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Shared motherhood IVF: high delivery rates in a large study of treatments for lesbian couples using partner-donated eggs

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KEY MESSAGE

Shared motherhood IVF is an increasingly requested assisted reproductive technique among lesbian couples. The autonomy of lesbian patients is increasingly being respected even though complex IVF treatment is mostly carried out for non-medical indications. Ovarian stimulation with single blastocyst transfer provides a uniquely safe and highly efficient treatment.

A B S T R A C T

Shared motherhood IVF treatment is becoming increasingly accepted among assisted reproductive techique practitioners and patients in Europe, although data on its overall efficiency remain scarce. This 6-year retrospective study from a single, private, UK HFEA-regulated centre included consecutive lesbian couples (n = 121) undergoing shared motherhood IVF treatment (141 cycles). Recipients were more parous and had undergone more previous intrauterine insemination and IVF treatments than donor partners, who had slightly higher ovarian reserve markers than recipients. Indications in most cycles (60%) were non-medical. Most (79%) egg-providers were stimulated with gonadotrophin releasing hormone antagonist protocol, and no moderate or severe cases of ovarian hyperstimulation syndrome (OHSS) arose. A total of 172 fresh and vitrified-warmed embryo transfers were carried out: 70% at the blastocyst-stage and 58% involved a single embryo. Cumulative live birth rate per receiver was 60% (72/120), and twin delivery rate was 14% (10/72). Perinatal outcome parameters were better for singleton than twin pregnancies, although the latter also achieved generally favourable outcomes. No significant difference in cumulative outcomes were found between synchronized and non-synchronized cycles. Shared motherhood IVF combines ovarian stimulation with single blastocyst transfer to provide a safe and effective treatment modality offering reassuring obstetrical and perinatal outcomes.

Oral presentation given at the 33rd Annual Meeting of the European Society of Human Reproduction and Embryology, Geneva, 2–5 July, 2017.

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https://doi.org/10.1016/j.rbmo.2017.11.006

1472-6483/

Please cite this article in press as: D. Bodri, S. Nair, A. Gill, G. Lamanna, M. Rahmati, M. Arian-Schad, V. Smith, E. Linara, J. Wang, N. Macklon, K.K. Ahuja, Shared motherhood IVF: high delivery rates in a large study of treatments for lesbian couples using partner-donated eggs, Reproductive BioMedicine Online (2017), doi: 10.1016/j.rbmo.2017.11.006

Introduction

Over recent decades, changes in attitudes towards lesbian couples (as well as unmarried single people and gay couples) have meant that assisted reproduction technique treatment has become increasingly accessible to them. In the UK, the right to civil partnership for same-sex couples was recognized in 2004, and same-sex marriage was introduced in 2014. In 2008, amendments were made to the Human Fertilisation and Embryology Act removing previous requirements for 'a child's need for a father' and allowing female partners to become legal parents. Subsequent equality legislation outlawed discrimination based on Protected Characteristics and prohibited refusal of fertility treatment based on sexual orientation (Priddle, 2015). In Europe and the USA, some professional bodies have issued concordant guidelines recognizing the right to access fertility treaments for singles, lesbian and gay couples as well as transgender people (Ethics Committee of American Society for Reproductive Medicine, 2013; De Wert et al., 2014).

Shared motherhood IVF treatment was first described in 2010 (Marina et al., 2010) and has generated extensive ethical debate. Whereas donor insemination or IVF with donor sperm (if a medical indication is present) was deemed acceptable for lesbian patients, for some practitioners and clinics, intra-couple egg donation for non-medical reasons was considered to be non-justifiable, risky and not cost-effective. According to a number of leading ethicists, however, this reasoning is weak and does not justify undermining autonomy by refusing to treat lesbian patients who wish to share their biological parenthood and accept undergoing a more complex procedure (Dondorp et al., 2010; Zeiler and Malmquist, 2014). Currently, shared motherhood IVF treatment can only be practised without restriction in a few European countries, including Spain, from where the first published series has originated. Extensive ethical debate has led to it becoming gradually accepted in others, such as Belgium and Sweden; however, in many, such as France, Germany and Italy, shared motherhood IVF is either prohibited or discouraged (**Table 1**).

