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Sex selection and preimplantation genetic diagnosis

The Ethics Committee of the American Society of Reproductive Medicine

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In 1994, the Ethics Committee of the American Society of Reproductive Medicine concluded, although not unanimously, that whereas preimplantation sex selection is appropriate to avoid the birth of children with genetic disorders, it is not acceptable when used solely for nonmedical reasons. Since 1994, the further development of less burdensome and invasive medical technologies for sex selection suggests a need to revisit the complex ethical questions involved.

BACKGROUND

Interest in sex selection has a long history dating to ancient cultures. Methods have varied from special modes and timing of coitus to the practice of infanticide. Only recently have medical technologies made it possible to attempt sex selection of children before their conception or birth. For example, screening for carriers of X-linked genetic diseases allows potential parents not only to decide whether to have children but also to select the sex of their offspring before pregnancy or before birth.

Among the methods now available for prepregnancy and prebirth sex selection are [1] prefertilization separation of X-bearing from Y-bearing spermatozoa (through a technique that is now available although still investigational for humans), with subsequent selection for artificial insemination or for IVF; [2] preimplantation genetic diagnosis (PGD), followed by the sex selection of embryos for transfer; and [3] prenatal genetic diagnosis, followed by sex-selective abortion. The primary focus of this document is on the second method, sex selection through PGD, although the issues particular to this method overlap with the issues relevant to the others. Preimplantation genetic diagnosis is used with assisted reproductive technologies such as IVF to identify genetic disorders, but it also can provide information regarding the sex of embryos either as a by-product of testing for genetic disorders or when it is done purely for sex selection (Table 1).

As the methods of sex selection have varied throughout history, so have the motivations for it. Among the most prominent of motivations historically have been simple desires to bear and raise children of the culturally preferred gender, to ensure the economic usefulness of offspring within a family, to achieve gender balance among children in a given family, and to determine a gendered birth order. New technologies also have served these aims, but they have raised to prominence the goal of avoiding the birth of children with sex-related genetic disorders.

Whatever its methods or its reasons, sex selection has encountered significant ethical objections throughout its history. Religious traditions and societies in general have responded with concerns varying from moral outrage at infanticide to moral reservations regarding the use of some prebirth methods of diagnosis for the sole purpose of sex selection. More recently, concerns have focused on the dangers of gender discrimination and the perpetuation of gender oppression in contemporary societies.

This document's focus on PGD for sex selection is prompted by the increasing attractiveness of prepregnancy sex selection over prenatal diagnosis and sex-selective abortion, and by the current limited availability of methods of prefertilization sex selection techniques that are both reliable and safe. Although the actual use of PGD for sex selection is still

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TABLE 1

Embryo sex identification by preimplantation genetic diagnosis for nonmedical reasons.

(a) Patient is undergoing IVF and PGD.	Patient learns sex identification of embryo as *part of*, or as *a by-product of*, PGD done for other medical reasons.
(b) Patient is undergoing IVF and PGD.	Patient requests that sex identification be *added to* PGD being done for other medical reasons.
(c) Patient is undergoing IVF, but PGD is not necessary to treatment.	Patient *requests PGD* solely for the purpose of sex identification.
(d) Patient is not undergoing either IVF or PGD (for the treatment of infertility or any other medical reason).	Patient *requests IVF and PGD* solely for the purpose of sex identification.

infrequent, its potential use continues to raise important ethical questions.

Central to the controversies over the use of PGD for sex selection, particularly for nonmedical reasons, are issues of gender discrimination, the appropriateness of expanding control over nonessential characteristics of offspring, and the relative importance of sex selection when weighed against medical and financial burdens to parents and against multiple demands for limited medical resources. In western societies, these concerns inevitably encounter what has become a strong presumption in favor of reproductive choice.

THE GENERAL ETHICAL DEBATE

Arguments for PGD and sex selection make two primary appeals. The first is to the right to reproductive choice on the part of the person or persons who seek to bear a child. Sex selection, it is argued, is a logical extension of this right. The second is an appeal to the important goods to be achieved through this technique and the choices it allows—above all, the medical good of preventing the transmission of sex-linked genetic disorders such as hemophilia A and B, Lesch-Nyhan syndrome, Duchenne-Becker muscular dystrophy, and Hunter syndrome. There also are perceived individual and social goods such as gender balance or distribution in a family with more than one child, parental companionship with a child of one's own gender, and a preferred gender order among one's children. More remotely, it sometimes is argued that PGD and sex selection of embryos for transfer is a lesser evil (medically and ethically) than the alternative of prenatal diagnosis and sex-selected abortion, and even that PGD and sex selection can contribute indirectly to population limitation (i.e., with this technique, parents no longer are compelled to continue to reproduce until they achieve a child of the preferred gender).

