Creating a life to save a life? Reflections on the conception of "saviour siblings"

Eric Blyth

Introduction

The term "saviour siblings" refers to children whose conception is – at least partially – motivated by the desire of their parents to secure human stem cells to provide treatment for an existing child with a life-threatening illness. It has comparatively recent origins, Spriggs and Savulescu (2002) making the first specific reference to "saviour sibling", although an article entitled "The Made-to-Order Savior" had appeared a year earlier in the *New York Times Magazine* (Belkin, 2001).

While conceiving a child to act as a potential donor of tissue for an older sibling is not new (see, for example, McBride, 1990), what is new about using reproductive technology techniques is the explicit conscription of health care professionals and the state (where this has an interest in regulating the activities of health care professionals) in the enterprise.

Using reproductive technology to conceive a saviour sibling

Key to the procedure is preimplantation genetic diagnosis (PGD), which involves the removal of one or two cells from an embryo that has been created *in vitro* using ICSI about three days following fertilization. The DNA from the biopsied cells is then tested for specific genetic conditions.

Hitherto, a couple knowing they are at risk of conceiving a child with a severe genetic condition for which there is a family history had several choices (none of which is likely to be their first choice):

1. They could forgo conceiving children altogether;
2. They could forgo conceiving their own genetically-related children and pursue parenthood via adoption;
3. They could use collaborative reproductive procedures such as sperm, egg or embryo donation or surrogacy. This could allow the "unaffected" parent to be a genetically-related parent of the child;
4. The woman could undergo prenatal diagnosis (PND) following conception; this typically involves chorionic villus sampling during the first trimester of pregnancy or amniocentesis during the second trimester. A woman undergoing PND faces the risks inherent in the procedure itself and the decision of whether to terminate the pregnancy of an affected fetus.

The advantage of **embryo** screening offered by PGD over **fetal** screening offered by PND is that a woman will know from the outset of her pregnancy that her baby is unaffected

by the condition and that she will not be required to undergo pregnancy termination. PGD may therefore be a preferable option to PND for physical, psychological and ethical reasons.

The first application of PGD in humans was reported in 1989 (Handyside *et al.,* 1989) and the first pregnancies were reported in 1990 (Handyside *et al*., 1990). Initial data from the first IVF pregnancies following PGD (12 singletons and four twins) showed a normal obstetric outcome (Soussis *et al*., 1996).

Currently PGD can be used to detect more than 100 genetic conditions. Its two most common uses are, first, to diagnose single gene conditions, such as cystic fibrosis, thalassaemia, and spinal muscular atrophy; and, second, to determine the sex of an embryo, which has therapeutic application for sex-linked conditions, such as Duchenne's muscular dystrophy and haemophilia – in which case a female embryo would be selected for implantation in order to avoid the birth of an affected child. The ability to determine an embryo's sex opens up the possibility of using or discarding an embryo simply on the basis of whether it would become a boy or a girl. However, discussion of this is beyond the scope of this paper.

PGD is still a relatively new procedure; it requires expertise in reproductive endocrinology, embryology and molecular genetics and is, consequently, extremely expensive. In the absence of funding for PGD through public health or health insurance programmes, it is unlikely to be affordable by more than a minority of the small number of people who have children with the serious genetic conditions for which it can be applied. Currently, there are three main safety questions for the use of PGD: the creation of the embryo by means of ICSI, the risks of the biopsy, and the risks of misdiagnosis.

ICSI was originally developed to enable subfertile men to father a genetically-related child, although indications for its usage have extended considerably. International follow-up studies of ICSI-conceived children up to the age of 5 show that in most respects, singleton, full-term ICSI-conceived children are similar to their naturally-conceived peers. However, they appear to be at higher risk of major congenital malformations, in particular genitourinary conditions in ICSI-conceived boys. This is thought to result from the quality of the sperm typically used in ICSI rather than from the ICSI procedure itself (Bonduelle *et al*., 2005). This is unlikely, therefore, to be a salient factor in the conception of a "saviour sibling". However, continuing follow-up is necessary to ensure that ICSI does not entail unacceptable longer-term risks.

While there is no current evidence that the removal of a single cell significantly impairs embryo development (Björndahl and Barratt, 2002), there are insufficient data to ascertain the effect of removing **two** cells (which reduces the risk of misdiagnosis) on either the embryo or resulting child (Shenfield *et al.*, 2003). Over 1000 children have

been born following PGD (Lavery, 2004; Verlinsky *et al*., 2004a) and a study of 754 PGD babies published in 2004 showed that they are no more likely to be affected by birth defects than babies conceived naturally (Verlinsky *et al*., 2004b). Since the infants involved in these studies are still very young, continued monitoring will be necessary to ensure that there are no long term adverse implications.

