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How do complications from PCOS and OHSS affect the success rate of implantation techniques?

Aashna Vyas
aashnavyas@icloud.com

ABSTRACT

IVF, or in vitro fertilization, is one of the most commonly used assisted reproductive technologies. Even though IVF is effective, standard protocols typically require high doses of hormones for ovarian stimulation. This carries significant risks for patients with Polycystic Ovary Syndrome (PCOS), who are particularly vulnerable to hyper-response. PCOS is a hormonal disorder that causes many small, immature follicles to develop on the ovaries, and because of this, patients with PCOS are more likely to have an exaggerated reaction to ovarian stimulation medications. This raises their risk of Ovarian Hyperstimulation Syndrome (OHSS), a condition in which the ovaries become swollen and painful and can sometimes lead to more serious complications. Because of these risks, many patients and doctors look to IVM (in vitro maturation) as a risk-mitigating option. IVM involves collecting immature eggs from the ovaries and then maturing them in a laboratory. Since this method uses little to no hormonal stimulation, it greatly lowers the chances of OHSS. It also provides a safer alternative for patients who have underlying hormonal sensitivity due to conditions like PCOS by reducing stimulation-related risks. To evaluate these treatments rigorously, this review distinguishes between embryo implantation rates, clinical pregnancy rates, and live-birth rates. Overall, both IVF and IVM are valuable options for patients dealing with PCOS-related infertility and high OHSS risk. These approaches allow doctors to tailor fertility treatments to each patient's needs while reducing risks and supporting safer outcomes.

Keywords: *Polycystic Ovary Syndrome (PCOS), Ovarian Hyperstimulation Syndrome (OHSS), IVF (in vitro fertilization), IVM (in vitro maturation).*

1) INTRODUCTION

IVF (in vitro fertilization) is the process of fertilizing a mature egg with sperm outside the body in a laboratory dish (1), and related assisted reproductive technologies (ART) have helped many families globally (2). It is estimated that over 13 million babies have been born worldwide using IVF, with the number potentially climbing to 17 million based on recent data (2, 3). Although IVM has been considered a gentler approach to achieving pregnancy for many patients, especially those suffering from Polycystic Ovary Syndrome (PCOS), studies show that modern IVF protocols have also significantly reduced the incidence of Ovarian Hyperstimulation Syndrome (OHSS) in women with this condition (3, 4). IVM (in vitro maturation) is a fertility procedure in which immature eggs are collected and then matured in a

laboratory before being fertilized (5). It is associated with lower hormonal injection doses and less overall physiological impact (3, 5). Polycystic Ovary Syndrome (PCOS) is the leading endocrine abnormality in women, affecting an estimated 6.6–8% of women of reproductive age (6).

Literature Review Methodology: To provide transparency in evidence synthesis, a literature search was conducted across PubMed, MEDLINE, ScienceDirect, and Google Scholar utilizing search terms such as "Polycystic Ovary Syndrome", "PCOS", "Ovarian Hyperstimulation Syndrome", "OHSS", "in vitro fertilization", "IVF", "in vitro maturation", "IVM", "embryo implantation rate", and "cryopreservation". Literature published up to 2026 was evaluated, prioritizing peer-reviewed clinical trials, systematic reviews, and professional guidelines (such as ASRM) while excluding non-peer-reviewed commentaries.

Implantation is a complex process that depends on the coordination between a healthy embryo and a receptive uterine lining (7). Even when embryos appear high quality, pregnancy may not occur if the endometrium is not properly prepared, showing that implantation success is not determined by embryo quality alone (7). Instead, it requires precise timing and interaction between embryonic development and the uterine environment (7). Clinical studies highlight that implantation rates in assisted reproductive technologies remain limited, meaning that fertilization and embryo transfer do not guarantee pregnancy (7, 8). Factors such as embryo transfer technique, uterine conditions, and hormonal balance can all influence outcomes (7). Overall, improving implantation success requires optimizing both embryo quality and endometrial receptivity together rather than focusing on one factor alone (7).