The current terminology describing shared motherhood IVF treatment is relatively heterogeneous, reflecting its unique clinical context. Although the term 'intra-couple or intra-partner egg donation' correctly describes the medical procedure itself, it might be perceived as too medical for lesbian couples who are not donating or receiving their own eggs for the same reasons as participants of altruistic egg-donation programmes (Woodward and Norton, 2006). Similarly, the uniquely Spanish acronym ROPA/REPA, established by the Barcelona group, which was the first to publish its experience, also underlines the medical aspect of 'receiving eggs/embryos from the partner' (Marina et al., 2010) and might be difficult to adopt in the English-language medical literature. The original term of 'Co-IVF' (or the similar sounding 'Reciprocal IVF') was coined by a US group emphasizing an equal contribution to the IVF process (Yeshua et al., 2015).

Table 1 – Regulation of family law, assisted reproductive technique access and shared motherhood IVF for lesbians across the European Union (as of October 2017).

Region	EU countries (28)	Family law, (year coming into effect)	Access to assisted reproduction techniques (single women/lesbian couples)	Shared motherhood IVF
Northern- and Western (9)	Belgium	ME, 2003	Singles/couples	Yes
	Denmark	ME, 2012	Singles/couples	No
	Finland	ME, 2017	Singles	Yes
	France	ME, 2013	No	No
	Ireland	ME, 2015	Singles/couples	Yes
	Luxembourg	ME, 2015	Singles/couples	No
	Netherlands	ME, 2001	Singles/couples	Yes
	Sweden	ME, 2009	Singles/couples	No
	UK	ME, 2013–2014	Singles/couples	Yes
Southern (6)	Cyprus	RP, 2015	Singles	No
	Greece	RP, 2015	Singles	No
	Italy	RP, 2016	No	No
	Malta	ME, 2017	No	No
	Portugal	ME, 2010	Singles/couples	Yes
	Spain	ME, 2005	Singles/couples	Yes
Central (3)	Austria	RP, 2010	Couples	No
	Czech Republic	L-RP, 2006	No	No
	Germany	ME, 2017	Singles/couples	No
Eastern (10)	Bulgaria	No	Singles	No
	Croatia	RP, 2014	Singles/couples	No
	Estonia	L-RP, 2016	Singles	No
	Hungary	RP, 2009	Singles	No
	Latvia	No	Singles	No
	Lithuania	No	No	No
	Poland	No	No	No
	Romania	No	No	No
	Slovakia	No	No	No
	Slovenia	RP, 2017	No	No

Adapted from 2017 Annual Review of ILGA-Europe (the European Region of the International Lesbian, Gay, Bisexual, Trans and Intersex Association): https://rainbow-europe.org; and by inquiring at ESHRE country representatives.
EU, European Union ME, marriage equality, RP, registered partnership, L-RP, limited registered partnership.

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These authors have also insisted on abandoning the classical nomenclature of 'donor' and 'recipient' that simply focus on the providing and accepting female gametes. Similarly, some encourage the more sensitive utilization of 'egg provider/giving partner' and 'receiving/gestating partner' for prospective shared motherhood IVF couples. In our study, we have preferred to use the already existing term 'shared motherhood IVF' treatment to emphasize that, for lesbian couples, the main reason to undergo the complex IVF procedure is mostly non-medical, motivated by a strong wish to achieve shared parenthood as well as a more positive relationship between the parents.

In recent years, shared motherhood IVF treatment has become increasingly accepted among practitioners and patients; however, its overall efficiency and outcomes have been subject to little study and are poorly understood. Therefore, the aim of our retrospective review was to present our 6-year experience with shared motherhood IVF treatment from a single centre, that, over the past 2 decades, has been a leading provider of fertility care for same-sex couples in the UK.

Materials and methods

Study population

Consecutive lesbian couples (n = 121) who underwent shared motherhood IVF treatment in a single, private, HFEA-regulated centre between August 2011 and December 2016 were included in this retrospective review. All cycles preceding a first live birth were included in this analysis. The outcome of all fresh and vitrified–warmed embryo transfers were followed-up until June 2017 (delivery outcome was missing for one previously confirmed ongoing pregnancy).