Since the first clinical applications of PGD there have been occasional reports of misdiagnosis in most of the major international centres offering PGD, although these were more common in the early years and remain relatively rare occurrences (Lavery, 2004; Verlinsky *et al*., 2004a). Subsequent use of PND may, of course, be used to check for PGD misdiagnosis.

Developments in embryo research have meant that PGD, combined with Human Leucocyte Antigen (HLA) typing, commonly known as "tissue typing", could not only be used to ensure that an embryo is unaffected by a condition for which a diagnostic test exists, but also to ascertain whether the child it might subsequently become would be a matched tissue donor for an existing affected sibling requiring a stem cell transplant. Since the same biopsy undertaken for PGD can be used to test for tissue typing, the embryo is exposed to no additional risk. Donation of cord blood stem cells itself is a non-invasive procedure, and there is no postnatal intervention involving the "saviour sibling" – and therefore no risk of physical harm.

The ethical debate

While the technology exists to enable the conception of a "saviour sibling", this does not necessarily mean that it should be permitted. Three main arguments against permitting the conception of "saviour siblings" have been advanced: first, the wrongful instrumentalization of the child; second, the "slippery slope"; and third, the welfare of the child (Pennings *et al*., 2002; Sheldon and Wilkinson, 2004).

Conceiving a child to be a donor for an older sibling is considered to be inherently wrong because "the whole reason for conceiving that child is for the sake of someone else" Campbell (2004). However, this assertion may be challenged on two fronts. First is the issue of whether the "whole reason" for conceiving the child is for the benefit of the older sibling. Verlinsky *et al.* (2004a: 2080) state that "each of the couples desired to have another child - a desire separate from the hope of having another child who could potentially serve as a donor of stem cells for the affected sibling". It is also reported that the parents in two UK families, the Hashmis and the Whitakers, that have been at the centre of the "saviour sibling" debate in the UK, wanted another child in any case **(**Sheldon and Wilkinson, 2004: 537, note 18). Second, if we consider "saviour siblings" in the wider context of reasons for having children, it does not take too long to realize that "pure" motivations, i.e. wanting a child exclusively for her own sake may, in reality be quite elusive. Many children are "born with a mission" - to save a marriage, to provide an heir, to maintain the family name, to provide grand-parents with a grand-child, to

provide a sibling with a playmate, to complete a family, to save a country. It may therefore be argued that conceiving a child as a "saviour sibling" simply extends the circumstances in which children may be conceived, rather than being qualitatively different. Finally, it seems counter intuitive to suggest that parents who would contemplate undergoing IVF and tissue typing to conceive a child are likely to take an instrumental view of their children. Indeed, it seems more plausible to suggest that parents taking an instrumental view of their children are more likely to abandon their sick child to her fate and put their efforts into conceiving a healthy child.

The "slippery slope" argument suggests that a particular action will lead inexorably to something else that is either less desirable or even clearly wrong – so the first step should not be taken. If the conception of a "saviour siblings" is permitted, what is to stop the conception of "saviour sons", "saviour daughters", "saviour cousins", "saviour nieces", "saviour nephews", "saviour friends", "saviour next-door-neighbours", even "saviour strangers"? Where would the line be drawn – if at all – at the persons in whose favour the proposed donor child is conceived? If the conception of "saviour siblings" for the donation of cord blood stem cells is permitted, what is to stop donation ending there? If the conception of "saviour siblings" is permitted to ensure certain characteristics - in this case tissue compatibility - what is to prevent the conception of children on the basis of other "desirable" characteristics, such as eye colour, hair colour, IQ, personality, and sex? While it is currently not possible to design a composite "wish list" child, who is to say that the genuine "designer baby" could not be created by future technological development?

In response to these challenges, it may be countered that there is no inherent reason why permitting the conception of a "saviour sibling" should lead to any of the anticipated consequences (Indeed, libertarians would reject the idea that - at least some of - these consequences are necessarily ones to be avoided - see for example, Harris, 1998; Robertson, 2003). But assuming that these consequences should be resisted, it is self-evidently possible through regulation to devise criteria that permit selection for some purposes but not others – as occurs in the UK.

Consideration of the welfare of the child involves both the child's physical and psychological well-being. As regards physical safety, the available evidence discussed above suggests that there are no current indications of physical harm, at least in the short-term. While these initial indications are reassuring, follow-up studies are necessary to ensure that this continues to be the case in the longer-term. When we consider the psychological well-being of "saviour siblings", there is no empirical evidence at all, although there has been considerable speculation on both sides of the argument.