However, questions have been raised regarding how effective and well established these techniques truly are (3). Although IVF is known to reduce the incidence of OHSS during pregnancy for patients at high risk of the condition, conventional ovarian stimulation has historically been a major contributor to some of the severe side effects associated with OHSS (3, 9). Severe OHSS can cause blood clots, electrolyte imbalances, and in some instances, kidney failure (9, 10, 11). Medications used in high-dose IVF can also cause significant fluid buildup in the ovaries and pleural cavities, leading to pain, abdominal distention, dyspnea, and intravascular volume depletion (9, 10, 11). These risks associated with high-stimulatory IVF can result in serious complications during pregnancy if not properly managed or identified early (9, 12). If symptoms become severe in pregnant patients with OHSS, treatment options range from outpatient monitoring to hospitalization and therapeutic paracentesis (9, 10). This intervention can help support a safer pregnancy and reduce the risk of further morbidity (9, 10).

Many concerns have also been raised regarding the use of IVM in patients with severe Polycystic Ovary Syndrome (PCOS) (13, 6). Patients with PCOS who undergo assisted reproduction may experience complications, even though IVM is intended to reduce the likelihood of these issues (13, 6). In some cases, complications are linked to underlying hormonal imbalances associated with PCOS (13, 6). To manage metabolic dysfunction in these patients, clinical protocols frequently incorporate insulin sensitizers such as metformin, which help regulate insulin levels and reduce ovarian androgen production, particularly in lean PCOS phenotypes (6). Other short-term management options include anti-androgen medications prescribed by a physician to block androgen receptor activity (6). These adjunctive

treatments reduce endocrine-related risks and allow patients to undergo fertility treatments more safely (6, 5).

In vitro maturation and in vitro fertilization for patients with OHSS and PCOS represent vital pillars in the field of Reproductive Endocrinology and Infertility (REI) (6, 14). Advances in research and technology have allowed these techniques to evolve and improve for patients experiencing infertility (15, 14). This review article explores the use of IVM and IVF, examining how each technique operates in different clinical scenarios (5, 16). Overall, conventional IVF involves high-dosage hormonal stimulation, which carries an innate risk of OHSS if unmanaged (1, 9). Conversely, IVM minimizes exogenous gonadotropin exposure (5, 16). While conventional IVF has historically presented high risks in high responders, modern protocol adjustments, such as GnRH agonist triggers, antagonist protocols, and freeze-all strategies, have dramatically improved its safety profile (14, 17, 18). Both IVF and IVM have proven to be valuable assisted reproductive technologies that allow clinicians to tailor treatments based on patient profiles and OHSS risk factors (6, 17, 5).

2) DISCUSSION

2.1 IVM and IVF implantation success rates and patient demographics in PCOS

Patients with PCOS who undergo fertility treatments are at a higher risk for medical complications during pregnancy (6, 12). However, clinical trial data show that the IVF embryo implantation success rate for patients with PCOS is approximately 70.8% (19). This is very similar to patients who use IVF and have no other underlying health conditions, whose success rate is around 70–80% (19, 20). This comparison shows that PCOS does not seem to have a significant effect on IVF implantation success rates (19, 20). Additionally, another study of PCOS patients shows that implantation and fresh embryo transfers depend strongly on age (20). Patients younger than 35 years of age tend to achieve higher live birth rates and superior embryo implantation rates, ranging between 53.7% to 53.8% (20). In comparison, patients older than 35 years of age have lower rates of successful embryo transfer and live births, ranging between 35.7% and 39.0% (20). Furthermore, PCOS patients with higher oocyte retrieval counts demonstrate improved embryo implantation rates and an increased likelihood of live births.

