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recommendations for fertility-sparing surgery for “any patients with clear cell carcinoma.” Borderline tumors can be treated with fertility-sparing surgery. Lastly, the authors discuss use of gonadotropin-releasing hormone agonists for ovarian protection for patients undergoing chemotherapy and use of the levonorgestrel-releasing intrauterine device as an option for medical management for endometrial cancers. The importance of interdisciplinary care where gynecologic oncologists, reproductive endocrinologists, and maternal fetal medicine specialists work together to optimize outcome for patients desiring preservation of fertility is emphasized.

Fertility is a serious concern for all women. When to have children is balanced with education, career, and other goals. For women with fertility

issues who are desirous of childbearing, the economics of assisted reproductive technologies is staggering (see companion editorial in this issue). What is the balance? Women need to be educated about the actual facts of decreasing ovarian function and possible oocyte harvesting in delayed situations. In the meanwhile, oncologists need to continue to develop conservative effective treatment for gynecologic cancers and continue to work on cancer prevention, in particular cervical cancer prevention. This is a complex area for women, and luckily, the incidence of gynecologic cancers is small relative to breast cancer and colon cancer. The increasing group of older women having children and onset of increasing cancer raises new concerns for management and requires exploration to arrive at viable options for this growing group.—LVL)

Long-Term Risk of Ovarian Cancer and Borderline Tumors After Assisted Reproductive Technology

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ABSTRACT

Despite inconclusive evidence, concerns that assisted reproductive technology may be associated with increased risk of ovarian cancer remain. Significant increases in gonadotropin levels and disruption of ovarian epithelium have been proposed as mechanisms to explain this potential association. Several studies investigating this have suggested the observed increased risk in those undergoing assisted reproductive technology (ART) may be more related to nulliparity and subfertility than the treatment itself.

This nationwide retrospective cohort study with prospective follow-up aimed to determine long-term ovarian cancer risk among women treated with ART compared with women in the general population and compared with subfertile women not treated with ART. Also investigated was whether unsuccessful ART and successful ART leading to childbirth had different effects on ovarian cancer risk. Women treated with ART between 1983 and 2000 identified in the OMEGA-1 (Ovariumstimulatie En Gynecologische Aandoengingen-1) cohort were included in this analysis. The OMEGA-1 cohort included women starting ovarian stimulation for ART in in vitro fertilization (IVF) clinics in the Netherlands, as well as a comparison cohort of subfertile ART-native women. Eligible women entered into the study cohort on the date of first ART or first clinic visit for subfertility evaluation. Cancer diagnosis data were obtained through the population-based Netherlands Cancer Registry between 1989 and July 2018. Ovarian cancer incidence in the ART and non-ART cohorts were compared, and standardized incidence ratios (SIRs) were calculated based on the observed and expected numbers of tumors in each cohort.

The final study cohort consisted of 30,625 ART-treated women and 9988 non-ART-treated women with a median follow-up of 24 years. A total of 158 ovarian cancers were observed in the follow-up period, 158 of which were invasive and 100 borderline. Ovarian cancer risk was increased in the ART group (SIR = 1.43; 95% confidence interval [CI], 1.18–1.71) but not in the non-ART group (SIR = 1.15; 95% CI, 0.81–1.59; $P = 0.25$) compared with the general population. Nulliparous women had a 2-fold increased risk of ovarian cancer compared with the general population, and each subfertility diagnosis was associated with an increase in ovarian cancer risk in ART-treated women but not in non-ART-treated women. When comparing the ART group and non-ART group and adjusting for age at start and parity, the hazards ratio (HR) for ovarian cancer was 1.02 (95% CI, 0.70–1.50), and this did not increase after more ART cycles. A decreased risk of ovarian cancer was associated with a larger number of successful ART cycles (1 successful ART cycle HR = 0.54; 95% CI, 0.35–0.87; ≥ 2 cycles HR = 0.37; 95% CI, 0.18–0.73; $P = 0.001$); however, a larger number of unsuccessful cycles was not associated with a greater risk. Borderline ovarian cancers were more common among both ART and non-ART women compared with the general population (SIR = 2.20; 95% CI, 1.66–2.86; SIR = 1.84; 95% CI, 1.05–2.99, respectively), and more common in ART-treated women compared with non-ART women (HR, 1.84; 95% CI, 1.08–3.14); however, risk did not increase with more ART cycles or follow-up time.

The results of this study show an increased risk of ovarian cancer among ART-treated women compared with the general population, but not compared with subfertile women not treated with ART and is attributed to nulliparity.

