The right to an heir in the era of assisted reproduction

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The latest remarkable technological advances in assisted reproduction, which enable cryopreservation of spermatozoa, embryos and ovarian tissue, raise difficult and debatable legal, social, ethical and moral issues concerning the right to posthumous reproduction. Furthermore, reports on the attitudes of the general public and of centres licensed for infertility treatment in the United Kingdom found that the majority of women and centres support the idea of posthumous reproduction. In this paper we review the data published on this issue, and after considering the various aspects, we conclude that each case should be discussed and authorized by a multidisciplinary committee that includes physicians, clergy, psychiatrists, psychologists, sociologists and other appropriate parties. In our opinion, the main principles that should guide this committee would allow posthumous reproduction in the context of marriage when a prior consent exists. For unmarried persons, post-mortem donation of gametes should be done only anonymously, if they are in agreement with existing laws concerning infertility treatments in every country and after appropriate consent and proper counselling. Moreover, any case which involves consanguinity or a possibility of incest should be forbidden, both for ethical and genetic reasons. In a case of pre-existing siblings, they should be consulted and their informed consent should be granted in advance so as to avoid legal problems in the inheritance of property. 

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Introduction

The desire for a genetic heir is as old as the beginning of life. It is common to all cultures, religions and social classes. It is instinctive as well as cognitive, and in essence it is basically a wish to perpetuate oneself and to pass heirloom to a genetic offspring.

In the Bible (Deuteronomy), in a case where a married man dies without having children, his brother or nearest relative has an obligation to marry the widow and the oldest son is named after the deceased. If the brother in law refuses to marry the woman he is obliged to go through a humiliating, public ceremony because of his unwillingness to establish his brother’s heirloom. In fact, King David is the grandson of Ovad son of Ruth, that was born according to this law (Ruth). Three thousand years ago, this was the nearest possible way to have a ‘genetic heir’.

Today, the remarkable technological advances in assisted reproduction, which enable cryopreservation of spermatozoa, embryos and ovarian tissue, raise difficult and debatable legal, social, ethical and moral issues concerning the right to posthumous reproduction. Other issues to be considered include the regulation and supervision of post-mortem reproduction, the financial and legal obligation towards the child to be born, the psychological effect on a child born from donated genetic material and the effect on the wider family relationship. Several publications have lately shown that there is a growing demand for posthumous reproduction, which is likely to become more common in the future. Moreover, reports on the attitudes of the general public and of centres licensed for treatment in the United Kingdom found that the majority of women and centres support the idea of posthumous reproduction.

Technical aspects

Cryopreserved spermatozoa

Cryopreservation of human spermatozoa achieved credibility in 1953 when Bunge and Sherman demonstrated that human spermatozoa, when frozen and thawed, could be used for insemination, with a resultant normal child. Lately, men who are about to undergo chemotherapeutic treatment for cancer have the option to donate semen for future use, in case of possible sterility as a side effect of chemotherapy. In order to preserve fertility, it is mandatory to bank semen samples prior to the initiation of therapy. In many of these patients the sperm quality is lower than the minimum criterion for sperm banking, due to the cancerous state. Only 23% of patients with Hodgkin’s disease and 66% of those with germ cell tumours will meet these criteria (Hendry et al., 1983). However, because of the tremendous advances during the last decade in the field of male infertility, and the introduction of micromanipulation techniques, it is incumbent upon patients to cryopreserve semen samples prior to therapy. This recommendation holds true even for those with severe semen abnormalities. As our experience shows, most patients wish to preserve their semen and such an approach helps them cope with the disease.

Moreover, today we can obtain viable spermatozoa post mortem within 24 h of death. A variety of procedures exist to obtain spermatozoa post-mortem (Kerr et al., 1997). The candidates for these procedures are most often the victims of sudden trauma, road accidents, construction accidents, fall or farming accidents, or medical conditions causing sudden death.
Also, young men facing dangerous conditions while traveling, working, participating in war activities or as astronauts may wish to donate semen or allow post-mortem sperm extraction in case of need.

**Ovum donation**

Presently, there is a shortage of eggs for use in infertility treatment. The possible use of oocytes, or ovarian tissue for transplantation, from the cadavers of adult women is technically feasible. In January 1991, Cha et al. (1991) reported, for the first time, a pregnancy after in-vitro culture and fertilization of immature human oocytes which were collected from unstimulated ovaries removed for various gynaecological indications and transferred to a donor programme.