Oocyte retrieval is the process of collecting immature eggs from the ovaries during IVF treatment (20, 21). Furthermore, patients with PCOS generally produce a large number of oocytes (6, 21). In addition, the quality of oocytes from PCOS patients can sometimes be lower, which can decrease the chance of live birth in some cases (21). Because of this, doctors often aim to retrieve a higher number of oocytes to improve fertility outcomes (20, 21). Another important factor is the use of medication during treatment (6, 22). These changes may also enhance uterine blood flow and overall reproductive function (6, 22). Collectively, these research studies show both the benefits and risks associated with IVF in PCOS patients (6, 19, 20). They explain that patients with PCOS can still have successful pregnancies and higher chances of live births, especially if they are younger than 35 years of age (20). In general, the impact of PCOS on IVF and implantation is not extremely large (19, 20). Many patients with high oocyte yields achieve successful pregnancies and optimal implantation outcomes (20). However, complications can still

occur; for instance, developing OHSS or being over the age of 35 may result in reduced embryo implantation rates or other medical complications, such as miscarriage (9, 20, 12).

Research has also identified complications associated with IVF in patients with PCOS (12). One of the main concerns after oocyte retrieval is the high risk of developing OHSS (9, 6). In addition, patients may face risks such as gestational diabetes mellitus (GDM), pregnancy induced hypertension (PIH), large gestational age (LGA) infants, and preterm delivery (12). Current research shows that live birth rates have improved with IVF treatment; however, there is still a higher risk of neonatal and obstetric complications (12). Even with improved outcomes, pregnancy risks are not completely eliminated (12). For example, preterm delivery can place the newborn at higher risk because organ development may be incomplete (12). Despite these risks, many researchers have found that IVF has improved pregnancy outcomes (19, 12). It has also become a viable third-line option for women with PCOS when ovulation induction treatment has failed or when coexisting male infertility factors are present (6, 19). Overall, pregnancy and implantation rates with IVF in women with PCOS are higher than in the past (19, 20). However, complications can still occur (12). Even so, research shows that patients with PCOS undergoing IVF are experiencing improved pregnancy rates and implantation success (19, 20). Furthermore, it has been shown that OHSS is more prevalent in younger women than older due to the risk mitigation factor (9, 6). In summary, using IVF in patients with PCOS and OHSS has both advantages and disadvantages (6, 19, 12). While many successful births occur, there is also a risk of maternal complications, neonatal complications, and secondary medical issues that may result in long-term health problems (12).

