

## Oophorectomy for Fertility Preservation

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### Abstract

#### **Presentation**

Turner syndrome (TS) is the most established genetic cause of premature ovarian insufficiency (POI). A 14-year-old girl with a TS mosaic karyotype was referred to the adolescent gynaecology department to discuss fertility preservation (FP) options.

#### **Diagnosis**

We report the first case of oophorectomy for the purpose of ovarian tissue cryopreservation (OTC) performed in Ireland.

#### **Treatment**

Oophorectomy was performed in Dublin and the ovary was transported to Oxford for cryopreservation.

#### **Conclusion**

OTC to preserve fertility is still considered experimental but is offered as a clinical service in other countries. Until now this technique has not been available in Ireland. It is the authors' hope that a FP service can be developed in Ireland.

### Introduction

Turner syndrome (TS), affects 1 in 2,500 newborn females.<sup>1</sup>

For some women with TS, particularly those with a mosaic karyotype, there may be sufficient ovarian reserve to undergo normal pubertal development with subsequent menarche. However, POI is inevitable for all women with TS.

While still considered experimental, OTC is the FP technique of choice for pre-pubertal girls at high risk of POI and post-pubertal girls who are not mature enough for ovarian stimulation with subsequent oocyte cryopreservation.

## Case report

A 14-year-old girl was referred by her paediatric endocrinology team to the adolescent gynaecology department at the National Maternity Hospital, Dublin.

She presented with short stature at the age of 11. Chromosomal analysis revealed TS mosaic karyotype (46,XX/45,X).

Her pubertal development was normal with spontaneous menarche at age 14. Her anti-mullerian hormone level (AMH, a serum marker of ovarian reserve) was critically low (0.6 pmol/L). Her follicle stimulating hormone (FSH) level was within the normal range (2.8IU/L).

Without fertility preservation treatment, she would inevitably develop POI, probably before the age of 18. Therefore, her only options for motherhood would be in vitro fertilization (IVF) using donor oocytes or adoption. Spontaneous conceptions are rare in women with TS. Oocyte cryopreservation is an established fertility preservation option but a poor response to stimulation would be predicted given such a low ovarian reserve. An alternative option is ovarian tissue cryopreservation. This is now considered for suitable girls in the United Kingdom and throughout Europe.

A multidisciplinary team meeting was held between the National Maternity Hospital, Merrion Fertility Clinic and a Consultant paediatric oncologist from 'Future Fertility Trust', a charitable trust based in Oxford, U.K. who help young people at risk of infertility access expert care. This patient was deemed suitable for OTC. Laparoscopic oophorectomy was performed in Dublin with transportation that day of the ovary to Oxford for processing and cryopreservation. There are currently no facilities in Ireland for the storage of cryopreserved ovarian tissue. Permission for the procedure and for transport of the tissue was obtained from the HPRA (Human Products Regulatory Authority) in Ireland and the HTA (Human Tissue Authority) and HFEA (Human Fertilisation and Embryology Authority) in the UK. The girl recovered well post-operatively.

## Discussion

Advances in cryopreservation techniques have raised hopes for FP in girls and women at risk of POI. Oocyte cryopreservation is usually the approach of choice. However, ultrasound scans and oocyte retrieval are typically performed trans-vaginally, thus requiring a certain level of physical and psychological maturity.<sup>3</sup> Furthermore, approximately two weeks of stimulation with gonadotropins is required, which in the case of oncology patients, could delay treatment.

OTC offers an alternative FP strategy. It involves the surgical removal of an ovary or ovarian cortex fragments, via laparoscopy with subsequent cryopreservation of the tissue.<sup>2</sup> Ovarian tissue can be thawed and grafted back to the pelvis at a later date. Retrieval of tissue for OTC does not require sexual maturity so it constitutes a suitable FP method for pre-pubertal girls. A further advantage is that auto-transplantation of ovarian tissue after puberty can restore general ovarian endocrine function, in addition to preserving fertility. Most cases of OTC are performed prior to cancer treatment

To date, over 130 live births following auto-transplantation of ovarian tissue have been reported worldwide.<sup>4</sup> The majority of these pregnancies have resulted from use of ovarian tissue that was harvested from post-menarchal adult ovaries.

At the time of writing, there have been just two reported cases of pregnancy following auto-transplantation of ovaries that were recovered from a pre-menarchal girls prior to gonadotoxic treatment.<sup>5,6</sup> No pregnancies have been reported to date in the TS cohort.

In conclusion, OTC holds promise as a potential way to preserve fertility for girls at risk of POI. It is the authors' hope that a FP service can be developed in Ireland. Such a service would allow girls at high risk of POI, especially those who require FP prior to treatment for cancer, to avail of OTC in Ireland.

**Declaration of Conflicts of Interest:**

The authors declare no financial interests in any of the work submitted here.

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