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INTRODUCTION – LECTURES: Medical overview. Techniques used in the treatment of human infertility – Efficacy and medical complications of assisted reproductive technologies – Respect for human life in assisted procreation techniques – Tubal microsurgery as treatment for human infertility – Knowledge of female sexual cycles through self-observation for the treatment of human infertility – History of Spanish law in the regulation of assisted reproduction techniques. The legal and family neglect of human life in vitro – Assisted procreation from the perspective of business or medical ethics – IVFET and medicine of desire – Discerning medically assisted procreation: key concepts of the Magisterium of the Catholic Church



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SUMMARIES

L. CHIVA, *Medical overview. Techniques used in the treatment of human infertility.*

During the last three decades, we have witnessed the overwhelming growth of different assisted reproductive techniques within the field of human infertility. In all these years, many questions have emerged regarding the ethical limits of these treatments, and the rights of patients and doctors to push the boundaries of the commencement of human life, putting the life of millions of human embryos at risk.

In this area there are three key principles to consider the medical therapy for infertile couples as an assistance and not as a substitution of the conjugal act: first, to encourage that sexual relations take place as part of the treatment; second, to systematically obtain the gametes from the couple themselves and not from donors, and finally, to take care of human embryos with the same respect as a human adult deserves.

In accordance to these principles, there are some reproductive techniques *without embryo manipulation*: ovarian stimulation and programmed intercourse, gamete transfer and intravaginal culture of gametes (INVO).

G. LÓPEZ, *Efficacy and medical complications of assisted reproductive technologies.*

Results published by centres where they perform Assisted Reproduction Techniques (ART) are disparate and their efficacy varies depending on the technique. Ovarian hyperstimulation, multiple pregnancies in which they often perform “embryo reduction” (selective abortion), and poorer perinatal results are the most common complications of ART. There are also psychological complications that depend on the success or failure of the technique, and also raise serious bioethical concerns.

J. AZNAR, *Respect for human life in assisted procreation techniques.*

The in-vitro fertilisation (IVF) technique not only produces life but also death. Although the main moral problem regarding IVF treatment is that it originates human life outside the loving relationship between spouses; another severe ethical problem is the secondary loss of human embryos.

We can state that since 1978, birth of the first IVF baby girl, over 120 million of human lives have been lost worldwide as a consequence of IVF treatment.

J.Á. MÍNGUEZ MILIO, *Tubal microsurgery as treatment for human infertility.*

Between 25-35% female sterility originates in the Fallopian tubes. Even though in the latest years reconstructive surgery has relinquished its leading role to assisted reproduction techniques, we still believe it is a valid option in selected patients. Patients need to be informed about that option in order to decide on their treatment.

A. OTTE, *Knowledge of female sexual cycles through self-observation for the treatment of human infertility.*

Self-observation and the graphic follow-up of the menstrual cycle in cases of supposed infertility, help to diagnose and treat certain gynaecological alterations in order to carry out the sexual intercourse focused on optimising conception. Through these natural procedures (Naprotechnology), with no ethical drawbacks, we can obtain birth rates that are comparable, or even higher, to those obtained with invasive treatments.

P.M. ESTELLÉS PERALTA, *History of Spanish law in the regulation of assisted reproduction techniques: the legal and family neglect of human life in vitro.*

The history of Spanish law in the regulation of assisted reproduction techniques has left *in-vitro* human life unprotected from a legal and familial point of view. Spanish law cannot be considered a tool for protection and safeguard of human life as seen in some controversial practices of the reproductive techniques, such as “savior siblings” and *postmortem* artificial insemination, among others.

F.J. LARA, *Assisted procreation from the perspective of business or medical ethics.*

This article hopes to demonstrate the existence of an authentic economic business, a real reproductive market behind the medical world of bioethics and infertility. This is what is known as the “Baby Business”. We hypothesis whether it is possible in this type of market (the “Baby Business”) to apply the generally accepted principles of subsidiarity, solidarity, reciprocity and gratuitousness.

J. BALLESTEROS, *IVFET and medicine of desire*.

The triumph of instrumental and calculating reason over the reason which reveals meaning has led nowadays society to become a “market society”, where everything becomes an object of venal and banal desire. In the midst of the situation described, there appears confusion between the legitimate right to have children – liberty right or prohibition of barriers for generation – and the false right to have children – claim rights or the demand to be a parent at any cost regardless of the harm caused to innocent third parties.

I. CARRASCO DE PAULA, *Discerning medically assisted procreation: key concepts of the Magisterium of the Catholic Church*.

The purpose of this essay is not to present an exposition of the teaching of the Catholic Church on the procedure for medically assisted procreation, but to provide some key concepts for the correct interpretation of the statements principally contained in the Instruction *Donum Vitae* published in 1987. Among the concepts presented, we should wish to underline, on moral grounds, the terms “artificial”, “rationality” and “dignity” also including the distinction between “assistance” and “substitution” as regards the procreative function. Indispensable conditions for an ethically correct medically assisted procreation would be the safeguarding of the causal role of conjugal union and the recognition of the woman as the exclusive place worthy of the conception of a new human being.

Introduction

“All women, because God so willed,
carry a sleeping child within their heart”
(Martínez Viana)

With this is a great truth, and so too is what Cervantes said in Don Quixote “To him who knows not whence his malady, A miracle alone a cure can give”.¹

This is what we shall discuss shortly. On the occasion of the Year of Faith, and to raise awareness of methods for the treatment of Human Infertility that respect the dignity of the person, the Institute of Life Sciences and the Faculty of Law at the St. Vincent Martyr Catholic University of Valencia have organised an International Symposium entitled “Treatment of Human Infertility”.

Since it affects a great many people and is also difficult to treat, this is a matter of great importance, due to the spread of highly controversial techniques. Some of them, in-vitro fertilisation (IVF), intracytoplasmic sperm injection (ICSI), egg and sperm donation, etc. have gone in recent years from being a solution to sterility to become instruments of technical and economic power.²

In July 2008, 30 years after Louise Brown, the journal Nature dedicated an issue to Assisted Reproductive Technologies (ART), where its pioneers admitted that their aim is not only to overcome infertility problems, but to make it an alternative to normal reproduction. Many of these technologies have been accepted, despite not meeting either basic scientific or ethical requirements. It is unthinkable that a medical technique with such a high failure rate as these have, could be used.

They also present risks for the patients and their possible offspring: ovarian hyperstimulation, multiple pregnancies, increase

1 FERNÁNDEZ RUIZ C. *La esterilidad en la historia*. Barcelona: Rocas; 1965.

2 LÓPEZ MORATALLA N. *El precio del “milagro” de los nacimientos por las técnicas de fecundación asistida*. Cuad Bioét. 2012; 23: 423-425.

*in gestational diabetes and hypertension, greater intervention in the mother, prematurity, risks for the foetus and newborn and many more that still remain unresolved.*³

ART procedures have also been taken out of the setting of the stable couple, and have been opened to single and older women and same sex couples, both male and female.

As a result, research on infertility, diagnosis, aetiology and possible treatments have advanced very little in relation to other medical specialities, due to the “by-pass” that has been opened in normal reproduction, and which is increasingly admired in the interest of supposed progress.

Despite everything, their efficacy is very low, as pregnancy rates range between 25% and 30% in all of them and in all countries.

As the French National Ethics Committee pointed out in 2010, the impact on the psyche of the child, who will one day know that he was the object of a contract, must also be considered. A reflection on other major legal and economic issues raised by these techniques merits a special mention.

In 2010, the CEFER Reproduction Institute emphasised a new family model, the Reception of Oocytes from Partner (ROPA) Model⁴ consisting of two lesbian biological mothers, one who provides the eggs and the other who carries the pregnancy. The possibility of sharing motherhood – egg mother, womb mother – has already been considered before, accepting the interferences between the egg donor biological mother and the womb mother. Knowing that from a legal point of view, and since the recognition of maternity is determined by birth, it will be the birth mother and not the biological mother who has legal recognition.

This Symposium has also been focused on discovering those morally licit techniques, those that consider three fundamental

3 MÍNGUEZ J. Aspectos médicos de la Reproducción Asistida: Avances y riesgos in BALLESTEROS J (ed.). *La Humanidad in Vitro*. Granada: Comares; 2002.

4 MARINA S, MARINA D, MARINA F ET AL. *Sharing motherhood: Biological lesbian co-mothers, a new IVF indication*. Hum Reprod. 2010; 25: 938-941.

*goods: Right to life and physical integrity, unity of marriage, and respect towards the specifically human values of sexuality.*⁵

As you can see in the subject index, we have attempted to address the various issues, with our magnificent list of Speakers.

José A. Mínguez Sanz*

5 CONGREGATION FOR THE DOCTRINE OF THE FAITH. *Instruction "Donum Vitae"* (22 February 1987), II A. 1. AAS (80) 1988.

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Medical overview

Techniques used in the treatment of human infertility

*Luis Chiva**

Introduction

During the last three decades, we have witnessed the overwhelming growth of different assisted reproductive techniques within the field of human infertility. In all these years, many questions have emerged regarding the ethical limits of these treatments, and the rights of patients and doctors to push the boundaries of the commencement of human life, putting the life of millions of human embryos at risk.

For the past twenty years, the author has been working in the area of reproductive medicine, trying to combine a scientific approach with an ethical perspective based on Christian anthropology. More specifically, there are three key principles that have been followed by the author while indicating medical therapies to infertile couples: first, to encourage that sexual relations take place as part of the treatment; second, to systematically obtain the gametes from the couple themselves and not from donors, and finally to take care of human embryos with the same respect that a human adult merits.

This article reviews the current state of the incidence and treatment of infertility, outlining some ethical concerns and showing a number of techniques that follow the above-mentioned key principles.

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Current epidemiologic data

For years, the definitions of sterility and infertility have been academically differentiated. In fact they have different connotations. Sterility is defined as the incapacity of a specific couple to conceive. Infertility, however, refers to those couples that can conceive but have recurrent fetal pregnancy losses.¹ Currently, both concepts are considered the same from a practical point of view. From the perspective of reproductive medicine, a couple is considered infertile or sterile when pregnancy is not achieved after trying for 12 months without using any contraceptive methods (American and European Society of Reproductive Medicine). More than 90% of couples become pregnant after trying for one year. Afterwards, the cumulative pregnancy rate increases very slowly. This is why gynecologists counsel patients to visit a specialist after trying to conceive for this period of time. The average menstrual cycle rate of success for pregnancy in humans is approximately 20%.² This percentage is quite low compared with many other mammals that typically reach a rate of 70-80%. Even though the incidence of sterility throughout the world is very difficult to estimate, it is believed that 10% of couples cannot conceive. In the first world, it is very interesting to note that the most influential factors in increasing sterility are: delaying the age of marriage and the late age at which the first child is conceived.³ For example, in Spain the average age for marriage has increased from 27 to 34 years old in males, and from 24 to 31 years old in females between 1978 and 2008.⁴ It is well known from classic sociological studies performed in different populations not

1 ZEGERS-HOCHSCHILD F, ADAMSON GD, MOUZON J ET AL. *The International Committee for Monitoring Assisted Reproductive Technology (ICMART) and the World Health Organization (WHO) Revised Glossary on ART Terminology*. Hum Reprod. 2009; 24: 2683-2687.

2 FRANK O. *The demography of fertility and infertility* in CAMPANA A. *Frontiers in Endocrinology. Reproductive Health*. Rome: Ares-Serono Symposia Publications; 1993: 81-91; FRANK O, BIANCHI PG, CAMPANA A. *The end of fertility: age, fecundity and fecundability in women*. J Biosoc Sci. 1994; 26: 349-368.

3 FRANK. *The demography...*, pp. 81-91; MENKEN J, TRUSSELL J, LARSEN U. *Age and infertility*. Science 1986; 233: 1389-1394.

4 INSTITUTO NACIONAL DE ESTADÍSTICA. *Movimiento natural de la población 2008*. Madrid: Instituto Nacional de Estadística; 2010.

exposed to contraception that the female fertility rate decreases progressively after the age of 20.⁵ The slope of this descending curve is clearly more pronounced after 35 years old. Meanwhile the fertility rate of a population, which is the average number of children that would be born to a woman over her lifetime, is extremely low in the wealthiest countries. In Spain for example, it is 1.4, while the replacement index is greater than 2.⁶

Causes of infertility

The etiology of sterility has been extensively investigated. It is known that the reasons for infertility account for a similar percentage in men and women, about 30% each. In 25% of cases, both are involved. Finally, the cause is unknown in 15% of the sterile population.⁷ The most specific causes of female and male infertility are shown in *Table 1*.

The basic infertility work-up

The main role of the sterility specialist during the first interview with the couple is to clearly define the cause of the problem using a few diagnostic tools. After investigating all the details of the past medical history of both, it is essential to have them understand the fertility window within the menstrual cycle. Additionally, it is really important to explore whether there are any serious problems at the time of sexual intercourse. Once this has been done, the subsequent diagnostic steps will try to recognize:

If there is sufficient ovarian reserve. A very simple determination

5 HERDERSHOT GE, PRATT WF. *Infertility and age: An unresolved issue*. Fam Plan Perspect. 1982; 14: 287-289; MENKEN, TRUSSELL, LARSEN. *Age and...*, pp.1389-1394.

6 INSTITUTO NACIONAL DE ESTADÍSTICA. *Movimiento...*

7 BALASCH J. *Investigation of the infertile couples: investigation of the infertile couple in the era of assisted reproductive technology. A time for reappraisal*. Hum Reprod. 2000; 15: 2251-2257.

Table 1.
Causes of human infertility

Etiology of human infertility	%
MALE	30
FEMALE	30
BOTH	25
UNKNOWN	15
Causes of female infertility	
ANOVLUTION	40
TUBAL FACTOR AND/OR ENDOMETRIOSIS	40
UNKNOWN	10
UNUSUAL PATHOLOGY	10
Causes of male infertility	
HYPOTHALAMIC-PITUITARY DISORDERS	1
PRIMARY GONADAL DISORDERS	40
DISORDERS OF SPERM TRANSPORT	20
UNEXPLAINED MALE FACTOR INFERTILITY	30-40

of serum follicle stimulating hormone (FSH) and estradiol on day 3 of the cycle can provide us with fair knowledge of the remaining oocyte pool. Additional tests such as the anti-Müllerian hormone (AMH) at any time of the cycle and/or antral follicle measurement give us additional information.⁸

If ovulation occurs correctly and the patient is able to identify the event in the cycle. Nowadays, ovulation monitoring can be perfectly accomplished, even at home. Vaginal ultrasound, over-the-counter ovulation tests found in most pharmacies and self-knowledge of the

⁸ *Ibid.*, pp. 2251-2257; LA MARCA A, SIGHINOLFI G, RADI D ET AL. *Anti Mullerian hormone (AMH) as a predictive marker in assisted reproductive technology (ART)*. Hum Reprod Update. 2010; 16: 113-130.

main cervical mucus changes can help the couple to determine the time of ovulation fairly accurately.⁹

If semen production is adequate and the spermatozoa are normal in number, capacity for movement and morphology. The key test to study the quality of semen secretion is the semen analysis or seminogram.¹⁰ While the semen is collected by masturbation in many assisted reproductive techniques (ART) centres, it can be obtained in a different way. In fact, many male patients are reluctant and refuse to follow the former procedure. There is literature enough demonstrating that semen can be collected at the time of a normal sexual intercourse with a special semen collector device. It resembles a condom but it does not contain any spermicide. The author has suggested this method to hundreds of couples, with outstanding results in terms of applicability, compliance and satisfaction by the couple. It is important to note that once the semen has been obtained, it should be delivered to the laboratory in a period no longer than one hour and in close contact with the skin, trying to maintain the temperature of the specimen.¹¹

Finally to demonstrate that female genital tract is morphologically normal, including the confirmation of tubal patency. A thorough physical exam, along with a meticulous vaginal ultrasound, can rule out most of the pathologic disorders of the genital tract. A specific test, the hysterosalpingogram, is designed to assess the patency of both tubes by instilling a radio-opaque contrast through the uterine cervix.¹² Laparoscopy, a diagnostic and operative minimally invasive procedure carried out through the umbilicus is the final test to most

9 STIERNEMANN JJ, SAMSON A, BERNARD JP ET AL. *Day-specific probabilities of conception in fertile cycles resulting in spontaneous pregnancies.* Hum Reprod. 2013; 28: 1110-1116.

10 WORLD HEALTH ORGANIZATION (WHO). *Laboratory manual for the examination and processing human semen.* 2010^{5th}.

11 ZAVOS PM. *Characteristics of human ejaculates collected via masturbation and a new Silastic seminal fluid collection device.* Fertil Steril. 1985; 43: 491-492.

12 BONILLA-MUSOLES F, SIMÓN C, SERRA V ET AL. *An assessment of hysterosonosalpingography (HSSG) as a diagnostic tool for uterine cavity defects and tubal patency.* J Clin Ultrasound. 1992; 20: 175-181; CHEN YM, OTT DJ, PITTAWAY DE, ET AL. *Efficacy of hysterosalpingography in evaluating tubal and peritubal disease in 200 patients with infertility.* Rays 1988; 13: 27-32.

accurately determine any abnormality, disease or condition of the internal female genitalia. It is indicated in those cases where non-invasive tests fail to reveal the problem.¹³

The various tools included in the basic infertility diagnostic agenda are able to identify or at least to suspect up to 85% of the causes of infertility. The remaining 15% are grouped under the umbrella of unexplained infertility.¹⁴ The recent overgrowth of the different ART has led today (and this is something that must be mentioned) to something which is unlike anything that occurs in other specialties; many of these standard diagnostic tests are not ordered anymore. The reasons for this are multiple, and can be explained by the mindset of obtaining a successful outcome by shortcutting the standard diagnostic procedure that has been considered mandatory in medicine.¹⁵ Furthermore, studies have been published showing that more than 24% of couples that were treated with ARTs were able to conceive later without medical assistance.¹⁶ In other words, in many reproductive centers, the treatment algorithm includes primarily any modality of *in-vitro* fertilisation (IVF) without having had a clear understanding of the initial cause of absence of children. The principles that have guided the systematic medical action that results from a detailed diagnostic work-up followed by step-by-step medical treatment has been replaced by a different scenario, where couples are led, under-diagnosed, to a complex, expensive therapy at the top pyramid of treatment.

What prompts the treatment of infertility today?

It can be said that sterility treatment, and more specifically IVF, has become a multi-billion industry that has left science, law and

13 CAMPO R, GORDTS S, BROSENS I. *Minimally invasive exploration of the female reproductive tract in infertility*. Reprod Biomed Online. 2002; 4: 40-45.

14 RAY A, SHAH A, GUDI A ET AL. *Unexplained infertility: an update and review of practice*. Reprod Biomed Online. 2012; 24: 591-602.

15 BALASCH. *Investigation...*, pp. 2251-2257.

16 TROUDE P, BAILLY E, GUIBERT J ET AL. *Spontaneous pregnancies among couples previously treated by in vitro fertilization*. Fertil Steril. 2012; 98: 63-68.

ethics, deeply at odds. The profound reasons are polyhedral and can be summarized as follows:

- A vehement desire to have offspring that is understood by many as a basic human right.
- An irresistible, very marked rewarding effect in the treating physicians.
- An unprecedented economic benefit in this field of medicine.

All these ingredients mixed together reveal the exact motivations that drive reproductive medicine.¹⁷

Conventional therapy in sterility

Anovulation. The absence of ovulation or an alteration of its mechanism is by far the most common reason for sterility among women, comprising 40% (*Table 1*). Similarly, it is the condition with the best prognosis. Apart from IVF, there are a variety of medical and surgical strategies than can be primarily applied after this diagnosis. They are summarized in *Table 2*.

Table 2.
Strategies of treatment in chronic anovulation

Anovulation treatment
Body weight control
Clomiphene and SERMS
Gonadotropins
Metformin
Tamoxifen
Aromatase inhibitors
Ovarian “Drilling”
Prolactin inhibitors

¹⁷ SPAR DL. *The Baby Business: how money, science and politics drive the commerce of conception*. Boston: Harvard Business School Press; 2006.

Tubal factor. Tubal factor is regularly considered a direct indication for IVF. However, data from the literature show excellent results with microsurgery in some specific situations. In fact, in the report produced under the direction of the *Practice Committee of the American Society for Reproductive Medicine*, the following evidence regarding the surgical management of tubal disorders is stated:¹⁸

- There is good evidence to support HSG as the standard first line test to assess tubal patency, but it is limited by false positive diagnoses of proximal tubal blockage.