Opponents have questioned the accuracy of the testing procedure and wonder about the possible consequences of mis-diagnosis - as a result of which the intended "saviour sibling" is either affected by the genetic condition or is not a suitable tissue match after

all. Concerns have been expressed about possible parental attitudes towards the "saviour sibling" and the possibility that her welfare might be subordinated to that of the older child. Unease has also been expressed about the potential psychological consequences on a "saviour sibling'" finding out that she was wanted not for herself, but as a means to save the life of her sick sibling. Fears have also been expressed about the impact on the "saviour sibling's" relationships with other family members. If the donation is unsuccessful, she may be blamed for not fulfilling expectations, especially if the older sibling dies. Alternatively, there may be demands for her to donate bone marrow for a subsequent transplant (see, for example CORE, 2004).

Advocates have been no less speculative. The act of saving an "existing, loved child …… would only increase [the] specialness of the ['saviour sibling']" (Robertson, 2003: 468). Sheldon and Wilkinson (2004) consider that she might derive pleasure from knowing that she has saved her sibling's life and would benefit from the saved child's company. Even though the "saviour sibling" might derive no direct personal benefit from acting as a donor, any risk of harm to which she might be exposed needs to be balanced against the welfare of the existing child. There are suggestions that it is more appropriate to consider the welfare of the "saviour sibling", not in isolation, but within the context of the family on the grounds that her social, emotional and psychological interests depend on the welfare of the family in which she grows up. Therefore, saving the life of her sibling is in her best interests also as this will ensure a happier family, from which she will herself benefit (Savulescu, 1996). Sheldon and Wilkinson (2004: 536) suggest that the "saviour sibling" will benefit by not having grieving parents, and further hypothesize that the alternative to a successful "saviour sibling" is a child who is unable to act as a tissue donor: "imagine the psychological impact on [the latter child], born into a bereaved family and later to discover that she was a huge disappointment to her parents because of her inability to save [the sick child's] life".

Circumstances under which a "saviour sibling" may be conceived

There is no avoiding the fact that prohibiting the use of PGD and tissue typing to conceive a "saviour sibling" will result in the deaths of children who might otherwise have been saved. Nevertheless, if the consequences of the solution are "worse" than the original problem, then we should not implement it. It seems to me that, at present, the case for prohibiting the conception of "saviour siblings" is not sufficiently compelling to prevent us from at least trying to save the lives of these children where the conception of a "saviour sibling" might provide the chance to do so. Pennings and Liebars (2002) refer to the "post-natal test": if it is unacceptable to use an existing child in a particular way, then it is also unacceptable to conceive a child for the same purpose. However, if it acceptable to use an existing child as a sibling donor, then it is also acceptable to conceive a child to act as a donor for a sibling, so long as the future child's needs are considered. This seems to provide an acceptable philosophical basis for developing a policy on "saviour sibling".

In the UK, the conception of a "saviour sibling" using a "treatment service" as defined under the Human Fertilisation and Embryology Act 1990, must have regard to the requirement of S (13) 5 that:

"a woman shall not be provided with treatment services unless account has been taken of the welfare of any child who may be born as a result of the treatment (including the need of that child for a father), and of any other child who may be affected by the birth."

Uniquely among existing legislation that recognises the welfare of children involved in assisted conception, the 1990 Act specifically recognises the position of "of any other child". While British parliamentarians can hardly have had "saviour siblings" in mind when the legislation was passed, Section 13 (5) provides a clear opportunity to ensure that the welfare of existing children is taken into account when considering the conception of any child by means of "treatment services".

In the wake of the legal challenge to its original decision in the Hashmi case, the HFEA has made clear its approval in principle for tissue typing either in conjunction with PGD (to ensure that the embryo is both free of the tested condition and a potential tissue match) or on its own (to ensure only that that the embryo is a potential tissue match). However, all applications will continue to be considered on a case-by-case basis. At the same time, the HFEA has provided details of the conditions which must be met and the procedures it expects centres to undertake (HFEA 2004).

Self-evidently, the implications of conceiving "saviour siblings" will become apparent only over time. The HFEA recognises the importance of research evidence in providing this information, to the extent that families should be "strongly encouraged" to participate in follow-up studies, including long-term medical and psychosocial follow up of children born as a result (HFEA, 2004: 14.27/3; 14.27/4). Researchers and service providers must, however, respect families' rights to privacy and their desire to lead as normal a life as possible, and must avoid any suspicion that access to services is dependent on agreement to participate in longer-term research.

References

Belkin, L. (2001) "The Made-to-Order Savior", *The New York Times Magazine,* 1 July.
Björndahl, L. and Barratt, C. L. R. (2002) *Sex selection: A survey of laboratory methods and clinical results*.
http://www.hfea.gov.uk/AboutHFEA/Consultations/Appendix%20C%20-%20Scientific%20and%20Technical%20Literature%20Review.pdf
Bonduelle, M, Wennerholm, U-B, Loft, A, Tarlatzis, B C, Peters, C, Henriet, S, Mau, C, Victorin-Cederquist, A, Van Steirteghem, A, Balaska, A, Emberson, J R and Sutcliffe, A G (2005) 'A multi-centre cohort study of the physical health of 5-year-old children

conceived after intracytoplasmic sperm injection, in vitro fertilization and natural conception', *Human Reproduction* 20 (2) 413–19.

