Case Reports in Women's Health 21 (2019) e00099

Contents lists available at ScienceDirect

Case Reports in Women's Health

journal homepage: www.elsevier.com/locate/crwh

# Vaginal culture for IVF allows two mothers to carry the same pregnancy: Is more always better?

## HIGHLIGHTS

- Intravaginal culture (IVC) is not a new technology but is gaining in popularity
- The INVOcell device is marketed as a lower cost treatment option to in-vitro fertilization (IVF)
- Previous studies done by the INVOcell owned company have shown similar live birth rates between INVOcell IVC and IVF
- It is unclear how much of a cost savings is present with use of IVC compared to traditional IVF
- IVC may represent a viable option for fertility treatment in select patients

The recent news of "a miracle baby carried by two moms" and "the first ever reciprocal effortless IVF baby" has made quite a splash worldwide [1,2]. The Massachusetts-based company INVO Bioscience has developed a medical device called INVOcell to provide a low-cost IVF treatment by eliminating the need for the conventional equipment used in traditional IVF [3]. Instead of having to use a full in-vitro fertilization (IVF) lab, a patient's vagina serves as an incubator. This device offers same-sex female couples a rare opportunity for both women to play an active role in the "incubation" of their offspring [1,2]. But is this really novel? While intravaginal culture (IVC) of embryos is a new hot topic in the media and thus in conversations in the clinic, it is not a new technology. Ranoux et al. described the technique of fertilization and blastocyst formation via a culture-filled tube placed in the vagina as early as 1988 [4].

The INOVcell is a container that is about 3x4cm in size and is placed inside a patient's vagina after combining the sperm and eggs. Preliminary studies published in 2012 using the gas-permeable, air-free plastic vaginal device showed pregnancy rates, live birth rates, and singleton live birth rates of 40%, 31.2% and 24%, respectively, which was comparable to the U.S. national statistics reported by the Centers for Disease Control from 2008 (41%, 33.8%, 23%) [5]. The patients in this 2012 trial underwent a mild IVF stimulation followed by conventional vaginal oocyte retrieval. Sperm was co-incubated in the INVOcell with 4 oocytes on average. This study was followed with a prospective randomized open-label controlled single-centre study done by the founder, CEO and CFO of INVOcell comparing traditional IVF with intravaginal culture (IVC) [6]. A total of 40 women aged 18–38 years were included in the study. Exclusion criteria were abnormal male semen analysis (<5million progressively motile sperm in the ejaculate), abnormal uterine cavity, chronic illness, vaginal infections, endometriosis, untreated hydrosalpinx, use of donor gametes, anti-mullerian hormone (AMH) level < 1 ng/ml, polycystic ovaries, prior history of ovarian hyperstimulation (but not prior history of IVF), smoker or drug user, two or more failed IVF cycles or fertilization failure in a prior IVF cycle, and a BMI >35. Again, patients underwent a mild COH and underwent only one vaginal ultrasound for monitoring on stimulation day 10. Patients were then randomized to the study group (IVC) or IVF (20 in each group). Oocytes were incubated with sperm for 2–4 h prior to being transferred to the vaginal device in the IVC group. The vaginal device was kept in place for 5 days and embryos were compared with those that underwent traditional culture incubation. They found that IVF was superior in generating good-quality blastocysts (grade 2BB or higher) when compared with IVC (50.6% vs 30.7%, $p = .0007$). Following a conventional trans-cervical embryo transfer, multiple embryos were transferred in both groups (1.65 average for IVC and 1.8 average for IVF). The live birth rates were similar (60% for IVF vs 55% for IVC) [6]. Thus, the use of the INOVcell device, in the setting of mild stimulation, appears to result in acceptable live birth rates for the initial embryo transfer at a cost of reducing the overall number of good-quality embryos.

Is INVOcell more affordable? While the major idea behind using the INOVcell is to reduce the costs associated with traditional IVF culture systems, there has not been a direct cost analysis of IVF vs IVC. IVC still does require COH and VOR, which represent a major cost of IVF. An embryologist is still needed for the preparation of the oocytes and incubation with prepped sperm; so this cost remains as well. Currently, there are a number of infertility clinics in the United States and elsewhere [7] that offer use of the INVOcell. However, it appears that costs, and specifically consumer costs, are roughly equal to traditional IVF costs, if not greater. Furthermore, with more and more clinics doing single-embryo transfer to decrease the rate of multiples associated with IVF, it is unclear how well IVC would compare in single-embryo transfers given that the good-quality blastocyst rate was lower in IVC. That said, the physiological factor for the patient is also incredibly important. Many patients see this as "more natural" when compared with IVF, promoting the in vivo concept. The process of IVC can be considered more intimate and as seen in the headlines of the same-sex couple who both "carried" their offspring, it can be a fulfilling process in the world of artificial fertilization. So, for some who meet all the inclusion criteria and desire a more "natural" process, less is more.

https://doi.org/10.1016/j.crwh.2019.e00099

## Contributors

The authors jointly contributed to the writing of this editorial.

## Conflict of Interest

Neither author has a financial or personal relationship with the company INVO Biosciences and the authors have no conflict of interest regarding the publication of this editorial.

## Funding

No funding was sought or secured in relation to this editorial.

## Provenance and Peer Review

This editorial was commissioned and not externally peer reviewed.

## References

[1] K. Hignett, INVOcell: two Texas women carry one baby in first ever "Reciprocal Effortless IVF" Procedure, Newsweek (2018) Online.
[2] S. Azad, Same-sex Couple Carries Same "Miracle" Baby in What may be Fertility World First, USA Today, 2018 Online.
[3] INVO Bioscience, at https://invobioscience.com/ 2016.
[4] C. Ranoux, F.X. Aubriot, J.B. Dubuisson, et al., A new in vitro fertilization technique: intravaginal culture, Fertil. Steril. 49 (1988) 654–657.
[5] E. Lucena, A.M. Saa, D.E. Navarro, C. Pulido, O. Lombana, A. Moran, INVO procedure: minimally invasive IVF as an alternative treatment option for infertile couples, TheScientificWorldJOURNAL 2012 (2012), 571596.
[6] K.J. Doody, E.J. Broome, K.M. Doody, Comparing blastocyst quality and live birth rates of intravaginal culture using INVOcell to traditional in vitro incubation in a randomized open-label prospective controlled trial, J. Assist. Reprod. Genet. 33 (2016) 495–500.
[7] Patients of low-cost Calgary fertility clinic call for better oversight. CBC, Calgary, 2018. Accessed 1/23/2019, at https://www.cbc.ca/news/canada/calgary/low-cost-fertility-clinic-patients-regulations-1.4870418.

Sara Babcock Gilbert
*Division of Reproductive Endocrinology and Infertility, Department of Obstetrics and Gynecology, University of Colorado School of Medicine, United States*
*E-mail address:* sara.gilbert@ucdenver.edu

Alex J. Polotsky
*Division of Reproductive Endocrinology and Infertility, Department of Obstetrics and Gynecology, University of Colorado School of Medicine, United States*

23 January 2019
Available online xxxx