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Contraception and Abortifacients

Eugene F. Diamond, M.D.

The crucial context for the discussion of abortion involves questions of life and death. Notwithstanding tangential issues of population, public health problems, felonious intercourse, the woman's right to privacy, etc.; it is obvious that the abortion lobby has worked very hard to separate the idea of abortion from the socially abhorrent idea of killing. As has been pointed out in a recent editorial in *California Medicine*¹, "The result has been a curious avoidance of the scientific fact, which everyone really knows, that human life begins at conception and is continuous whether in-

tra or extra uterine until death. The very considerable semantic gymnastics which are required to rationalize abortion as anything but taking a human life would be ludicrous if they were not often put forth under socially impeccable auspices".

Similar to this attempt to separate abortion and killing, is the attempt to dissociate abortion from those contraceptive methods such as oral progestins and intrauterine devices whose effects are abortifacient in that their action occurs after conception by interference with implantation in

the uterine wall. Arguments which have been advanced are those which suggest that the definition of "conception" should be extended to include those stages of intra-oviductal development which precede the development of the blastocyst. Some have suggested that life should be redefined as beginning with implantation. The basis for this new definition would be the observations regarding twinning and "recombination" of zygotes. It is well known that the fertilized ovum can divide, during its early developmental stages into identical parts which become identical twins. Since identical twins have identical genotypes, the original zygote can still be said to be determinative and complete.

The allegation that twins or triplets might combine into one individual, is a less familiar and more complex matter which requires some background and explanation.

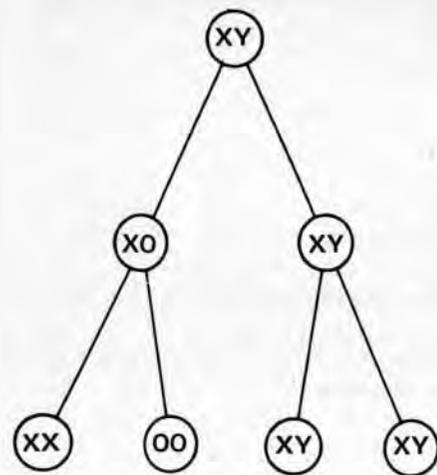
In pioneering work by Tarkowski in 1961² it is shown that it was possible to fuse mouse embryos at the eight cell stage into a single blastocyst by a series of techniques. These were 1) mechanical removal of the zona pellucida by a micropipette; 2) squeezing the two divided eggs together in a microdrop immersed under liquid paraffin, and 3) culturing of such pairs of eggs in a special enriched bicarbonate solution. This method was modified by Mintz³ to allow for the removal of the protective envelope of the zona pellucida by enzymatic means (using pronase) rather than the mechanical method. In addition, Mintz

showed that the squeezing of the eggs in a microdrop was not necessary on condition that the manipulations are carried out at 37°C rather than room temperature. It was also shown by Mintz that eggs could be fused through the whole period of cleavage through the stage of the late morula. It has been suggested that spontaneous fusion of eggs *in vivo* could occur accounting for some types of mosaicism⁴. Though it has been observed⁵ that experimentally denuded eggs do occasionally fuse *in vivo*, it must be pointed out that there is no evidence that spontaneous denudation of eggs during cleavage does occur in any mammalian species. As Tarkowski points out⁶, it would be difficult to imagine an adequate mechanism which could account for the simultaneous loss of the zona pellucida of each of two contiguously located fertilized eggs under the required conditions of stage of cleavage and ideal environment.

Some authors⁷ have, however, contended that the existence of certain types of sex chromosome mosaicism in lower animals and in human beings offers substantial evidence of spontaneous "recombination" of cleaving fertilized ova. Cited as evidence in human studies is the prototype case of the XX/XY mosaic with red blood cell chimerism^{8,9}. This type of mosaicism has been recognized for almost a decade and has been the subject of considerable speculation and perplexity.

Most sex-chromosome mosaics are thought to result from mitotic

errors during early embryogenesis such as chromatid non-disjunction or loss. The XX/XY type of mosaic is very difficult to explain in this way. It would theoretically be possible through chromatid loss in an XY zygote resulting in an XO/XY embryo. The XO cell would then undergo a duplication of the X chromosome with loss of the complementary OO cell as follows in an oversimplified diagram.