Campbell, A. (2004) Oral Evidence to the House of Commons Science and Technology Select Committee: Human Reproductive Technologies and the Law: 96. 13 October. In House of Commons Science and Technology Committee. *Human Reproductive Technologies and the Law. Fifth Report of Session 2004–05. Vol II: Oral and Written Evidence*.
http://www.publications.parliament.uk/pa/cm200405/cmselect/cmsctech/7/7ii.pdf

Comment on Reproductive Ethics [CORE] (2004) *HFEA designer baby decision unethical, unnecessary and undemocratic*. 26 July
http://www.corethics.org/document.asp?id=f260704.txt&se=3&st=4

Handyside, A.H. Pattinson, J. K., Penketh, R. J., Delhanty, J.D., Winston, R. M., and Tuddenham, E. G. (1989) Biopsy of human preimplantation embryos and sexing by DNA amplification. *Lancet*, 1 (8634) 347-349.

Handyside, A. H., Kontogianni, E H., Hardy, K., and Winston, R. M. (1990) Pregnancies from biopsied human preimplantarion embryos sexed by Y-specific DNA amplification. *Nature*, 344 (6268) 768-770.

Harris, J. (1998) 'Rights and reproductive choice', in Harris, J. and Holm, S. (eds) (1998) *The Future of Human Reproduction: Ethics, Choice and Regulation.* Oxford: Oxford University Press: 5-37.

Human Fertilisation and Embryology Authority (2004) *Preimplantation Testing for Histocompatibility (Tissue Typing)*. London: Human Fertilisation and Embryology Authority.

Lavery, S. (2004) Preimplantation genetic diagnosis and the welfare of the child. *Human Fertility*, 7 (4) 295-300.

McBride G. (1990) Keeping bone marrow donation in the family. *British Medical Journal*; 300 1224–5.

Pennings, G. and Liebaers, I. (2002) Creating a child to save another: HLA matching of siblings by means of pre-implantation genetic diagnosis. In Shenfield, F. and Sureau, C. (eds) *Ethical Dilemmas in Reproduction*. London: Parthenon: 5-65.

Pennings, G., Schots, R. and Liebaers, I. (2002) Ethical considerations on preimplantation genetic diagnosis for HLA typing to match a future child as a donor of haematopoietic stem cells to a sibling. *Human Reproduction*, 17 3 534-538.

Quintavalle v. Human Fertilisation and Embryology Authority [2005] UKHL 28.
http://www.parliament.the-stationery-office.co.uk/pa/ld200405/ldjudgmt/jd050428/quint-1.htm

Robertson, J. A. (2003) Extending preimplantation genetic diagnosis: the ethical debate: Ethical issues in new uses of preimplantation genetic diagnosis. *Human Reproduction*. 18 3 465-471.

Savulescu, J. (1996) Substantial harm but substantial benefits. *British Medical Journal*, 312 241-242.
Sheldon, S. and Wilkinson, S. (2004) Should selecting saviour siblings be banned? *Journal of Medical Ethics* 30 533-537.
Shenfield, F., Pennings, G., Devroey, P., Sureau, C., Tarlatzis, B., Cohen, J. (2003) The ESHRE Ethics Task Force. Taskforce 5: Preimplantation genetic diagnosis. *Human Reproduction*, 18 (3) 649-651.

Soussis, I., Harper, J. C., Handyside, A. H., and Winston, R. M. L. (1996) Obstetric outcome of pregnancies resulting from embryos biopsied for preimplantation diagnosis of inherited disease. *British Journal of Obstetrics and Gynaecology* 103 784-788.

Spriggs, M. and Savulescu, J. (2002) Saviour siblings. *Journal of Medical Ethics* 28 (5) 289.
Verlinsky, Y., Rechitsky, S., Sharapova, T., Morris, R., Taranissi, M. and Kuliev, A. (2004a) Preimplantation HLA Testing. *Journal of the American Medical Association* 291 2079-2085.
Verlinsky. Y., Cohen, J., Munne, S., Gianaroli, L., Leigh Simpson, J., Ferraretti, A. P. and Kuliev, A. (2004b) Over a decade of preimplantation genetic diagnosis experience - a multicenter report. *Fertility and Sterility* 82 (2) 292-294.

Eric Blyth is Professor of Social Work at the University of Huddersfield. He is a founder member of BICA and is a former editor of the *Journal of Fertility Counselling*.

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