ORIGINAL ARTICLE

Posthumous sperm retrieval: a procreative revolution

Francesca Negro[1], Renata Beck[2], Antonella Cotoia[2], Maria Cristina Varone[1]

[1]Department of Anatomical, Histological, Forensic and Orthopaedic Sciences, Sapienza University of Rome, Rome, [2]Anesthesia and Intensive Care Unit, Department of Medical and Surgical Sciences, University of Foggia, Policlinico "AUO Riuniti", Foggia; Italy

ABSTRACT

Aim Postmortem sperm retrieval with consequent artificial insemination has become a technically possible option for future use in assisted reproductive technology (ART). The authors have set out to discuss the social and ethical significance of posthumous sperm retrieval, and the laws currently in force in Italy, the United States and elsewhere.

Methods International literature from 1997 to 2020 has been reviewed from Pubmed database, Google Scholar and Scopus, drawn upon American, Italian and international sources (an ethically acceptable solution can only be achieved through an overhaul of the laws currently in effect). One of the most contentious issues was about donor consent. In Italy, a donor's will to retrieve his sperm in the event of premature disappearance can be proven according to the Law 219/2017, through advance health care directives.

Results A substantial increase, both in requests and protocols, was documented in the United States. In Italy, over the last two years, three rulings were issued concerning posthumous insemination. However, no official standardized protocols, guidelines or targeted legislation exist at the national level to regulate medical activity in that realm, whereas established laws often set implicit limitations.

Conclusion Current legal frameworks appear to be inadequate, because in most cases they were conceived under conditions that have radically changed. The need for newly-updated regulatory frameworks to promptly bridge that gap is increasingly clear, if current social needs related to reproductive rights are to be met in the foreseeable future.

Key words: ART, ethics, gamete supply, posthumous reproduction, posthumous sperm use

Corresponding author:
Renata Beck
Anaesthesia and Intensive Care Unit,
Department of Medical and Surgical Sciences, University of Foggia,
Policlinico "AUO Riuniti"
Viale Pinto 1, 71100 Foggia, Italy
Phone: +39 0881 732 387;
E-mail: beckrenata64@gmail.com
Francesca Negro ORCID ID: https://orcid.org/0000-0003-2966-1112

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INTRODUCTION

The innovations in the field of Medically Assisted Procreation (MAP) and the success that modern insemination techniques have had in terms of treating couple sterility meant that the posthumous sperm retrieval and the ensuing production of embryos have become reality. The first instance of posthumous sperm retrieval (PSR) occurred in 1980, when a 30-year-old man was declared brain dead after a car accident and his family asked for his sperm to be preserved (1). Between 1980 and 1995, Kerr et al. (2) reported a total of 82 such requests in 40 facilities in the United States. None of these facilities had established protocols or guidelines in place for PSR, while the first case of a child born following posthumous conception took place in 1999 (2). From 1997 to 2002, Hurtwitz et al. (3), noticed a 60% increase in PSR requests in the United States, with the number of approved requests also growing by 68%, in lockstep with the improvement of assisted reproductive technologies (ART) (3).

The methods mainly used for PSR of the sperm samples include the direct recovery from the epididymis: through percutaneous epididymal sperm aspiration (PESA) or microsurgical epididymal sperm aspiration (MESA). Other methods entail the collection of testicular tissue and/or the removal of the testicles. The sperm should be recovered within 24-36 hours of death to ensure gamete viability. Following recovery, the sperm is generally cryopreserved in a sperm bank until its use (4).

There are numerous ethical implications associated with PSR, including concerns about informed consent, the rights of the deceased, the interests of the requesting party, the best interests of the minor (5), as well as the underlying delicate position of both doctors and fertility clinics (6,7). Such multifaceted challenges have led many countries to enact strict regulations on PSR. France, Canada, Germany, Sweden and some states in Australia have banned PSR altogether, regardless of consent (8). In the United Kingdom, the deceased is required to have signed valid informed consent documentation in order for his sperm to be legally retrieved. Moreover, according to the Human Fertilization and Embryology Act of 1990, it is illegal in the UK to store sperm without a signed consent from the donor (9).

