Gamete intrafallopian transfer: A preliminary experience


ABSTRACT

Background. After in vitro fertilization and embryo transfer for tubal infertility, gamete intrafallopian transfer has been introduced for patients with non-tubal infertility. However, the gametes need to be transferred in 2 to 5 minutes and the distance between the operating theatre and tissue culture laboratory delayed its introduction at our hospital.

Methods and Patients. To overcome this problem we designed a box in which gametes could be stored. Using gametes taken from this box and employing the standard technique, we achieved 5 pregnancies in 39 infertile women.

Results. From 41 treatment cycles, 39 women underwent oocyte retrieval. Five pregnancies were achieved of which 4 delivered live births at full term and 1 ended in abortion. Our first gamete intrafallopian transfer baby was born on 6 January 1988.

Conclusion. The gamete intrafallopian transfer technique can be successfully adapted for India.

INTRODUCTION

In vitro fertilization and embryo transfer (IVF-ET) was originally designed to treat infertility in patients who had severely damaged, blocked or absent fallopian tubes. It was later extended to treat infertility caused by a large number of aetiological factors including anatomically patent fallopian tubes.

Gamete intrafallopian transfer (GIFT) was introduced as a method to treat non-tubal infertility. This procedure involves the laparoscopic aspiration of oocytes and their insertion into the fallopian tube along with washed sperms. The technique has been widely used to treat infertility caused by impaired tubal sperm transport, poor sperm fertilizing ability, failure of ovum release or failure of ovum pick-up by the fimbria. Other indications for GIFT include unexplained infertility, male, cervical and immunological factors, and endometriosis.

Infertility is one of the major problems among patients attending the gynaecology clinics at most of our public hospitals. However, most of these hospitals do not practise medically assisted reproductive technologies. We had successfully introduced an IVF-ET programme which led to the birth of the first IVF baby in India on 6 August 1986. Despite achieving several pregnancies by IVF-ET, the introduction of GIFT into our therapeutic repertoire has been delayed because of the considerable distance between the operating theatre and the tissue culture laboratory. To overcome these constraints, especially the absence of a second CO₂ incubator in the operating theatre, we designed an insulated and heated box to store the retrieved oocytes along with the washed spermatzoa brought from the culture room until the time of gamete transfer.

This study reports our experience with the GIFT procedure using the makeshift CO₂ incubator. India's first GIFT baby was born in this hospital on 6 January 1988.

MATERIAL AND METHODS

Patients

Between January 1987 and March 1990, 41 cycles in 39 infertile women between 22 and 40 years of age were subjected to GIFT (2 women underwent GIFT twice). The primary indications for the GIFT procedures were unexplained infertility (n=27) diagnosed according to the criteria described by Wallach and Moghissi, i.e. a couple that has failed to establish a pregnancy despite an evaluation uncovering no obvious reasons for infertility or after correction of the factor or factors identified as probably responsible for infertility; stages II and III endometriosis; failed cases of artificial insemination of donor (AID) in whom the male factor was responsible for infertility and AID had been carried out for at least 1 year prior to GIFT; and failed cases of artificial insemination of donor (AID) in whom the male factor was responsible for infertility and AID had been carried out for at least 1 year prior to GIFT.

The women were subjected to a pre-treatment diagnostic laparoscopy to assess tubal patency and the male partner's semen samples were evaluated microscopically according to the WHO recommendations.

Follicular stimulation and monitoring

Multiple follicle development in these women was accomplished by the sequential administration of a combination of clomiphene citrate (CC) and human menopausal gonadotropin (hMG, Perganol Serono...
In 38 of the 41 cycles, ovarian stimulation was individualized depending upon the length of the menstrual cycles (individualized protocol, IP\textsuperscript{16}) and in the remaining 3, the menstrual cycles were programmed by treating the women with oral contraceptives (programmed protocol, PP\textsuperscript{18}). The ovarian response was monitored by estimating oestradiol levels by radioimmunoassay in daily blood samples as well as by measuring follicular growth by ultrasonography.\textsuperscript{17}

**Semen preparation**

Semen samples from the husband or donor were obtained 2 hours before subjecting the patient to laparoscopic oocyte retrieval and GIFT. Washed sperms were prepared as described.\textsuperscript{17}

**Laparoscopic oocyte harvesting**

Oocyte recovery was carried out approximately 34 hours after hCG injection.\textsuperscript{17} All follicles measuring more than 12 mm in diameter were aspirated, the follicular fluid screened under the optical microscope in the operating theatre and the oocytes graded according to their appearance, the corona and the cumulus cells.\textsuperscript{18} Mature oocytes, as evidenced by a dispersed cumulus and an expanded corona or presence of the first polar body, were selected for transfer. The oocytes were kept in Ham's F-10 medium containing 50% heat inactivated foetal cord serum in the box (described below) until the gametes were transferred.

At our institution, the operating theatre is situated about 400 metres from the tissue culture laboratory. The oocytes are transported there and then incubated for IVF. However, the GIFT procedure necessitates storage of the gametes very near the operating theatre so that they can be transferred within 2 to 5 minutes of retrieving the oocytes.