Wynn et al. (1997), in a randomized study, examined the maturation in vitro of oocytes collected from 20 healthy women with normal ovaries who were undergoing surgery to achieve sterilization. The volunteers were randomly allocated either to receive a short protocol of recombinant follicle-stimulating hormone (FSH) stimulation on days 2, 4 and 6 of the cycle or to remain untreated. Oocytes were recovered on day 7, the average number of oocytes recovered per patient was 3.7 ± 1.1 in the unstimulated group and 7.7 ± 1.4 in the stimulated group, with significantly more oocytes maturing to metaphase II in patients receiving FSH (P < 0.01).

Another theoretical source of eggs or ovarian tissue is aborted female fetuses, since each fetal ovary contains millions of immature eggs. However, it is not yet known whether early fetal oocytes can develop into mature eggs or are capable of fertilization and cleavage. Moreover, the drastic decline in the number of eggs in the human ovary which occurs from the 20th week of gestation to adulthood could be due to genetic selection and elimination of disadvantageous oocytes. In spite of the above mentioned considerations, in our opinion the use of aborted fetal tissue for medical purposes is not ethically objectionable in itself. However, this potential source of oocytes raises some fundamental ethical and social questions. The possibility of obtaining oocytes from each aborted fetus might cause significant structural changes in our society. If this activity is permitted without official monitoring, unscrupulous people may exploit the desire of women to become pregnant. In the minds of the opponents of this option, this development conjures up the image of ‘cloning’ of populations by clinicians supplying oocytes from one aborted fetus to thousands of women and producing communities built up from people with identical haplotypes. Resulting consanguinity, or even incest, might increase dramatically the proportion of anomalous children in such a society. Furthermore, another troubling issue is the generation of human life from genetic material which is not merely unborn, but has not been subjected to natural selection. And what about the impact on the offspring, participants and families created through ovum donation from aborted fetuses? Similarly, there are implications for society of late motherhood and the growing number of peri- and post-menopausal women who wish to become pregnant.

In light of this and many other ethical issues involved, each society must carefully examine and define the conditions and controls that would permit this activity to be within its acceptable standards (Shushan and Schenker, 1994).

**Cryopreserved embryos**

The transfer of cryopreserved embryos is a routine technique in most in-vitro fertilization (IVF) centres and achieves pregnancy rates of approximately 15% per transfer. A recently published prospective study of children conceived following embryo cryopreservation assessed the rate and type of major congenital malformations and minor congenital anomalies and compared them with control children (Sutcliff et al., 1995). The proportion of children with a major congenital malformation in the group derived from cryopreserved embryos was similar to that in the controls, 3.3% and 2.4% respectively. The frequency of minor congenital anomalies was also statistically similar in the two groups. Finally, there were no significant differences between the groups in the mean Griffiths quotient (GQ) or the mean subquotient values. Therefore, the process of cryopreservation may not increase the risk of chromosomal abnormalities in live-born infants. Data from the UK Registry indicates that there is a higher perinatal mortality rate in IVF pregnancies resulting from the transfer of cryopreserved–thawed embryos or fresh embryos than the UK national average. The difference has been attributed largely to an increase in multiple pregnancies and preterm births after assisted conception rather than to an overall increase in the congenital malformation rate compared to population-based estimates (Office of Population Censuses and Surveys, 1988).

The legal status of cryopreserved embryos is difficult to define. In most countries they have no legal status. The legislation regarding storage of cryopreserved embryos in the United Kingdom and Australia and regulations in other countries give the donors of the gametes the right to decide the fate of the embryo (HFEA, 1990; Western Australia Human Reproductive Bill, 1990). According to the wish and consent of the gamete donors, they can be disposed of, donated to other couples, or given to research, although in countries such as Germany, Norway, Austria, Switzerland, Ireland and Israel research on embryos is forbidden (Corrigan et al., 1996).

The use of frozen embryos after the death of the husband, by a surrogate mother after the death of the woman, is thus only a legal and moral issue.

**Infertility centres and public attitudes**

There is a growing demand for procurement of post-mortem spermatozoa and ovarian tissue for treatment of infertility. Kerr et al. (1997) examined the prevalence of requests for semen procurement in the USA and Canada and found that it was much greater than anticipated. A total of 82 requests was reported in 40 centres in 22 different American states between 1980 and 1995, more than half of which (43) were between 1994 and 1995. Of the 82 requests 25 were honored in 14 centres in 11 different states. No such requests were reported from Canada.

