

Fertility Issues in Female Cancer Survivors

OVERVIEW OF THE FEMALE REPRODUCTIVE SYSTEM

Purpose of the Female Reproductive System

The female reproductive system is the foundation of conception. Besides the genital organs, there are also other organs that play a vital role in reproduction. These organs include the areas of the brain known as the hypothalamus, the pituitary gland, and the adrenal glands. (Miranda, A. M., Schnatz, R. H., & Gest, T. R., 2017). The hypothalamus orchestrates the interactions among the genital organs, pituitary glands and the adrenal glands to enhance regulation of the female reproductive system. These hormones stimulate the ovaries to produce the female sex hormones such as the estrogen and the progesterone (Cancer Council Victoria, 2016). The adrenal and hypothalamus glands and hormones may be directly affected by cancer treatment. A cohort study conducted among childhood cancer survivors measured the hypothalamic or pituitary radiation doses and chemotherapy doses the cancer patients were exposed to. The findings indicated that cancer survivors who were exposed to these treatments were less likely to experience pregnancy than their healthy siblings (Green, D., Kawashima, T., Stoveall, M., Leisenring, W., Sklar, C...et al., 2009).

The Stages of the Reproductive System

Throughout life, women experience different stages of their reproductive cycle. The time prior to menarche is called pre-menstruation. Puberty marks the beginning of a female's reproductive life cycle (Hoyt, L. T., & Falconi, A., 2015). Perimenopause marks the end of a female's reproductive life cycle (Hoyt, L. T., & Falconi, A., 2015). Female cancer patients who are in the pre-menstruation phase of life are less likely to be counseled and informed of fertility preservation options due to their young age (Anderson, R. A., Weddell, A., Spoudeas, H. A., Douglas, C., Shalet, S. M., Levitt, G., & Wallace, W., 2008). Women diagnosed within the

perimenopause phase do not have to worry about fertility preservation because they have reached the end of their reproductive life cycle (Hoyt, L. T., & Falconi, A., 2015).

OVERVIEW OF CANCER TREATMENT

Cancer Treatment Methods

There are several types of cancer treatment methods. Some cancer patients seeking treatment may only receive one treatment, but most cancer patients receive a combination of the therapy ranging from chemotherapy to radiation to surgery (Fallat, M. E., & Hutter, J. 2008; National Cancer Institute, 2017). A cancer patient may also have immunotherapy, hormone therapy or targeted therapy (Peccatori, F. A., Azim, H. A., Hoekstra, H. J., Pavlidis, N., Kesic, V...et al., 2013; National Cancer Institute, 2017). Each method can affect fertility in cancer patients; however, the treatments associated with the highest risk include chemotherapy and radiation (Green, et al., 2009).

Effects of Cancer Treatment on the Reproductive System

Chemotherapy can cause infertility in the majority of patients. In a large-scale study of reproductive age women diagnosed with breast cancer, researchers found that 35% of patients who received chemotherapy treatment experienced amenorrhea. (Valentini, A., Finch, A., Lubiński, J., Byrski, T., Ghadirian, P., 2013). Only 5.3% of those who did not receive chemotherapy treatment experienced amenorrhea (Valentini et al., 2013). It appears that due to the processes and procedures employed during treatments, the ovaries in women are also highly affected (Larsen, Müller, Rechnitzer, Schmiegelow, & Andersen, 2003). One study in particular highlights the effects of chemotherapy and radiation on the ovaries (Larsen et al., 2003). The

study concluded that chemotherapy and radiation therapy are likely to lower the number of eggs in each ovary, regardless of normal menarche (Larsen et al., 2003).

OVERVIEW OF FERTILITY ISSUES IN FEMALE CANCER SURVIVORS

Fertility Issues in Female Cancer Survivors

One of the most common fertility issues of cancer treatment survivors is sexual dysfunction, or the inability to produce sexual hormones. Women may have trouble with ovulation and problems within the fallopian tubes due to these hormone issues (El-Shalakany, A. H., Ali, M. S., Abdelmaksoud, A. A., Abd, S., & Hasan, E. A., 2013). Researchers have discovered that these hormone issues from chemotherapy treatment can also lead to a lower average ovarian volume in female cancer survivors than healthy reproductive age females (El-Shalakany et al., 2013; Larsen et al., 2003). Radiation, or radiotherapy, that directly affects the ovaries or pituitary and adrenal glands can deplete ovarian volume or cause early menopause in women (Gnaneswaran, S., Deans, R., & Cohn, R., 2012).