In Israel, a twofold protocol has been enacted, according to which sperm can be recovered by a living man or after his death at the request of his partner; however, in order to proceed it is necessary to obtain a permission by a Court, which will evaluate the requests on a case-by-case basis (10).

In the United States, although there is no government regulation on PSR, several scientific societies have weighed in on the subject. The American Society for Reproductive Medicine states: "A spouse's request that sperm or ova be obtained terminally or soon after death without the prior consent or known wishes of the deceased spouse need not be honored". (11). Instead, the 2006 Universal Anatomic Gift Act allows the recovery of organs and tissues after death upon consent of the closest relative, unless there is evidence that the deceased would not have consented (12).

In Italy PSR is prohibited, under articles 5 and 12, 2nd subsection of Law 40/2004, unless the application of the reproductive technique has already led to the formation of embryos and the implantation is allowed in order to uphold "the rights of all the subjects involved, including the conceived", as stated in Art.1 of the Law n.40, according to the rules laid out in Article 6 of the same legislation (13).

Many countries do not have standardized protocols yet, and the existing ones differ significantly from each other, particularly concerning evidence requirements of prior consent, waiting periods before being allowed to use the sperm sample, retrieval methods, preservation-related logistic aspects, and financial costs of the procedure (14,15).

The aim of this study was to map out and expound upon the legal, ethical and social implications which PSR entails, through an analysis of selected relevant cases and judicial and legislative approaches. Given the complexities and challenges that arise when competing interests and rights are at stake, it is worth exploring all aspects relative to PSR and the various approaches taken over the years by scientific societies, regulatory bodies and courts. This article was in fact meant as a starting point for a broader discussion of the practical role, ethical significance, social value of PSR, and of the laws currently in force in Italy, the United States and other countries.

MATERIALS AND METHODS

Materials and study design

A systematic review of studies published on scientific databases from 1997 to 2020 has been

carried out in order to investigate and shed light on the current state of ART techniques, and to compare them to the current laws and guidelines governing MAP, including PSR, in different countries. The study was conducted over the years 2019-2020 at the University of Rome "Sapienza", Department of Anatomical, Histological, Forensic and Orthopaedic Sciences, in a collaboration with the Department of Medical and Surgical Sciences, University of Foggia.

Methods

Pubmed, Google Scholar, Scopus, as well as legal databases (Lexis, Justia, Kleagle) were reviewed by applying various combinations of terms in the following three categories. Search terms 1: "posthumous", ‘’post-mortem", "deceased", "death", "end of life"; search terms 2: "sperm", "gametes", "reproduction"; search terms 3: "policy", "protocol", "guidelines". The searches have produced 5640 results on Google Scholar, 166 publications on Pubmed and 121 on Scopus. Only 64 sources were ultimately deemed fit for the article's main purpose, i.e. those with direct correlation with ART and PSR techniques within the broader context of policy-making, regulations and court rulings.

From the standpoints of legislative and regulatory initiatives targeted to PSR, Italian scientific production appears to be lagging behind compared to the overall international scenario: very few reports and recommendations have been issued by Italian medical societies and bioethics committees and scientific institutions. Hence, the main frame of reference is still the national legislation which governs access to medically-assisted procreation procedures, whose effects have been herein highlighted through an analyses of relevant court decisions. Besides, in order to better figure out the relationship between Italy and PSR practices, we have fine-tuned Google searches by using the following two categories: term 1 - "ruling", "Tribunal", "Supreme Court"; term 2 - "posthumous fertilization", "end of life". The research produced various commentaries on legal cases and topics such as posthumous fertilization, but no result on PSR. Relevant sources were sifted through and taken into account in terms of their relevance in the broader analysis of PSR, within the realm of medically-assisted procreation; MAP procedures, particularly those which entail heterologous fertilization, have often sparked controversy, even resulting in litigation at times, given the conflicting interests of the actors involved: intended parents, donors, children and health care professionals and facilities; the bone of contention is not only legal in nature, but social and anthropological as well, since it has to do with how societies progress and evolve, particularly with respect to family structure; such major changes often outpace legislators, thus giving rise to a vacuum which may result in individual rights being put in jeopardy.

