the meaning becomes apparent upon treatment completion, and the accompanying psychological toll may become part of the long-term sequelae to be resolved in cancer survivorship.

Despite the availability of reproductive assistance, more research is needed to determine if knowledge and access to reproductive assistance, allowing for genetic offspring, the experience of pregnancy, and/or alternative family-building options are being discussed and utilized in the cancer setting. Additionally, more studies are necessary to document the rates of success of assisted reproduction among cancer survivors.

Health-care providers and researchers have started to focus on a number of related questions requiring further investigation. For example, does the lack of reproductive knowledge increase the risk of depression and distress? Does the experience of infertile women with no history of cancer awaiting third-party parenting techniques mirror the psychological response of cancer survivors eligible for these techniques? In addition, mechanisms to facilitate adjustment and adaptation in cancer survivorship need to be identified.

Wenzel and colleagues[14] evaluated the relationship of infertility and long-term quality of life in female cancer survivors and found that reproductive concerns are of great importance and centrally linked to psychosocial outcomes. However, much more research is imperative to understand the unique needs experienced by cancer survivors of reproductive age.

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