- The evidence is reasonable to recommend tubal cannulation for proximal tubal obstruction in young women with no other significant infertility factors.

- The evidence is reasonable to recommend laparoscopic fimbrioplasty or neosalpingostomy for the treatment of mild hydrosalpinges in young women with no other significant infertility factors.

- There is good evidence to support the recommendation for microsurgical anastomosis for tubal ligation reversal.

Endometriosis. Endometriosis is a medical condition defined by the presence of heterotopic endometrial tissue in another location of the anatomy. It produces an inflammatory reaction and is associated with up to 40% of sterility. It is frequently accompanied by pelvic pain and dyspareunia. The treatment is drawn up based on symptoms, stage of the disease and other associated fertility factors. Hormone therapy may improve symptoms but has not been proven to improve fertility. There is evidence that surgical therapy has a role in early stages, especially after removing endometrial cysts greater than 4 cm. In any case, restoration of the normal pelvic anatomy, including meticulous adhesiolysis, definitely increases the chances of becoming pregnant.¹⁹

Uterine factor. A number of heterogeneous causes are grouped under this title, including uterine fibroids, endometrial polyps, uter-

18 PRACTICE COMMITTEE OF THE AMERICAN SOCIETY FOR REPRODUCTIVE MEDICINE. *Committee opinion: role of tubal surgery in the era of assisted reproductive technology*. Fertil Steril. 2012; 97: 539-545.

19 HOWARD FM. *Surgical treatment of endometriosis*. Obstet Gynecol Clin North Am. 2011; 38: 677-686.

ine synechiae, congenital abnormalities and hostile cervical mucus. Most of these conditions have effective treatment apart from IVF.

Male factor. The main causes of male infertility can be divided into the following categories:

- Sperm disorders, problems with the production and maturation of sperm are the most common causes of male infertility. Sperm may be immature, abnormally shaped, or unable to move properly. Normal sperm may be produced in abnormally low numbers (oligospermia) or seemingly not at all (azoospermia). Many different conditions such as infectious diseases, endocrine or hormone disorders, immunological diseases, lifestyle factors and genetic diseases may cause this problem.

- Anatomical abnormalities, obstructions of the genital tract can cause infertility by partially or totally blocking the flow of seminal fluid.

- Mitochondrial deletions: mitochondria are structures in the cell responsible for energy production.

- Liver disease, renal disease, or treatment for seizure disorders.

- Other factors may arise from the defective delivery of sperm into the female genital tract, which could be caused by impotence or premature ejaculation.

Surgical and medical treatment have demonstrated efficacy with different success rates in the following diseases:²⁰

- Hypogonadotropic hypogonadism.

- Grade III varicocele without testicular atrophy.

- Genital infections.

- Obstructive azoospermia.

- Retrograde ejaculation.

Although hormone therapy in cases of male infertility has been practically abandoned by most ART centers, a 2006 Cochrane systematic review recently showed that compared to placebo or no treatment, gonadotropins showed a significantly higher pregnancy rate per couple randomized within 3 months of completing therapy

²⁰ LOPUSHNYAN NA, WALSH TJ. *Surgical techniques for the management of male infertility*. Asian J Androl. 2012; 4: 94-102.

(OR 3.03, 95% CI 1.30 to 7.09). Pregnancy rate was 13.4% (19/142) in the gonadotropin group and 4.4% (6/136) in the control group.²¹

Assisted Reproductive Techniques without embryo manipulation

As stated at the beginning of the article, the author has been working during last two decades following some ethical principles that try to respect the natural-law concepts of:

- Unity of sexual intercourse.
- Dignity of human life since the very moment of conception.
- To consider the medical therapy to infertile couples as an assistance and not as a substitution of the conjugal act.

Therefore, besides those medical and surgical therapies discussed above, there are some Reproductive techniques that adhere perfectly to the aforementioned values. These therapies are indicated depending on the specific diagnosis and the severity of the disorder.

- Ovarian stimulation and programmed intercourse. A timed intercourse treatment cycle is commenced and ovulation induction involves hormonal stimulation of the ovaries. Hormone stimulation will assist in the controlled ovulation. It will also further improve the embryo's chance of implanting successfully in the endometrial cavity.²²

- Intrauterine insemination with the husband's semen. Intrauterine insemination is a simple treatment, which consists of the assisted deposition of the sperm into the woman's uterus. In this procedure, ovulation is programmed to make the oocytes coincide temporarily with prepared capacitated sperm to fertilize it. In the woman, there should not be any barrier impeding the communication of the ovary with the uterine cavity, and at least one of the tubes should be permeable. To carry out this process, the male must present normal se-

21 ATTIA AM, AL-INANY HG, FARQUHAR C ET AL. *Gonadotrophins for idiopathic male factor subfertility*. Cochrane Database Syst Rev. 2007; 17 (4).

22 ZEYNELOGLU HB, ARICI A, OLIVE DL ET AL. *Comparison of intrauterine insemination with timed intercourse in superovulated cycles with gonadotropins: a meta-analysis*. Fertil Steril. 1998; 69: 486-491.

men characteristics or at least minor alterations requiring a motile sperm concentration of over 4 million mobile spermatozooids per milliliter. We have been performing this technique for years by obtaining the semen specimen with a seminal collector device at the time of regular sexual intercourse. The average time for sperm capacitation is just 2 hours after the specimen is delivered to the laboratory. We do not use either frozen or donor semen. The pregnancy rate in the literature is 15% when it has been correctly indicated.²³

- Gamete transfer. There are number of reported procedures that include retrieval of oocytes to facilitate the pregnancy which can be done following these ethical concepts. Among them, the most well-known is Gamete intrafallopian transfer (GIFT). In 1984, the first pregnancy using GIFT was achieved in a woman with unexplained infertility.²⁴ The development of GIFT was based on the assumption that transfer of oocytes and spermatozoa to the Fallopian tubes would bring about optimal conditions for fertilization and early embryo growth, resulting in a higher implantation rate. The GIFT procedure has substantially enhanced the prospects of many couples entering assisted reproductive technique (ART) programs, and numerous publications have confirmed its usefulness. The pregnancy rate (PR) with this technique has been reported to range between 27% and 48%, and in 1996, 29% of deliveries per retrieval were reported by the American Society for Reproductive Medicine/Society for Assisted Reproductive Technology Registry.²⁵ In spite of its good results, the technique is being used increasingly less frequently, probably for one main reason: the requirement for a surgical procedure, under anesthesia. This part is obviated in IVF. A secondary reason might be that in couples with poor male factor, the pregnancy rate is as low as classic IVF in the pre-ICSI era. There are other variations of

23 MATORRAS R, OSUNA C, EXPOSITO A ET AL. *Recombinant FSH versus highly purified FSH in intrauterine insemination: systematic review and meta-analysis*. Fertil Steril. 2011; 95: 1937-1942.

24 ASCH RH, BALMACEDA JP, ELLSWORTH LR. *Pregnancy after translaparoscopic gamete intrafallopian transfer*. Lancet 1984; 2: 1034-1036.

25 THE AMERICAN SOCIETY FOR ASSISTED REPRODUCTIVE TECHNOLOGY. *Assisted Reproductive technology in the United States: 1996 results from the American Society for Reproductive Medicine/Society for Assisted Reproductive Technology Registry*. Fertil Steril. 1999; 71: 798-807.

GIFT, such as Low Tubal Ovum Transfer (LTOT) and Direct Gamete Transfer to the uterus (DIRGAT).²⁶ LTOT involves ovarian stimulation, timed sexual intercourse, ultrasound-guided oocyte retrieval and finally the oocytes are placed within the fallopian tube through a laparoscopy. DIRGAT includes the uterine transfer of gametes, spermatozoa and oocytes, into the uterine cavity, which acts as incubator instead of the fallopian tubes. These two last procedures are nowadays seldom used as they obtain a low pregnancy rate.

- Intravaginal culture of Gametes (INVO). Intravaginal culture of gametes (IVC), also called INVO (“in-vivo”), is a procedure developed by Ranoux et al. in 1988,²⁷ proposed as a natural alternative option to conventional IVF. In the procedure, oocyte fertilization and early embryo development are carried out in the patient’s vagina, inside a gas permeable device; thus fertilization occurs within the maternal body. The device has been ISO 10993 tested (and mouse embryos tested) to assess toxicity and biocompatibility and has received the European Union CE mark declaration of conformity, which is equivalent to approval by the Food and Drug Administration (FDA) in the USA. More recently, the procedure has been gaining supporters, especially in South America, where a recent publication by Lucena and colleagues has shown a total of 125 attempts of IVF with an average rate of 40% and 31.2% of clinical pregnancy and live birth, respectively.²⁸ These results suggest that the INVO procedure is an effective alternative treatment option in assisted reproduction that shows comparable results to those reported for existing IVF techniques. In our group, in Spain, we have already obtained two first pregnancies.

The guidelines as we apply the procedure are as follows:

26 CHIVA DE AGUSTÍN L, MARTÍNEZ-ARENZA A ET AL. *Pregnancy achieved by intrauterine gamete transfer (DIRGAT)* Prog Obstet Ginecol. 1999; 42: 454-456.

27 RANOUX C, POIROT C, FOULOT H ET AL. *A new in vitro fertilization technique: intravaginal culture*. Fertil Steril. 1988; 49: 654-657; RANOUX C, POIROT C, FOULOT H ET AL. *Intravaginal culture and embryo transfer*. Rev Fr Gynecol Obstet. 1988; 83: 637-638.

28 LUCENA E, SAA AM, NAVARRO DE ET AL. *INVO procedure: minimally invasive IVF as an alternative treatment option for infertile couples*. Scientific World Journal. 2012, doi:10.1100/2012/571596.

- Mild ovarian stimulation is performed until follicular maturation is reached.
- Ovulation is induced.
- Semen is obtained during normal intercourse with a Seminal Collector.
- Up to a maximum of two mature oocytes along with 50,000 spermatozoa are introduced in the device into the vaginal cavity for 3 days. During the incubation period, the patient carries on with her regular life, avoiding, of course, overexertion.
- After this 72-hour culture period the INVO cell device is removed and immediately either the oocytes or the embryo/s (in the case of successful fertilization) are identified in the device. Immediately afterwards, and without any manipulation or selection, all the formed embryos, if any, one or both, are transferred to uterine cavity under ultrasound guidance.
- Post-transfer progesterone therapy is prescribed as usual.

Assisted Reproductive Techniques with embryo manipulation

Currently, most of the indicated ARTs are designed from a different perspective. Although it is not the goal of this article to thoroughly review IVF techniques, it is interesting to discuss the most acute differences between these two approaches. Firstly, in IVF techniques the goal of efficiency generally prevails. Thus, all steps are prepared to obtain a final objective, which is a baby to take home, independently of the number of embryo losses that may occur. More specifically, sexual intercourse is systematically avoided in these techniques and it is rarely encouraged as the manner of obtaining the semen. An aggressive protocol of superovulation accompanied by attempt to fertilize most of the obtained oocytes is carried out. In a large number of cases, fertilisation is performed by intracytoplasmic sperm injection (ICSI), whether or not there is a male factor. The newest techniques include a close computerized supervision of the first divisions during the early embryos' life; these are then classified depending on their growth rate and shape. A selection is made based on their microscopic qualities and unselected embryos are

commonly stored in liquid nitrogen under a constant temperature of -196 Celsius. During this process, the selected embryo to be transferred often undergoes a different form of manipulation including assisted hatching, preimplantational genetic diagnosis by embryo biopsy and eugenic selection, among others. Furthermore, the use of donors gametes is a normal scenario, especially among older women seeking pregnancy.²⁹ Moreover, homosexual couples and gestational carriers are allowed under the some specific international legislations promoting what is called Reproductive Tourism or Cross-border reproductive care.³⁰ Finally, as result of the residual outcome of these procedures, an infinite number of embryos remain frozen under an uncertain future. Many of them were classified as second class, and frequently will not withstand the thawing process.

In summary, infertility is a real circumstance affecting the human couple that is exacerbated in the first world by the delay in seeking offspring. A clear debate on embryo manipulation, embryo losses and the uncertain future of frozen embryos has been blocked. Non embryo-manipulation alternatives in reproductive medicine exist and should be implemented, since they offer real solution to infertility in many situations without threatening the life of millions of human beings.

Key words: assisted reproductive techniques, medical therapy for infertile couples, ethical limits, embryo manipulation.

Parole chiave: tecniche di procreazione assistita, terapia medica per le coppie sterili, limiti etici, manipolazione degli embrioni.

²⁹ 2010 NATIONAL SUMMARY. *Assisted Reproductive Technology (ART) Report. CDC Reproductive Health* (retrieved on 05.11.2012, at: <http://www.cdc.gov/art/ART2010>).

³⁰ INHORN MC, PATRIZIO P. *The global landscape of cross-border reproductive care: twenty key findings for the new millennium.* *Curr Opin Obstet Gynecol.* 2012; 24: 158-163.

SUMMARY

During the last three decades, we have witnessed the overwhelming growth of different assisted reproductive techniques within the field of human infertility. In all these years, many questions have emerged regarding the ethical limits of these treatments, and the rights of patients and doctors to push the boundaries of the commencement of human life, putting the life of millions of human embryos at risk.

In this area there are three key principles to consider the medical therapy for infertile couples as an assistance and not as a substitution of the conjugal act: first, to encourage that sexual relations take place as part of the treatment; second, to systematically obtain the gametes from the couple themselves and not from donors, and finally, to take care of human embryos with the same respect as a human adult deserves.

In accordance to these principles, there are some reproductive techniques *without embryo manipulation*: ovarian stimulation and programmed intercourse, gamete transfer and intravaginal culture of gametes (INVO).

RIASSUNTO

Aspetti medici. Tecniche in uso per il trattamento della sterilità umana.

Nel corso degli ultimi trent'anni, abbiamo assistito all'imponente sviluppo delle diverse tecniche di riproduzione assistita nel campo della infertilità umana. In tutti questi anni, sono emerse molte domande riguardo i limiti etici di questi trattamenti, ed i diritti dei pazienti e dei medici di forzare i confini dell'inizio della vita umana, mettendo a rischio la vita di milioni di embrioni umani.

In questo ambito ci sono tre principi chiave per poter considerare le terapie mediche per le coppie sterili come un aiuto e non come una sostituzione dell'atto coniugale: in primo luogo, far sì che i rapporti sessuali avvengano come parte del trattamento; in secondo luogo, ottenere sistematicamente gameti della stessa coppia e non da donatori; e, infine, avere cura degli embrioni umani con lo stesso rispetto che merita un essere umano adulto.

In base a questi principi, si possono individuare alcune tecniche di procreazione *che non effettuano alcuna manipolazione dell'embrione*: la stimolazione ovarica e il rapporto sessuale programmato, il trasferimento dei gameti e la coltura intravaginale di gameti.

Efficacy and medical complications of assisted reproductive technologies

Guillermo López*

The World Health Organization (WHO) defines reproductive health as “*a state of complete physical, mental and social well-being in all matters relating to the reproductive system at all stages of life*”. Similarly, it defines health as “*a state of complete physical, mental and social well-being*”. In Spain, article 2 of organic law 2/2012 of 3 March on sexual and reproductive health defines reproductive health as “*the state of physiological, psychological and sociocultural well-being in matters relative to the reproductive capacity of the person, which implies that he/she may have a safe sex life, the freedom to have children and to decide when to have them*”. These generic statements are a utopia. They are definitions that persist in many medical journals which repeat them as a “slogan” and which then justify medical acts such as “Embryo reduction” in multiple pregnancies or “eugenic abortion” after diagnosing embryonic or foetal abnormalities. Sterility and infertility are two terms that are considered synonyms and refer to the inability to have a living child naturally. Sterility affects 10-15% of couples. The woman’s age is an important factor to take into consideration; fertility falls steadily over the age of 35 and accelerates after the age of 40.

Changes in cervical mucus characteristics and the sperm quality of semen interfere in the capacity for natural fertilisation with an estimated frequency of 10%. Tubal and peritoneal diseases, secondary mostly to infections, endometriosis or tubal ligations are causes that affect 20-25% of sterilities. Finally, in 10-15% of sterile couples, there is no identifiable cause of sterility.

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The diagnosis of sterility requires a functional and anatomical study of the couple, with specific routine tests within the reach of all sterility clinics. The usual practice in medicine is that once the diagnosis has been established, the appropriate treatment is indicated. However, it is not uncommon in some sterility clinics to resort to assisted reproductive techniques without having completed the diagnostic studies.

Assisted reproduction technologies

Assisted reproduction technologies (ART) are comprised of procedures that seek pregnancy by manipulating ova (eggs), sperm and/or embryos. Two groups of techniques have been established: artificial insemination (AI) and *in-vitro* fertilisation (IVF) with embryo transfer.

Homologous AI or AI using donor semen is used fundamentally in male factor sterility, and in cases of abnormal cervical mucus that make insemination difficult, often with an immunological cause.

In order for AI to be effective, there must be tubal patency and ovulation in the woman, and at least 3 million motile sperm. In male sterility, pregnancy is achieved in 10% with the first insemination, reaching 40% if continued with at least four inseminations.

In IVF, mature ova are obtained with ovarian follicle puncture, usually after ovarian hormone stimulation. The ova are fertilised in the laboratory with homologous or donor semen. The egg can be obtained (egg donation) on the same day on which the IVF is performed or frozen eggs can be used. Fertilisation can occur spontaneously in the laboratory or by microinjecting a sperm cell into the egg (ICSI).

Once one or several eggs have been fertilised, the resulting embryos are transferred to the woman's uterus. This can be done 24 hours later, or even after waiting 5-7 days before transferring the embryo in the blastocyst phase.

IVF results depend on several factors: age, time and cause of the sterility, type of ovarian stimulation for obtaining the eggs, good or poor response to ovarian stimulation, receptive capacity of the en-

dometrium and even the characteristics and experience of the centre (public or private) where the technique is carried out.¹

The *European Society of Human Reproduction and Embryology* (ESHRE) records assisted reproduction data from 36 European countries, and also publishes comparative data with other countries. The practice of ART cycles, according to the ESHRE report of 6.07.2011, was 525,640 cycles for 36 European countries. In the United States there were 148,055 cycles and in Australia and New Zealand, 61,929.²

In Spain, from May 2006, a National Registry of Activities and Results from Assisted Reproduction Centres and a Donor Register was established. Previously, the Spanish Fertility Society set up an anonymous, voluntary, non-accredited register up to 2008, publishing the first IVF and ICSI data in 1996 and Artificial insemination data in 1998.

The demand for ART in Spain, considering 10 million women of reproductive age, is estimated at 65,000 cycles annually, 1,400 cycles per million inhabitants and 6 cycles per thousand women of reproductive age.

In Europe, it was estimated (according to 2008 data) that the number of births due to ART was 3.3% in Sweden, 3.0% in Finland, 2.4% in Norway and the Netherlands, 2.4% in the United Kingdom, 1.9% in Germany and 1.7% in Spain. On 6.07.2011, the ESHRE published the number of ART cycles with frozen eggs, which was 3,284 in Italy, 325 in Finland and 199 in Spain.

Egg donation from younger women substantially improves the results. Countries with more permissive laws permit “boundaries to be crossed” and accounted for 30% of cycles in Spain. On 4.02.2013, the French Government made public a note prohibiting women from

1 ADAMSON GD, DE MOUZON J, LANCASTER P ET AL. *World collaborative report on in vitro fertilization, 2000*. Fertil Steril. 2006; 85: 1586-1622; CENTERS FOR DISEASE CONTROL AND PREVENTION. *2008 Assisted reproductive technology report* (retrieved on 05.09.2012, at: <http://www.cdc.gov/ART/ART2008/index.htm>).

2 ESHRE. (retrieved on 05.11.2012, at: <http://www.eshre.on/home>); LUKE B, BROWN MB, WANTMAW E ET AL. *Cumulative birth rates with linked assisted reproductive technology cycles*. N Engl J Med. 2012; 366: 2483-2491.

being referred to a centre in Barcelona without authorisation in France for ART.

In 2008, the Spanish Fertility Society reported treatments carried out in Spain on foreigners: IVF/ICSI (599 cases), donor eggs (809 cases), frozen embryos (482 cases) and preimplantation genetic diagnosis (29 cases). This was a total of 1,919 cases.