In our study, 12 couples (10%) were cross-border reproductive care patients residing in countries where this treatment option was legally not permitted or not routinely practised (France: 3, Sweden: 2, Denmark: 1, Norway: 1, Ireland: 1, Bulgaria: 1, Switzerland: 1, Singapore: 1, New Zealand: 1). The protocols used were complied in accordance with UK regulation (Human Fertilisation and Embryology Act, 1990, 2008) and were carried out in a facility inspected and certified by the Human Fertilisation and Embryology Authority (HFEA). This retrospective analysis did not require ethical or institutional review board approval, as it assessed clinical outcomes from previously validated and approved procedures, practised under license from the HFEA. All participating patients provided informed written consent for the use of their clinical data in this analysis.

Shared motherhood IVF treatment, laboratory procedures and embryo transfer

Prospective patients were treated in line with current HFEA regulations (HFEA Code of Practice, 2008). Both partners underwent the necessary infectious disease screening, cervical smear test, transvaginal pelvic ultrasound scanning and evaluation of their ovarian reserve (antral follicle count and anti-Müllerian hormone). Before starting treatment, mandatory counselling sessions were provided on the implications of using donor sperm and intra-couple egg donation. Oral contraceptive pill pre-treatment (Microgynon, Bayer, UK) was used to synchronize the egg-givers and recipients' menstrual cycles. Subsequently egg providers were stimulated in most cases with a gonadotrophin-releasing hormone (GnRH) antagonist co-treatment protocol rather than long or short protocol GnRH agonist one, and final oocyte maturation was triggered with HCG (Ovitrelle, Merck Serono, UK) or a GnRH agonist (Suprecur, Sanofi, UK). Receiving partners underwent an artificial endometrial preparation cycle with oral oestrogens (Progynova, Bayer, UK) and vaginal progesterone (Cyclogest, Actavis, UK) with ultrasound monitoring of their endometrial thickness. Retrieved oocytes were fertilized using a previously chosen frozen donor sperm sample, either through IVF or intracytoplasmic sperm injection (ICSI). Normally fertilized oocytes were cultured until cleavage or blastocyst-stage. One or maximum two embryos were selected for fresh embryo transfer and surplus good-quality embryos were vitrified (Kitazato, Japan) for further use. All embryo transfer procedures were carried out under transabdominal ultrasound guidance. In case of a conception, luteal support was continued until the 12th gestational week.

Possible treatment scenarios

Most treatment cycles (88%) were 'synchronous', in which the giving partner underwent ovarian stimulation and egg collection whereas the receiving partner underwent artificial endometrial preparation and fresh embryo transfer. In 12% of the cycles, however, the option of 'delayed transfer' was chosen (for reasons of personal convenience). This approach removed the need to synchronise cycles as embryos were electively vitrified and the receiver underwent a vitrified-warmed embryo transfer at later stage when her partner had entirely recovered from the ovarian stimulation and egg collection. In one couple, a 'simultaneous transfer' cycle took place, in which the receiving partner and the giving partner underwent a fresh embryo transfer. In another case, the couple underwent two successive non-synhcronous treatment cycles by switching 'roles' and electively cryopreserving all resulting embryos.

Outcome measures and statistical analysis

The main outcome measure was cumulative live birth per included couple. Live birth was defined as the delivery of a viable newborn(s) after 24 weeks of pregnancy.

Clinical pregnancy was defined as the presence of fetal heart beat(s) on a 7–8 gestational weeks scan. Baseline characteristics of egg-sharers and recipients were compared using the Student's t-test (for normally distributed continuous variables), Mann–Whitney U-test (for non-normally distributed continuous variables) and chi-squared tests (for categoric variables). $P < 0.05$ was considered statistically significant.