EDITORIAL COMMENT

(Twelve percent of American women will receive infertility services during their reproductive life. After 1 year of having unprotected sex, approximately 15% of couples are unable to achieve pregnancy. Infertility is attributed to female causes in one third of cases, male causes in one third of cases, and the rest is attributable to either both partners or unknown etiology. Fertility is costly business due to the need for several stages of preparation to undergo IVF. The cost per IVF cycle ranges from \$10,000 to \$15,000 per cycle, and cost per live birth is approximately \$50,000 to \$60,000. The cost of infertility drugs alone exceeded 500 million dollars per year. Treatment of infertility is varied, and one aspect is IVF. A cycle of IVF includes treatment with numerous drugs to stimulate ovulation. One of the concerns regarding ovarian stimulation is the hypothetical risk of increase in ovarian cancer.

Dr Spaan and physicians from the Netherlands undertake a nationwide cohort study including 30,625 women who received ovarian stimulation for ART and 9998 infertile women who were not treated with ART. They also compared outcomes from the general population. This study is notable for including a

control group of infertile patients who did not undergo ART, use of trained abstractors for a large portion of the study followed by extraction from electronic medical records, and the ability to obtain outcomes from the Netherlands Cancer Registry. Of the 158 cancers diagnosed, 53% were serous, 10.8% were mucinous, 7% were clear cell, 14.6% were endometrioid, and 14.5% other. It is notable that the HR for developing ovarian cancer in the ART group versus the non-ART group was 1.02. The risk did not increase with additional cycles of treatment. Histologically proven endometriosis was associated with an HR of 1.93 for developing nonserous cancers. Ovarian cancer risks actually decreased when women had larger numbers of successful cycles. In contrast, the risk of borderline ovarian tumors was statistically significantly increased in both infertile groups compared with the general population (ART and non-ART). Borderline tumor risk was increased in patients with tubal etiology for infertility and unexplained infertility. Again, there was no increase in the incidence of borderline ovarian tumor with increasing numbers of cycles. The authors note that “this is the

first large cohort study with long-term follow-up in a subfertile comparison group.” They hypothesize that the risk factors that cause infertility are similar to those contributing to increased ovarian cancer risks such as nulliparity and irregular cycles. Strengths of the study include the long-term follow-up and the reliability of data, and limitations include study of an infertility group, which is a younger population than those who might develop cancer. Lastly, it is notable that mucinous and clear cell cancers were diagnosed. The etiology of clear cell cancers is strongly related to endometriosis, which is not the etiology of infertility patients in the study, and mucinous tumors are felt to be entirely different disease.

Infertility is big business in all countries and an important service that reflects our respect and need for families. It is costly, and should patients need ART/IVF, the process is cumbersome, emotionally draining, expensive, and often not covered by insurance. The concern of increased ovarian

cancer has been lingering since the 1990s when a series of studies suggested that ovarian stimulation was associated with an increased risk of cancer. The current study includes a nontreated infertile patient group, which is one of its strengths; studies preceding this, except for a few, did not include this control group, and thus conclusions were difficult to make. The authors did not find an increase in ovarian cancer in ART patients and more importantly did not note increased risks with administration of more cycles of treatment. They did see an increase in borderline tumors but again not related to increasing cycles. The significance of this is unclear in particular because ovarian epithelial cancers and borderline tumors are not felt to be developed on a continuum. Taken with the other 2 large studies, which included non-ART infertile group, the data are convincing that there is no increased risk. Good quality studies with long-term follow-up and appropriate control groups suggest that there is no increased risk.—LVL)

Use of Telehealth by Surgical Specialties During the COVID-19 Pandemic

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ABSTRACT

Given the US health care system mandates to minimize patient and clinician exposure to COVID-19, telehealth use across all specialties increased dramatically in the COVID-19 pandemic. Telehealth for preoperative and postoperative surgical follow-up patient visits had started to occur at low levels before the pandemic. The extent to which different surgical specialties were able to adjust to telehealth as the major modality of health care delivery remains unclear.

This statewide cohort study aimed to determine how telehealth use patterns changed across surgical specialties before and during the COVID-19 pandemic. For the primary analysis, new adult outpatient visits with a surgeon (including colorectal surgery, general surgery, neurosurgery, obstetrics and gynecology, ophthalmology/ear, nose, and throat, orthopedics, plastic surgery, thoracic surgery, and urology) between January 5 and September 5, 2020, were identified from a large commercial insurance payer in Michigan. Patient visits were categorized as in-person office visits or telehealth visits using appropriate telehealth modifier codes. The pandemic was stratified into 3 periods based on national and state regulations, as well as trends in raw data: period 1 (pre-COVID-19 pandemic, January 5 to March 7), period 2 (early pandemic, March 8 to June 6), and period 3 (late pandemic, June 7 to September 5). The primary study outcome was telehealth conversion in 2020. This outcome was defined as the rate of new patient telehealth visits per week divided by the mean weekly new patient visit volume in 2019