Cancer and uterine preservation: a first step toward preserving fertility after pelvic radiation

When a young woman is diagnosed with cancer, timely and thorough treatment is paramount to an excellent prognosis; but as our cancer treatments and increasing access to minimally invasive surgical techniques improve every year, the oncologic and patient communities are progressively advocating for preservation of quality of life when deciding upon treatment timelines and options. One of the major considerations only recently, and now increasingly prioritized, is preservation of fertility. For women whose cancer requires pelvic radiation, the question of maintaining fertility has generally meant egg or embryo cryopreservation with the future hope of employing a surrogate to carry her child, given that the radiation therapy reduces uterine volume, causes myometrial fibrosis, damage to the endometrium, and decreases uterine vascular perfusion. Surrogacy carries with it inherent potential medical, emotional, and financial risks, and Ribeiro et al. (1) have questioned whether this will remain the necessary approach. With their pioneering case of uterine transposition, they have now brought us one step closer to preserving a woman's uterus and potentially her fertility even after pelvic radiation. We would like to commend Ribeiro et al. (1) for thinking out of the box, towards finding a solution to the problem of maintaining fertility after pelvic radiation.

Each year in the United States, two thousand women of reproductive age are diagnosed with colorectal cancer, and those young women who are presented with fertility preservation options are offered egg or embryo cryopreservation prior to pelvic radiation, with the hope of having a surrogate pregnancy when desired (1). Pregnancy after pelvic radiation is extremely uncommon and is generally considered highly unadvisable. There are two case reports of patients who have achieved pregnancy after pelvic radiation. Wald et al. (2) reported on a 25-year-old woman who underwent a lower dose (30 Gy) of pelvic radiation for anal cancer, conceived spontaneously, and delivered a healthy baby by scheduled cesarean section. The extent of damage to the uterus after radiation is unpredictable, however, and as of now there is no imaging method to evaluate uterine health or predict pregnancy outcome. The other case report of pregnancy after pelvic radiation demonstrates why pregnancy after pelvic radiation can be quite morbid. In the article by Wald et al. (2), Hurmuz et al. reported on a case of neonatal mortality in which 3 years after pelvic radiation for rectal cancer a 36-year-old patient spontaneously conceived twins, and after preterm rupture of membranes at 28 weeks she underwent a cesarean section. After ten arduous minutes and a large stellate extension in the scarred uterus, the presenting twin was extracted but was not alive; the other twin did survive. After pelvic radiation, the uterus is too often severely injured with scarring and decreased blood perfusion for a patient to safely conceive.

Ribeiro et al. (1) have skillfully transposed the uterus of a 26-year-old patient with rectal adenocarcinoma, successfully moving the uterus into the upper abdomen out of the field of radiation and then repositioning it back into its normal location in a second laparoscopic surgery, after the radiation course was complete. They hypothesize that by preventing radiation damage to the uterus, they may allow the patient to gestate her own future child without the need for a surrogate. The patient continues to menstruate postoperatively and it will be very informative to learn whether she is able to conceive and if so, if the pregnancy can be carried to term and successfully delivered.

Indeed, the safety of pregnancy after the ligation of the uterine arteries is controversial. The American Congress of Obstetricians and Gynecologists issued a committee opinion in 2004 stating that there is insufficient evidence to ensure the safety of uterine artery embolization in women who desire to conceive in the future, and consider the procedure in such women relatively contraindicated. More recently, however, Mohan et al. (3) conducted a systematic review of literature regarding pregnancy outcomes after uterine artery embolization (UAE) for fibroids, and conclude that "although pregnancy complication rates were similar to those in patients with untreated fibroid tumors, a few studies have reported higher miscarriage rates following UAE." Ribeiro et al. (1) keenly compare their procedure of ligating the uterine arteries to cervical cancer patients who have undergone uterine artery ligation for radical trachelectomy, who subsequently demonstrate a 65% pregnancy rate. In the Ribero et al. (1) study, since it is unknown whether any or how much radiation has unknowingly affected the patient's uterus while it was harbored in the upper abdomen, and since her uterus now receives its vascular supply only from the utero-ovarian ligaments, her pregnancy would be a high risk one in which she should undergo frequent Doppler ultrasound monitoring to evaluate healthy placentation and fetal growth, and an early scheduled delivery may be considered.

One complication of the patient's course in Ribeiro's procedure (1) was that of vaginal cuff dehiscence, which is instructive for future attempts at the same procedure. As with a hysterectomy, special care must be taken to prevent vaginal cuff dehiscence, especially since the surgeon in this situation must anticipate additional stress to the cuff in the context of patient who will undergo pelvic radiation after cuff closure (4, 5). The other complication in the Ribeiro case, migration of the left adnexa to the lower abdomen and consequent radiation of the ovary, demonstrates that perhaps the ovaries should be sutured even more thoroughly and higher up in the abdomen prior to radiation. For now, until excellent residual ovarian function is confirmed after oophoropexy and radiation, it is wise to continue with oocyte retrieval and cryopreservation preoperatively as a back-up method for the patient to conceive in the future via in vitro fertilization, as Ribeiro's group has done. If the ovaries and fallopian tubes however were adequately preserved, it would be remarkable and potentially pose fewer complications for the post-uterine-transplant patient to actually conceive spontaneously.

This first uterine transposition case may pave the way for future surgical techniques that may be developed to temporarily move the uterus away from the field of radiation and provide fertility options for young women with cancer.

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