



Abandoned Cryopreserved Embryos: The Unresolved Challenge

Assisted reproductive technologies (ARTs) are the most wonderful advances in the field of obstetrics and gynecology in the last century. The advancements in embryo and gamete cryopreservation, especially the vitrification method, greatly helped infertile couples and IVF specialists in storage of surplus embryos following IVF cycles or delaying embryo transfer due to failure of the endometrial receptivity. The simplicity of this method and the lack of need for expensive equipment quickly spread its use in all IVF clinics around the world as an essential aspect of ART. The high survival rate of embryos after freezing with their ability to develop from cleavage to blastocyst stage, has prompted Reproductive and Endocrinology and Infertility (REI) physicians to expand the freeze-all strategy in ART cycles. Successful freezing of gametes and embryos maximized the cumulative pregnancy rate per oocyte retrieval and increased the safety and efficiency of IVF treatment which is beneficial in reducing the costs of IVF, particularly with the emphasis on elective single embryo transfer (eSET) (1).

One of the main challenges of most IVF centers is the uncertainty over the fate and abundance of frozen gametes and embryos. Many couples abandon their stored embryos after a successful pregnancy and the birth of a healthy child or children without planning for another pregnancy. Also, some other couples leave their saved embryos due to other reasons such as despair after an unsuccessful IVF success, inability to afford the IVF costs, changes in their life plans, aging or separation of couples. Unfortunately, most of these couples never respond to repeated calls and follow-ups from IVF centers to determine the fate of their frozen embryos (2).

There is technical complexity for long-term frozen storage of embryos in IVF centers. It is an expensive process and requires specific secure area under continuous temperature control and meticulous supervision. Since the frozen embryos are considered the property of couples, preserving their safety and preventing any harm has legal consequences for IVF centers. In many communities where there is a belief that life begins following conception, the legal and moral implications are even more serious regarding storage of frozen embryos. According to current practice in IVF centers, a limited number of frozen embryos will be birthed by their genetic mothers, yet thousands more belong to parents who are undecided about the destiny of their embryos. Therefore, millions of embryos have been stored and abandoned for decades, despite the fact that more frozen embryos are added to this abandoned population in all IVF centers worldwide every day. As a result, many clinics with long history in IVF are overwhelmed by the sheer numbers of nitrogen storage dewars that take up huge facility space (1, 2).

Often, IVF centers produce more embryos than are needed for one cycle of embryo transfer. In some countries, due to lack of regulations and restrict guidelines for the precise control of the ovarian stimulation, sometimes 40 to 60 oocytes are retrieved in each cycle and the embryologist is forced to inseminate all of them. However, the satisfaction and the desire of the patient to retrieve this number of oocytes and fertilize them is not properly considered. The most important issue following production of surplus embryos is that there are numerous guidelines and protocols regarding the storage time of frozen gametes and embryos worldwide. For example, in the UK, frozen oocytes, sperm, and embryos can be stored for up to 55 years. Frozen embryos can be stored for up to 10 years in Sweden (before 2019, the storage period was limited to 5 years). In Australia, the duration of storage is 5 years. However, in the United States, gametes and embryos can be stored indefinitely. In the United States, the cost of storage is a disincentive for couples as they pursue frozen embryo destruction rather than preservation. In countries with the ability to store frozen embryos indefinitely, the practice contributes to the problem of embryo abandonment and the associated logistical and ethical dilemmas. Based on the available evidence, the longer storage of embryos is accompanied by the likelihood of their abundance and lack of response of owners in deciding the fate of the embryos (3).

The abandoned embryos in storage dewars of IVF centers have several destinations. The most suitable outcome for the owner would be paying the cost of freezing and preserving the embryos for future pregnancies. Otherwise, they can be destroyed at the request of parents or they can be donated for biomedical research, although the number of research projects on human embryos and laboratories studying on abandoned embryos has been greatly reduced due to limited research funds in recent years. The frozen embryos can be donated to other couples who can have children only using donated embryos. Most of these couples turned to adoption due to impossibility of using embryo donation, but with the increase of surplus embryos in IVF centers and

the development of NGOs to promote embryo donation as a cultural duty as well as encouragement of donor and recipient couples for embryo donation, these services are expanding in IVF centers. While embryo donation is beneficial for the couples in terms of affordability, nearly half the expense of an IVF cycle, and shorter waiting time to receive a donated embryo, child adoption has a longer history and its benefits and challenges are clearly defined. The basic problem for embryo donation in some countries and cultures is the direct connection of the donor and the recipient as well as their attitude towards donated embryos as a commercial item. Therefore, the development of these services in IVF centers requires proper standards, regulations, and ethical guidelines for donating and receiving embryos. If we believe that an embryo is potentially a human, it should not simply be traded as goods in social media without any protection. Stability and continuity of the recipient family foundation is another important issue. Currently, most of the organizations and IVF centers performing embryo donation prefer to provide services for heterosexual and legally married couples regardless of their ethnicity and race. Although most of the embryos donated in the United States are from Caucasian, Asian, or Hispanic families with few embryos available from African and American couples, the priority of IVF centers is the similar racial background of the recipient families and the donor's embryos (4).

Donation of abandoned embryos in IVF centers has its outspoken critics. They argue that the practice may be deemed immoral as it encourages production of more embryos than are needed for one or two transfer cycles. The critics state that the ideal scenario for a child is to grow up with their genetic parents. However, children resulting from embryo donation, like adopted children, will struggle with the story of their donation, acceptance of their parents, and searching for biological parents. On the other hand, there are parents who face a dilemma of whether accepting the donation program or consenting to the destruction of their abandoned embryos. Even supporters of embryo donation believe that the preferred solution would be to prevent the production of surplus frozen embryos. This would be achieved through strict regulations as well as increased awareness and education of infertile couples and professionals. A well-known example of these laws and regulations is found in Germany, where embryo freezing is prohibited except in rare cases; therefore, IVF centers and specialists avoid to produce additional embryos (3, 4).

Finally, decision on the fate of abandoned frozen embryos is a complex and multifaceted issue, depending on views of different communities regarding the nature of the embryo. If IVF-produced embryos are considered as potential human beings, the issue of whether they can easily be destroyed becomes much more complex. Moreover, if we consider embryos stored by IVF centers as property, it becomes a challenge to decide which authority as an eligible entity would have the right to determine their fate in case that their owners abandon their property.

References

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