RESULTS

The research analysis conducted has laid bare a lack of uniformity and homogeneity in the way PSR is approached and regulated; that in turn reverberates on the rights and prospects of those involved, who often have to rely on lengthy court proceedings and trials to have their rights upheld, given the lack of clean-cut legislative frameworks in the countries herein analysed. In addition, such imbalances and discrepancies in the way the issue is regulated negatively impact those who lack the financial means to travel abroad to countries with more permissive regulations in place (so-called "procreative tourism"), adding to the sense of social inequality.

Some works, similar to protocol proposals, which aim to standardize PSR procedures were found (16). Most protocols call for the acquisition of informed consent (17), in some cases directly in writing and signed by the donor (18), in other cases as a verbal memory documented before the donor's death and defined as a verbal conversation with a doctor or another figure who must not be the beneficiary of the subject's provisions (19). Some protocols admit the possibility of an implicit consent or the designation of a surrogate decision maker, which could be a spouse/partner or the closest relative (20).

The first case of international resonance was from 1997: a widow requested that sperm be retrieved from the gonads of her late husband, brain dead because of a fulminant meningitis (21); her request was initially granted (the sperm sample was collected and stored). However, she was forced to file an application to the British Court of Appeal in order to subsequently use this sample for conception. An oversight commission was summoned, which did not prohibit the recovery and storage of gametes, but nonetheless stated in its decision: "The posthumous use of gametes is a

practice which we feel should be actively discouraged" (21). At the end, however, she obtained the legal right to export the retrieved sperm to Belgium, where an artificial fertilization procedure was carried out. She managed to give birth to a viable male child, who was the first baby born as a result of PSR. In 1999, a woman became the first American to obtain sperm from her deceased husband for the purpose of fertilization. The sperm sample was collected 30 hours after the death of her husband and kept for 15 months. At the end of this period of mourning, she underwent intracytoplasmic sperm injection (ICSI) and managed to give birth to a baby girl (22). These two cases of considerable legal relevance were followed by others which concerned the posthumous acquisition of sperm material, which resulted in pregnancies (23,24).

From the women's perspective, the issue of PSR only concerns the use of those recovered during life (25,26). On the other hand, for men, ethical issues arise both from the recovery and the post-mortem use of sperm, which translate into the tortuous moral and legislative pathways, necessary either with or without written informed consent by the deceased.

Recently, PSR has been the subject of a report by the Ethics Committee of the American Society for Reproductive Medicine. The document stresses that the posthumous use of gametes for fertility techniques is legally feasible only after a written documentation is produced, reflecting the will of the deceased. In the absence of written documentation, only requests made by the surviving spouse/partner should be considered, especially if they were filed when both spouses were still alive (27,28). The argument for allowing the PSR is based on the reasonably inferred concept of consent: that is, acting on behalf of the deceased in a way that is logically consistent with how he would have acted if he had been able to choose (17,29,30). From such perspective, Italian law 91/99 on "tacit agreement" could be applied (31). In light of a statement issued by the Italian Ministry of Health on 20 August 2019, in the absence of an explicit refusal in life, organs and other tissues can be used in transplants after death (32). It is worth bearing in mind, however, that PSR use may also be motivated by personal interests, e.g. financial ones related to future inheritance (33).

Since reproductive decisions are highly personal in nature, it is essential that the requesting (interested) party be associated with a "surrogate decision maker", tasked with representing the deceased. The Italian legal system, with the Englaro ruling, has laid out for the first time a set of requirements aimed at defining the profile of the surrogate decision maker, in order to identify the forms of assessment best suited and/or respectful of the dying subject's autonomy: the Court in fact believes that the substitute judgment mechanism, which is consolidated in the US legal tradition, can be instrumental in upholding the self-determination of the incapable, clearly straying from the theory of best interest. Therefore, current legislation requires doctors to follow the patient's wishes and, where necessary, binds them to file an application to the Court in order to ascertain the patient's alleged ante-mortem wishes, if the patient has not left advance directives, in order to relieve the medical staff of any responsibility (34).