Results

Baseline characteristics

A total of 121 lesbian couples underwent 141 treatment cycles (121 first, 17 second and three third attempts). No significant differences were identified between giving and receiving partners in age or body mass index. Seventy-five per cent of egg providers were aged 35 years or younger, and 23% were between the ages of 36 and 39 years. The age difference between givers and receivers ranged from –12 to +17 years; in 47% of the couples, the age difference was less than 2 years. Receivers were more parous than egg-providers (15% versus 2.5%,

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Table 2 – Baseline characteristics of sharers and receiving partners.[a]

Patients	Sharing partner (*n* = 121)	Receiving partner (*n* = 121)	*P*
Age, years	32.4 ± 4.1 (20–41)	33.3 ± 4.9 (23–46)	NS[b]
Body mass index, (kg/m^2)	24.5 ± 3.4	24.6 ± 3.5	NSb
Previous live birth, n (%)	3 (2.5)	18 (15)	0.0006[d]
AMH, (pmol/L)	25.3 ± 16.6	18.8 ± 16.9	0.002[c]
AFC, n	19 ± 11	16 ± 10	0.049[c]
Previous IUI treatment, n (%)	8 (6.6)	25 (21)	0.0014[d]
Previous IVF treatment, n (%)	5 (4.1)	18 (15)	0.007[d]

[a] Continuous variables reported as mean ± SD (range).
[b] Student's t-test.
[c] Mann–Whitney U-test.
[d] Chi-squared test.
AFC, antral follicle count; AMG, anti-Müllerian hormone; IUI, intrauterine insemination; NS, not statistically significant.

P = 0.0006). In receivers, 12 children had been born through previous IUI or IVF treatments and six children conceived in a previous relationship. Among givers, all three children had been born as a result of previous fertility treatments. Ovarian reserve markers were slightly higher in egg-providers (for anti-Müllerian hormone 25.3 ± 16.6 versus 18.8 ± 16.9, *P* = 0.002 and for antral follicle count 19 ± 11 versus 16 ± 10, *P* = 0.049). Receivers had undergone more previous IUI and IVF treatments than egg providers (21 versus 6.6%, *P* = 0.0014 and 15 versus 4.1%, *P* = 0.007, respectively). Baseline characteristics of the treated couples are presented in **Table 2**. About 40% of the cycles involved some medical indication: failed intrauterine insemination or IVF treatment (*n* = 23), diminished ovarian reserve (*n* = 13), female age over 40 years (*n* = 13); however, in the remaining cases, non-medical grounds, for example, achieving shared motherhood or an egg provider who is not keen to carry the child, were predominant.

Ovarian stimulation and laboratory outcome

Egg providers were stimulated with a GnRH antagonist (79%) or short/long GnRH agonist protocol (21%) and triggered with a GnRH agonist (65%) or HCG (35%) producing an average of 12 eggs per cycle (range: 1–34). One patient (0.8%) who was triggered with a GnRH agonist was hospitalized for 3 days after egg collection owing to suspicion of OHSS.

Twenty-two per cent of cycles used ICSI. The overall fertilization rates per retrieved egg using donor sperm were 65% (11–100%), resulting in 7.5 (1–27) fertilized eggs per cycle. Embryos were cultured to the blastocyst or cleavage stage in 65% and 34% of cycles, respectively. One treatment cycle (0.7%) was cancelled owing to arrested embryo development. In 15 (11%) non-synchronous cycles, all embryos were electively cryopreserved. One-hundred and twenty-five fresh and 47 vitrified–warmed embryo transfers were carried out with the transfer of an average 1.4 ± 0.5 embryos, of which 70% were at the blastocyst stage and 30% at the cleavage stage. The single embryo transfer rate was 58% and the double embryo transfer rate was 42%. During a the 6-year study period (resulting from general clinic policy change), a gradual shift took place from cleavage to blastocyst stage (2011: 25%; 2012: 23%; 2013: 48%; 2014: 79%; 2015: 85%; 2016: 83% at blastocyst-stage in our study cohort) and from double to single embryo transfer (2011: 25%; 2012: 23%; 2013: 52%; 2014: 56%; 2015: 61%; 2016: 73% were single embryo transfers in our study cohort). In 52% of patients, unused surplus embryos remain in storage. Ovarian stimulation and laboratory characteristics are presented in **Table 3**.