Data on the efficacy of ART that can be obtained from a literature search are very disparate. They depend on many factors according to the series and characteristics of the cases (age, time and cause of sterility, technique and anatomical and functional status of the ART users). The results improve if 2-3 embryos are transferred, although better results are not obtained with more than 2 embryos and the risk of multiple pregnancy increases. The “quality” of the embryos transferred is also a very important factor, a fact that is commonly associated with preimplantation genetic diagnosis (eugenic selection).³

Taking the above factors into account, it can be estimated that successes in ART range from 30% to 40-60% in some centres, according to the number of treatment cycles – up to 7 in some studies, which many women cannot tolerate.

Spain, there are 259 private and 21 public registered centres that perform ART. The results for most are unknown.

Complications of ART

ART are not exempt from complications, and thus the puncture wound from obtaining oocytes can be the cause of intraperitoneal haemorrhage that may occasionally require surgical treatment. The more refined the technique and the more experienced the technician, the lower the risk, which is assessed in per thousand (1 or 2 cases).

3 SPANISH FERTILITY SOCIETY. *Registro SEF 2009* (retrieved on 05.11.2012, at: <http://www.registrosef.com>); THURIN A, HILLENSJO T, JABLONOWSKA ET AL. *Elective single-embryo transfer versus double embryo transfer in vitro fertilization*. N Engl Med J. 2004; 351: 2392-2402; TROKOUDES KM, PAVLIDES C, ZHANG X. *Comparison outcome of fresh and vitrified donor oocytes in an egg-sharing donation program*. Fertil Steril. 2011; 95: 1996-2000.

Data that can be found in the current literature indicate more maternal complications, both in the pregnancy and in labour, if compared with natural pregnancies. The number of miscarriages and preterm births increases; the rate of caesarean sections rises and symptoms of gestosis and diabetes are more common in pregnancies achieved with ART. With respect to newborns, low weight, congenital malformations, chromosome disorders and perinatal mortality are also increased if compared with the results of natural pregnancies. Several factors may be involved in these results: the age of the women, treatments necessary in ART and manipulation of gametes and embryos in the laboratory.

The age of women at first pregnancy has been increasing in recent decades, and it is known, from epidemiological data, that after the age of 35, female fertility falls. This drop increases rapidly from age 38 or 40 years, and women of these ages who undergo ART have been shown to have poorer results due to the low quality of their eggs; the pregnancy rates improve if they resort to egg donation from young women.

Ovarian hyperstimulation syndrome is a complication that can become serious in some cases. If a high number of eggs is obtained (to transfer embryos and to be able to freeze the rest) in the hormone stimulation cycle, there is a risk of triggering this syndrome. Additionally, the transfer of several embryos results in an increase in multiple pregnancies, which clouds the final result in these cases. Those who perform ART procedures are aware that multiple embryo transfer is not recommendable. In natural pregnancies, the number of twin pregnancies is less than 1%, and in these the perinatal morbidity and mortality increases in relation to single foetus pregnancies. In ART, the number of multiple pregnancies is 25%; it is considered as a major risk factor and multiple pregnancy is considered as “malpractice” given the complications indicated.

To reduce the high rate of multiple pregnancies in ART, the number of embryos transferred per cycle is limited to a maximum of 2 in many countries. In Spain, the 2006 law authorises the transfer of 3 embryos, with a multiple pregnancy rate of 23.8%, much higher than countries like Sweden (7%), Finland (9.3%), Germany and Italy (21.2%), according to ESHRE data from 6 July 2011.

It is known that the number of implantations increases the more embryos that are transferred, although the final resulting “babes in the cradle” are poorer due to the complications of multiple pregnancy. This reality has led some centres to the massive conservation of embryos for future transfers, thus avoiding repeat hormone stimulation for obtaining eggs. If the transfer of a high number of embryos results in a pregnancy of 3 or more embryos, they resort to what is euphemistically called “embryo reduction” (selective abortion) using ultrasound-guided intra-amniotic lethal injection.

One issue to take into consideration in ART is the psychological impact. The information usually transmitted to users of these techniques about expectations of success are very often not met, creating frustration in the couples who return to undergo further attempts, sometimes multiple times, to achieve a pregnancy that often fails as well.

A study published in the BMJ in 2011 is very illustrative. It analysed 4,102 cycles in which the authors expected a pregnancy rate of 53.3%; in fact the real rate was 31.2%, creating not only emotional distress in the couples, but also frustration and high economic costs.⁴

An extremely important part in the study of complications of ART, and which should be treated with the maximum scientific rigor, is the risk of congenital abnormalities in children born using these techniques. The literature is extensive. N. López Moratalla recently published an ACRE report in Cuad. Bioética XXIII, 2012/2. It is an exhaustive review that the author entitled: “*Health risks of birth by assisted fertilization techniques. Tip of the iceberg*”. In 42 pages, the author states the current state of this issue, concluding that: “*Data on the frequency of malformations, chromosome abnormalities, rare syndromes, and many more, in the short and long term, in children born through the intervention of some of the processes involved in so-called Assisted Reproductive*

4 BOIVIN J, GRIFFITHS F, VENETIS CA. *Emotional distress in infertile women and failure of assisted reproductive technologies: meta-analysis of prospective psychosocial studies*. BMJ. 2011; 342: d223.

*Technologies, are a wake-up call that calls for accountability of the professionals and damage control systems. Urgent and thorough investigation of the health of those already born and information for both those who use ART and society is required. Application of any of the ART requires rigorous diagnosis of the sterility or infertility of the couple. The health risks for the offspring depend only in part on the quality of the gametes. In other cases it is the techniques alone that cause the abnormalities. Male factor is mostly of genetic origin, both due to mutations in the genes and epimutations. These alterations pass to the offspring when fertilisation is forced by injection of a sperm cell into the cytoplasm of the egg (ICSI). This technique is the most invasive and the one that results in most disorders in both the short and longer term, and causes a serious intergenerational problem. ICSI should be advised against, and even refused, if the diagnosis of male infertility is genetic. However, it is the most widely used procedure, not only in cases of sub-fertility, but also by protocol indication when genetic diagnosis prior to embryo transfer is to be performed. The risk of using these techniques is higher when they are more invasive. The number of epigenetic (regulators of the natural expression of the genome in the embryo) abnormalities which result from exposure of the embryo to an artificial environment, both of the oocytes obtained by ovarian stimulation and the culture of the fertilised egg, or the freezing-thawing and revival of the embryo prior to implantation in the maternal uterus is high. All this has direct consequences in the short, medium and long term on the life of the individual generated using assisted reproduction techniques. Even in terms of being inheritable, they can cause an intergenerational problem”.*⁵

The risks of ART should be known by the people who use them. In order to try to mitigate the complications, better control of ovarian stimulation, putting limits on the number of embryos transferred,

5 LÓPEZ MORATALLA N, HUERTA ZEPEDA A ET AL. *Riesgos para la salud de los nacidos por las técnicas de fecundación asistida. La punta de un iceberg.* Cuad Bioét. 2012; 23: 467- 527.

control of laboratories and methodology and the exclusion of experimental methods with embryos is necessary.⁶

Scientific Societies, the National Commission for control of ART and Bioethics committees need to know the results of centres that practice Assisted Reproductive Techniques.

Key words: sterility, assisted reproduction techniques (ART), ART efficacy, ART complications.

Parole chiave: sterilità, tecniche di fecondazione artificiale, efficacia delle tecniche di fecondazione artificiale, complicanze delle tecniche di fecondazione artificiale.

SUMMARY

Results published by centres where they perform Assisted Reproduction Techniques (ART) are disparate and their efficacy varies depending on the technique. Ovarian hyperstimulation, multiple pregnancies in which they often perform “embryo reduction” (selective abortion), and poorer perinatal results are the most common complications of ART. There are also psychological complications that depend on the success or failure of the technique, and also raise serious bioethical concerns.

RIASSUNTO

Efficacia e complicanze mediche delle tecniche di fecondazione artificiale

I risultati pubblicati dai centri dove si eseguono tecniche di fecondazione artificiale (ART) sono disparati e la loro efficacia varia a seconda della tecni-

6 NIEMITZ EL, FEINBERG AP. *Epigenetics and assisted reproductive technology: a call for investigation*. Ann J Hum Genet. 2004; 74: 599-609; THOMPSON JR, WILLIAMS CJ. *Genomic imprinting and assisted reproductive technology: connections and potential risks*. Semin Reprod Med. 2005; 23: 285-295; HANSEN M, BOWER C, MILNE E ET AL. *Assisted reproductive technologies and the risk of birth defects. A systematic review*. Hum Reprod. 2005; 20: 328-338; DE NEUBOURG D, GERRIS J, MAGELSCHOTS K ET AL. *The obstetrical and neonatal outcome of babies born after single-embryo transfer in IVF/ICSI compares favourably to spontaneously conceived babies*. Human Reprod. 2006, 21: 1042-1046.

ca. L'iperstimolazione ovarica, le gravidanze multiple sulle quali spesso si effettuano la c.d. "riduzione embrionale" (aborto selettivo), e più scarsi risultati perinatali sono le complicanze più comuni delle tecniche di fecondazione artificiale. Ci sono anche complicanze psicologiche che dipendono dal successo o dal fallimento della tecnica, ed anche gravi preoccupazioni a carattere bioetico.

Respect for human life in assisted procreation techniques

*Justo Aznar**

It is a paradoxical fact that in the same setting and at the same time, human life is defended and attacked. This apparently rather illogical way of acting can be observed in different medical areas, but is especially evident in relation to abortion, the regulation of human fertilisation and *in-vitro* fertilisation (IVF).

With respect to abortion, it can be observed in the contradiction that exists between laws which, on one side, promote the defence of life, such as the “Declaration of Human Rights”, which in its Preamble states “the equal and inalienable rights of all members of the human family”, so the unborn can hardly be excluded from such rights, as they are humans, and on the other side, the greatest contempt for human life in history, abortion, is encouraged in Western society, which in 2012 alone exceeded 40 million.¹

In relation to the regulation of human fertility, it is also paradoxical that, on one side, policies in favour of limiting the number of children are being promoted, which has led to a drastic decline in birth rates, especially in Western countries. This is causing a serious demographic problem by preventing generational replenishment, resulting in major social problems that we cannot address here, but which is especially reflected in the inversion of the demographic pyramid, favouring an increase in the number of older people, which is endangering the social benefits of our welfare society. To try to resolve this serious problem, Western countries are dedicating large economic resources to promoting a birth policy, especially focused on encouraging the birth of a third child. Both facts, anti-birth poli-

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¹ WORLDOMETERS. *Statistics of abortions in the world* (retrieved on 22.11.2012, at: <http://www.worldometers.info/abortions/>).

cies and dedication of economic resources to promoting new births, incontrovertibly reflect the ideological schizophrenia to which we are referring.

Also in the field of assisted procreation, especially in the area of IVF a similar circumstance arises, as these techniques are intended to resolve the problems of infertile couples who wish to have a child, i.e. to promote human life, and on the other to achieve this they use methods that entail the loss of large numbers of human embryos.

However, before moving on to address this latter aspect in more detail, which is the reason for our presentation, allow me to make a reflection of a general nature. In our opinion, the ideological foundation of this intellectual antinomy, which defends and attacks human life at the same time, has its basis in the contraposition of two rights, women's right to reproductive autonomy and the right to life; in most Western countries, the former prevails over the latter. It can be said that, in general, the principle of reproductive liberty predominates over the principle of reproductive beneficence, which should always protect the child conceived.

In relation to IVF, which is the topic that specifically concerns us, much has been said and written regarding the announcement, on 4 October 2010, and the subsequent awarding of the Nobel Prize in Medicine to Robert Edwards on 10 December 2010, for his work in the field of reproductive medicine, work which led to the first successful conception through IVF, culminating in the birth of a baby girl, Louise Brown.² Much of what has been said has focused on the positive aspects of this technique, and so we will not elaborate on them here. Yet the use of IVF isn't always associated to positive outcomes, in fact some can be said to be negative; there is one such aspect that we believe to be the most significant: the number of embryos – human lives – that have been lost as result of this technique.

To be able to support our claim that human lives are lost through IVF, we need to take as our point of departure two biological facts.

2 STEPTOE PC, EDWARDS RG. *Birth after the preimplantation of a human embryo*. Lancet 1978; 2: 266.

The first is that a human embryo is a living being and its destruction is tantamount to destroying a human life; and second, that freezing human embryos is equivalent to their destruction, for sooner or later they will eventually be destroyed unless they are transferred to the woman's uterus for reproductive purposes, an occurrence which is rare.

Therefore, in order to make an ethical judgement on what it means to destroy these incipient embryonic lives, it must first be well-established that human life begins with fertilisation, something which, in my opinion, is a biologically undeniable fact.³

Naturally, we cannot dwell here to evaluate each of the biological foundations that support that human life begins with the start up of its developmental engine, after fusion of the male and female pronuclei and, that that primitive embryo has a genetic identity that will determine it as a specific individual; furthermore, there is a whole series of biochemical and cellular mechanisms that regulate its development, which could not take place if that primitive biological entity were not an organised living being of our species, but could if do so we refer to the genetic identity of the human embryo.

A traditionally used argument in defence of the human nature of the early embryo states that the genome of the zygote already contains all the genetic information necessary for that new being to develop fully until its status as a living adult being of a certain species. If nothing organic from outside modifies the genomic content of that nascent biological individual, since it only receives messages that help to regulate its own development from the world around it, it is difficult, if not impossible, to establish any leap in its life evolution that could mark the start of a genomic reality different from the previous. The evolution of that being is a continuous biological process resulting in the different phenotypic realities of its development, within the living unit that identifies it as a unique living human being, from the impregnation of the egg by the sperm until its natural death.

3 AZNAR J. *Biological status of the human embryo in Bioética y Cuidados de Enfermería* (Volumen 2). Valencia: Consejo de Enfermería de la Comunidad Valenciana (CECOVA); 2013: 59-76.

However, identifying the individuality of that emerging human being by its genome alone seems a limited and even erroneous concept.⁴ Indeed, every day there are more biological arguments to affirm that a human individual is something more, certainly quite a lot more, than its genetic code. In this respect, we have increasingly more information about non-genetic mechanisms, epigenetic mechanisms that significantly influence embryo development. Therefore, we believe that DNA is necessary, but not sufficient, to identify a human individual. Not everything is in the genome, but the genetic information grows with the expression of the genes it contains, for which the activation and transmission of its specific development programme is necessary; this programme is activated as the life cycle of that individual advances, making it possible for the new being to be able to initiate the complete and orderly transmission of the genetic messages required in order for its development to take place in an orderly and complete manner. Thus, every day more importance is being given to epigenetic factors.

I.e., during the development of the living being, new genetic information not expressed directly in the primitive genome is emerging, due to interaction of the genome with its environment. Added to this information is what is known as epigenetic information. Therefore, any phenotypic expression of a living being is the result of the gene content of their genome and the epigenetic information that is generated throughout its evolution, as a fundamental consequence of the interaction of the genome with its environment.

But in addition to its genetic identity, we believe that it can be stated that the early human embryo cannot be considered as a simple cell cluster, because a series of biological mechanisms occur in it, which in our opinion, can only take place in an organised, living human being.

These include most notably: 1. all the mechanisms that regulate the emission of the embryo development program; 2. everything relative to the so-called position information, i.e. the information nec-

4 LÓPEZ MORATALLA N, SANTIAGO E, HERRANZ G. *Inicio de la vida de cada ser humano ¿Qué hace human el cuerpo del hombre?.* Cuad Bioét. 2011; 22: 283-308.

essary for the development of the embryo depends on the relations between the cells themselves and those of these with the cell niche that they occupy; 3. the role that fusion of the cell membranes of both gametes, male and female, play in the start up of the embryo development process and the new knowledge on the mechanisms that determine the asymmetry and polarity of the zygote, and how this influences the assignment of functions for each of its cells, and the spatial asymmetry of the various organs in the body of the embryo; 4. various biochemical factors, mainly intra- and extracellular calcium levels, which may directly influence embryonic development; 5. the genetic regulation of the mechanisms of cell differentiation; 6. the biochemical dialogue established between the embryo, during its passage through the Fallopian tube, and its mother; 7. and finally the inhibition of the mother's immune response, which allows the embryo to implant in her uterus without being rejected.

For all these genetic and molecular reasons, we believe that the preimplantation human embryo has all the characteristics necessary to be able to define it as a living being of our species, i.e. *a.* possibility of starting up the engine of its own biological evolution; *b.* capacity for self-control and self-directing its own development; *c.* excitability, or the capacity for response to its own stimuli and those of the environment; *d.* capacity to reproduce itself maintaining the genetic characteristics of its parents; i.e. all these biological characteristics that define an autonomous and individual human life.

Specifically, with the fertilisation and generation of the zygote, a new living being of our species is produced, which has an autonomous life, different from that of its parents, and which will undoubtedly follow a continuous biological process without breaks until its natural death. Therefore, to end it is to end a human being; it is an abortive act.

However, according to Herranz,⁵ it can be stated that, for some, awarding a certain ontological category to that preimplantation human being does not depend on its biological nature, but on the range

⁵ HERRANZ G. *Interview by Antonio García Prieto on the occasion of a conference given in Logroño. 2001.*

that it is assigned, on the ethical policy applied to it. According to a policy of power and utility, it will only have the dignity that others accord it. It would be the parliaments, parents, media, researchers, philosophers, and society in general who award it (or not) dignity and rights. It is they who determine since when and until when it is subject to that dignity. In this context of awarded dignity, the dignity of the human embryo is negotiated, and it is stripped of this when scientific, social and even personal objectives deem it appropriate. However, under a policy of respect, all human beings must be recognised and treated as such for their intrinsic dignity that makes it intangible, in keeping with the Kantian imperative which states that man is an end in himself, and so can never be used as a means, however excellent the ends appear. In the words of Pope Benedict XVI, in his last General Audience on 6 February past, before presenting his resignation of the papacy on Monday 11 of the same month⁶ “our origin is not irrationality and necessity, but reason, love and liberty. Hence the alternative: either the priority is given to irrationality, to necessity, or priority is given to reason, liberty and love. We believe in this second position”, and in this is based human dignity in particular.

Once we have established our premise, that human life begins with fertilisation and that to end the life of a human embryo is ethically as negative as to end an adult life. We will now move on to our thesis, that IVF not only produces life, but is also associated to a consequence, which, even though it is not a desired outcome, it is still negative – that of death.

But before determining the number of embryos that may be lost through the use of IVF, and the total number of embryos lost since the technique was introduced, it is important to indicate that from the moment the first experiments in IVF began in 1960,⁷ until the birth of Louise Brown in 1978,⁸ nine years of laboratory work tran-

6 BENEDICT XVI. *General Audience* (6 February 2013) (retrieved on 20.11.2013, at: http://www.vatican.va/holy_father/benedict_xvi/audiences/2013/documents/hf_ben-xvi_aud_20130206_en.html).

7 EDWARDS RG, BAVISTER BD, STEPTOE PC. *Early stages of fertilization in vitro of human oocytes matured in vitro*. *Nature* 1969; 221: 632-635.

8 STEPTOE, EDWARDS. *Birth after...*, p. 266.

spired which entailed the destruction of an indeterminate number of human embryos. That means that to achieve this one successful pregnancy, 100 failed attempts were made.⁹

As stated earlier, probably the most serious ethical problem associated with IVF is the great number of human embryos that are lost.

We have based our calculations on an article which provides interesting data on the subject.¹⁰ This study evaluated 572 ovarian stimulation cycles which yielded 7,213 oocytes, that is, 12.6 oocytes per cycle. A total of 2,252 embryos were produced and 326 live babies were born (226 from fresh embryos and 64 from frozen embryos). Based on these figures, the number of live babies born for every 100 embryos was 14.47; or to put it another way, for every 100 embryos produced, 85.53 embryos were lost.

That is, 6.9 embryos are lost for every live baby born.

Moreover, and although this is of little ethical impact, it is of interest to point out that 4.6 live babies were born for every 100 extracted oocytes.