Such duplications are, however, not known to occur in man. This has led to the development of alternative theoretical mechanism whereby the XX/XY type of mosaicism might be explained. These explanations have sought to explain the existence of genetically balanced cells with the

genetic equivalent of two zygotes. A very apt title for this condition, coined by Chown is "geminism", i.e. twins in one capsule.

Mechanisms proposed for human geminism in the literature have been as follows: 1) Fertilization of an egg with two nuclei by two sperm. 2) Fertilization of the ovum and a retained polar body.* 3) Fertilization of two mitotic products of a single ovum. 4) The phenomenon of "mediate cleavage" whereby the first meiotic division results in two equally sized cells (rather than a large oocyte and a small polar body) both of which may be fertilized. 5) Fertilization of two ova by two sperm followed by cell fusion. Six instances of human geminism have been reported in the literature. Although the precise mechanism involved in these reported instances is, in each instance, obscure, the authors have speculated as to the most likely mechanism favored by their findings. Their conclusions are summarized as follows:

- 1) Gartler, et al. Am. J. Human Genetics, 15:62, 1965. Two sperm, two identical oval nuclei, probably mitotic products of a post-meiotic nucleus.
- 2) Grouchy, et al. J. Clin. Endocrinology, 25:114, 1965. Two sperm, one binucleate ovum.

3) Corey, et al. Am. J. Human Genetics, 19:378, 1967. Two sperm, two identical oval nuclei.

4) Myhre, et al. Transfusion, 5:501, 1965. Two sperm, two identical oval nuclei.

5) Zuelzer, et al. Am. J. Human Genetics, 16:38, 1964. Two sperm, ovum and retained polar body.

6) Lejeune, et al. Ann. Genet., 10:188, 1967. 2 sperm, ovum and retained polar body.

As can be noted, all of the authors favored explanations number 1, 2, or 3 (above) and none favored the explanation of "recombination" or fusion of two separate zygotes (formed by the fertilization of two distinct ova by two dissimilar spermatozoa).

The inference to be drawn from these reported cases is that, while recombination remains a legitimate speculation, it is by no means confirmed nor even strongly supported by the demonstration of the existence of XX-XY types of chimeras.

Even if recombination is accepted as an established fact, it is difficult to see the relevance of this fact of twinning to the issue of the beginning of life. Surely the fer-

tilized ovum is no less human or no less alive *before* twinning or recombination than it is obviously alive and human *after* either of these phenomena. The only difficulty, it would seem, arises from the question as to how these phenomena relate to ensoulment. If there is a discrimination to be made between the "animated" and "non-animated" embryo as regards the right to protection against death from abortion, some problems appear. If ensoulment is envisaged as occurring at conception in a manner somewhat like a ghost coming to take possession of a haunted house, then some sticky arithmetical situations develop. Was there one soul which multiplied with twinning or two souls which combined with fusion of fertilized ova? Such equations are insoluble if one attempts to reconcile certain types of theological speculation with biological observations. If the term "soul" is accepted in the sense of a vital principle which exists in all living persons, the above numerical problems are most likely irrelevant. Where human life exists, a soul exists with all the attributes of a human soul including a supernatural destiny. Where human life exists, certain inalienable rights accrue including the right to life. Human life is no less present in the zygote than the blastocyst, given current biological insights. The distinction between the zygote and the blastocyst does not relate to the current movement to change abortion laws since implantation has obviously occurred before the woman is aware of pregnancy and, therefore, before the abortion decision arises. This distinction is

*The polar body is a minute cell produced and usually discarded during the development of an oocyte. It contains

one of the nuclei derived from the first or second division of meiosis but has practically no cytoplasm.

clearly germane, as previously mentioned, to the pill (including the "morning after" pill) and the intrauterine device.

Agonizing inconsistencies do arise among the various people of good will involved in the abortion discussion. Can we reject abortion and embrace abortifacient contraception? Can we develop a pro-life program which implicitly excludes new life? We certainly do not wish to make an endorsement of *Humane Vitae* a prerequisite for membership on the anti-abortion team even if we recognize that no one ever arrived at a pro-abortion position except by way of a contraceptive mentality. The weight of present information however would seem to preclude any "anti-abortion pro-contraception" position not structured around an underlying acceptance of the notion that life begins at conception.

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