Reproductive and basic obstetrical and perinatal outcomes

The cumulative live birth rate achieved by receivers was 60% (72/120), resulting in 72 confirmed live births (for one ongoing pregnancy delivery outcome was missing). The twin delivery rate was 14% (10/72). For singletons, the premature delivery rate (delivery between 34 and 36 weeks) and low birth weight (<2500 g) rate was 10% and 6.5%, respectively. These complications were significantly more frequent in twin pregnancies (60%, *P* < 0.0001 and 30%, *P* = 0.006 respectively), although no case of severe prematurity was reported (all deliveries between 33 and 36 weeks). For singletons, the overall caesarean section rate was high (40%). In singletons, most caesarean sections were of emergency nature (64%), whereas, in twins, most were planned interventions (89%). Only one newborn had a significant congenital defect (operable atrio-ventricular septum defect) diagnosed during pregnancy. Reproductive and basic perinatal outcomes are presented in **Table 4** and **Table 5**.

Table 3 – Ovarian stimulation characteristics and laboratory outcomes.[a]

Cycles (*n* = 141)	
Antagonis t protocol, n (%)	112 (79)
Short/long agonist protocol, n (%)	29 (21)
Antagonist with agonist trigger, n (%)	92 (65)
Antagonist/agonist with HCG trigger, n (%)	49 (35)
Duration of stimulation, days	11.2 ± 2.1
Total gonadotropin dose, IU	2697 ± 1151
Oocytes retrieved, n (range)	11.8 ± 6.9 (1–34)
IVF cycles, n (%)	110 (78)
ICSI cycles, n (%)	31 (22)
Oocytes fertilized, n (range)	7.5 ± 4.9 (1–27)
Fertilization rate, % (range)	65 ± 20 (11–100)
Embryo transferred/vitrified, n (range)	3.1 ± 2.2 (1–13)
Fresh embryo transfers, n	125
Vitrified-warmed embryo transfers, n	47
Embryos per transfer, n (range)	1.4 ± 0.5 (1–2)
Single embryo transfers, n (%)	100 (58)
Double embryo transfer, n (%)	72 (42)
Blastocyst-stage transfers, n (%)	121 (70)
Cleavage-stage embryo transfer, n (%)	51 (30)

[a] Continuous variables reported as mean ± SD (range).
ICSI, intracytoplasmic sperm injection.

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Table 4 – Pregnancy and obstetrical outcomes.

Fresh or vitrified-warmed embryo transfers (*n* = 172)	
Positive beta-HCG, n (%)	103 (60)
Clinical pregnancies, n (%)	89 (52)
Ongoing pregnancies, n (%)	73 (42)
Confirmed live births[a], n	72[a]
Twin deliveries, n (%)	10 (14)
Premature deliveries, n (%)	12 (17)
C-sections, n (%)	35 (49)

[a] One missing delivery outcome.

Subgroup analyses

The cumulative live birth rate did not differ significantly according to the egg-providers' age group (20–29, 30–34, 35–39, 40–41 years); however, only two patients were in the oldest group. The oldest oocyte provider contributing to a live birth was 40 years of age. Similarly, cumulative success rates did not differ according to the receiving partner's age (up to 46 years) (**Figure 1**). No significant differences occurred in cumulative outcome (62 versus 50%) between synchronized (immediate fresh embryo transfer to recipient) versus non-synchronized cycles (elective vitrification and delayed embryo transfer).

Table 5 – Basic obstetrical outcomes.

Deliveries (*n* = 72)	Singleton (*n* = 62)	Twin (*n* = 10)	*P*
Premature deliveries, n (%)	6 (10)	6 (60)	<0.0001[a]
Birth weight, g	3521 ± 650	2642 ± 312	0.0001[b]
Low birth weight (<2.500 g), n (%)	4 (6.5)	6 (30)	0.006[a]
Caesarean section, n (%)	25 (40)	9 (90)	0.003[a]

[a] Chi-squared test.
[b] Student's t-test.

Discussion

As far we we are aware, this retrospective study reports the largest number of cases of women in a same-sex relationship who wish to share biological motherhood, and shows that intra-partner egg donation is an acceptable, successful and safe treatment option offering good obstetrical and perinatal outcomes.