Another study by the same group¹¹ analysed 191 ovarian stimulation cycles performed on 53 female donors. The donors were classified into two groups: 28 were highly successful donors, and 23 were classified as standard. The highly successful donor group yielded a total of 2,470 oocytes from 130 cycles of ovarian stimulation. Of these, 779 embryos were produced, (342 were transferred as fresh embryos and 437 were cryopreserved). A total of 125 live babies were born. The standard donor group yielded 1,044 oocytes, from 61 cycles of ovarian stimulation. Of these, 336 embryos were produced; 131 embryos were transferred and 205 were cryopreserved. The total number of live babies born was 26.

Based on these figures, a total of 1,115 embryos were produced and a total of 151 live babies were born. Consequently, the number of live babies born per 100 embryos was 13.54, in other words, the

9 WATTS G. *News. BMJ* 2010; 341: c5533.

10 PATRIZIO P, SAKKAS D. *From oocyte to baby: a clinical evaluation of the biological efficiency of in vitro fertilization.* *Fertil Steril.* 2011; 91: 1061-1066.

11 MARTINI JR, BROMER JG, SAKKAS D ET AL. *Live babies born per oocyte retrieved in a subpopulation of oocyte donors with repetitive reproductive success.* *Fertil Steril.* 2010; 94: 2064-2068.

number of embryos lost for every 100 embryos produced was 86.46. For every live baby born, 7.38 embryos were lost. If we take both studies into consideration, then we can state that for each live baby born, approximately 7 embryos were lost.

In light of the above data, we extend our analysis to ask the following question: How many embryos, how many human lives, have been lost due to IVF since its introduction in 1978?

It is thought that since its introduction in 1978, approximately 4.3 million babies have been conceived through IVF.¹² If approximately 7 embryos are lost for every live baby born, then approximately 30 million human embryos have been lost through IVF since 1978.

Yet, in addition to the embryos lost in cases leading to a successful birth, there are other circumstances which also lead to a loss of human embryos. In effect, the previous calculation only took into account the embryos lost per live baby born but there is a significant number of women who are not able to conceive a baby through the IVF process, despite receiving several cycles of ovarian stimulation and subsequent embryo transfer. This means that even when the process does not lead to a successful birth, failed IVF processes also bring about the loss of an indeterminate number of human embryos.

In effect, approximately 50% of the women who receive three cycles of ovarian stimulation as part of IVF treatment fail to have a child.¹³ If 10 or more embryos are produced during each stimulation, and the average number of cycles per patient is at least 3, then for each patient who fails to have a baby, approximately 30 embryos will have been lost. This figure is greater – approximately 50 – if we take into account that most clinics will give 5 cycles of treatment before IVF is abandoned.

Additionally, if the total number of children born via IVF treatment since 1978 is 4.3 million, and if approximately 50% of the women who receive treatment are unable to give birth to a baby,

¹² GIANAROLI L, GERAEDTS J, VEIGA A ET AL. *The "Father of IVF" and a Founding Father of ESRHE*. Hum Reprod. 2010; 25: 2933-2935.

¹³ GNOTH C, MAXRATH B, SKONIECZNY T ET AL. *Final ART success rates: a 10-year survey*. Hum Reprod. 2011; 26: 2239-2246.

even taking into consideration that some of the pregnancies result in multiple births, at least 3 million women failed to have a child after receiving IVF treatment since 1978. Therefore, based on the previously calculated figure of 30 embryos lost by each woman who does not have a child via IVF, and given that approximately 3 million women have not given birth to a child through this treatment, a total of approximately 90 million embryos have been lost through unsuccessful IVF treatment.

That is, the total number of embryos – human lives lost since the introduction of IVF in 1978 owing to the two circumstances mentioned above, would be 30 million + 90 million, that is, 120 million. We believe that this figure is sufficiently large, and that it should, or rather must, be taken into consideration when ethically evaluating this practice.

To help us gauge the magnitude of the number of human lives lost through this procedure, we thought it would be enlightening to compare it to the number of human lives lost to AIDS since its discovery in 1981: approximately 25 million.¹⁴ That is, over a comparable length of time, five times more lives have been lost through IVF than from AIDS, one of the most devastating pandemics of the last quarter of the 20th century and still a serious concern today.

Conclusion

Although the moral assessment of assisted procreation techniques will be the object of the Closing Conference of this Symposium, I do not want to miss this opportunity to make a final ethical reflection.

It seems, beyond any personal opinion, that the enormous loss of embryos, human lives, that accompanies IVF means that morally this practice cannot be classified as ethically positive; however, I believe that it will not be a sound judgment if the negative moral classification that assisted procreation merits was defended only by the al-

¹⁴ COHEN MS, HELLMAN N, LEVY JA ET AL. *The spread, treatment, and prevention of HIV-1: evolution of a global pandemic*. J Clin Invest. 2008; 118 (4): 1244-1254.

ready mentioned loss of embryos. Indeed, modifications to *in-vitro* techniques may arise that avoid the loss of human embryos, such as already happens with ICSI for example, which might lead to the conclusion that its ethical limitation would have disappeared. This circumstance is very far from reality, since the great moral difficulty in assisted procreation techniques lies (apart from other circumstances such as the loss of human embryos at present) in the fact that human life is produced outside the context of the marital relationship, outside the gift of love between man and woman, the only breeding ground in which human life, because of its own dignity, should be initiated. This will be addressed in more depth at the Closing Conference of this Symposium, but by way of a simplified prescription, it can be stated that the only morally acceptable techniques for providing a child to couples with fertility problems are those that facilitate fertilisation, helping the sperm to reach the female genital tract under the best conditions, but always without breaking the unity of the conjugal act.

Key words: in-vitro fertilisation, human embryos, negative side effects, human lives losses.

Parole chiave: fecondazione in vitro, embrioni umani, effetti collaterali, perdita di vite umane.

SUMMARY

The *in-vitro* fertilisation (IVF) technique not only produces life but also death. Although the main moral problem regarding IVF treatment is that it originates human life outside the loving relationship between spouses; another severe ethical problem is the secondary loss of human embryos.

We can state that since 1978, birth of the first IVF baby girl, over 120 million of human lives have been lost worldwide as a consequence of IVF treatment.

RIASSUNTO

Il rispetto della vita umana nelle tecniche di fecondazione artificiale.

Le tecniche di fecondazione in vitro (FIV) non producono solo la vita ma anche la morte. Anche se il problema morale principale per quanto riguarda l'uso della FIV è quello di originare la vita umana al di fuori della relazione d'amore tra i coniugi, un altro grave problema etico è la conseguente perdita di embrioni umani.

Possiamo affermare che dal 1978, anno di nascita della prima bambina concepita *in vitro*, in tutto il mondo oltre 120 milioni di vite umane sono state perse come conseguenza dell'uso delle tecniche di FIV.

Tubal microsurgery as treatment for human infertility

*José Ángel Mínguez Milio**

Between 25-35% of female factor sterility has its origin in the fallopian tubes.¹ Furthermore, 20-30% of women who have undergone tubal sterilisation later express their desire to become mothers again.²

The fallopian tubes were first described in the sixteenth century by Gabrielle Fallopio. An Italian physician and anatomist born in Padua, he enjoyed a great reputation in his time, contributing numerous findings in Human anatomy.

The fallopian tubes are highly specialised organs. They consist of a musculo-membranous canal, about 7-14 cm in length, with various layers. The outermost layer is the peritoneal serosa. In the middle is the muscle layer, and inside is the mucosa with folds and cilia. The distal portion of the tubes, the fimbriae, will capture the egg after ovulation. This will be transported by the mucosal cilia and muscle contractions towards the ampullary region, where fertilisation will take place. The tubal secretions will capture the sperm so that they can fertilise the egg and will then nourish the embryo in its early developmental stages, transporting it to the uterine cavity, where implantation will take place. The problem, therefore, is not limited to the tubes being permeable, although this is fundamental.

Hence, a patient with sterility of tubal origin must face the following crossroads: *in-vitro* fertilisation (IVF) or reparatory surgery?

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1 PANDIAN Z. *Surgery for tubal infertility*. Cochrane Database Syst Rev. 2008; 3: CD006415; doi: 10.1002/14651858.CD006415.pub2.

2 SMIDT JE. *Requesting information about and obtaining reversal tubal sterilization findings from de U.S. Collaborative Review of Sterilization*. Fertil Steril. 2000; 74: 892-898 (level III).

Traditionally, problems in the fallopian tubes were resolved with surgery. Since the introduction of assisted reproduction techniques, and IVF in particular, surgery has lost part of its prominence. The reasons that have led to this are diverse. Some are technical, as the surgery requires extensive training to obtain satisfactory results. Others are economical, with assisted reproduction techniques sometimes become a tremendously profitable business. Other times, it is due to the pressure exerted by the patient herself, who wants immediate results and does not want to wait the time required after surgery for a pregnancy to occur. In any case, these reasons have not always answered the question: Which is better for me, doctor? Which gives the best results? What are the problems with each of the options?

And: Which is better? we might ask. The answer is that there are no randomised studies comparing the efficacy of surgery with IVF, or even with expectant treatment.³

However, there is reasonable evidence that surgery may be highly effective in selected patients.⁴

What are the strong points of surgery. Reconstructive surgery is a curative procedure, aimed at restoring fertility permanently by a single intervention. After successful surgery, new pregnancies are possible without requiring new treatment for each cycle. Anatomical restoration does not raise any ethical concerns. The psychological benefits for the couple, of being able to conceive a child after normal sexual intercourse, cannot be ignored. The economic cost of the intervention is similar to that of one IVF cycle. The risks derived from the procedure, including surgery and anaesthesia are usually very low. Those of pregnancy are similar to those of the general population, unlike those of pregnancies achieved by IVF, as

3 PANDIAN. *Surgery...*

4 SCHIPPERT C. *Is there still a role for reconstructive microsurgery in tubal infertility? Current opinión.* Obstet Gynecol. 2011; 23: 200-205; ZAREI A. *Reconstructive, organ preserving microsurgery in tubal infertility: still an alternative to in vitro fertilization.* Fertil Steril. 2010; 93: 1359-1361; THE PRACTICE COMMITTEE OF THE AMERICAN SOCIETY FOR REPRODUCTIVE MEDICINE. *Committee Opinion: role of tubal surgery in the era of assisted reproductive technology.* Fertil Steril. 2012; 97: 539-545.

already mentioned in previous talks and widely recognised in the literature.⁵

With respect to surgery, the weak points are that the results are highly dependent on the experience of the surgical team.

The ideal candidate is a young patient (<37 years) (except in the case of re-permeabilisation after tubal ligation, in which women over this age also have good results) with a lesion localised in a specific segment of the tube, with a length after repair of at least 4 cm. The presence of the distal portion (fimbriae) is necessary, with no other associated sterility factors, such as severe ovulatory dysfunction or male factor sterility.

When we have a couple with a sterility problem, the first thing that we propose is an accurate diagnosis. All good diagnoses start with a proper anamnesis. Previous history of ectopic pregnancy, pelvic inflammatory disease (PID), endometriosis or pelvic surgery increase the suspicion of sterility of tubal origin. Evaluation of the tubal factor, permeability and function, is a key point in the assessment of the infertile patient. All methods available for evaluating the fallopian tubes have limitations, which means that several are often required.

Hysterosalpingography (HSG) is a simple and relatively atraumatic method, so it should be the first choice. It consists of performing an x-ray of the uterus to which radio-opaque contrast medium has previously been administered through a cannula inserted through the uterine cervix. It shows us the uterine cavity and the tubal lumen, until the contrast can be seen passing to the peritoneal cavity. The advantage of this test is that when it is normal, tubal pathology can be practically discarded. When it is abnormal, or there are doubts, a further step must be taken in the diagnosis; diagnostic laparoscopy is

5 WISBORG K, INGERSLEV HJ, HENRIKSEN TB. *IVF and stillbirth: a prospective follow up study*. Hum Reprod. 2010; 25: 1312-1316; BERTELSMANN H, DE CARVALHO GOMES H, MUND M ET AL. *The risk of malformation following assisted reproduction*. Dtsch Arztebl Int. 2008; 105: 11-17; ALLEN VM, WILSON RD, CHEUNG A. *Genetics Committee of the Society of Obstetricians and Gynecologists of Canada (SOGC); Reproductive Endocrinology Infertility Committee of the Society of Obstetricians and Gynaecologists of Canada (SOGC). Pregnancy outcomes after assisted reproductive technology*. J Obstet Gynaecol Can. 2006; 28: 220-250.

the gold standard. Laparoscopy is indicated if there is evidence or high suspicion of endometriosis, adnexal adhesions or significant tubal disease, especially in young patients with no other added sterility factors.

With respect to the most common diagnoses, at proximal level, the most common is to find a temporary blockage due to a muscle spasm, which is a false positive. More than 60% of proximal obstructions are due to this situation,⁶ which does not require any treatment. On other occasions we find plugs due to mucus or detritus, as well as small polyps, myomas or endometriosis. The most severe proximal blockage is due to salpingitis isthmica nodosa (SIN).

Distal involvement is usually due to pelvic inflammatory disease, either due to infection, previous surgery or endometriosis. It causes what is known as a hydrosalpinx, which is an accumulation of fluid inside the tube that causes its thickening; it may reach various sizes, occasionally damaging the mucosa or musculature of the tube itself.

Lesions in the third layer are due to either an ectopic pregnancy or previous tubal ligation.

Bilateral or massive involvement of the tube has a poor prognosis with respect to the possibility of repair.

Once the problem has been diagnosed, there are several treatment options according to each case. In the case of a proximal blockages, the options are transcervical recanalisation or tubocornual anastomosis.

Transcervical recanalisation is an outpatient procedure that consists of the selective catheterisation of both tubular ostia in a radioguided procedure through the cervix, using a guidewire designed for such purpose; it allows small obstructions due to the accumulation of secretions or loose adhesions to be diagnosed and treated. It is a procedure that is generally well-tolerated, and sedation is possible if the patient demands it. It is generally performed in the follicular phase. Complications of the procedure are few and usually with no effects (3-11% tubal perforations).

6 HONORE GM. *Pathophysiology and management of proximal tubal blockage*. Fertil Steril. 1999; 71: 785-795.

A meta-analysis⁷ of studies in which patients with proximal obstruction were treated by selective catheterisation showed that the obstruction was overcome in 85% of cases and 50% of these patients became pregnant. Approximately one third of opened tubes become occluded again. Another review, with more than 1400 patients from various series, found that recanalisation was achieved in 80% of patients, and that approximately 30% of the total became pregnant.⁸

If transcervical recanalisation is not possible, resection of the damaged area and tubo-cornual anastomosis is indicated, i.e. joining the healthy distal area to the uterine horn by microsurgery. A recent Cochrane review showed a high pregnancy rate in cohort and case series studies.⁹ A very well known classic study showed a live birth rate with a follow-up of more than three years of 53%.¹⁰ Poor prognostic factors after surgery are a short tube length, chronic inflammation or endometriosis.

Another review study showed improved results using microsurgery techniques (58.9% pregnancies) compared to macrosurgery (36.5%).¹¹ Another study with 68 patients by the Hamburg group (Dr. Schippert) showed tubal anastomosis results (excluding ligation reversal) of 56% intrauterine pregnancies.¹²

Another useful procedure in sterility of tubal origin is adhesiolysis. This is a procedure to release or excise adhesions that affect the tubes, ovaries and/or uterus, making it difficult for them to function normally. It is usually carried out using a laparoscopic approach, which is less aggressively invasive. The intrauterine pregnancy rates following microsurgical adhesiolysis vary widely according to the

7 HONORE. *Pathophysiology...*, pp. 785-795.

8 THURMOND AS, MACHAN LS. *A review of selective salpingography and Fallopian Tube Catheterization*. *Radiographics* 2000; 20: 1759-1768.

9 JOHNSON N. *Surgical treatment for tubal disease in women due to undergo in vitro fertilization (review)*. *Cochrane Database Syst Rev*. 2010; 1: CD002125. doi: 10.1002/14651858.CD002125.pub3.

10 PATTON PE. *Microsurgical reconstruction of the proximal oviduct*. *Fertil Steril*. 1987; 47: 35-39.

11 HONORE. *Pathophysiology...*, pp. 785-795.

12 SCHIPPERT C, BASSLER C. *Reconstructive organ preserving microsurgery in tubal infertility: still an alternative to in vitro fertilization*. *Fertil Steril*. 2010; 93: 1359-1361.

study (20-80%), basically due to using different criteria for evaluating patients. There is no standardised procedure for assessing tubal damage that is universally accepted. The poorest results occur in patients with firm adhesions and extensive involvement of the tubes. A study with 147 patients in whom adhesiolysis was performed by laparotomy showed a cumulative pregnancy rate of 40% compared to 8% in the untreated group. The follow-up was 12 months.¹³ In the study by Dr. Schippert (Hamburg), the pregnancy rate after adhesiolysis was 42.2%.¹⁴ In another recent study,¹⁵ a mean pregnancy rate of 40% was achieved, with much better results in cases of mild adhesions (75%) compared to severe cases (33%).

When occlusion of the tubes occurs at the level of the fimbriae, something known as hydrosalpinx occurs, i.e. the distension of the most distal part of the fallopian tube due to the accumulation of fluid caused by the blockage. Not all hydrosalpinx conditions are equally reparable. According to the American Society for Reproductive Medicine (ASRM), conditions with a good prognosis are considered to be those without firm and/or extensive adhesions, mildly dilated tubes (<3 cm), thin and pliable walls, with thick endosalpinx and preserved folds.¹⁶

Procedures that can be carried out are salpingoneostomy (when an obstruction has to be opened completely) or fimbrioplasty (in the case of phimosis at the level of the fimbriae). In all cases, microsurgery techniques have improved the results enormously.

Normally, the best results are obtained after fimbrioplasty, as it is performed in less damaged tubes. One study that evaluated the results after treatment of hydrosalpinx with laparoscopy found better results in patients with a good prognosis (58-77% intrauterine pregnancies with 2-8% ectopic) compared to those with a poor prognosis

13 TULANDI T. *Treatment-dependent and treatment – independent pregnancy among women with periaidnexal adhesions*. Am J Obstet Gynecol. 1990; 162: 354-357.

14 SCIPPERT, BASSLER. *Reconstructive...*, pp. 1359-1361.

15 FEINBERG FC. *Infertility surgery is dead: only the obituary remains?*. Fertil Steril. 2008; 89: 232-236.

16 THE PRACTICE COMMITTEE OF THE AMERICAN SOCIETY FOR REPRODUCTIVE MEDICINE. *Diagnostic evaluation of the infertile female: a committee opinion*. Am Soc Reprod Med. 2012; 98: 302-307.

(0-22% intrauterine and 0-17% ectopic).¹⁷ Another study that prospectively evaluated the pregnancy rate according to the prognosis of hydrosalpinx using microsurgery techniques found 59% full-term pregnancies with 4% ectopic in patients with a good prognosis, compared to 3% full-term pregnancies and 16% ectopic in those with a poor prognosis.¹⁸ Dr. Schippert's group found an intrauterine pregnancy rate of 54.6% after fimbrioplasty and 34.6% after salpingoneostomy.¹⁹

A recent meta-analysis showed similar pregnancy rates after salpingoneostomy/fimbrioplasty, depending on whether they were performed by laparotomy (43.7%) or laparoscopy (41.6%).²⁰ As the latter is less aggressive, it appears to be the best technique to use.

We have already mentioned that a not insignificant percentage (25%) of women with tubal ligation show a renewed desire for pregnancy. There is abundant scientific evidence to back the efficacy of microsurgery as the treatment of choice in these situations, with pregnancy rates between 40-97%.²¹ The reasons for such disparity in the data have been studied in depth, the most notable being the patient's age.²² With respect to the approach, there are insufficient randomised studies comparing laparoscopy and laparotomy. In general, the results are better in procedures performed by mini-laparotomy (and using microsurgery techniques) than using the laparoscopic approach.²³ The procedure is much shorter in mini-laparotomy. Some studies (non-randomised) have recently appeared, comparing the use

17 MILINGOS SD. *Laparoscopic treatment of hydrosalpinx: factors affecting pregnancy rates.* J Am Assoc Gynecol Laparosc. 2000; 7: 355-361.

18 BOER-MEISEL M, TE VELDE E. *Predicting the pregnancy outcome in patients treated for hydrosalpinx: a prospective study.* Fertil Steril. 1986; 45: 23-29.