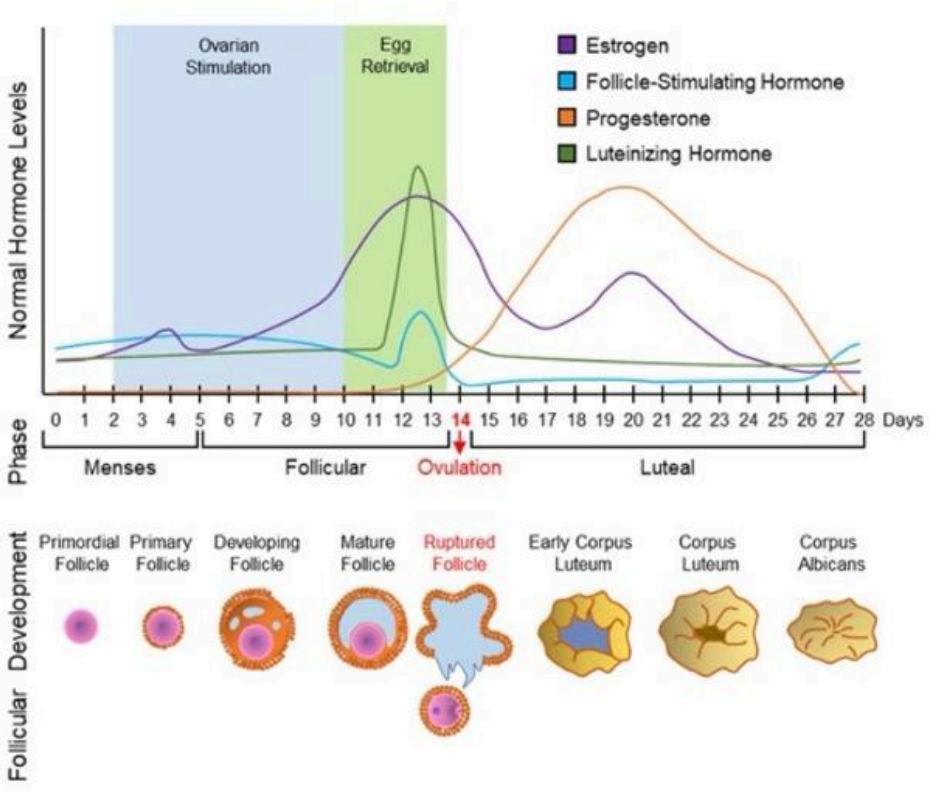


Figure 1. *Schematic overview of normal hormonal fluctuations and follicular development phases during ovarian stimulation and oocyte retrieval. Adapted from "Review of Minimally Disruptive In Vitro Fertilization (IVF) Approaches as a Strategy for Assisted Human Conception," by C. A. Kim et al., 2024, Georgetown Medical Review, 8(1) (23).*

2.2 Impact of Reduced Hormonal Stimulation and Lower hCG Dosing on OHSS Mitigation

Metformin is a tablet taken twice a day until the day of the oocyte collection (22). Medications like metformin have also been shown to increase pregnancy and implantation rates by reducing PCOS-related symptoms that affect oocyte quality and embryo development (22, 21). Research has found metformin helps improve reproductive function in some women with PCOS by improving insulin sensitivity and follicular development; however, high-dose ovarian stimulation also places them at a higher risk of developing OHSS (6, 22). Minimizing hormonal exposure has become a critical focus in clinical protocols (18, 16). Studies have shown that lower doses of hCG or modified IVM approaches in patients with PCOS strengthen the oocyte retrieval without adversely affecting clinical safety outcomes (24, 5, 16). One specific study from the National Library of Medicine found that in 56 patients at high risk of OHSS during a controlled ovarian hyperstimulation cycle, hCG (hormonal injection) was given when the leading follicle reached 12–14 mm in diameter (24). Seventy-six percent of oocytes matured from this cycle and underwent fresh embryo transfers, with a clinical pregnancy rate of 46%, which is considered high for OHSS patients (24). Theoretically, decreasing the standard dose of hCG administered to trigger oocyte maturation (10,000 IU) might help prevent OHSS (24). Doses of hCG as low as 3,300 IU have

been shown to effectively trigger oocyte maturation in assisted reproductive technology (ART) without adversely affecting cycle outcomes (24). Building upon these modified protocols, broader clinical studies demonstrate that lower hormonal interventions yield improved results; for example, specific cohorts in Germany observed pregnancy rates reaching 39.6% using optimized trigger approaches (24, 16). Emergency vitrification of embryos has been shown to be successful in preventing OHSS in high-risk women; however, it may also have complications, including rare cases of multi-organ failure and cerebrovascular thrombosis associated with assisted reproductive technologies (5, 16). Lower doses of hCG may help reduce the risk of OHSS without significantly compromising oocyte or embryo quality. In some cases, these lower doses can still support the development of viable embryos suitable for fresh transfer. Additionally, some studies suggest that lower hormonal stimulation protocols may improve oocyte maturation, which is particularly relevant to IVM approaches. Although research is still limited, emerging data indicate that lower hCG dosing in patients at risk for OHSS may be associated with high pregnancy and live birth outcomes (24).

2.3 Cryopreservation, Endometrial Recovery, and Clinical Success Rates using IVF in High-Responders PCOS

Although higher doses of gonadotrophin injections are known to increase follicle growth as well as the risk of pregnancy loss and other complications in patients with PCOS, clinical evidence demonstrates that optimizing dosage protocols significantly improves overall patient outcomes (6, 24). One study shows that women with PCOS are also noted to have higher serum Anti-Müllerian hormone (AMH) levels, with granulosa cells showing up to a 75-fold increased production of AMH (6, 21). Serum AMH levels are also significantly higher in women with PCOS compared to their ovulatory counterparts. Given the known negative regulatory effect of AMH on FSH signaling and its inhibition of follicle development, elevated AMH is one mechanism that contributes to disrupted follicular development in women with PCOS (6, 21). Numerous metabolic abnormalities, including elevated LH and increased serum androgen levels, also contribute to elevated AMH levels. This mechanism, in addition to the effects of insulin resistance and hyperandrogenism, contributes to the anovulation and infertility observed in PCOS (6). Even when ovulation is present, PCOS patients may still be at a higher risk for infertility, possibly due to oocyte quality issues and/or reduced endometrial receptivity (7, 21).