The patients in our study derive from a country in which assisted reproduction techniques for lesbians (including shared motherhood IVF treatment) has been widely accepted for several years. In other European countries, eligibility criteria for lesbians to undergo fertility treatment are subject to great variation according to country-specific assisted reproduction technique legislation and other soft regulation (professional guidelines and generally accepted clinical practice) (Berg Brigham et al., 2013). Moreover, relevant aspects of family law (marriage, registered partnership, legal parentship, adoption rules) also differ significantly and could limit the reproductive autonomy of lesbian couples wishing to conceive. A Europe-wide

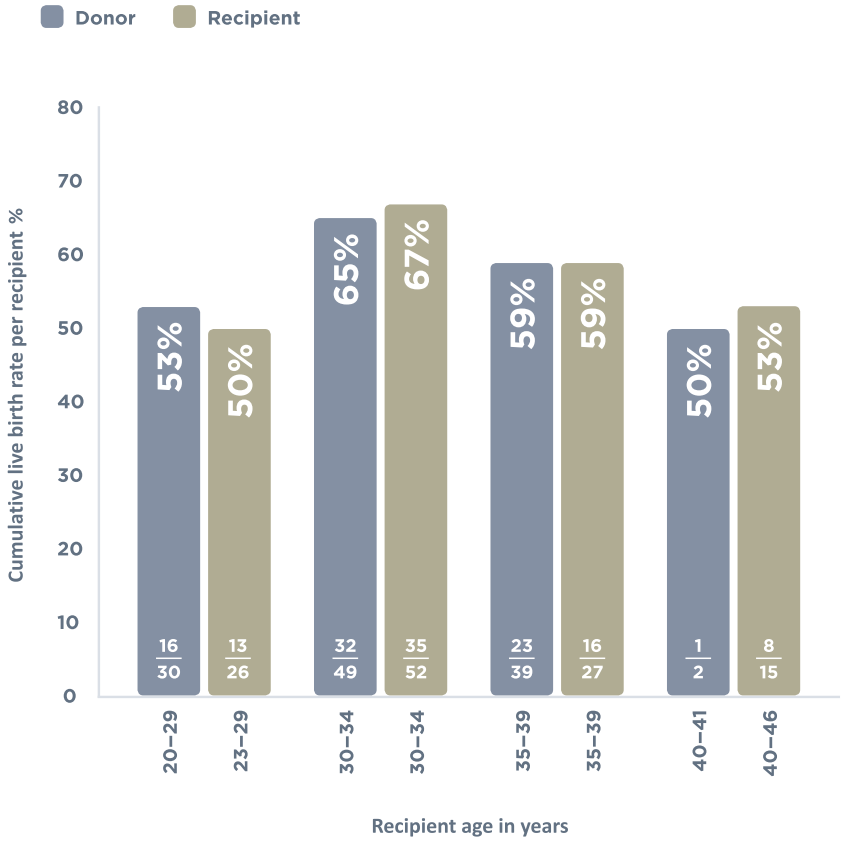

Figure 1 – Cumulative live birth in shared motherhood cycles according to donor and recipient age groups.

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comparison shows that, whereas in recent years same-sex marriage has become fully legalized in Northern and Western countries (as well as Malta, Spain and Portugal), in several Southern-, Central- and some Eastern-European countries, only (limited) registered partnership is allowed, and in a number of other Eastern-European countries, neither is permitted. A similar pattern (North and West versus South and East Europe) arises when examining the eligibility of lesbians to undergo fertility treatment either as couples (involving both partners with joint parenthood allowed legally, mainly in Northern-Western Europe, Spain and Portugal); only when declaring as a 'single' woman (for some Southern and Eastern-European countries); or no access to assisted reproduction technique at all (in some Eastern-European contries but also France and Italy) (Jouannet et al., 2014). Less information is available on the possibility of undergoing shared mothethood IVF treatment, which, apart from assisted reproduction technique eligibility rules, is also affected by whether or not oocyte donation is legally authorized in a particular country. At present, only a few countries (including Belgium, Finland, Ireland, the Netherlands, Spain, Portugal and the UK) allow this treatment option without any restriction. In these countries, the following generally apply: same-sex marriage is allowed, lesbians are eligible for all forms of assisted reproduction techniques, and 'known' egg donation (when the donor is known by the recipient) is not restricted. So far, however, far most reported cases of shared parenthood have emerged from just two European countries (Spain and UK), although this might change with increasing patient demand and the gradually accumulating experience of IVF centres in different countries. This European 'legal patchwork' also opens the possibility of cross-border reproductive care for lesbian couples who want to share motherhood; in fact, in our series 12 couples (10%) were cross-border reproductive care patients.