19 SCHIPPERT, BASSLER. *Reconstructive...*, pp. 1359-1361.

20 AHMAD G. *Laparoscopy or laparotomy for distal tubal surgery? A meta-analysis.* Hum Fertil. 2007; 10: 43-44.

21 KIM SH, SHIN CJ. *Microsurgical reversal of tubal sterilization: a report on 1118 cases.* Fertil Steril. 1997; 68: 865-870; MOON HS, JOO BS. *High pregnancy rates after microsurgical tubal reanastomosis by temporary loose parallel 4-quadrant sutures technique. A long-term follow up report of 961 cases.* Hum Reprod. 2012; 27: 1657-1662.

22 HANAFI MM. *Factors affecting the pregnancy rate after microsurgical reversal of tubal ligation.* Fertil Steril. 2003; 80: 434-440.

23 GOMEL V. *Reversal of tubal sterilization versus IVF in the era of assisted reproductive technology: a clinical dilemma.* Reprod Biomed Online. 2007; 15: 403-407.

of the Da Vinci robot with microsurgery techniques.²⁴ They give similar pregnancy rates, with longer surgery time and somewhat shorter recovery in the robot cases.

The conclusions of this review are as follows:

Surgery has a place in the treatment of infertility of tubal origin.

There is reasonable evidence to recommend transcervical re-anastomosis to treat proximal obstructions in young women with no other significant infertility factors.

Tube-cornual anastomosis has been shown to be highly effective in selected patients.

There is reasonable evidence to recommend adhesiolysis, fimbrioplasty and neosalpingectomy in patients with no other significant infertility factors.

There is strong evidence to recommend microsurgical anastomosis for reversing tubal sterilisation, even in patients over 40.

Patients should be properly informed so that they can participate in the decision taken.

Key words: tubal microsurgery, re-permeabilisation of the tubal, treatment of the tubal injuries.

Parole chiave: microchirurgia tubarica, ri-permeabilizzazione della tuba, trattamento per i danni tubarici.

SUMMARY

Between 25-35% female sterility originates in the Fallopian tubes. Even though in the latest years reconstructive surgery has relinquished its leading role to assisted reproduction techniques, we still believe it is a valid option in selected patients. Patients need to be informed about that option in order to decide on their treatment.

²⁴ RODGERS AK, FALCONE T. *Tubal anastomosis by robotic compared with outpatient mini-laparotomy*. *Obstet* 2007; 109: 1375-1380.

RIASSUNTO

Microchirurgia tubarica come trattamento per l'infertilità umana.

Fra le diverse cause di sterilità femminile, circa il 25-35% ha origine nelle tube di Falloppio. Anche se negli ultimi anni la chirurgia ricostruttiva ha perso il suo ruolo centrale a causa del massiccio uso delle tecniche di procreazione assistita, siamo convinti che questa sia un'opzione ancora valida in determinate pazienti. Si ribadisce, pertanto, la necessità di informare le pazienti sull'esistenza di tale opzione al fine di decidere sul loro trattamento.

Knowledge of female sexual cycles through self-observation for the treatment of human infertility

Ana Otte*

Introduction

“One in eight couples in the United States has trouble getting or staying pregnant- one in three couples in which the woman is over 35 and one in two in which the woman is over 40. And these figures have been on the rise for decades. Right now, more than nine million American women seek treatment for fertility issues every year, and their partners need treatment, too.

Infertility medicine today is all about aggressive surgical, pharmacological, and technological intervention. It’s a high stakes, high pressure world. But making babies is still best as a natural process. So we aim to support a woman’s ability to bear a child with just enough help to get nature to do its thing. There are hundreds of thousands of families out there that exist thanks to intensive and aggressive medical intervention-and here’s to them! – but for many women, there is a better way”.¹

Natural Family Planning (NFP)

The utility of female sexual cycles has always stood out in natural fertility regulation methods for preventing or postponing pregnancy, and for trying to achieve it. The latter has received less attention,

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¹ DAVID S, BLAKEWAY J. *Making Babies A Proven 3-Month Program for Maximum Fertility*. Boston: Little Brown and Company; 2007.

but in recent years, increasing numbers of scientific papers have appeared evaluating its usefulness in studies on impaired fertility.

Basic concepts of NFP

NFP is based on the observation of biological indicators that occur during the woman's menstrual cycle. Through these signs, women can distinguish the fertile from the infertile phases, and identify the time of ovulation, how close it is, the moment of ovulation itself (± 2 days) and when it occurred. When pregnancy is not desired, the couple abstain from sexual intercourse on the days recognised as probably fertile, and take advantage of these days when trying to become pregnant.

These natural methods do not interfere in any way with the natural course of the cycle. No drugs are taken; neither devices nor artificial barriers are used. Fertility remains totally intact and the body is respected as it is. The couple themselves can decide when to have another child: if they know how to recognize the wife's fertile days, they will be able to manage their own fertility. The husband learns to respect his wife and can demonstrate affection, showing that he does not mind postponing sexual relations for the good of everybody. The couple recognize their combined fertility and the wife acquires valuable knowledge about her body. This knowledge is free and for life. The most important thing is that the couple consciously share their procreative responsibility.

The biological indicators that indicate fertility or infertility are basically the mucus that is produced in the cervical crypts by hormonal action, and the basal body temperature. Both parameters evolve characteristically during the cycle:

- The amount of mucus is directly proportional to the amount of hormones secreted. Progesterone is responsible for the thick mucus that acts as a biological barrier at the entry to the uterus and does not allow the sperm to pass. These die within a few hours due to the acidity of the vagina ("infertile" mucus). The oestrogens are responsible for a fluid mucus that favours the ascent of the sperm into the uterus and their survival for several days ("fertile" mucus). This fer-

tile mucus, which can be detected by women in the vulva, appears a few days before ovulation and increases in quantity and quality around ovulation (mucus PEAK). After ovulation, through the action of progesterone produced by the corpus luteum, thick, viscous and opaque mucus is again produced throughout the postovulatory phase in the cycle which prevents the passage of spermatozoa.

- The temperature is low in the pre-ovulatory phase with an increase around ovulation, caused by the action of progesterone from the corpus luteum on the hypothalamic temperature-regulating centre, and remains high until the onset of the next menstruation.

The major methods that are widespread throughout the world today are the Basal Body Temperature Method (BBT), which is based on the changes in the BBT during the menstrual cycle of a woman in the fertile age, the Billings Ovulation Method (BOM), which is based on cervical mucus observation only, and the Symptothermal Method, which includes measurement of the basal body temperature (BBT), changes in the cervix, and other indicators of minor importance.²

The fertility window

More than the 95% of spermatozoa ejaculated into the vagina do not survive for more than four hours due to the acidic environment. When fertile cervical mucus is present, the remaining 5% of spermatozoa is captured and stored in the cervical crypts where they can begin the series of modifications called capacitation. In the fertile cervical mucus spermatozoa can survive for about five days with individual variations. Taking into account that the oocyte survives approximately 24 hours, we can establish that the fertility of a couple depends on the survival of the sperm in the fertile cervical mucus and on the life of the oocyte.³

2 OTTE A, MEDIALDEA C, GONZÁLEZ F ET AL. *El sistema reproductivo humano. Cómo reconocer la fertilidad. El método sintotérmico*. Madrid: EUNSA, 2009⁵.

3 FUSI FM. *Viability of human spermatozoa*. IEEF/EIFLE Conference of Natural Family Planning. Future role and development. Milan, 28th June-2nd July 2000 (retrieved on 05.11.2012, at: <http://www.eifile.org/conferences/milano/abstracts.xml>).

Defining this fertile time, i.e. the “physiological fertility window” is the challenge of all NFP methods: This “fertility window”, which is detected empirically by observing the biological indicators of the menstrual cycle, has been confirmed by studies conducted with comparisons of the mucus peak, daily urinary hormone analysis and notations of the days on which sexual intercourse takes place. In a retrospective cohort study by Stanford, the object was to examine the probability of conception on different days of the menstrual cycle, as defined by the standardized observation of vaginal discharge from cervical mucus, using chart review from records of couples. There were a total of 2,407 completely recorded menstrual cycles of observation with 108 conceptions. This study proves the hypothesis that the maximum fertility occurs from intercourse on the peak day and the three days immediately preceding.⁴

The results of another study prove that pregnancy is possible since five days before ovulation and the day of the ovulation.⁵

Comparison of ovulation with clinical tests and biological indicators of the menstrual cycle

Attempts have been made to determine whether the supposed ovulation detected through self-observation coincides with real ovulation. To that end, various clinical tests indicative of ovulation have been performed: luteinising hormone (LH) levels 28 to 36 hours before ovulation, ultrasound measurement of the diameter of the lead follicle before rupture, cytological diagnosis and progesterone analysis indicative of the post-ovulatory phase.

In the case of ovulation proven by cytology and progesterone levels, it has been confirmed that both parameters correspond to a late luteal phase (progesterone: 26.5 ng/ml), i.e. ovulation has occurred

4 STANFORD JB, SMITH KR. *Variation in fecundity in the menstrual cycle*. IEEF/EIFLE Conference of Natural Family Planning. Future role and development. Milan, 28th June-2nd July 2000 (retrieved on 05.11.2012, at: <http://www.eifile.org/conferences/milano/abstracts.xml>).

5 STANFORD JB, WHITE GL, HATASAKA H. *Timing Intercourse to Achieve Pregnancy: Current Evidence*. Am Coll Obstet Gynecol. 2002; 100: 1333-1341.

previously. Confirming imminent ovulation by ultrasound monitoring of the follicle until rupture and the LH concentration (21.2 mIU/ml) coincides, as in the previous case, with the graphic notations of users of the symptothermal method.⁶

Usefulness of knowing the menstrual cycle

The practical usefulness of monitoring the ovarian cycle lies in knowing the fertility window in order to seek, prevent or postpone pregnancy, to provide guidelines on the best date for performing hormone tests and measurements and timed intercourse in the case of difficulties in conceiving.

Knowledge of the menstrual cycle is also important for detecting disorders through changes in the cervical mucus and BBT patterns, which must be followed by specific tests and techniques that can be better managed from the start, saving time and cost.

When there is a change in the cervical mucus pattern, e.g. constant mucus, it may mean polycystic ovary syndrome; long-lasting fertile mucus indicates a possible functional ovarian cyst, or in the case of dryness with no changes, it may be ovarian failure.

When there is a change in the BBT pattern, e.g. a temperature increase longer than 16 days, it is probably due to trapped oocyte syndrome or pregnancy. A late drop in the high temperature level leads us to consider endometriosis.⁷

The most common changes in the BBT pattern detected by users of the symptothermal method are:⁸

1. A monophasic cycle (anovulatory):

Physiological in puberty, pre-menopausal and post-partum. Sepa-

6 SZCZAWINSKA M. *The Issue of the menstrual cycle charting for the early diagnosis of gynaecological disorders*. Natural Family Planning. Special Issue. Foundation Pro Humanae Vitae Cracow; 1997.

7 SANCHEZ-MENDEZ J-I. *Aplicaciones de los Métodos Naturales de la Regulación de la Fertilidad en el diagnóstico y tratamiento de la esterilidad y la infertilidad*. Act Obst Ginecol. 1997; 9: 237-243.

8 SZCZAWINSKA. *The Issue...*

rately in women with normal cycles. Pathological in women with recurrent monophasic cycles.

2. A short post-ovulatory phase (<10 days):

Physiological during puberty, pre-menopause and post-partum. Separately in women with normal cycles. Pathological in recurrent short luteal phase (inadequate progesterone production by the corpus luteum). This is the cause of 4-20% of infertility and 35% of spontaneous and early miscarriages.

3. A prolonged post-ovulatory phase (>16-18 days) indicates a probable persistent corpus luteum:

if the pregnancy test is negative it indicates a luteinisation of the Graafian follicle due to failure to rupture, cyst or blood in corpus luteum. If the pregnancy test is positive: the result is a pregnancy (in 97% of cases).

Results of a study on the treatment of infertility with “Naprotechnology” (Natural procreative technology)⁹

This technology is based on monitoring the biomarkers of the menstrual cycle according to the Creighton Fertility Care System™ (CrMS) model, in order to detect hormonal dysfunction in the female reproductive system that may be the cause of existing infertility and, according to the findings, to apply hormone or surgical treatments to restore reproductive function to achieve conception naturally (the Creighton Model is a standardised modification of the Billings ovulation method, introduced by Dr. Thomas W. Hilgers in the United States).

Number of participants: 1,072 couples. Age of the women: 25-48 years (mean: 35.8). Study period: 1998-2002. Participants' previous situation: trying to conceive for more than five years; 24% had achieved a prior birth, 33% had undergone assisted reproduction but failed.

9 STANFORD JB, PARNELL TA, BOYLE PC. *Outcomes From Treatment of Infertility With Natural Procreative Technology in an Irish General Practice*. J Amer Board Fam Med. 2008; 21 (5): 375-384.

After treatment of the abnormalities detected (50% sub-optimal serum reproductive hormone levels, 25% deficient cervical mucus production, 10% polycystic ovary syndrome), women were instructed in self-observation of the biological signs of the cycle, in this case, the application of the Creighton model.

The results obtained were: in the first 12 months, 27.1% live births, after 24 months 52.8% live births (among these 4.6% twins). Five percent conceived without medical intervention, with the Creighton method and timed intercourse alone. 88% of babies were born to term, none had low birth weight, there was no ovarian hyperstimulation and a minimum risk of twin or multiple pregnancy.

Conclusion

The results are comparable to birth rates with more invasive treatments, including assisted reproduction, and do not have any ethical drawbacks, because they respect the dignity of persons and the true nature of conjugal love.

NFP can be a valuable help in responsible planning pregnancy after physical, mental and medical preparations. The knowledge of the basic fertility indicators is extremely important in the cases of sub-fertility, because it makes possible planned intercourse. Therefore it is worthwhile to encourage patients to carry out self observations so that they are aware of their natural fertility pattern so this can be used in medical practice.¹⁰

But if there is absolutely no way of achieving a child, one has to explain to the couple that the desired child is a gift which one either receives or not, but that this is not essential to one's life. If it proves impossible, one should give up on that idea and open one's mind to new goals which can be followed together.

¹⁰ SZCZAWINSKA. *The use of the menstrual cycle...*

Key words: female reproductive system, natural family planning (NFP), basic fertility indicators, fertility window, naprotechnology.

Parole chiave: sistema riproduttivo femminile, pianificazione familiare naturale, indicatori base di fertilità, finestra fertile, naprotecnologia.

SUMMARY

Self-observation and the graphic follow-up of the menstrual cycle in cases of supposed infertility, help to diagnose and treat certain gynaecological alterations in order to carry out the sexual intercourse focused on optimising conception. Through these natural procedures (Naprotechnology), with no ethical drawbacks, we can obtain birth rates that are comparable, or even higher, to those obtained with invasive treatments.

RIASSUNTO

La conoscenza dei cicli sessuali femminili attraverso l'auto-osservazione per il trattamento della sterilità umana.

L'auto-osservazione e il follow-up grafico del ciclo mestruale in caso di presunta sterilità, aiutano a diagnosticare e trattare certe alterazioni ginecologiche, al fine di attuare il rapporto sessuale finalizzato ad ottimizzare concepimento. Attraverso queste procedure naturali (naprotecnologia), prive di aspetti negativi da un punto di vista etico, possiamo ottenere tassi di natalità che sono paragonabili, o addirittura superiori, a quelle ottenute con trattamenti invasivi.

History of Spanish law in the regulation of assisted reproduction techniques: the legal and family neglect of human life in vitro

*Pilar María Estellés Peralta**

Assisted reproduction technologies (ART) enjoy a wide social acceptance, as they enable many sterile couples, same sex couples and single women to have a child. It could be said that assisted reproduction techniques have conferred on mankind new powers over human life from conception. Paradoxically, scientific and technological progress, advances in the life sciences, have meant a regression in the protection of human life and dignity.¹ The Law, far from being an instrument for protecting and safeguarding the individual, has contributed to treating the human being in the embryonic stage as an object and not subject of Law. And Spanish law is among the pioneers.

At present, assisted reproduction techniques are regulated in Spain under current Law 14/2006, of 26 May.² According to the annex of Law 14/2006, which can be extended by the Government by Royal Decree, assisted reproduction technologies are: *a.* Artificial insemination (AI); *b.* *In-vitro* fertilisation (IVF) and intracytoplasmic sperm injection with the man's own or donor gametes (ICSI) and embryo transfer (ET); *c.* Gamete intra-fallopian transfer (GIFT).³ Throughout the presentation, we will highlight that Spain is one of

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1 In same way, CICCONE L. *Bioética. Historia. Principios. Cuestiones*. Madrid: Palabra; 2005: 130.

2 *Law 14/2006*. Boletín Oficial del Estado 2006; 126: 19947-19956.

3 The application of any other technique not included in the Annex isn't absolutely prohibited; it's just conditioned to a National Commission on Assisted Human Reproduction previous report.

the most “advanced” countries in the lack of protection of human embryonic life, as it permits reproductive treatments to be carried out that are not allowed in other countries.

In Comparative law, few countries have adopted specific legislation on assisted reproduction, mainly European countries: Spain, Law 14/2006 on assisted reproduction technologies; England: *a.* Human fertilisation and embryology act 1990, *b.* Law of 1st April 2005 (on donor anonymity), *c.* Surrogacy arrangement act, 1985 and *d.* Complementary act, 1991; Sweden: *a.* Law 1140/84 on artificial insemination, *b.* On *in-vitro* fertilisation, June 1988 and *c.* Law on artificial insemination of 1990; Germany, Law on protection of the embryo, of 13 November 1990 (entered into effect on 1 January 1991); Italy, regulations in matters of Medically Assisted Procreation, Law no. 40/2004; France, Law on Bioethics of 29 July 1994 (Law 94-654). Outside the European environment: Australia, State of Victoria, Infertility Act, 1984; Costa Rica, Decree no. 24.029 of 1995, on the Regulation of Assisted Reproduction.

Other countries have introduced partial amendments to the Civil Code, such as those relating to the impossibility of contesting the paternity of the husband of the woman who has given his consent for her to be inseminated with donor semen. For example: Portugal (Civil Code Art.1839), Canada (Québec Civil Code, art. 539); Bolivia (Family Code, art. 187); Chile, Law 19.585/99, which amends the Civil Code in matters of filiation, article 182, among others.

It can be stated that today, the legislative outlook on the subject is very complicated, even without going outside the EU. Little consensus has been reached in the EU on assisted reproduction. In general, it can be said that there are two groups of legislation on assisted procreation in Europe:⁴

a. The first is integrated with laws that seek to satisfy the desire for a child at all costs through assisted procreation techniques. In this respect, either no particular conditions are set for access to the

4 ANDORNO R. *Regulación legal de las técnicas de procreación asistida: síntesis de la legislación europea y comentario de dos proyectos de ley presentados al Senado argentino*. Persona 2006; 58 (retrieved on 30.11.2012, at: <http://www.revistapersona.com.ar/Persona57/57Andorno.htm>).

techniques (for example, stable couple and not a single woman) or they are very lax. The interest of the minor in having a legal father and mother who match their biological father and mother is also left to the side, on legitimising the use of anonymous donor gametes. These types of laws disregard the protection due to human embryonic life, which is reduced to a mere material for selection and subsequent freezing for experimentation and/or destruction. This group includes, among others, Spanish laws 35 and 42 of 1988 and current law 14/2006, of 26 May and the 1990 British Human Fertilisation and Embryology Act.

b. The second group consists of laws which, while accepting assisted reproduction techniques, try to find a balance between these and the ethical and legal requirement to protect human embryonic life, and to safeguard the interests of the child resulting from the use of these techniques. Thus, these laws prohibit, to a greater or lesser extent, experimentation with embryos, as well as their selection and freezing, setting a maximum limit on the number of embryos that can be obtained in each attempt (normally three), all of which must be transferred to the uterus of the biological mother. In this group of legislations, the 1990 German law on protection of the embryo (*Embryonenschutzgesetz*) and the laws adopted in Austria (1992), Switzerland (1998) and Italy (2004) particularly stand out.

SPANISH REGULATION AND THE LACK OF PROTECTION OF THE UNBORN CHILD

The laws regulating this matter in Spain are:

- Law 35/1988 of 22 November on Assisted reproduction techniques . Law 35/88 was one of the first laws enacted among the legislations developed on this matter in countries with a similar cultural and geographic environment.