In order to maintain optimal temperature and ambient conditions for keeping the gametes outside the body, a box was designed to provide conditions similar to those obtained in a CO\textsubscript{2} incubator (Fig. 1). It was made of polystyrene, had an inlet on one side for the entry of a filtered (0.2 \(\mu\) ) mixture of 5% CO\textsubscript{2}, 5% O\textsubscript{2} and 90% N\textsubscript{2}. A gas outlet was situated at the opposite side of the box. The box was covered with a warm (37 °C) electric blanket and the base of the box was layered with bottles containing warm saline (37 °C). This minimized temperature changes caused by frequently opening and closing the box in the air-conditioned operating theatre.

**Gamete transfer**

Separate teflon catheters (Rocket of London, 16 gauge, 40 cm long) were used for tubal cannulation on each side. A blunt ended metal sleeve, with a trocar to guide the catheter, was introduced into the peritoneal cavity through the same puncture site as that of the aspiration needle. Palmer's forceps were introduced through the second puncture and the fimbrial end of the fallopian tube was gently grasped at its anti-mesenteric edge close to the ostium and aligned to the blunt end of the metal sleeve.

One end of the gamete transfer catheter was connected to a Hamilton syringe and flushed with Ham's F-10 medium containing 10% heat inactivated foetal cord serum.
The main advantage of the GIFT procedure is that it brings the oocytes into direct contact with the spermatozoa swimming up into the fallopian tube under physiological conditions which bypass all barriers from the cervical mucus upwards. In addition to this, the oocytes in the cumulus mass are better protected from adverse environmental conditions during transfer to the fallopian tube whereas the embryos in vitro are only protected by their zona pellucida during transfer to the uterus.

There are two important limitations of the GIFT procedure: the inability to confirm whether fertilization occurs in vivo if pregnancy fails to ensue and secondly the lack of information on the fertilization potential of oocytes and spermatozoa.

Theoretically, GIFT may result in a high incidence of ectopic pregnancy due to the presence of undiagnosed intrinsic tubal disease resulting in endosalpingeal damage.

At our institution the IVF-ET programme was launched in 1985 and had a good success rate. However, the GIFT technique was not established because of the considerable distance between the operation theatre and the tissue culture laboratory and also because of the absence of a portable CO₂ incubator. To overcome these limitations, we designed a box which served as a portable CO₂ incubator for storage of the gametes until they were transferred into the fallopian tube. With the help of this incubator, we achieved a carry-home baby rate of 10% (4/39) which is comparable to other studies reported in the literature.19

For those who are unresponsive to conventional therapy GIFT seems to be an effective method for treating long term infertility of varied aetiology when at least one fallopian tube is patent and the fimbria are accessible. Our experience shows that GIFT is easy to perform despite infrastructural limitations and results in successful pregnancies.

REFERENCES
Multimodality approach to renal and ureteric calculi

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ABSTRACT

Background. Minimal or non-invasive methods for treating renal or ureteric calculi have reduced the incidence of open surgery in the West to less than 1%. Before using these methods routinely in India we need to take into account the social and economic needs of our patients and the cost-effectiveness of the therapy.

Methods. Over a period of 16 months we analysed the results of 596 renal units with renal and ureteric calculi managed by (a) extracorporeal shock wave lithotripsy, (b) percutaneous litholapaxy, (c) ureteroscopy, (d) open surgery and (e) various combinations of a, b, c and d.

Results. Out-patient lithotripsy achieved a satisfactory outcome in pelvic (69% complete clearance, 21% minor residue), middle calyceal (84% complete clearance, 5% minor residue) and non-impacted ureteric calculi (93% complete clearance) with limited stone bulk. Percutaneous procedures had a better and quicker outcome than lithotripsy when the stone bulk was greater than 400 mm$^2$ because it required a larger number of shock waves, repeated sittings and pre-lithotripsy stenting. Primary percutaneous debulking with adjunct lithotripsy for staghorn calculi had a satisfactory outcome in 80% cases, while lithotripsy monotherapy usually failed. Percutaneous extraction resulted in a 95% success rate for large impacted upper ureteric calculi. Seventy-six per cent of ureteric calculi below the pelvic brim were retrieved using ureteroscopy alone. Open surgery either primarily or after failure of other modalities was offered to 6.4% of the patients. It was the procedure of choice for large staghorn calculi with major stone bulk spread over various calyces, for multiple large pelvicalyceal calculi, and for calculi associated with congenital anomalies.

Conclusion. In India lithotripsy should only be used when a quick and satisfactory outcome is expected, otherwise an appropriate minimally invasive method or surgical stone removal should be advised.

INTRODUCTION

More than one-third of the patients admitted to urology departments in India have urinary calculi. Our referral centre records a higher incidence because it specializes in the treatment of calculus disease. Patients are now aware of minimal or non-invasive techniques for treating calculi and expect the urologist to select a treatment option which requires the shortest period of time away from work and also achieves satisfactory results. However, many of our patients in India seek medical opinion after they have had symptoms for several years and an increased duration of impaction results in secondary changes which make the non-invasive techniques less effective. (Obstructive uropathy causes up to 40% of end-stage renal disease in this country.)

The advent of percutaneous removal of stones in the late 1970s and ureteroscopy soon afterwards greatly influenced the management of calculus disease. Extracorporeal shock wave lithotripsy (ESWL) was introduced in the early 1980s and in the last few years this technique has been successful in removing calculi anywhere from the renal calyx to the bladder. In the West the incidence of