As for the children thus conceived, by definition, a deceased sperm donor cannot be a social presence in the life of his child (5). Therefore, pursuing PSR can be considered a choice mainly in favour of the requesting party and which, consequently, may not take into account all the needs for the care of the resulting child, for whom the possibility of having a second "social parent" is forgone (35, 36). Moreover, the right of donor-conceived children to know their biological donor parent cannot be exercised for obvious reasons (37).

There are so few cases of PSR in the world that it is not possible to establish with a reasonable degree of certainty what consequences could affect the child. These methods could therefore be integrated with psychological follow-up programs after childbirth, in order to best serve their interests (38,39).

Given the lack of international protocols and/or guidelines defining the areas, procedures and times to be implemented in such cases, doctors or fertility centres take on a highly controversial role indeed. In fact, PSR is not a part of the essential procedures of the care process; on the other hand, the doctor who decides to carry out this procedure becomes morally responsible for upholding the rights of the deceased in terms of procreation. Hence, doctors should not be bound to meet such requests (40, 41). In addition, a sentient new life could result from the doctor's decision to proceed with PSR. According to the ASRM, "a pre-embryo deserves greater respect than that of another hu-

man tissue because of its potential for life, but less respect than that accorded actual persons" (42).

The safety of PSR is another aspect of fundamental importance. The sperm sample collected posthumously, as well as that collected from a living donor, should undergo some screening protocols to minimize the risk of disease transmission or infections, and to ensure the good health of the mother and foetus. Although PSR should be carried out within a short period following death (from a urological point of view, sperm can be collected within 36 hours after death) (43), the actual use of sperm for procreation should be delayed to allow for a mourning period. Most centres with existing protocols suggest a period of time from 6 months to 1 year to complete appropriate medical screening procedures and psychological vetting (16). These reasons, combined with the unstable emotional circumstances stemming from the death of a spouse, would recommend a 6-month waiting period for the use of the cryopreserved sample in assisted procreation procedures.

Another aspect that has stood out from the literature herein examined, and which could encourage the use of cryopreserved posthumous sperm taken from one's partner, has to do with the possible medico-legal litigation related to the degree of reliability of fertility clinics, which the woman would have to contact for ART practices where it is not allowed to use her own partner's sperm (44). There have been cases that have cast doubt on the role of clinics and sperm banks. A case dates back to 2015, when a Canadian couple of two women approached an American sperm bank (Xytex) and selected a sperm donor. Seven years after the birth of the child, the couple received the name of the donor, which allowed them to identify him as a schizophrenic who had dropped out of university and had just been accused of burglary. In March 2015, the Canadian couple filed a lawsuit against the sperm-supplying bank, which was however dismissed by a judge from Fulton County, Georgia (45). Another egregiously important aspect that may be inferred from the Canadian affair is the growing difficulty in guaranteeing sperm donor anonymity; that is partly due to the amount of information which can be gathered through the new methods of DNA identification (7), as well as the possible issues arising from the use of sperm from an unknown subject.

DISCUSSION

In recent years, demand for PSR procedures has risen, along with the development of ART methods. The legislative statutes that regulate such practices are relatively few. In the US states of North Dakota and Virginia, the provisions of the Uniform Status of Children of Assisted Conception Act of 1988 are partially adopted, by which a person may not be legally viewed as a parent if his sperm or oocyte has been used to conceive a child after his death; the same reasoning applies to cryopreserved embryos prior implantation. The same view is shared by the Uniform Parentage Act of 2000 (46).

The American Bar Association Model Act has provided a further limitation to the concept of posthumous legal parent, establishing that if gametes (either female or male) are used for reproductive purposes after 3 years from the death of the donor, the donor cannot be legally recognized as parent (47). Furthermore, according to a 1985 decree by the New York State Task Force on Life and the Law, a child does not have any inheritance rights unless the deceased has expressly left specific provisions in his will (48,49).