Arguments against PGD used for sex selection appeal either to what is considered inherently wrong with sex selection or to the bad consequences that are likely to outweigh the good consequences of its use. Suspicion of sex selection as wrong is lodged in the concerns identified earlier: the potential for inherent gender discrimination, inappropriate control over nonessential characteristics of children, unnecessary medical burdens and costs for parents, and inappropriate and potentially unfair use of limited medical resources for sex selection rather than for more genuine and urgent medical needs. These concerns are closely connected with predictions of negative consequences, such as risk of psychological harm to sex-selected offspring (i.e., by placing on them too high expectations), increased marital conflict over sex-selective decisions, and reinforcement of gender bias in society as a whole. Sometimes the predictions reach to dire consequences such as an overall change in the human sex ratio detrimental to the future of a particular society.

PREIMPLANTATION GENETIC DIAGNOSIS AND SEX SELECTION: JOINING THE PARTICULAR ISSUES

The right to reproductive freedom has never been considered an absolute right, certainly not if it is extended to include every sort of decision about reproduction or every demand for positive support in individuals' reproductive decisions. Still, serious reasons (e.g., the likelihood of seriously harmful consequences or the presence of a competing stronger right) must be provided if a limitation on reproductive freedom is to be justified. Hence, the weighing of opposing positions regarding PGD and sex selection depends on an assessment of the strength of the reasons given for and against it.

Preimplantation genetic diagnosis has the potential for serving sex selection in varying categories of cases, each of which raises different medical and ethical questions. Preimplantation genetic diagnosis may be done for disease prevention, or it may be done for any of the other motivations individuals have for determining the sex of their offspring. Moreover, information about the sex of an embryo may be obtained (a) as an essential part of or by-product of PGD performed for other (medical) reasons or (b) through a test for sex identification that is added to PGD performed for medical reasons. Further, (c) a patient who is undergoing IVF procedures as part of fertility treatment (but whose treatment does not require PGD for medical reasons) may request PGD solely for the purpose of sex selection, and (d) a patient who is fertile (hence, not undergoing IVF as part of treatment) may request IVF and PGD, both solely for the purpose of sex selection. Each of these situations calls for a distinct medical and ethical assessment (Table 1).

There presently is little debate over the ethical validity of PGD for sex selection when its aim is to prevent the transmission of sex-linked genetic disease. In this case, sex selection does not prefer one sex over the other for its own supposed value; it does not, therefore, have the potential to

contribute as such to gender bias. And when the genetic disorder is severe, efforts to prevent it can hardly be placed in a category of trivializing or instrumentalizing human reproduction. Moreover, prepregnancy sex-selective techniques used for this purpose appear to have a clear claim on limited resources along with other medical procedures that are performed with the goal of eliminating disease and suffering.

It is less easy to eliminate concerns regarding PGD and sex selection when it is aimed at serving social and psychological goals not related to the prevention of disease. It must be recognized, of course, that individuals and couples have wide discretion and liberty in making reproductive choices, even if others object. Yet ethical arguments against sex selection appear to gain strength as the categories of potential cases descend from (a) to (d). For example, desires for family gender balance or birth order, companionship, family economic welfare, and the ready acceptance of offspring who are more "wanted" because their gender is selected may not in every case deserve the charge of unjustified gender bias, but they are vulnerable to it.

Whatever they may mean for an individual or family choice, they also, if fulfilled on a large scale through PGD for sex selection, may contribute to a society's gender stereotyping and overall gender discrimination. On the other hand, if they are expressed and fulfilled only on a small scale and sporadically (as is presently the case), their social implications will be correspondingly limited. Still, they remain vulnerable to the judgment that no matter what their basis, they identify gender as a reason to value one person over another, and they support socially constructed stereotypes of what gender means. In doing so, they not only reinforce possibilities of unfair discrimination, but they may trivialize human reproduction by making it depend on the selection of nonessential features of offspring.

Desired potential social benefits of sex selection also may appear insufficiently significant when weighed against unnecessary bodily burdens and risks for women, and when contrasted with other needs for and claims on medical resources. In particular, many would judge it unreasonable for individuals who do not otherwise need IVF (for the treatment of infertility or prevention of genetic disease) to undertake its burdens and expense solely to select the gender of their offspring. Although individuals may be free to accept such burdens, and although costs may be borne in a way that does not directly violate the rights of others, to encourage PGD for sex selection when it is not medically indicated presents ethical problems.

More remote sorts of consequences of PGD and sex selection, both good and bad, remain too speculative to place seriously in the balance of ethical assessments of the techniques. That is, potential good consequences such as population control, and potential bad consequences such as imbalance in a society's sex ratio, seem too uncertain in their prediction to be determinative of the issues of sex selection. Even if, for example, the current rise in sex selection of offspring in a few countries suggests a correlation between the availability of sex selection methods and the concrete expression of son-preference, there can be no easy transfer of these data to other societies. This does not mean, however, that all concerns for the general social consequences of sex selection techniques regarding general gender discrimination can be dismissed.

The United States is not likely to connect sex selection practices with severe needs to limit population (as may be the case in other countries). Moreover, gender discrimination is not as deeply intertwined with economic structures in the United States as it may be elsewhere. Nonetheless, ongoing problems with the status of women in the United States make it necessary to take account of concerns for the impact of sex selection on goals of gender equality.