As reported by ASRM guidelines, GnRH agonist trigger protocols are considered first-line management for patients at high risk of OHSS, such as those with PCOS, because they induce an endogenous LH surge that dramatically reduces OHSS incidence while maintaining comparable reproductive outcomes when luteal phase support is provided (25). Clinical comparisons between hCG and GnRH agonist triggers show that while both achieve comparable oocyte retrieval and embryo implantation rates ranging from 49.3% to 62.2%, GnRH agonists are strongly preferred for OHSS prevention (26). Furthermore, modern cryopreservation techniques provide an essential safeguard for high-responding patients. Vitrification, the rapid transformation of a liquid into an amorphous, "glass-like" state rather than ice crystal formations, revolutionized embryo freezing (20). Vitrification achieves post-warming survival rates of 92% to 97%, resulting in superior clinical pregnancy outcomes compared to traditional slow-freezing methods (20, 27).

The implementation of "freeze-all" strategies allows the endometrium to recover from supraphysiological hormone levels before embryo transfer, virtually eliminating early-onset OHSS without compromising cumulative live-birth rates (20, 28).

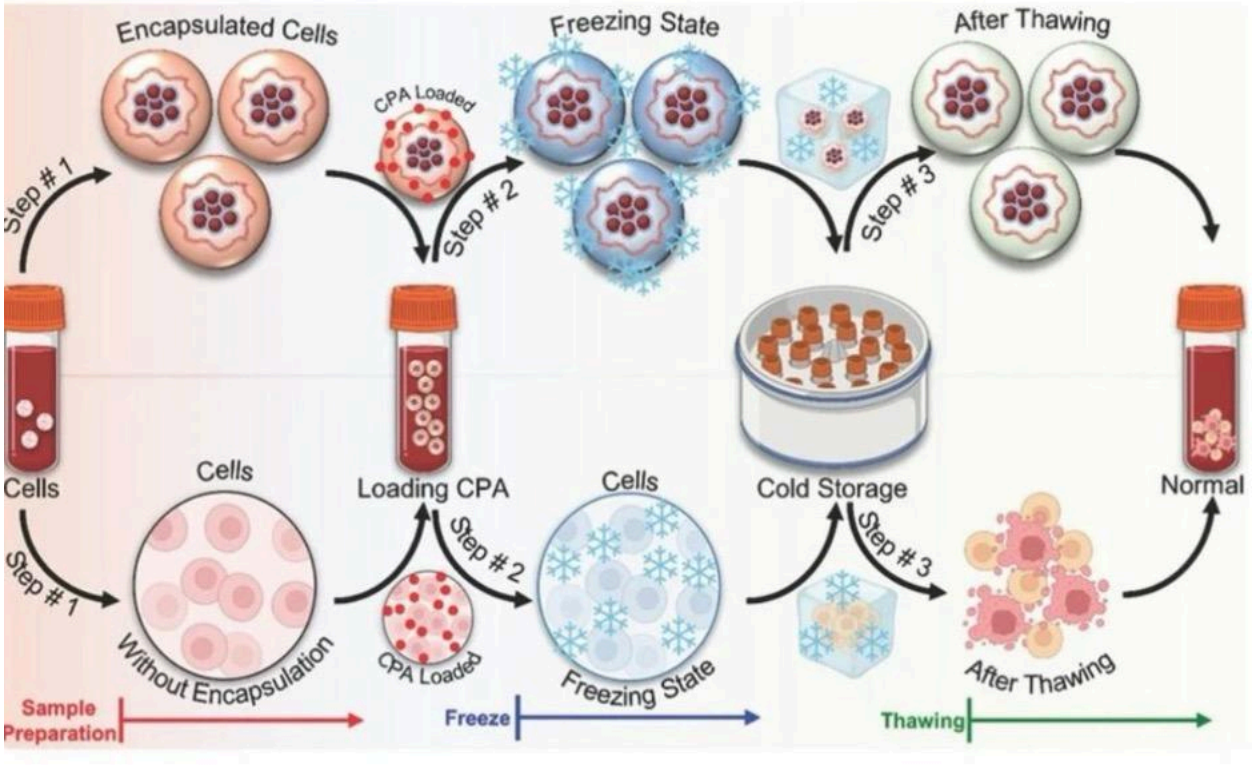


Figure 2. Adapted from research illustrating the comparative mechanics of cellular cryopreservation with and without structural encapsulation (e.g., Memon et al., featuring CPA dynamics and matrix-stabilized freezing frameworks, Research Gate, 2025). (27).

2.4 New Research Developments of implantation techniques with IVF and IVM and how that impacts patients with PCOS and OHSS

New developments for IVF and PCOS patients include a "freeze-all" strategy, as well as newer approaches using GnRH agonist triggers and dopamine agonists to reduce OHSS risk. Another major development is the use of GnRH agonist triggers to minimize OHSS. In addition, other adjuvants administered around the time of the trigger injection have been evaluated. The most well-studied is the use of dopamine agonists, based on animal models of OHSS and evidence of low dopamine tone in PCOS patients, which leads to dysregulated vascular endothelial growth factor (VEGF) signaling, a key driver in the pathogenesis of OHSS. Cabergoline inhibits vascular endothelial growth factor receptor 2 (VEGFR-2) phosphorylation and signaling, thereby preventing VEGF from activating its receptors and ultimately