In the United States, therefore, the absence of protocols and/or regulations recognized at the national level means that jurisprudence guides the legal framework in case of PSR requests, as demonstrated by a judgment from the Massachusetts Supreme Court issued in January 2002, the first ruling in the United States on PSR, in which the Social Security Commissioner established that children born using posthumous gametes are to all intents and purposes legal heirs (36,50), meaning that a child born through PSR methods, in order to be considered in all respects a legal heir, must be genetically related to the deceased and the deceased must have consented to the conception of the child prior to his death and committed himself to supporting it. The ruling also noted that the child born through PSR has the same legal succession rights as the heirs already born. This ruling can be considered by any measure the milestone to better define the inheritance rights for children conceived through posthumous sperm retrieval.

In Italy, in order to access medically assisted procreation, both partners in a couple must be alive. Doubts have arisen as to whether art. 5 of the l. 40/2004 refers only to the time of the request for

access to the reproductive technique or if, on the contrary, it should be construed as valid for the entire duration of the procedure and up to the moment of conception.

At any rate, post-mortem procreation is made possible by cryopreservation, which can affect both gametes and embryos already formed in a test tube. Numerous ethical questions arise regarding embryo selection, genetic repairs of human genome, such as the recent human embryo-editing experiments (51,52), all of which could significantly affect the development and evolution of humanity itself (53-57), while posing new, extremely challenging ethical and legal quandaries (58).

Italian Law 40/2004 allows for the cryopreservation of gametes, both male and female (Article 2), while it directly bans it for embryos, except for those cases where it is necessary, according to the specialists, "for serious and documented force majeure stemming from the woman's health condition, which was not foreseeable at the time of the treatment" (Art. 14) (13). In this scenario, PSR for procreation purposes may run counter to the right to self-determination and reproductive freedom protected by Italian law. The fundamental issue of PSR aimed at ensuring the production of an embryo to be implanted into the womb of a widowed woman. Of course, there are many consequent ethical, logistical and legal implications; yet, it is important to take into consideration the issue as a logical achievement, within the framework of a trend already established at both the international and Italian level (59,60).

We can conclude that heterologous fertilization techniques have radically changed the traditional notion of family (61). The conventional family structure can in fact no longer be considered as the only one capable of providing children with balance, a favourable environment in which to grow, as validated abroad in various court judgments that recognized as families same-sex unions with children born to homosexual parents through ART. Our research has laid bare a widespread and substantial inadequacy of legal frameworks and statutes, which in most cases are conceived and modelled according to social and scientific conditions that have rapidly and radically changed. The need for regulatory frameworks to promptly bridge that gap is increasingly clear and urgent, if the new social needs related to reproductive issues are to be met in the foreseeable future (62).

Still, there are no official laws regulating the use of posthumous reproductive technologies at the international level; some countries, apparently more responsive to this need, have enacted formal sets of regulations (63,64). Nonetheless, the growing number of requests for these procedures around the world has brought to the forefront the issue of reconciling PSR practices with the legal and ethical landscape of the reference country (65).

In Italy, the situation is remarkably different from the international one. The inertia of the Italian legislative and judicial system rests upon a cultural, social and religious subtext that strongly affects and influences bioethical thought and policy-making initiatives. Such an ecosystem makes the Italian legislative system obsolete, unable to keep up with the rate of scientific progress in the ART field, as demonstrated by the inherent contradictions of the current legal regulations regarding PMA (66) and by the most recent judgments of the Italian Supreme Court (67), which has recently ruled on the controversial topic of "posthumous" medically assisted procreation. Furthermore, as widely highlighted, it is of utmost importance to be able to prove patient consent in life to posthumous procreation.

Therefore, in accordance with the 2017 Law 219, it is necessary to foster information and raise awareness, particularly among new generations of citizens, of ART-related issues, and what these entail in terms of opportunities for couples, in order to overcome ethical controversies and expedite the bureaucratic procedures in case of PSR request.

The presence of consent granted during life should be the first step towards a greater degree of uniformity and harmonization of the legal rules aimed at regulating and governing MAP practices in Italy. By virtue of the inalienable right of surviving spouses to exercise their reproductive freedom and fulfil the wish of the deceased spouse to become a father, PSR should be effectively regulated by striking a balance between law and ethics with the involvement of all stakeholders, no matter how challenging and controversial that may be.

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