- Law 42/1988, of 28 December on donation and use of human embryos and foetuses or their cells, tissues or organs (in force until 5 July 2007).

- Law 45/2003, of 21 November, amending Law 35/1988, of 22 November on ART.

- Law 14/2006, of 26 May, on Assisted Human Reproduction Techniques.

- Law 14/2007, of 3 July on biomedical research.

Art. 15 of our Constitution establishes that “*Everyone has the right to life and to physical and moral integrity*”.

The terminology deliberately employed in the provision by the legislator is significant. There is no mention of the person or man and woman; rather that “*Everyone*” is, including the human being in any of its stages.

From a legal point of view, the precedent to note in this issue is the Judgement of the Constitutional Court (CC) 53/1985⁵ regarding the amendment of article 417 bis, of the Penal Code, which legalises the crime of abortion in three situations. The Judgement related the value of human life with the fundamental legal value of the dignity of the person enshrined in Article 10 of the Constitution. In order to lay down rules governing the protection of unborn life (*nasciturus*), the ruling prescribed in Legal Basis 5 that human life was a “process that begins with gestation (...)”: Life is a reality from the beginning of pregnancy; “The life of the unborn child, as it embodies a fundamental value – human life – guaranteed in Article 15 of the Constitution, constitutes a legal right for which protection is provided in the aforementioned constitutional basis provision”; This unborn life includes all its stages: “preembryo”, embryo, foetus, which begin with gestation. Then, for the CC, the unborn child is not considered as a subject of the right to life, but as a constitutionally protected legal right⁶ whose protection was found in the said constitutional basis provision, but was denied ownership of said right while it still did not have a legal personality which, according to the provisions of the Civil Code, art. 29 was conditional to being born, without taking into account that the same article 29 paragraph two states “... *but the conceived being is assumed to be born for all intents and purposes which may be favourable to it, provided that it is born with the conditions set out*”.

⁵ *Judgement of the Constitutional Court 53/1985*. Boletín Oficial del Estado 1985; 94.

⁶ *Legal Basis 7, Src 53/1985*.

in the following article". Even so, the CC ruled that the unborn child is protected by art. 15 of the Constitution.⁷

With everything, the life of the unborn as a constitutionally protected right requires of the State: "The positive obligation of contributing to the realisation of these rights, and the values that they represent...".⁸

This protection that the Constitution bestows on the unborn implies two obligations for the state in general: That of abstaining from interrupting or hindering the natural process of gestation, and that of establishing a legal system for the defence of human life that involves effective protection of the same and that, given the fundamental nature of life, also includes, as a final guarantee, criminal provisions.⁹

We will see that Act 35/1988 introduced a notable change in this respect. It fragments the continuity of human life from fertilisation by denying the condition of "human life" to the non-viable, pre-implantation embryo. For Law 35/1988, the viability of the human embryo was a necessary requirement for such protection. Only the viable "preembryo", alive and suitable for transfer to the woman's uterus and its subsequent development, was considered to have a right which had to be legally protected.¹⁰

The Constitutional Court has had occasion to rule on this matter in two important decisions (CCR 212/1996 and CCR 116/1999), not precluding further discussion on whether the treatment of the human embryo is compatible with the dignity of the person and his inherent rights. Instead, both rulings deviate from the doctrine established by the Constitutional Court itself in CCR 53/1985 and consider as good the lack of legal protection of the human embryo enshrined in the Law on Assisted reproduction.¹¹

7 *Legal Basis 5, STC 53/1985*. See in this sense: VIDAL MARTÍNEZ J. *Derechos inherentes en la reproducción asistida*, in BALLESTEROS J (ed.). *La Humanidad in Vitro*. Granada: Comares; 2002: 268-269.

8 According to *Legal Basis 4, STC 53/1985*.

9 See art. 160, Código penal español.

10 ZURRIARÁIN RG. *La progresiva desprotección jurídica de la vida humana embrionaria en España: de la ley 35/1988 a las leyes 14/2006 y 14/2007*. Cuad Bioét. 2009; 20: 158-181.

11 BELLVER V. *El estatuto jurídico del embrión* in BALLESTEROS. *La Humanidad...*, p. 255.

So, we find the new Law 14/2006, of 26 May, on Assisted Human Reproduction Techniques. This law, unlike law 35/1988 as it did in its Statement of Reasons (which has no legislative nature), defines and regulates in article 1-2 what is meant by pre-embryo: “*the in-vitro embryo made up of a group of cells resulting from the progressive division of the oocyte from its fertilisation to 14 days later*”. This definition, as well as an oral artifice,¹² does not have a rigorous scientific basis and establishes differential legal treatment of the two stages of human life. The aim is clear: to permit the manipulation, modification and elimination of human embryos, the idea that the human condition is not acquired from the moment of fertilisation has been “legally” introduced.¹³

For his part, EU attorney general, Yves Bot, in his interpretation of Directive 98/44 on biotechnological inventions, issued an opinion following a question before the Court of Justice of the European Community by a German court because of a German researcher who had patented neural stem cells isolated and purified from embryonic cells, specifically the blastocyst. The report (non-binding) tackles one of the most controversial issues: what is and is not a human embryo, reaching the conclusion that “the concept of human embryo is applied from fertilisation”. Likewise, he was in favour of the establishment of a single definition of embryo for all member states. “This is not”, he said, “a matter that should be left to the discretion of countries”.¹⁴

In my opinion, the definition of embryo should not be left to the discretion of lawyers, legislators or courts. The Law should be confined to regulating and providing protection to transcendent realities of the same Law which are determined by nature and science. The person is not or does not start with the Law but is prior thereto. The Law should be an instrument for its protection and safeguarding.

12 The Dictionary of the Royal Spanish Academy of Language not includes the term “pre-embryo”.

13 LOPEZ GUZMÁN J. *El estatuto biológico del embrión* in BALLESTEROS. *La Humanidad...*, pp. 176-177. In the same way: ANDORNO. *Regulación legal...*, p. 4. Also, CICCONE. *Bioética...* p. 81 and ff.

14 *Report March 10th, 2011. Case C-34/10. Request a preliminary ruling insted by the Bundesgerichtshof (Germany)*. See also: LOPEZ GUZMÁN. *El estatuto...*, p. 185 and ff.

The existence of the person and their recognition cannot be determined by legal regulations. The legal concept of person is an instrumental concept. Like any other legal concept, it serves as a vehicle; it is not the last instance. Otherwise, not every person would be a human being, but only those in whom the law of every age recognised that quality.¹⁵

Assisted reproduction techniques and above all, the legal regulation of these, have disrupted the role of subject of Law attributed to humans traditionally differentiated from all other realities through the basic distinction between people and things. With *in-vitro* fertilisation, humans are not procreated, but produced; thus, the objectification of persons formed as a result of such techniques occurs imperceptibly; humans are considered as mere reproductive materials,¹⁶ or as a meagre raw material; or as an object for donation.

SOME CONTROVERSIAL PRACTICES IN ASSISTED REPRODUCTION AND OTHER DEVIATION

ART users

Spain: Law 14/2006: art. 6 permits all adult women with full capacity to act regardless of their marital status and sexual orientation to use ART.

Treatment of single women is also permitted in England.

It is not permitted in France, Germany, Austria, Italy or Norway.

In Sweden, it is allowed if, in a stable heterosexual couple, partners are living together.

15 DORAL JA. *Concepto filosófico y concepto jurídico de persona*. Per y Der. 1975; II: 113-130; HERNÁNDEZ GIL A. *Perspectiva sociológico-jurídica de la persona* in QUINTANA JM. *En torno al concepto de Derecho Civil*. Salamanca: Ediciones Universidad de Salamanca; 1959: 7-10; DIEZ PICAZO, GULLÓN L. *Sistema de Derecho Civil*. Vol. I. Madrid: Tecnos; 1989: 237.

16 VIDAL MARTÍNEZ. *Derechos inherentes en la reproducción...*, pp. 268-269; ANDORNO R. *Bioética y dignidad de la persona*. Madrid: Tecnos; 1998: 112.

In the case of access to single women, the child is deprived of his paternal ancestry in the moral and legal framework. This measure goes against the higher interests of the child and their development as a person¹⁷ (art. 10 Spanish Constitution). Children have rights that must be respected; they are entitled, before taking measures with respect to them, for those measures that promote and protect their rights to be adopted, and not those that infringe them.

Production of oocytes

Current law 14/2006 abolishes the limit of production of 3 oocytes per cycle, to ensure (it says) the success of fertilisation processes. The number of oocytes fertilised in each case will be determined by the professionals responsible for the assisted reproduction process (art. 3.2).¹⁸

The norm thus disregards the advisability of not producing surplus embryos, then allows the express production of embryos destined for death or research, which is the main aim of the law. Otherwise, the law should limit the transfer of embryos per cycle to one. The law should aspire to resolving the problem of frozen embryos and not make it worse, if possible.¹⁹

Donation of gametes and donor anonymity

In relation to this aspect, some European laws (Germany, Austria, Switzerland, Italy) prohibit or at least discourage the use of gametes from third parties, as this practice generates fragmentation of the paternity and/or maternity between various individuals and gives rise

17 VIDAL MARTÍNEZ. *Derechos...*, p. 289.

18 German Law does not allow to produce more ovules than those that can be transferred to a woman in the same cycle – maximum of 3. *Embryo Protection Act* of December 13, 1990 (Embryonenschutzgesetz).

19 ANDORNO. *Regulación legal...*, p. 3.

to what some psychologists call “ascendency void” in the child, since the gamete donors are normally anonymous.²⁰

In Spain, article 5 of Law 14/2006 regulates donation and establishes that the donation must be anonymous; only exceptionally, in extraordinary circumstances that threaten the life of the child or their health, can the donor’s identity be revealed.

Swedish law recognises the right of the child born through donor AI to know the identity of his/her biological father when they reach the age of majority. It is the only country that refuses the right to anonymity of the semen donor in favour of what it considers a right of the child.

Adoption is a legal resource aimed at providing a permanent home to a child who has been abandoned or neglected. As indicated in the Convention on the Rights of the Child, adopted by the United Nations General Assembly on 20 November 1989, approved and ratified by Spain on 26 January 1990, “States Parties that recognise and/or permit the system of adoption shall ensure that the best interests of the child shall be the paramount consideration (...)”. Gamete donation does not meet the purpose of adoption as there is no neglected or abandoned child to protect, and frozen embryo donation should only make sense and be authorised as an emergency solution.²¹

Postmortem artificial insemination

German legislation prohibits and expressly sanctions it²² and Swedish law implicitly prohibits it. The prohibition is based on the need for the child conceived through artificial insemination to have access to both parents.

Spanish law 14/2006, of 26 May, accepts post-mortem artificial

20 *Ibid.*, p. 5. “No parece lo mejor para la salud psíquica del niño que se provoque deliberadamente una disociación de la paternidad y la maternidad entre diversos sujetos (“padre legal”, “padre biológico”, “madre legal”, “madre biológica”).”

21 *Ibid.*, p. 3.

22 Article 4.3 *Embryo Protection Act* of December 13th, 1990 (*Embryonenschutzgesetz*, Germany) establishes imprisonment up to three years or economic sanction.

insemination (art. 9) if it occurs within 12 months (previously 6 months with law 35/1988, of 22 November) after the death of the husband or partner provided that these have previously consented by public deed or will (in order to recognise the legal, matrimonial or non-matrimonial parentage of the child born).

This regulation poses other problems relative to heredity.

Surrogacy

Both German and Swedish laws prohibit surrogacy although they do not sanction the surrogate mother or the parents.

Spanish law considers the surrogacy contract invalid (art. 10); parentage will be determined by the birth. Law 14/2006 does not sanction the surrogate mother or the parents either.

England is the only European country that has a specific law on this point, which does not prohibit surrogacy

Creation and selection of human embryos for purposes other than reproduction: saviour siblings

The progressive lack of legal protection of the embryo can also be detected in this point:

Law 35/1988 prohibited the creation of human embryos for purposes other than reproduction (art. 3).

Law 14/2006 authorised so-called “saviour siblings” or genetic selection of “pre-embryos” for therapeutic purposes for third parties. This technique, according to the Law, “will be performed in certain cases and under administrative control and authorisation”.²³

Briefly, the technique consists of the *in-vitro* production of a genetically selected compatible embryo with the exclusive aim of curing his/her sick sibling.

²³ General Provisions in Law 14/2006, May 26th about assisted reproductive techniques (Spanish Law).

The ethical issue in this matter lies in the fact of creating a human life with the sole aim of serving a purpose other than its own good, which is none other than to develop as an adult. To this is added the medical and ethical problem that this entails, which is that to obtain an immunologically compatible embryo it is necessary to generate an abundant number of embryos which are discarded, not because they are carriers of the risk gene or because they have some genetic defect, but due to their genetic incompatibility with their sibling.²⁴

From an ethical and legal point of view, this practice is incompatible with the respect due to the human embryo, to its dignity, and is only justified from a utilitarian concept of human life.²⁵ Instrumentalisation of the person thus occurs on reducing the person to a means to obtain benefits which are not for them but useful for third parties.²⁶ The human being is objectified.

It is surprising and contradictory that the Law prohibits, on one side, the modification of non-pathological hereditary traits and the selection of individuals by race (art. 13.2c) and, on the other, approves preimplantation diagnosis, which is another way of selecting human individuals, human embryos chosen due to their genetic characteristics and ascribed to an end extrinsic to the embryo itself: to cure a sibling.²⁷

Research with embryos

Law 35/1988 prohibited the creation of human embryos for purposes other than reproduction (*art. 3*). For this reason, any intervention on the viable “pre-embryo” transferred to the maternal uterus

24 ZURRIARÁIN. *La progresiva...* p. 169.

25 In same meaning, ID. *El utilitarismo ético en la investigación biomédica con embriones humanos*. *Pers Bioét.* 2008; 65: 16-28.

26 CICCONE. *Bioética...*, p. 51 and ff; KANT I. *Grundlegung zur Metaphysik der Sitten* (1785) (tr. es. *Fundamentos de metafísica de las costumbres*. Madrid: Santillana; 1996: 51). “Actúa de tal modo que trates a la humanidad, tanto en tu persona como en la persona de cualquier otro, siempre como un fin y nunca como un medio”.

27 ZURRIARÁIN. *La progresiva...*, p. 169.

should be exclusively for diagnostic purposes and for therapeutic or preventive purposes, art. 15.2. On the contrary, article 15.3 legalised non-therapeutic research and experimentation in *in-vitro* embryos, biologically “non-viable” and non-transferred.

Consequently, according to Law 35/1988, only research with viable “preembryos” was permitted in Spain, if said research had a diagnostic, therapeutic or preventive nature for the “pre-embryo” itself.

In this respect, any research carried out for other purposes could only use dead or non-viable human pre-embryos.

For its part, Law 42/1988, of 28 December 1988, on *Donation and Use of human embryos and foetuses or their cells, tissues or organs*, like Law 35/88, required the non-viability of the embryo or foetus as a fundamental criterion for permitting their use for research purposes.

The serious problem of the fate of supernumerary pre-embryos propelled Law 45/2003, of 21 November, which amended law 35/1988, of 22 November: in accordance with the legislation in force until 2003, research with human embryos in Spain in no case could resort to viable “surplus” embryos from IVF. Only research with non-viable “pre-embryos” was permitted.

The approval of Law 45/2003 is therefore a further step in the legal history of the lack of protection of human life: non-transferred viable embryos, frozen prior to the entry into force of the law, which have the corresponding informed consent, and which had not been transferred to the biological mother or donated to others, could be used for stem cell research, once their death had been verified, after thawing without revival.²⁸ However, embryos cryopreserved after the entry into force of Law 45/2003 could only be used for the reproductive purposes of the generating couple or donation to other women.

It seems surprising, as Lacadena notes, that on one side, research with embryos frozen until the entry into force of the law is autho-

²⁸ ZURRIARÁIN. *La progresiva...*, pp. 165-166.

rised while, on the other, said use is prohibited in the future (art. 11.3) “because if a thing is bad, it is always bad”.²⁹

However, to be able to carry out this measure, the reform needed to change the meaning given to the term “viability” up to then. The meaning of “viability” in Law 45/2003 was not only biological, as in the previous legislation, but also “functional”. Research with frozen embryos was not justified because these did not have the ability to restart their development process, but rather, being biologically viable, functionally they lacked viability, as they were supernumerary embryos from IVF techniques that had exceeded the term for their transfer (5 years Law 35/1988 and the fertile life of the woman Law 45/2003) and were not going to be accepted by their parents, or donated, or due to various circumstances, personal or social, related with the parents, could not be used for reproduction.³⁰

One degree further in the lack of legal protection of humans was added in current Law 14/2006, of 26 May, which generalises the possibility of researching with “pre-embryos” and establishes the possibility of donating them for research (art. 11-4 and art. 15), following the written consent of the couple, in projects that have the authorisation of the National Commission for Assisted Reproduction and under the control and monitoring of the competent health authorities. Their viability is not mentioned.

Moreover, if the parents do not renew their consent for 2 biannual renewals (total period of 4 years) the law confers the decision on the fate of the “pre-embryos” on the clinics (art. 11.6): cryopreserved “pre-embryos” become a source of raw material for research, thus confirming one of the most important aims of Law 14/2006: the “donation” of embryos fertilised by IVF for research purposes.³¹ It is clear that non-renewal of consent confers the clinics with the power to dispose of these embryos.

29 LACADENA JR. *La experimentación con embriones sobrantes en España. Un comentario a la Ley 45/2003 que modifica la Ley 35/1988 sobre Técnicas d Reproducción Asistida*. *Rev Der Genom Hum.* 20; 2004: 194.

30 ZURRIARÁIN. , pp. 165-166.

31 *Ibid.*, pp. 165-169.

CONCLUSIONS

Spanish legislation has implemented a process of increasing legal and familial abandonment of incipient human life, or in other words, a process of instrumentalisation of the human being in its early stage.

It started with the distinction of human life in its early stages of development by denying the so-called “pre-embryo” consideration as a human being and continued with the legal acceptance of the production of “surplus” embryos that had be stored frozen and, later, allowing research on non-viable embryos (Law 35/1988 and Law 42/1988); it later permitted, with some limitations (which did not have any other purpose than thawing and death), research on viable frozen embryos (Law 45/2003) and finally it authorised the production and use of viable embryos for research (Law 14/2006).

Research that starts from human embryos, whatever their state and whatever the potential future benefit to third parties, cannot be justified either legally or ethically, since it is not going to benefit the life and health of the embryo itself, a legal right constitutionally protected by the Spanish Constitution in art. 15.

Parents who permit the creation of more embryos than will be transferred, who do not renew their consent allowing clinics to use their children as raw material for experiments are abdicating their parental duties imposed by nature and by law. The result is that the human being in its earliest stages, a time when it should receive the most protection, is neglected by both the law and its parents, who do not fulfil their duty towards their children. Who then protects the human being in its embryonic stage?

Key words: legal regulation of assisted reproduction, legislation on assisted procreation in Europe, legislation on assisted procreation in Spain.

Parole chiave: norme sulla riproduzione assistita, legislazione sulla riproduzione assistita in Europa, legislazione sulla riproduzione assistita in Spagna.

SUMMARY

The history of Spanish law in the regulation of assisted reproduction techniques has left *in-vitro* human life unprotected from a legal and familial point of view. Spanish law cannot be considered a tool for protection and safeguard of human life as seen in some controversial practices of the reproductive techniques, such as “savior siblings” and *postmortem* artificial insemination, among others.

RIASSUNTO

Storia della legge spagnola in tema di tecniche di riproduzione assistita: l'abbandono legale e familiare della vita umana in vitro

La storia della legge spagnola in tema di tecniche di riproduzione assistita mostra come la vita umana *in-vitro* risulti non essere stata protetta dal punto di vista legale e familiare. La legge spagnola non può essere considerata uno strumento per la tutela e la salvaguardia della vita umana, come si è potuto vedere in alcune pratiche controverse di tecniche riproduttive, come nel caso dei “savior siblings” e dell’inseminazione *postmortem*.