Impact on Quality of Life

Cancer treatment and the adverse effects it has on the fertility of the patient changes the life of the survivor. Survivors are more likely to become depressed and have difficulties coming to terms with the fact that they may not be able to bear children (Direkvand-Moghadam, A., Delpisheh, A., & Direkvand-Moghadam, A., 2014). In a cross-sectional study that utilized the Pediatric Quality of Life Assessment (PedsQL), researchers found that about 85% of the female cancer surviving participants desired children in the future (Sandheinrich, T., Wondmeneh, S. B., Mohrmann, C., Gettinger, K., Henry, J., & Hayashi, R. J. 2018). These survivors lives are negatively impacted which may lead to low self-esteem, distress and low quality of life (Green,

D., Kawashima, T., Stoveall, M., Leisenring, W., Sklar, C...et. Al., 2009). A systematic review of young breast cancer survivors indicates that women of reproductive age who develop breast cancer struggle with mental, emotional, and physical health problems regarding fertility. There is a substantial difference of infertility and its effects in younger women than post-menopausal women (Howard-Anderson, J., Ganz, P., Bower, J. E., & Stanton, A. Lynette 2012). However, fertility counseling and discussing reproductive options with oncologists has been shown to lead to a greater quality of life in female cancer survivors (Letourneau, Ebbel, Katz, Katz, Chien, Rosen, 2011).

OVERVIEW OF FERTILITY PRESERVATION FOR FEMALE CANCER SURVIVORS

Fertility Preservation Options

There are fertility preservation methods available for those who want to wish to reproduce following cancer and cancer treatment. These methods include ovarian cryopreservation and transplantation (Oktay and Oktem, 2010), as well as mature oocyte preservation (Wallace, W. H., Critchley, H. O., & Anderson, R. A. 2012), ovarian tissue freezing and grafting, and hormonal suppression (Levine, J., Canada, A., & Stern, C. J., 2010). Ovarian cryopreservation and grafting was found to be successful in the cases in which it was used. However, it is not utilized as often as it could be in cases of infertility caused by cancer treatment (Oktay and Oktem, 2010). This is likely due to the fact that reproduction is the secondary focus during cancer treatment, while surviving is the primary concern (Hoeg, D., Schmidt, L., & Macklon, K. T. 2016).

Ease of Access to Information and Care

There seems to be an apparent need for discussion between patients and oncologists regarding the effects of cancer treatment and fertility preservation options (Letourneau, et al., 2011). Interviews conducted with female and male cancer patients found that there are major disparities between the information given to women versus men (Hoeg, D., Schmidt, L., & Macklon, K. T. 2016). Men have easier and quicker access to fertility preservation methods. It often takes longer for women to access and utilize the available fertility preservation methods (Peddie V, Porter M, Barbour R, Culligan D, MacDonald G, King D, et.al. 2012).

SUMMARY

Synopsis of Research Findings

Based on these studies, there is an apparent relationship between infertility and cancer treatment. This association is increased when the cancer diagnosis directly affects the reproductive organs. Further research findings indicate the need for access to information and care prior to cancer treatment, especially for women and younger patients (Anderson, R. A., Weddell, A., Spoudeas, H. A., Douglas, C., Shalet, S. M., Levitt, G., & Wallace, W., 2008). Female cancer patients are often unaware of the detrimental effects of chemotherapy and radiation on fertility (Hoeg, D., Schmidt, L., & Macklon, K. T., 2016). It is imperative for female cancer survivors to understand the complications that may accompany cancer treatment so they can make decisions regarding reproduction in the future.

Suggestion for Future Research

There is already research regarding the gender and age disparities in fertility education and preservation for cancer survivors. Furthering this research will help make oncologists more aware of the issue and solve the problem by referring patients to fertility specialists early on in the diagnosis. There is also the issue of how effective fertility preservation methods are for those individuals who are likely to have fertility issues from chemotherapy and radiation. There are ongoing studies that highlight the importance of effectiveness of fertility preservation (Oktay and Oktem, 2010). Because cancer is a prevalent health issue in the world today, continuing research will help surviving cancer patients overcome future fertility issues and help increase patients quality of life.

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