Moreover, the issue of controlling offspring characteristics that are perceived as nonessential cannot be summarily dismissed. Those who argue that offering parental choices of sex selection is taking a major step toward "designing" offspring present concerns that are not unreasonable in a highly technologic culture. Yet it appears precipitous to assume that the possibility of gender choices will lead to a feared radical transformation of the meaning of human reproduction. A "slippery slope" argument seems overdrawn when it is used here. The desire to have some control over the gender of offspring is older than the new technologies that make this possible. This, however, suggests that should otherwise permissible technologies for sex selection be actively promoted for nonmedical reasons—as in (b), (c), and (d) above—their threat to widely valued meanings of human reproduction may call for more serious concern than other speculative and remote negative consequences of PGD and sex selection.

Objections to PGD and sex selection on the grounds of misallocation of resources are more difficult to sustain. Questions of this sort are not so obviously relevant to systems of medical care like the one in the United States. If an individual is able and willing to pay for desired (and medically reasonable) services, there is no direct, easy way to show how any particular set of choices takes away from the right of others to basic care. Yet even here, individual and group decisions do have an impact on the overall deployment of resources for medical care and on the availability of reproductive services.

Although, as already noted, there is little controversy about the seriousness of the need to prevent genetic diseases, it is doubtful that gender preference on the basis of other social and psychological desires should be given as high a priority. The distinction between medical needs and nonmedical desires is particularly relevant if PGD is done solely for sex selection based on nonmedical preferences. The greater the demand on medical resources to achieve PGD for

no other reason than sex selection, as in descending order in (b) through (d) above, the more questions surround it regarding its appropriateness for medical practice. If, on the other hand, PGD is done as part of infertility treatment, and the information that allows sex selection is not gained through the additional use of medical resources, it presumably is free of more serious problems of fairness in the allocation of scarce resources and appropriateness to the practice of medicine.

The ethical issues that have emerged in this document's concern for PGD and sex selection are in some ways particular to the uses and consequences of a specific reproductive technology. Their general significance is broader than this, however. For example, the concerns raised here provide at least a framework for an ethical assessment of new techniques for selecting X-bearing or Y-bearing sperm for IUI or IVF (ongoing clinical trial reports of which appeared while this document was being developed). Here, too, sex selection for the purposes of preventing the transmission of genetic diseases does not appear to present ethical problems. However, here also, sex selection for nonmedical reasons, especially if facilitated on a large scale, has the potential to reinforce gender bias in a society, and it may constitute inappropriate use and allocation of medical resources. Finally, although sperm sorting and IUI can entail less burden for parents, questions of the risk to offspring from techniques that involve staining and the use of a laser on sperm DNA remain under investigation.

RECOMMENDATIONS

Of the arguments in favor of PGD and sex selection, only the one based on the prevention of transmittable genetic diseases is strong enough to clearly avoid or override concerns regarding gender equality, acceptance of offspring for themselves and not their inessential characteristics, health risks and burdens for individuals attempting to achieve pregnancy, and equitable use and distribution of medical resources. These concerns remain for PGD and sex selection when it is used to fulfill nonmedical preferences or social and psychological needs. However, because it is not clear in every case that the use of PGD and sex selection for nonmedical reasons entails certainly grave wrongs or sufficiently predictable grave negative consequences, the Committee does not favor its legal prohibition. Nonetheless, the cumulative weight of the arguments against nonmedically motivated sex selection gives cause for serious ethical caution. The Committee's recommendations therefore follow from an effort to respect and to weigh ethical concerns that are sometimes in conflict—namely, the right to reproductive freedom, genuine medical needs and goals, gender equality, and justice in the distribution of medical resources. On the basis of its foregoing ethical analysis, the Committee recommends the following:

1. Preimplantation genetic diagnosis used for sex selection to prevent the transmission of serious genetic disease is ethically acceptable. It is not inherently gender biased, bears little risk of consequences detrimental to individuals or to society, and represents a use of medical resources for reasons of human health.
2. In patients undergoing IVF, PGD used for sex selection for nonmedical reasons—as in (a) through (c) above—holds some risk of gender bias, harm to individuals and society, and inappropriateness in the use and allocation of limited medical resources. Although these risks are lower when sex identification is already part of a by-product of PGD being done for medical reasons (a), they increase when sex identification is added to PGD solely for purposes of sex selection (b) and when PGD is itself initiated solely for sex selection (c). They remain a concern whenever sex selection is done for nonmedical reasons. Such use of PGD therefore should not be encouraged.
3. The initiation of IVF with PGD solely for sex selection (d) holds even greater risk of unwarranted gender bias, social harm, and the diversion of medical resources from genuine medical need. It therefore should be discouraged.
4. Ethical caution regarding PGD for sex selection calls for study of the consequences of this practice. Such study should include cross-cultural as well as intracultural patterns, ongoing assessment of competing claims for medical resources, and reasonable efforts to discern changes in the level of social responsibility and respect for future generations.