reducing OHSS. A randomized controlled trial (RCT) compared cabergoline at the time of trigger versus placebo and found that treatment with cabergoline decreased moderate OHSS risk to 20%, compared to 43.8% with placebo. A recent retrospective study compared dosing at the time of GnRH agonist trigger versus the day of retrieval, with the former group showing less mild to moderate OHSS. This approach of administering cabergoline at the time of trigger rather than at retrieval makes physiological sense given the need to prevent the early rise in VEGF levels. A subsequent meta-analysis incorporating this and 16 other RCTs determined that the risk of OHSS was substantially reduced using a GnRH trigger compared to an hCG trigger (OR 0.15, 95% confidence interval [CI] 0.05–0.47) (29).

The "freeze-all" strategy involves freezing embryos for later transfer rather than performing a fresh transfer. Studies have shown that the freeze-all strategy in PCOS patients leads to higher live birth rates (LBR), lower miscarriage rates, and lower OHSS rates. A subsequent RCT involving 212 high-responding patients (as PCOS patients often are) showed no difference in pregnancy rates (PR) or LBR between the freeze-all group and the fresh transfer group with hCG support. Both cleavage-stage and blastocyst-stage embryos were transferred. However, the fresh embryo transfer group was the only one to experience moderate to severe OHSS, at a rate of 8.6%, compared to 0% in the freeze-all group. Overall, the freeze-all strategy appears to result in better outcomes in terms of LBR and OHSS reduction for patients with PCOS. This study not only shows that the freeze-all protocol may be superior to fresh embryo transfer due to a lower risk of OHSS, but also that it is associated with fewer pregnancy complications and higher birth rates, reported at 62.4%. This is particularly important for PCOS patients, who often experience challenges related to elevated androgen levels and increased follicle counts, which can make achieving strong embryos and successful implantation more difficult even with hormonal medication (29).

These methods not only protect PCOS patients from developing OHSS but also contribute to safer and more stable pregnancy outcomes. Whether through preventing the hormonal cascade that triggers OHSS or by using frozen embryos for later transfer, both approaches reduce risk and improve patient safety. More research is still needed in this field, but current evidence suggests that these are among the most effective approaches for supporting PCOS patients undergoing IVF (29). In vitro maturation (IVM) has also been used as an alternative option for patients at high risk of developing OHSS due to PCOS. IVM has been proposed as an alternative to conventional IVF because it significantly reduces or eliminates the risk of OHSS. IVM treatment typically involves a short duration of gonadotrophin stimulation and retrieval of oocytes from follicles at a much smaller diameter than in conventional IVF, often without the use of a trigger injection. Oocyte maturation then occurs in vitro.