Corrigan et al. (1996) conducted a survey to examine the attitude of 106 centres in the United Kingdom. Of these, 77 (73%) replied. Fifty six centres (74%) agreed to the posthumous use of either spermatozoa or embryos, but 27 of them (48%)
demanded restriction such as informed consent, advanced counselling, and approval by an independent ethics committee. Three centres agreed only to produce a sibling for an existing child. The Human Fertilisation and Embryology Authority in the United Kingdom (HFEA) has recently published a document on the views of the public and interested organizations on the use of eggs and ovarian tissue from live donors, cadavers or fetuses for both research and the treatment of infertility (Lyall et al., 1995). The survey included 1142 women attending a family planning clinic, 241 women from an infertility clinic and 200 women before termination of pregnancy. There were no significant differences in attitudes between the three groups. Over 89% of women agreed that ways should be sought to increase the availability of oocytes for research and infertility treatments. Live donors are considered the most acceptable source for treatment (59%), but most participants would also support the use of fetal oocytes or tissue as a source of eggs for treatment of infertility (54%). However, women before termination of pregnancy were less likely to support the use of cadavers as a source of eggs for treatment (48 versus 59%; P < 0.05).

**Social and moral issues**

An important consideration in posthumous reproduction is the possible psychological implications for the child to be born and on his wider family relationship. The psychological effect on a child conceived after the death of one of his genetic parents, or from an egg derived from a cadaver or from an aborted fetus, are unknown. On the other hand, we already allow routine donation of eggs and spermatozoa in assisted reproduction. Moreover, children are being born in families where one of the parents is dead as a result of war, road accidents or from maternal mortality related to pregnancy and delivery. Furthermore, we treat infertile couples with serious health problems such as breast carcinoma, thalassaemia major, post liver transplantation and more. Thus many children conceived through assisted reproduction are derived from donated gametes or have to grow up without one of their parents.

In a lately published abstract McWhinnie (1997) studied ethical and psychological issues in families from assisted conception. The study group comprised 54 families with 101 children, 74 of whom were the result of assisted conception. The age range of the children was up to 12 years for donor insemination and up to 7 years for IVF/gamete intra-Fallopian transfer (GIFT). The results show that all the children in the study were wanted and are much loved. However, IVF parents defined themselves as ‘over-protective’, 42% were apprehensive about the use of the term ‘test-tube baby’ and nearly 10% kept the embryo transfer process a secret. Those with multiple births required more support from community and health resources than average. The physical and emotional demands of being a parent in such a family can cause health and psychological problems. All the donor insemination families kept it a secret. In the donor insemination group, 61% of couples were confident of managing their role as parents. For the remaining 39% there was a range of problems. All donor insemination families had common problems including the long term consequences of half of the genetic and family history of the child being unknown to the parents and the child, the impact of male infertility on family relationship, the moral and religious dilemmas and pragmatic problems of maintaining a secret for a lifetime from loved children, relatives and friends, and the long term consequences of deception.

**Legal position of posthumous reproduction**

Requests for posthumous reproduction are not elicited by any standard policy or protocol. In most countries there is no relevant legislation or clear guidelines concerning posthumous reproduction. Canada, France, Germany and Sweden have legislation that forbids it. In the UK, the Human Fertilisation and Embryology Act of 1990 demands that those providing IVF must take into account the welfare of the child, including the need of that child for a father. In the USA this issue has not yet been regulated. A few relevant law cases have recently been published in the media. William Everett Kane (Hecht vs Superior Court, 1993) was an attorney from California, USA, who deposited his spermatozoa at a California cryobank with instructions to allow his girlfriend to use it after he committed suicide. He had two college-aged children from his former wife whom he had divorced 15 years before. The appeals court ruled that spermatozoa, like embryos, are ‘gametic material’ and a ‘unique type of property’ so that the gamete source should decide their use, and that spermatozoa can be bequeathed in a will (Assize-Shasta, 1994). The American appeals court found only one precedent case, in France (Parpalaix c. CECOS – Centre d’Etude et de Conservation du Sperme Humain – 1984) where a man had deposited spermatozoa before treatment for testicular cancer, but left no instructions at the time of deposition. The French court ruled that his wife had a right to be inseminated by the semen of her husband (Wynn et al., 1997). Corinne Parpalaix was inseminated in November 1984, but did not become pregnant.