In the present study, non-medical indications were predominant (about 60%), reflecting that, for many lesbian couples, experiencing shared motherhood was the primary objective of choosing this treatment option. In contrast, medical reasons (previous failed IUI or IVF treatment, diminished ovarian reserve markers or advanced female age) were present in about 40% of receiving partners. These indications, however, were often not exclusive and usually co-existed with the wish to share motherhood. Currently, studies on the motivations of prospective same-sex couples choosing shared motherhood treatment and how they choose their reproductive (egg-provider or gestating) roles are lacking.

Different approaches can be used for shared motherhood IVF treatment. Apart from the already described synchronized and non-synchronized treatment options, another less conventional scenario during a synchronized treatment might involve the simultaneous fresh embryo transfer in both partners with the possibility of concordant success and simultaneous (even multiple) pregnancies and deliveries. Understandably, this option puts higher physical and psychological strain on the couple, and therefore it is only rarely chosen. Same-sex couples also have the unique possibility of switching their reproductive roles after a successful treatment (and delivery) or in the case of unsuccessful treatment (usually if cycle outcome was suboptimal with suspected egg quality issues). Compared with heterosexual couples undergoing IVF, same-sex couples undergoing shared motherhood IVF treatment inherently have an increased reproductive potential. If for any medical reason (related to egg/embryo quality or uterine conditions) a treatment cycle is unsuccessful, by switching provider or recipient roles the lesbian couple could compensate for a previous failed attempt. Similarly, for those couples in whom intra-couple egg donation would be indicated for a purely medical reason (ovarian or uterine indications), resorting to shared motherhood IVF treatment would reduce the need for anonymous egg donation or surrogacy treatment (often conducted abroad).

In our study, most sharers were stimulated using co-treatment with a GnRH antagonist protocol and GnRH agonist triggering, resulting in the absence of any significant moderate to severe OHSS cases. This approach is consistent with the now well-established policy routinely used for anonymous oocyte donors that has been proven to be much safer and as efficient (compared with GnRH agonist-based protocols) both in large published series and a meta-analysis (Bodri et al., 2008, 2011). Similarly, from the receiving partner's point of view, single embryo transfer at the blastocyst-stage was the preferred option which contributed to maintaining a high success rate while reducing the number of multiple conceptions close to the level recommended by the HFEA (Roberts et al., 2011). Although basic perinatal outcomes were significantly better for singletons, no severe prematurity has occurred, and perinatal outcome was favourable even for twins. The caesarean section rate in singletons, however, was well above the UK national level (42 versus 26.2% in 2013–2014), which clearly needs further attention (Birth rate down as CS increases, 2015).

The findings of our study are concordant with previous smaller studies reporting on the outcome of couples undergoing intra-couple egg donation treatment. The first published European study reported the pioneering experience of a Spanish group from Barcelona (Marina et al., 2010) on 14 same-sex couples who achieved 4 (29%) ongoing pregnancies. Although this study was small, it has successfully focused attention on this new treatment option and generated an extensive ethical debate that has influenced awareness among clinicians throughout Europe (Dondorp et al., 2010; Zeiler and Malmquist, 2014). A more recent study reported a similarly encouraging experience from a single centre in New York between 2002 and 2014 (Yeshua et al., 2015). This study involved 21 same-sex couples undergoing 'Co-IVF' treatments who achieved 13 (62%) ongoing pregnancies, a similar overall outcome to ours. Sixty-two per cent of the couples had some medical indication, mainly previously failed IUI and IVF treatments or diminished ovarian reserves. Although no obstetrical outcome data were presented, the proportion of multiple deliveries was 33% (including a triplet pregnancy), suggesting that the average number of transferred embryos was much higher (2.4 compared with 1.4) than in our study.

Limitations of our study are related to its retrospective nature. It included all consecutive couples undergoing shared motherhood IVF treatment at our centre, however, thus reducing the risk of selection bias. As its strength, it represents the largest published series so far, giving insight into patient characteristics and overall outcomes that were not available until now.