Assisted procreation from the perspective of business or medical ethics

Francisco J. Lara*

The relationship between bioethics and the economy goes hand in hand with ethics. This relationship has been studied in the academic and scientific literature,¹ but without sufficient attention. More recently, Holland (2011)² discussed the role of Virtue Ethics in relation to bioethics, and this is certainly one of the most topical issues, as it was the subject of the latest edition of *Business Ethics Quarterly* in 2012.³

In this article, we hope to demonstrate the existence of an authentic economic business, a real reproductive market behind the medical world of bioethics and infertility. This is what is known as the “Baby Business”⁴ or “Commerce à la Carte”.⁵ Therefore, we hypothesise whether it is possible in this type of market (the “Baby Business”) to apply the generally accepted principles of subsidiarity, solidarity, reciprocity and gratuitousness.

There are three controversies that regularly arise:

- Cost-benefit analysis of *in vitro* fertilization (IVF).
- Cost analysis of multiple pregnancies.
- Inequality in access to infertility services.

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1 EISER AR, GOOLD SD, SUCHMAN AL. *The role of bioethics and business ethics*. *J Gen Intern Med*. 1999; 14: 58-62; EPSTEIN M. *How will economic downturn affect academic bioethics?*. *Bioethics* 2010; 24: 226-233; FISCHER J. *Lessons of business ethics in bioethics*. *J Bus Ethics*. 2001; 34: 15-24.

2 HOLLAND S. *The virtue ethics approach to bioethics*. *Bioethics* 2011; (25) 4: 192-201.

3 *Reviving Tradition: Virtue and the common good in business and management*. *Bus Ethics Q*. 2012; 22 (2).

4 SPAR D. *The Baby Business: How money, science and politics drive the commerce of conception*. Boston: Harvard Business Press; 2006.

5 ZEGERS-HOCHSCHILD F, ADAMSON GD, DE MOUZON J. *International Committee for Monitoring Assisted Reproductive Technology (ICMART) and the World Health Organization (WHO) revised glossary of ART terminology, 2009*. *Fertility and Sterility* 2009; 92 (5): 1520-1524.

Cost-benefit analysis

Since 1978, around 60,000 cycles have been carried out in the US annually, resulting in around 18,000 pregnancies. Of the latter, 15,000 culminated in successful births. When we analyse its costs, in a first pedagogical approach, we can state that the average cost per cycle is around 10,000 dollars, with a 25% success rate, so the average rises to 40,000 dollars to guarantee its success.⁶ In Spain, these costs are lower, around 5,000 euros per cycle.

According to an article by Patricia Katz⁷ and other authors, published in *Nature Medicine* in 2002, the evolution of IVF in the US between 1985 and 1998 (in round numbers) has risen from 2,389 to 61,284 cases, which represents a multiple of over 25 times. For its part, in the EU we had reached (in the same year, 1998) a figure of more than 193,111 IVF cycles, i.e. three times the total number of US cases. However, the success rate for cycles in the US is 24.7%, while these rates are lower in the EU.

In 1998, according to data provided by the Journal,⁸ there were 360 assisted reproduction clinics in the US, of which 31 clinics in 3 US states offered services covered by medical insurance; their cycle rates were higher than average, and the birth rates lower than the aforementioned average. In another 5 states, with 27 clinics, the coverage for this service was mixed or partial, while in another 37 states with a total of 302 clinics, there was no public coverage for said service.

Consequently we can state that “state-mandated health insurance coverage of *in-vitro* fertilization services is associated with greater utilization of such services but with reductions in the number of embryos transferred per cycle, the proportion of cycles resulting in pregnancy, and the proportion of pregnancies with three or more fetuses”.

6 GUZICK DS. *Should insurance coverage for in vitro fertilization be mandated?*. *N Engl J Med.* 2002; 347: 686-688.

7 KATZ P, NACHTIGALL R, SHOWSTACK J. *The economic impact of the assisted reproductive technologies.* *Nat Med.* 2002; 8: S29-S32.

8 JAIN T, HARLOW BL, HORNSTEIN MD. *Insurance coverage and outcomes of in vitro fertilization.* *N Engl J Med.* 2002; 347: 661-666.

However, if we take the previous Nature (2002)⁹ article as a reference, it consistently argues that medical coverage by states is one of the reasons why the practice of IVF is very widespread in Europe if we compare it with the US in overall numbers. From an economical point of view, this also explains the price differences between them, which range from 10,000 in the US to 5,000 in the EU. Half. I.e. that we, the public, are subsidising 50% of the costs via taxes, which the states then allocate to the health institutes.

Yet, is this really a “socially constructed need” or a “disease or medical condition” that should be covered by the State? In short, we are talking about a reproductive market that moves more than 3,000 million dollars annually. This market includes the following processes or procedures in its value chain:

- Donation of gametes.
- Artificial insemination.
- *In-vitro* fertilisation.
- Cloning.
- Sale of ova.
- Surrogacy.

The Business Journal of Milwaukee (2002)¹⁰ pointed out the existence of Egg Banks in the US, with an average cost of around 10,000 dollars for obtaining ova and about 500 dollars per year for their storage. Their stored frozen eggs, have only produced 46 viable births. So, we need to ask ourselves the same question as Dr. Jane Orient, Executive Director of the American Medical and Surgical Association: How many women are selling their chances of motherhood for a few hundred or thousand dollars?

9 KATZ, NACHTIGALL, SHOWSTACK. *The economic...*, pp. S29-S32

10 TREWYN P. *Local doctor starts human egg bank*. Bus J Milwaukee. 2002 (retrieved on 5.11.12, at: <http://www.bizjournals.com/milwaukee/stories/2002/11/04/story2.html?page=all>).

Cost analysis multiple pregnancy

The aforementioned Nature article (2002)¹¹ reports that, in order to guarantee the success of IVF, patients often resort to the transfer of several embryos, which is considerably increasing the cases of multiple pregnancies.

This increment in multiple pregnancies is undoubtedly one of the most worrying elements in IVF, and is one of the priority objectives of embryo reduction, in order for it to be successful. From an economic or cost point of view, we can see that patients and families are not properly informed.

In the specific case of twins, the direct hospital costs are four times that of a single birth. If they are triplets, this figure is multiplied by 11, and if they are quadruplets, by 100. This is without counting the indirect costs derived in the long term due to the increased risk of complications such as cerebral palsy, chronic problems or learning disabilities often derived from necessarily premature births.

In the Cost-Benefit study, or Risk and Profitability of said investment, it would be interesting to make a practical reflection, allowing ourselves the luxury of accepting the benefits that this market effectively has, but logically they must be proportionate and higher than the costs involved, both tangible and intangible. Thus, we try to justify the goodness of this market initially, and see what would be the benefits of strengthening this market and the costs of not doing so.

If we think carefully, we will find one, two or three reasons that justify this market (strengths) and the same with the costs of not strengthening it (threats).

However, if we delve into its opposite, i.e. the costs of strengthening it (weaknesses), as well as the benefits of seeking other alternatives (opportunities), we will discover that while in the first case the arguments and reasons were true in the short term, often they are not so in the long term, or they are even false reasonings that do not hold up to logical and rational in-depth critique.

11 KATZ, NACHTIGALL, SHOWSTACK. *The economic...*, pp. S29-S32.

Inequality of access to infertility treatments

Thirdly, the view of Infertility as a socially constructed medical necessity or a medical illness is a radical question. Thus, in the US, it is generally a treatment borne by the interested parties, while in the EU it is expected (and in fact has been established) as a treatment highly subsidised by the State, i.e. by each and every one of its citizens through taxes.

For example, Australia, Austria, Denmark, Finland, France, Germany, Iceland, Holland, Norway and Sweden provide public funds for IVF.¹² In the US, infertility is viewed as a “socially constructed need” and not as an illness, so therefore is excluded from generally accepted medical coverage.

This explains, as we mentioned earlier, the difference in prices between the EU and the US, which practically doubles the costs. However, the issue to be discussed is whether this is a fundamental right or a socially constructed need. We cannot say either scientifically or socially that this is a disease. Therefore, we can state that it is a socially constructed need, which as such should not be subsidised by the State.

Growth of the reproductive market or the “Baby Business”

In 2009, Lord Robert Winston, in the United Kingdom, criticised in an article published in “The Guardian”¹³ that the supervisory authority for assisted reproduction clinics in Great Britain had not controlled the disproportionate growth of these types of clinics, which had multiplied by 10 in recent years, and that on that date, some 87 clinics were invoicing more than 500 million sterling pounds, which resulted from more than 30,000 patients who underwent about 40,000 cycles at an average cost of 8,000 pounds.

12 HUGHES G, GIACOMINI M. *Funding in vitro fertilization treatment for persistent subfertility: the pain and the politics*. *Fertil Steril*. 2001; 76: 431-442.

13 JHA A. *Winston: IVF clinics corrupt and greedy. Fertility expert says industry exploits women and watchdog is failing them*. *The Guardian*, 31 May 2007 (retrieved on 05.11.2012, at: <http://www.theguardian.com/science/2007/may/31/medicineandhealth.health>).

However, these data drew our attention, since the average success, as we stated previously, in achieving a birth is around 3-5 cycles, so according to adjusted data, the amount would rise to at least 1,000 million pounds.

In Spain, we have data from the “Rainbow Institute” and the “Instituto Bernabeu”, where the approximate cost per cycle is around 7,500 euros, and where there have been more than 2,500 treatments in the last year.

Analysing the Spanish case in more depth, and taking the Valencian Region as a reference (and more specifically, Valencia city alone), of the latest accounting information available from the 5 major assisted reproduction companies, among which the IVF undoubtedly stands out, these clinics invoice more than 40 million euros annually. The IVF Valencia alone invoices more than 25 million euros annually, not to mention that most of their business is not in Spain but abroad, mainly in Latin American countries.

Recently, we have been finding advertising deals for these types of treatment in TV shows, as well as offers for not inconsiderable discounts, such as price reduction from 4,500 to 3,750 per treatment.; i.e. discounts of around 20%.

Conclusion

The fallacy that we encounter is that the “infertility” treatments initially accepted for the treatment of infertile couples, are beginning to be used for preimplantation genetic diagnoses in couples who do not have any fertility problems, so this type of cost-benefit analysis should be further examined to examine both its efficacy and efficiency as well as its ethical requirement.

Media pressure for the States to regulate and increase support by subsidising these types of treatments continues. Recently, the newspaper “The Economist”¹⁴ echoed the pressures to which Poland is

¹⁴ CARR G. *Poland and IVF. Deeply divisive*. The Economist, 23 July 2012 (retrieved on 12.11.2012, at: <http://www.economist.com/blogs/easternapproaches/2012/07/poland-and-ivf>).

being subjected to regulate and subsidise these types of treatments by the State.

It is notable that in the American case, the alternative to IVF of adoption is proposed, undoubtedly as an alternative measure for the less affluent classes, given the cost of treatment. This is due in part to the lower medical coverage for these services by some states and public institutions. On the contrary, perhaps in Europe this alternative is not considered as economical or effective, because said service is being subsidised. It is paradoxical that a society in the middle of a severe economic crisis is engaged in subsidising these types of treatments, while others less in crisis do not even raise the issue.

However, from both an economic and ethical point of view, the alternative is clear.

The solution that we propose is to promote, both economically and if necessary through the specific support of the State, adoption. Not only because it is more effective and efficient, but especially because it is much more ethical. Allow me to introduce the aforementioned principles one by one: subsidiarity, solidarity, reciprocity and gratuitousness. In a business context there are costs and benefits, which clearly contribute directly to the common good, to the good of one another, of parents who want to have a child and cannot and of children who want to have parents and do not. The question with which we will end and which will hopefully help us to reflect, is not if there is a right for parents to have a child, but if there is a right (and a fundamental right) for children to have parents. And consequently, to prioritise the children's right over the other.

Key words: baby business, business ethics, medical ethics.

Parole chiave: baby business, business ethics, etica medica.

SUMMARY

This article hopes to demonstrate the existence of an authentic economic business, a real reproductive market behind the medical world of bioethics and infertility. This is what is known as the "Baby Business". We hypothesis

whether it is possible in this type of market (the “Baby Business”) to apply the generally accepted principles of subsidiarity, solidarity, reciprocity and gratuitousness.

RIASSUNTO

La procreazione assistita dalla prospettiva della business ethics o dell’etica medica.

L’articolo ha l’obiettivo di dimostrare l’esistenza di un vero e proprio business economico, un vero e proprio mercato riproduttivo dietro al tema dell’infertilità. È ciò che è noto con il nome di “Baby Business”. Se possibile, per questo tipo di mercato (il “Baby Business”), ipotizziamo di applicare i principi generalmente accettati di sussidiarietà, solidarietà, reciprocità e gratuità.

IVFET and medicine of desire

*Jesús Ballesteros**

Anthropological emergency. Market society and culture of separation

Since the end of the 60s, we have been living an anthropological crisis, catastrophe or emergency,¹ caused by the extension of nihilism, a loss of reality and a loss of sense. May 1968, and post-structuralism called into question the idea of continuity of self, to the point of referring to the human being as an individual, and volatised the central precept of ethics, the golden rule: the requirement to do onto others as we wish them to do onto us. As the self is seen as various, it is sufficiently occupied in its various selves and it is impossible to escape from it and take care of others.²

The causes of this nihilism can be seen, among others, in these two contemporary phenomena:

1. Firstly, as the Encyclical *Caritas in Veritate* highlights, the commodification of society, or market society, produces “cultural levelling and indiscriminate acceptance of types of conduct and life-styles”.³ The market society must be distinguished and even contrasted with the market economy. In this the fundamental thing is the freedom and responsibility of people, and therefore it requires ethical criteria above the market such as truthfulness, loyalty, transparency, as well as equality of treatment in free competition. On the contrary, in a market society ethics has disappeared,

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1 BARCELONA P, SORBI P, TRONTI M ET AL. *Emergenza antropologica: per una nuova alleanza tra credenti e non credenti*. Milan: Guerini e Associati; 2012.

2 BALLESTEROS J. *Postmodernità: decadenza o resistenza*. Milano: Ares; 2000: 66-70.

3 BENEDICT XVI. *Encyclical Letter “Caritas in veritate”* (29.06.2009), n. 26.

as all reality is subject to the market, and therefore anything goes because everything has a price, and therefore can be an object of transaction, purchase and sale. As Schumacher⁴ graphically said, “it takes the sacredness out of life because there can be nothing sacred in something that has a price”. The principle “too big to fail” is the keystone of the current financialisation of the economy, of the current market society, and at the same time it is radically incompatible with a real market economy as it reveals the defence of an oligopolistic system, hostile to free competition.⁵

2. Secondly, the culture of *separation*, which arises from the rupture of the unity of reason, to which its substantive dimension is denied: the capacity to discover the meaning of life and non-negotiable values, and reduces it to calculating reasoning, instrumental reasoning, which serves only efficiency.⁶ Both dimensions are related, as it was inside the same economic theory, specifically in Mainstream Economics or Neoclassical Economics, where objective values have disappeared in favour of only focusing on desire.

This loss of the unity of reason leads to dichotomies and dualisms, e.g.

a. Between technique, identified with calculating reason, to which is recognised the legality to operate without limits, and nature, and within it the human body, both of which are seen as objects of manipulation, exploitation and dominance.

b. Among the activities that fall within the competence of calculating reason, such as productive activities (and for our topic, procreative activities, now called reproductive due to the influence of biological reductionism) and those activities that move due to irrationality and chance, such as sex.⁷

4 SCHUMACHER EF. *Small is beautiful. Economics as if people mattered*. New York: Harper Perennial; 1973.

5 BALLESTEROS J. *Globalization: from chrematistic rest to humanist wakefulness in Globalization and Human Rights: challenges and answers from a European perspective*. Dordrecht, Heidelberg, New York, London: Springer; 2012: 22-25.

6 ID. *La costituzione dell'immagine attuale dell'uomo* in YARZA I (a cura di). *Immagini dell'uomo*: Roma: Armando; 1996: 23-30.

7 DE JOUVENEL. *La civilization de pouissance*. Paris: Fayard; 1974; TÖFFLER A. *La tercera ola*. Barcelona: Plaza Janés; 1982: 53-57.

c. Between humans who may have calculating reason, which is also a reason at the service of dominance and control, like adults, and those who are still not in conditions to exercise it, such as embryos, foetuses, infants. The former are considered rights holders and the latter, not.⁸

The medicine of desire

One of the manifestations of nihilism, produced by market society and the culture of separation is called by the German clinical psychologist Matthias Kettner, medicine of desire.⁹ Its fundamental characteristics consists in believing that the patient has become the client and that the right of this individual to choose is unquestionable, and his belief that disease and pain are avoidable injustices in all cases must be respected. Therefore, the medicine of desire is “medicine for *enhancement*”, which goes beyond maintaining good health and is materialised in a series of desires to which correspond medical interventions and which relate to the start of life, infancy and youth, adult life and the end of life. González Quirós y Puerta¹⁰ list an unending table of desires, which confirms the Aristotelian idea that desire knows no limits (see p. 992).

The supposed right to have children at any cost

Within these unlimited client desires is the right to have children at any cost.

This pretension however confuses two types of rights, which need to be clearly differentiated:

⁸ BALLESTEROS J. *Exigencias de la dignidad humana en la biojurídica*. Riv Intern Filos Diritto. 2002; 2: 177-208.

⁹ KETTNER M. “Wunscherfüllende Medizin” zwischen Kommerz und Patientendienlichkeit. Ethik Med. 2006; 1: 81-91.

¹⁰ GONZÁLEZ QUIRÓS JL, PUERTA JL. *Tecnología, demanda social y medicina del deseo*. Med Clin (Barc). 2009; 133: 671-675.

<i>DESIRE</i>	<i>MEDICAL INTERVENTION</i>
<i>a. Start of life</i>	
Desire not to father a child after fully consensual intercourse	Morning-after pill
Desire to engender a child with a certain sex	Preimplantation genetic diagnosis (PGD) for sex selection
Desire to engender a child without the participation of a man (man not included!)	Acquisition of an ampoule of semen in a gamete bank (e.g. www.cryos.dk)
Desire to give birth to a child on a certain date	Elective caesarean
Desire to conceive a child after a hysterectomy	Surrogacy
<i>b. Childhood and youth</i>	
Desire to reach a certain height growth	Hormones that stop or increase
<i>c. Adult life</i>	
Desire to modify sexual attributes	Breast augmentation, penis enlargement, etc.
Desire to modify the physiognomy	Aesthetic medicine and surgery
Desire to improve the state of wakefulness social abilities or sexual potential	Modafinil, fluoxetine, sildenafil, etc.
Desire for a sex different to the chromosomal sex	Gender reassignment surgery
Desire to receive more holistic or “spiritual” medical care	Alternative and complementary medicine, acupuncture, ayurveda, etc.
Desire for better physical performance	Erythropoietin, steroids, etc.
Desire to get rid of a healthy limb (apotemniphilia)	Surgical removal of the unwanted limb
Desire for surgery without scarring	Laparoscopic techniques, etc.
Desire to look young	Anti-aging treatments (chemical, physical and surgical)
Desire not to go under general anaesthesia	Local anaesthetic techniques
<i>d. End of life</i>	
Desire to die without suffering or awareness	Terminal sedation
Desire for immortality	Cryogenic techniques

a. The rights understood as *liberty rights*, or exclusive or reserved rights, which must prevent the interference of the state in the person's life. These are called first generation rights, sometimes designated as negative rights in reference to the requirement for abstention by the State.

b. *Claim rights*, also called second generation rights, and positive rights, which require positive action of the right to give them effectiveness.¹¹ In relation to the issue of procreation, the regulation of IVF incurs in the absurdity of considering that there is a positive right to have children at any cost, when in fact the only real right existing is procreative freedom, which should in no case be hindered by the State, as still happens in some countries, especially in the one that can be seen as a leading world economic power: China.

IVF, together with abortion, is the principle serious result of the current anthropological crisis in the field of biorights. From it comes, like a domino effect, other violations to life and human dignity present nowadays such as:

a. freezing of embryos, a most elemental denial of the right to the human environment, and in short of the right to life;¹²

b. comparing the human being with merchandise, and therefore subjecting it to quality control;

c. discrimination between siblings who are allowed to be born and other siblings, who are discarded so that the former can be born;

d. the devaluation of the human body, which leads to the pretention to surpass the species *homo sapiens* by genetic manipulation as advocated by transhumanism and posthumanism.¹³

Against this background is an urge to recover human ecology, and with it the awareness that the positive right to maternity and

11 HOFFELD WN. *Fundamental legal conceptions, as applied in judicial reasoning and other legal essays*. New Haven: Yale University Press; 1919.

