Encyclopedia of Reproductive Technologies

Edited by

Annette Burfoot
Fertilization typically takes place high in the fallopian tube, near the point where the ovum enters the tube after leaving the ruptured follicle. From this point, passage down to the uterus usually takes two or three days. It now seems that lower points are less optimal for fertilization either because the chances for implantation in the wall of the uterus are decreased as the time of passage to the uterus is shortened or because unknown factors reduce the chances of fertilization in the lower tubal regions.

Female infertility often is the result of scarring of the fallopian tubes subsequent to infection by a sexually transmitted disease. In such cases it is not possible for the ovum to pass down the tube or for sperm to reach it. Fallopian tubes can sometimes be repaired so as to reopen them, permitting normal fertilization to occur. However, because such surgical procedures often involve removal of the scarred section and reconnection of the open ends of the fallopian tube, there may be insufficient tube for reconnection or the tube may be so shortened that it is more difficult for the ovum to pass from the ovary into the tube. Sometimes the upper portions of fallopian tubes are missing due to malformation or surgical removal as a part of treatment for cancer or other diseases.

**History and Procedure**

In vitro fertilization (IVF) was developed to circumvent persistent tubal blockage. The procedure’s complexity and expense prompted researchers...
to seek other ways to assist conception. In May 1982, the British journal *Lancet* reported the first pregnancy resulting from inserting ova and sperm through the cervix directly into the uterus. This was followed by another new fertility procedure, announced in 1983: low tubal ovum transfer, or LTOT. Simply put, it involved a laparoscopy on the woman immediately prior to predicted ovulation to retrieve one or more ova (eggs), the relocation of the ova so as to circumvent the area of tubal damage, and then intercourse with the ova in place in the lower portion of the tube in the hopes that fertilization would take place.

To Catholic moralists, LTOT had several advantages over IVF. It did not involve a decision whether to implant or discard the embryo; in fact, the embryo was not manipulated at all. Fertilization would take place in vivo in the normal manner rather than artificially in vitro, and masturbation to obtain sperm was not involved. This procedure appeared to most Catholic commentators to be morally permissible, analogous to a diabetic person's daily dose of insulin that bypasses the defective insulin-producing gland. Practically, however, LTOT did not work; no pregnancies resulted when LTOT was employed in sixty-five cycles of forty women over twenty-three months despite the earlier optimism generated by results in studies with monkeys. A different procedure, tubal ovum transfer (TOT), soon replaced LTOT.

In TOT, the ovum was placed as high as possible in the tube. Such placement restricted its application to women whose fallopian tubes were not damaged. Ova were taken from the woman's body, and the sperm were collected during intercourse by means of a perforated sheath. Sperm and ova were then combined and inserted into the upper region of the tube. The acronym was later changed to TOTS (tubal ovum transfer with sperm) to reflect the differences in treatment of sperm between LTOT and the new technique.

During the time between the inauguration of LTOT and TOT, Ricardo Asch and associates introduced a technique similar to TOT/TOTS, which they gave the acronym GIFT (for gamete intrafallopian transfer). With GIFT, semen was obtained from the husband through masturbation two hours before laparoscopy and removal of ova, ova were incubated to permit some additional maturation, and sperm and ova were placed in a catheter separated by air to prevent in vitro fertilization. The catheter tip was inserted into each fallopian tube and a mixture of ova and sperm was delivered into each. A twin pregnancy resulted the first time the procedure was used. Variations on the technique, involving frozen or donated sperm or the use of laser repair of tubal blockage and GIFT in a single procedure, were subsequently developed.

GIFT and TOTS require at least one healthy fallopian tube. IVF, where fertilization occurs in vitro, does not. With GIFT and TOTS, some of the
elements of normal conception occur; the manipulations are to assist sperm and ova to reach the right place together. Sperm are collected in a manner compatible with some sperm reaching the ovum naturally; because there is at least one healthy tube, ova are manipulated in a manner compatible with an ovum reaching the tube naturally. Hence, as no barriers exist to natural conception provided the means of collecting ova and sperm are approved, some forms of GIFT and TOTS appear to be consistent with Catholic doctrine. However, as GIFT often involves sperm obtained through masturbation rather than in intercourse, its practice often is at odds with such doctrine.

Complications
GIFT and the associated alternatives have a number of possible complications. One recent study of 1,000 pregnancies achieved chiefly through IVF and GIFT reports that 1 of every 100 pregnancies involves multiple-sited or heterotopic pregnancies—that is, concomitant pregnancies either within the uterus or in the fallopian tubes or the abdominal cavity (also called ectopic pregnancies). Pregnancies outside the uterus almost never develop to term and almost always pose grave risks to the mother. Presumably, the process of injecting ova and sperm into the upper reaches of the fallopian tubes either washes them back into the abdominal cavity or delays their normal passage into the uterus sufficiently that the stage of implantation is reached in the tube; also, sperm may bypass the transferred ova and encounter an ovum just at the point of, or just after, follicular release. The technique often involves insertion of multiple ova with sperm into each fallopian tube (if both are intact). That multiplicity, together with the likelihood of additional ova ripening under the influence of luteinizing hormone surges both at the time of, and after, retrieval of ova, can result in multiple concomitant intrauterine pregnancies.

GIFT is a strictly physical manipulation; it can be employed with ova and sperm from any source and so can be used both as a form of artificial insemination from a donor and as a form of ovum donation. Indeed, the acronym GIFT is suggestive of gamete donation. Donor gametes provide a special problem for Catholic and some non-Catholic moralists in that the child is denied a perceived right to be conceived and brought into the world within the institution of marriage.

Because GIFT does not require extracorporeal incubation, it is substantially cheaper than IVF, but it does involve drug therapy (to stimulate multiple ovarian follicles) and laparoscopic (and possible other) surgery to obtain the ova and sometimes to repair the fallopian tubes. In one 1987 survey, success was obtained on average in 29 percent of cases (ranging from 10 to 56 percent depending on the type of infertility) at an average
cost of $3,500. Those studying the likely directions of cost containment in health care see high-technology infertility services at risk of exclusion from both national and private insurance coverage because they are generally limited to otherwise healthy individuals not experiencing life-threatening illness. Thus such services are likely to remain, as they are generally now, available only to those who can afford them.

Couples seeking high-technology infertility services have often invested years of effort and expense to achieve pregnancy. As fertility services offer greater technological intervention in pursuit of the couple’s goal, many couples report increasing anxiety, obsessive preoccupation, and disruption of other activities and responsibilities. That technology offers such a low probability of success at such a high personal and financial price raises deep questions about the rationality of the pursuit of such technological fixes, confounding our understanding of the protective role of the traditional requirement of informed consent. Finally, as infertile couples have traditionally been the chief pool of likely adoptive parents and as the world already holds a vast number of orphans and abandoned and unwanted children, the need to transform infertile couples into parents by reproductive technology raises important social questions about the prioritization of genetic lineage.

**FOR FURTHER READING**