In conclusion, shared motherhood IVF is an increasingly requested form of assisted reproduction technique treatment among many lesbian couples. Increasingly, the autonomy of lesbian patients is being respected even though complex IVF treatment is carried out for (mostly) non-medical indications. To this end, OHSS-free ovarian stimulation with single-blastocyst-transfer provides a uniquely safe and highly efficient treatment modality. As shared motherhood IVF is taken up more widely worldwide, studies on mother–child relationships will become paramount to understand the psychological wellbeing of children born through this emerging medical procedure.

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Acknowledgement

The authors greatly appreciate the present manuscript's thorough review and suggestions made by Dr Zeynep Gurtin and Professor Susan Golombok.

ARTICLE INFO

Article history:
Received 12 September 2017
Received in revised form 13 November 2017
Accepted 17 November 2017
Declaration: The authors report no financial or commercial conflicts of interest.

Keywords:
In-vitro fertilization
Lesbian couples
Oocyte donation
Shared motherhood IVF
Single embryo transfer

REFERENCES

2015. Birth rate down as CS increases. Midwives 18, 6.

Berg Brigham, K., Cadier, B., Chevreul, K., 2013. The diversity of regulation and public financing of IVF in Europe and its impact on utilization. Hum. Reprod. 28, 666–675.

Bodri, D., Guillen, J.J., Polo, A., Trullenque, M., Esteve, C., Coll, O., 2008. Complications related to ovarian stimulation and oocyte retrieval in 4052 oocyte donor cycles. Reprod. Biomed. Online 17, 237–243.

Bodri, D., Sunkara, S.K., Coomarasamy, A., 2011. Gonadotropin-releasing hormone agonists versus antagonists for controlled ovarian hyperstimulation in oocyte donors: a systematic review and meta-analysis. Fertil. Steril. 95, 164–169.

De Wert, G., Dondorp, W., Shenfield, F., Barri, P., Devroey, P., Diedrich, K., Tarlatzis, B., Provoost, V., Pennings, G., 2014. ESHRE Task Force on Ethics and Law 23: medically assisted reproduction in singles, lesbian and gay couples, and transsexual peopledagger. Hum. Reprod. 29, 1859–1865.

Dondorp, W.J., De Wert, G.M., Janssens, P.M., 2010. Shared lesbian motherhood: a challenge of established concepts and frameworks. Hum. Reprod. 25, 812–814.

Ethics Committee of American Society for Reproductive Medicine, 2013. Access to fertility treatment by gays, lesbians, and unmarried persons: a committee opinion. Fertil. Steril. 100, 1524–1527.

Jouannet, P., Commission, X., Commission, X., 2014. [Extension of assisted reproductive technologies with donor sperm (ARTD) to non-medical indications]. Bull. Acad. Natl Med. 198, 951–971.

Marina, S., Marina, D., Marina, F., Fosas, N., Galiana, N., Jove, I., 2010. Sharing motherhood: biological lesbian co-mothers, a new IVF indication. Hum. Reprod. 25, 938–941.

Priddle, H., 2015. How well are lesbians treated in UK fertility clinics? Hum. Fertil. (Camb.) 18, 194–199.

Roberts, S.A., McGowan, L., Vail, A., Brison, D.R., 2011. The use of single embryo transfer to reduce the incidence of twins: implications and questions for practice from the 'towardSET?' project. Hum. Fertil. (Camb.) 14, 89–96.

Woodward, B.J., Norton, W.J., 2006. Lesbian intra-partner oocyte donation: a possible shake-up in the Garden of Eden? Hum. Fertil. (Camb.) 9, 217–222.

Yeshua, A., Lee, J.A., Witkin, G., Copperman, A.B., 2015. Female couples undergoing IVF with partner eggs (Co-IVF): pathways to parenthood. LGBT Health 2, 135–139.

Zeiler, K., Malmquist, A., 2014. Lesbian shared biological motherhood: the ethics of IVF with reception of oocytes from partner. Med. Health Care Philos. 17, 347–355.

Please cite this article in press as: D. Bodri, S. Nair, A. Gill, G. Lamanna, M. Rahmati, M. Arian-Schad, V. Smith, E. Linara, J. Wang, N. Macklon, K.K. Ahuja, Shared motherhood IVF: high delivery rates in a large study of treatments for lesbian couples using partner-donated eggs, Reproductive BioMedicine Online (2017), doi: 10.1016/j.rbmo.2017.11.006