12 BALLESTEROS J. *Il diritto alla vita e il diritto all'ambiente* in LÓPEZ TRUJILLO A, HERRANZ J, SGRECCIA E (eds.). *Evangelium vitae e diritto*. Città del Vaticano: Libreria Editrice Vaticana; 1997: 193-196.

13 BALLESTEROS J. *Biotecnologia, biolitica y posthumanismo, en Biotecnologia y posthumanismo* Pamplona: Thompson; 20: 21-46.

paternity is not the mothers' and fathers', but the childrens'.¹⁴ Only thus will the often cited but often ignored "best interests of the child" be properly taken care of. This proposal would require us to stop seeing *rights* as my claims versus others, but to see them simultaneously and preferentially as rights that others have in relation to me.¹⁵ This change will be possible only if we abandon the market society and culture of separation and we recover the important sense of human being and of life.¹⁶

Key words: calculating reason, market society, rights; posthumanism, human ecology.

Parole chiave: ragione strumentale, società di mercato, postumanesimo, ecologia umana.

SUMMARY

The triumph of instrumental and calculating reason over the reason which reveals meaning has led nowadays society to become a "market society", where everything becomes an object of venal and banal desire. In the midst of the situation described, there appears confusion between the legitimate right to have children – liberty right or prohibition of barriers for generation – and the false right to have children – claim rights or the demand to be a parent at any cost regardless of the harm caused to innocent third parties.

14 GARIBO AP. *Hijos de padre anónimo ¿Una nueva categoría discriminatoria?* in BALLESTEROS J, ENCARNACIÓN F (eds.). *Biotecnología y Posthumanismo*. Madrid: Thomson-Aranzadi; 2007: 487-503.

15 COTTA, S. *Absolutisation du droit subjectif et disparition de la responsabilité*. Arch de Philosophie droit. 1977; 22: 23-30; LEVINAS E. *Les droits de l'homme et les droits d'autrui*. Hors Sujet, Montpellier: Fata Morgana; 1987.

16 BALLESTEROS J. *Cristianesimo e diritti umani* in RODRÍGUEZ L, COLOM E (eds.). *Teologia ed etica politica*. Città del Vaticano: Libreria Editrice Vaticana; 2005: 63-77.

RIASSUNTO

FIVET e medicina del desiderio.

Il trionfo della ragione strumentale e calcolatrice su quella che rivela il significato delle cose ha condotto la società odierna a diventare una “società di mercato”, dove tutto diventa un oggetto del desiderio venale e banale. Al centro della situazione descritta, si è generata una confusione tra il legittimo diritto di avere figli – nel senso del diritto alla libertà o divieto di generare – e il falso diritto di avere bambini a tutti i costi, indipendentemente dagli eventuali danni causati a terzi innocenti.

Discerning medically assisted procreation: key concepts of the Magisterium of the Catholic Church

*Ignacio Carrasco de Paula**

Premise

I take it for granted that the opposition, in line of principle, of the Catholic Church with respect to medically assisted procreation (MAP) is sufficiently well known by the reader. The fundamental texts (I refer particularly to the instruction *Donum vitae*)¹ are easily accessible and furthermore, the latest edition of the Catechism of the Catholic Church ² states, with the clarity and concision typical of this literary genre, some of the ethical limits of these biotechnologies.

Therefore, my objective is not to explain that doctrine, but rather to examine some terminological, conceptual and hermeneutic issues that are essential for the correct interpretation and application of Church doctrine.

In the last fifty years, Catholic philosophy and theology have come a long way in the understanding of the nature and meaning of human love, and, with it, the understanding of the father/mother-child relationship. The use of the phenomenological method, and especially the personalist approach, has provided new cognitive instruments, correcting an excessively legalistic view of the marital experience. In some rare cases it has been possible to fall into the other end of the spectrum: a personalist perspective that is too one-sided

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1 CONGREGATION FOR THE DOCTRINE OF THE FAITH. *Instruction "Donum Vitae"* (22 February 1987).

2 *Catechism of the Catholic Church* (15 august 1997), nn. 2376-2378.

and runs the risk of marginalising the consideration of the ontological aspects that underlie love and human procreation.

It is precisely to eliminate that risk that these reflections start from the anthropological question: What is man? An appropriate answer, perhaps the most common today in the Christian cultural context, is the following: man is a person, understanding by person both the Boethian meaning (subsistent individual himself endowed with a rational nature) and the axiological perspective characteristic of modernity (an end in himself and never a mere instrument).

Another possible answer, no less appropriate although somewhat fallen into disuse, appeals to the Aristotelian paradigm of a rational animal (*zoon logikon*) in its double aspect indicative of the ontological status (what it is) and the ethical status (what it should choose to be). Since it is rationality that makes homo sapiens into a human being, it stands as the universal rule that regulates his behaviour. The contemporary statement “act according to what you are” (a person or corporeal being able to manage his own life) constitutes the core of what we call natural law.

This latter concept has almost disappeared from ethics treatises, leaving behind a huge vacuum that the category dignity is attempting to fill. It is an obvious process in bioethics. It is a proper procedure, but requires quite a few caveats, since natural law and dignity are not superimposable axiological profiles. Dignity invites us to choose according to what one is worth, the natural law according to what one is. Both concepts are certainly closely related, but they are not the same, and neither is it always possible to reach the same conclusions with them.

The complexity of the speculative context in which human procreation is placed cannot be covered from the single concept of dignity. A parallel moral reflection attentive to the metaphysical foundations is required, a reflection such as that crystallised in the second part of the *Summa Theologica* of Saint Thomas and which the anti-metaphysical bias assumed by modernity has helped to marginalise. That prejudice is perhaps the worst and most tragic mistake of modernity.

The natural moral law has very little to do with mechanical laws or legal regulations. For it, the so-called naturalist fallacy has no val-

ue (it would be wrong to move from is to ought), as the natural moral law does not access the moral plane from the physical plane mechanically or automatically. The natural moral law does not impose rigid categorical imperatives like “you must do this”, but rather proposes reasonable choices in the style of “you should choose to do this”. The natural moral law is present only where man can opt between behaving or not as befits the person or human nature, so that the ethical reflection would be a futile exercise if it could not be supported by an anthropological reflection. It is no accident that the loss of interest in the natural moral law coincides with the invasion of moral relativism.

Moral significance of “artificiality”

Since the very beginning, in referring to MAP, the Magisterium has used the adjective “artificial”: artificial insemination, artificial fertilisation. Some authors see in this an early denunciation of the ethical negativity of both procedures: reproducing with the aid of an artifice that which in itself is a natural process would necessarily entail corrupting it. However, this theory is erroneous, or at least arguable.

In 1949, at the IV congress of the IFCMA, Pius XII³ explained that the reservations held against artificial insemination and/or fertilisation by the Catholic Magisterium “does not necessarily prohibit the use of artificial means”. Why then is this adjective used, even with the risk of confusing less sensible persons? Because that is the terminology legitimately imposed by scientific language.

In general, science, and also medicine, coins terms that describe a human action or process or state, dispensing with its moral significance; e.g. the clinical expression “suspend fluids” in itself indicates nothing more than the decision to withdraw water provided intravenously or subcutaneously. In order for this act to be morally

³ PIUS XII. *Address at the IV International Congress of Catholic Doctors*. IFCMA. 29.09.1949.

classified, as well as “what is done”, “the reason why it is done”⁴ (intentionality) must also be taken into account, e.g. to relieve a generalised oedematous condition, or to reduce care during the terminal phase of a disease to only the essential, or even to obtain death by dehydration. In the latter case, “suspend fluids” would no longer be a therapeutic act like the other two, but a euthanasia practice.⁵

Artificial insemination (AI) per se means that the semen has reached the female genital tract, not as the exclusive result of a conjugal act, but thanks to the use of an instrument, an artifice (a cannula). Whatever the moral sign of that action, positive or negative, is another matter altogether, since it does not depend on the nature of the instrument used, but on how its instrumental use (that way of inseminating) is positioned (type of causality) with respect to the natural process of the procreative function: Does it modify it? Facilitate it? Impede it? Etc.

AI can work in the procreative process in two different ways: 1. by introducing the male semen obtained outside the conjugal act into the uterus, thereby substituting or marginalising that act, or 2. by collecting the semen ejaculated in the vaginal recess and successively transferring it past uterine cervix, and in that case helping to overcome an obstacle that causes sterility. The difference between these two modes is obvious, and crucial to the moral assessment. An artificial means is used in both cases, but in one it prevails over the natural act and replaces it, while the other, on the contrary, is placed at its service, it supports it.

There is a net difference in meaning between “natural” applied “to what is present or is given or produced by nature” (ontic level) and “natural” applied “to proper free action or in accordance with the way of being or nature of man” (ethical level). Classical philosophical language spoke of *secundum naturam* or also *secundum rationem*, since suitability or conformity is not decided automatically but is recognised by reason (*recta ratio*), thus making a good and

4 ANSCOMBE GEM. *Modern Moral Philosophy*. Philosophy 1958; 33: 1-19.

5 This is the case of Terry Schiavo and Eluana Englaro.

free decision possible. The formulation is complicated, but it is something that we do without difficulty every day.

Once and for all: that which opposes natural in its moral meaning is not the artificial, but what is contrary to reason, the unreasonable, the irrational.

It is understood thus because disregarding the marital act to create a child is unnatural, i.e. it is not reasonable, either from the point of view of the couple who aspire to become parents, or from the point of view of the child who could be conceived. It is not reasonable for many reasons, e.g. due to some unacceptable collateral practices (gamete donation) or because that procedure violates the dignity of the persons involved, etc., but above all because it does not make sense (it would be irrational) to leave aside the only moment (the conjugal union) that gives the spouses true procreative causality. Without that union, in the best case, the spouses would only supply the biological material required, but they would not truly be parents, even though they behave as such in the education of the newly conceived being.

On the contrary, using a cannula to help to overcome an anatomical obstacle which makes a conjugal act sterile is reasonable, just as it is reasonable to resort to hormone or surgical treatment when necessary to recover fertility.

We are thus faced with a core principle: human procreation is in accordance with the way of being human, it is natural or reasonable, when it takes place through the conjugal act. This act is *secundum naturam* in both senses cited: it forms part of the process intended by nature and, in turn, consents to the free participation of the spouses in the creation of a child through an act of donation which is at the same time bodily and spiritual.

Human procreation, production and reproduction: the logic of benevolence

Remember that by procreation we understand that human behaviour that sets the biological conditions necessary to enable a new human being to be conceived. This term contrasts with production

(manufacture or transformation of a thing) and reproduction (manufacture or generation of an identical item or a copy).

A person is neither a thing nor a simple copy representative of its species: each human individual is a unique being, inimitable and irreplaceable. Procreation follows a logic given to the person, such as the logic of benevolence (freely wanting good for another), the logic of the unconditional gift. Production and reproduction also have their logic, but it is not the logic of benevolence; it is the logic of productivity, the logic of obtaining satisfactory results for those who put it into practice (although not only for them).

The techniques used for MAP, which include *in-vitro* fertilisation with subsequent embryo transfer into a womb (IVF-ET), are placed in the logic of productivity, a logic that cannot not exclude a quality control mechanism to reject defective products. In fact, the evolution of IVF-ET, from its beginnings in 1978, has always pursued the best product possible according to the standards in use and the desires of the clients. Hence the simultaneous use of several embryos, the introduction of intracytoplasmic sperm injection into the ovum (ICSI), preimplantation diagnosis, embryo reduction, etc. It is very difficult for something that does not come from benevolence to be loved unconditionally.

Both the instrumental logic of IVF-ET, with some of its secondary consequences (in particular, embryo manipulation and loss) alone support a consistently negative moral judgement. However, as *Donum vitae* expressly states, not even the “simple case” (which theoretically should avoid those problems as it occurs with a single embryo) merits a different assessment.

Why? Because these techniques themselves violate the *ordo naturae*, from the time at which it is unreasonable for a human being to be caused, to be put into being, by virtue of a technical procedure, neither does it seem reasonable that two spouses who cannot create a child, choose to assume a passive role or a role of simple material cause in a biotechnological process which effectively sets the biological conditions necessary for the conception of the child.⁶ In oth-

⁶ In IVF-ET, the technical act is efficient cause and not only instrumental cause of the creation. It is instead an instrument of desire of the aspiring parents.

er words, in human procreation, technique logic takes the place of the logic of benevolence; in reality, the spouses do not “give” existence to that child, they only “wish” it, “request” it and, if all goes well, “receive” it. Once in their arms though, the spouses can embrace it, restoring the ties of benevolence that are essential to the father/mother-child relationship.

Ethical discernment of MAP: central role of the spousal union

The introduction of AI in obstetric practice at the end of the XIX century as a new therapeutic standard for the treatment of some forms of sterility encountered many difficulties from an ethical point of view. One of course was the understandable resistance to transferring a biotechnology developed in animal husbandry to the human world. In the Catholic sphere, several bishops asked the Congregation of the Holy Office for guidance. The question was formulated as follows: *an adhiberi possit artificialis mulieris fecundatio?* Is it morally licit to use AI in a woman? The response of the Congregation – a laconic but unequivocal *non licere*, it is not licit – was published in 1897 and ultimately confirmed the unanimous opinion of the most accredited moralists of the time. In fact, the technique as it was practiced then consisted of two unacceptable elements: 1. the sperm was obtained by masturbation, and therefore, 2. the conjugal act was dispensed with. Later, another serious problem would be added, by using sperm provided by a person other than the husband.

Fifty-two years would pass before the Magisterium of the Church would explain the reasons for this negative judgement in detail, and it would do so in an address by Pius XII in 1949,⁷ in order to moderate and channel the debate and arguments wielded among experts in favour of and against AI. Essentially, the Holy Father emphasised the following:

1. Only the spouses have a reciprocal right over their own bodies

⁷ PIUS XII. *Address...*

to engender new life, an exclusive and unalienable right (excluding the use of donors);

2. While it is true that AI can generate a child and that the desire of the couple to be parents is legitimate in itself (natural, reasonable), that is not sufficient to legitimise the use of that technique (it is not the same to be able to do something or want to do it, than to have the right to do it);

3. In contrast, the use of instruments “solely destined either to facilitate the natural act or to cause the natural act normally accomplished to attain its end” may be licit.

That is, the correct ethical discernment of MAP establishes that:

1. The conjugal union is the only ontologically and ethically appropriate foundation for the generation of a human being;

2. Simultaneously, any eventual medical treatment of sterility should be designed as an aid to, and never as a replacement for, the conjugal union.

Indeed, as we have seen, there is a substantial ontological and ethical difference between “aid” and “replace”: simple aid respects the father/mother-child relationship, while replacement irreversibly breaks that relationship, since the eventual conception of a child would be an effect caused by the medical act.⁸

Ethical discernment of MAP: “in vivo” conception

The Magisterium of the Church has also been concerned with another problem related with human procreation and apparently opposite in sign to infertility treatments; I am referring to contraception.

In 1930, Pius XI addressed the issue of contraception for the first time in an Encyclical (*Casti Connubii*),⁹ defining it as “any use whatsoever of matrimony exercised in such a way that the act is deliberately frustrated in its natural power to generate life”. Almost

⁸ Some manuals use the expression “Improper Artificial Insemination” to refer to procedures that respect the conjugal act. I think that this terminology should be avoided: what AI is or is not is established by Medicine; what is licit or not, and why, corresponds to Ethics.

⁹ PIUS XI. *Encyclical Letter “Casti Connubii”* (31 December 1930).

forty years later, Paul VI, in another Encyclical, *Humanae Vitae*,¹⁰ explained the principle better, speaking of “the inseparable connection between the two meanings of the conjugal act: the unitive significance and the procreative significance” Both expressions – “procreative virtue” and “inseparable connection” – are placed in the category of causality. Contraception is a behaviour that aims to strip the conjugal union of a power bestowed on it by nature, i.e. to be the source of existence of a new human being.

Oddly enough, that same action occurs in IVF-ET, although with one difference: contraception counteracts the procreative power of the conjugal union, while in IVF-ET that power is transferred to another situation: to the doctor who handles the test tube or who performs the ICSI.

Hence the correct ethical discernment of MAP assumes that the fertilisation and conception of a new human being occurs in its natural (or reasonable) place, i.e. “*in vivo*” (in the woman’s genital tract) and never “*in vitro*” (in the laboratory).

This condition is required not only to respect the causality relationship between conjugal union and procreation, but also to protect the newly conceived being so that he or she cannot be an object of manipulation and/or discrimination (preimplantation diagnosis, cryopreservation, etc.).

In conclusion

At this point, I do not think it out of place for the reader to ask some questions such as the following:

1. Is it possible to help spouses with infertility problems to satisfy their legitimate desire to become parents?
2. Is it possible to do so, not only with pharmacological and surgical treatments, but also, when these are not adequate, with an appropriate MAP?
3. Does a MAP technique that is effective, while also licit and re-

¹⁰ PAUL VI. *Encyclical Letter “Humanae Vitae”* (25 July 1968).

spectful of the ethical imperatives of the natural moral law really exist?

Such deep questions underscore the extreme complexity of the ethical issues that accompany MAP. Do not forget that we are talking about something that was considered impossible until recently: the procreation of a human being, of a new person, of someone who, as the Christian faith teaches, is called to friendship with God and to participate in the intimate life of God. It is reasonable, therefore, that the ethical criteria are extremely stringent, which does not preclude an affirmative answer to the questions above.¹¹

In fact there are no arguments, either from a clinical or ethical point of view, to exclude *a priori* the possibility of an appropriate MAP, unless the possibility of distinguishing between the natural and irrational, between the licit and illicit, between the correct or incorrect application of the teachings of the Catholic Church is denied.¹²

I would like to conclude by recalling a widely shared truth: boys and girls conceived thanks to MAP procedures, of whom there are many today (they exceed a million), are rightfully persons, they are children of God, they exist because God has not refused to infuse them with a rational and immortal soul. These children have come to our world in a different way than would have been reasonable, but, despite this, or perhaps because of this, they are completely welcome, because from their conception until their natural death, they deserve to be treated as what they are: people called to participate in Christ of the Eternal life of God.

¹¹ I do not want to go into the analysis of the innumerable variants of MAP that currently exist, as this is a topic that requires separate treatment. However thirty years ago, moralists of renowned authority and prestige believed, for example, that the technique of GIFT (collection of gametes in the context of a conjugal act and immediate transfer separately to the Fallopian tube) met the necessary ethical conditions. Curiously, *Donum vitae* avoids contradicting this opinion.

¹² Some people hold that any instrumental intervention in natural procreation violates the principle of “inseparability” between the unitive dimension and procreative dimension of the conjugal act formulated by *Humanae vitae*. However, that argument assumes that the conjugal act and *coitus* (penetration) are the same thing.

Key words: medically assisted procreation, dignity, moral law, artificial, natural.

Parole chiave: procreazione medicalmente assistita, dignità, legge morale, artificiale, naturale.

SUMMARY

The purpose of this essay is not to present an exposition of the teaching of the Catholic Church on the procedure for medically assisted procreation, but to provide some key concepts for the correct interpretation of the statements principally contained in the Instruction *Donum Vitae* published in 1987. Among the concepts presented, we should wish to underline, on moral grounds, the terms “artificial”, “rationality” and “dignity” also including the distinction between “assistance” and “substitution” as regards the procreative function. Indispensable conditions for an ethically correct medically assisted procreation would be the safeguarding of the causal role of conjugal union and the recognition of the woman as the exclusive place worthy of the conception of a new human being.

RIASSUNTO

Il discernimento sulla procreazione medicalmente assistita: i concetti chiave del Magistero della Chiesa Cattolica.

Lo scopo di questo saggio non è quello di presentare la dottrina della Chiesa Cattolica sulla procreazione medicalmente assistita, ma di fornire alcuni concetti chiave per la corretta interpretazione delle Istruzione *Donum Vitae* del 1987. Tra i concetti presentati, vanno sottolineati, sul piano morale, i termini “artificiale”, “razionalità” e “dignità”, includendo anche la distinzione tra “assistenza” e “sostituzione” per quanto riguarda la funzione procreativa. Condizioni indispensabili per una procreazione medicalmente assistita eticamente corretta sarebbero la salvaguardia del nesso causale della unione coniugale e il riconoscimento della donna come luogo esclusivo degno del concepimento di un nuovo essere umano.