In another French case (Mme Claire G. c. CECOS, 1991), which followed shortly after Parpalaix, Mme Claire G. requested that CECOS release the frozen spermatozoa of her deceased husband. Because of Parpalaix, CECOS made clear to Michel G., who had testicular cancer, that the posthumous use of his spermatozoa was unacceptable. Michel G. agreed that his spermatozoa could only be used in his presence and with his explicit consent. Claire G. contested the agreement on the basis that she had a right to procreate. The Tribunal de Grande Instance de Toulouse ruled that a legitimate desire to have a child does not create an indefensible right to a child and, thus, Mme Claire G. has no legitimate claim to the frozen spermatozoa in this case.

A few law cases have ruled on the use of frozen embryos. The case of Davis vs Davis (1990) involved seven frozen embryos created by IVF whose custody and control were contested in a divorce action (Assize-Shasta, 1994). The Davis court decided that the couple, not the court or anyone else, should decide on the fate of the embryos. If the couple could not agree the court permitted the destruction of the embryos.

**Comment**

The emergence of new techniques to alleviate infertility confront us with growing demands for post-mortem reproduction which are likely to increase in the future. The decision to honour a request does not adhere to any standardized practice, and legally the issue has not been settled. Consequently, none of the treat-
ment centres have a policy, protocol or guidelines to address requests for such treatment.

The works cited above demonstrate that the majority of the public and treatment centres support posthumous reproduction under certain restrictions.

In our opinion, each case should be discussed and authorized by a multidisciplinary committee that includes physicians, clergy, psychiatrists, psychologists, sociologists and other appropriate parties.

A major issue to be considered in regard to donation is consent. Informed consent is considered an essential part of donation in current programmes, including the donation of ovarian tissue and immature oocytes. Where adults are involved they should be given relevant and full information and a proper counselling to enable them to give an appropriate consent. Concerning the use of ovarian tissue and immature eggs from the cadavers of women and children, consent should be obtained from the parents of the dead person, similar to the use of organ donation for transplantation. Consent for the use of aborted fetal oocytes should be separate from the decision to have an abortion. Under no circumstances should abortions be allowed to provide fetal oocytes for particular purposes or persons. The final decision regarding an elective abortion should be made and recorded before discussion concerning potential egg donation. Legislation should be developed to limit the possibility of using aborted fetal oocytes from coerced abortions or pregnancies that would not have occurred otherwise, as well as any economic benefits that might raise moral concerns.

In cases of frozen or post-mortem sperm procurement, the informed consent of both male and female should be obtained in advance. In our opinion, in some cases the decision is simple both legally and ethically. In the context of a married couple with prior consent it should be allowed. The use of spermatozoa for a common law wife should be allowed after the agreement of the special committee, preferably in agreement with first degree relatives and with consent given in advance.

In cases where the sperm donor is unmarried, posthumous sperm donation can be allowed only anonymously with consent of the person or in extreme cases after the desire and approval of the family.

Cases may arise where a woman may want to be inseminated with her son’s spermatozoa or to carry an embryo which is the result of fertilization of an oocyte from her deceased daughter with the father’s spermatozoa. In our opinion any case which involves consanguinity or a possibility of incest should be forbidden, both for ethical and genetic reasons.

The use of oocytes from a cadaver, although technically feasible, involves the cooperation of a surrogate mother, and thus, is limited to places where this is legal.

The use of frozen embryos, after the death of one of the contributors, can be more complicated, in the case of the death of the woman, as it then involves a third party, namely a surrogate mother. In the case of frozen embryos, the Israeli law allows transfer of such embryos to the wife 1 year after the death of her husband even in the absence of consent, while in cases where the wife has died the frozen embryos cannot be used (Schenker, 1987).

In any case where children already exist they should be con- 

sulted and their informed consent should be obtained in advance so as to avoid legal problems in the partition of heirloom.

To summarize, this paper was written in order to stimulate discussion and consideration of the various aspects of posthumous reproduction. The authors did not intend to provide definite answers, as there are no universal solutions to this complicated issue, which can be adopted internationally. The attitudes toward posthumous reproduction will undoubtedly differ according to cultural, religious and geographic differences. Moreover, the issue is not merely medical, and involves ethical, moral, religious, and legal aspects which should be considered with an active participation of specialists in the above mentioned fields.

An international debate on the subject might provide common guidelines that can be adopted as a basis for further practice and development of the subject.

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