The IVM process involves the collection of immature oocytes at the germinal vesicle (GV) or metaphase I (MI) stages of meiosis, retrieved from small ovarian follicles via transvaginal oocyte retrieval. Subsequently, these oocytes undergo resumption of meiosis and maturation to metaphase II (MII) in the laboratory. The in vivo preparation for IVM treatment is somewhat controversial, and it has been suggested that cycles involving both gonadotrophin stimulation and an ovulation trigger should instead be classified as "minimal stimulation IVF" rather than true IVM. With the administration of a human

chorionic gonadotropin (hCG) trigger prior to oocyte collection ("hCG priming"), meiosis resumes in vivo, and oocytes may be retrieved at varying stages of maturation (GV, MI, or MII). This creates logistical challenges in vitro, as fertilization, embryo culture, and transfer must be adjusted according to oocyte maturity. Rigorously defined, "true" IVM refers strictly to cycles performed without an hCG trigger, ensuring that oocyte maturation occurs entirely in laboratory culture rather than in vivo (31). While cycles utilizing hCG priming present logistical variations, IVM remains a highly valuable, risk-mitigating modality that entirely avoids supraphysiological estradiol exposure and eliminates OHSS risk (30, 31, 32).

2.5 How genetics contribute to differences in implantation success rates using IVF or IVM among women with PCOS

Both PCOS and endometriosis, which is a chronic inflammatory condition where tissue similar to the lining of the uterus (endometrium) grows outside the uterus, can affect implantation. Unexplained infertility may also result from implantation defects, potentially due to an altered phenotype associated with PCOS or endometriosis. Similar mechanisms have been implicated in implantation failure associated with infertility. These include avB3 integrin(alpha v beta 3) integrity and glycodelin expression, which are vital biomarkers of endometrial receptivity that must be present and properly localized for successful embryo implantation, as well as dysregulation of estrogen receptors and progesterone resistance. A study shows that women with PCOS, even after ovulation has been restored, have an increased risk of spontaneous miscarriage, with lower cumulative pregnancy rates compared with other sub-fertile populations (33). In addition, some studies have suggested an increased rate of spontaneous abortion in women with endometriosis compared to women without the condition. Furthermore, low mid-luteal progesterone levels have been associated with a lower probability of achieving a live birth despite the use of ovarian stimulation, suggesting the presence of hormonal dysfunction leading to failed outcomes in certain infertile patients with genetic contributions (33). It remains to be determined how different etiologies of infertility, resulting from underlying genetic and epigenetic factors, contribute to endometrial dysfunction that leads to implantation failure, miscarriage, and adverse outcomes related to placentation defects, as well as short- and long-term reproductive consequences (33). Single-gene disorders leading to disease and primary infertility have been identified; however, these account for only a small percentage of infertility cases, which are likely multifactorial in nature. More recently, the most common type of genetic variation in the population, single nucleotide polymorphisms (SNPs), has been found to be associated with infertility-related disease. Because these variants are common and have relatively mild effects on risk, they are typically identified through large population-based genome-wide association studies (GWASs). Several large GWASs conducted in PCOS case-control populations have identified multiple risk loci near genes involved in hormone regulation and reproductive function. The LHCGR gene, which encodes the luteinizing hormone and human chorionic gonadotropin receptor, is critical for normal menstrual function (33). Several candidate genes, including FSHR, FSHB, DENND1A, INSR, and THADA, are also involved in reproductive hormone regulation and have been linked to metabolic syndrome and insulin resistance, which are common in PCOS and may contribute to an increased risk of miscarriage and gestational diabetes during pregnancy. In addition, clinical literature reports that several polymorphisms have been identified in the progesterone receptor (PR) gene, with the PROGINS

polymorphism, in particular, hypothesized to alter ligand binding and downstream cellular signaling in the context of endometriosis as a potential correlative factor implicated as a genetic contributor to progesterone resistance (34). By examining these genetic and molecular factors alongside clinical outcomes, this review clarifies that implantation success in PCOS is governed by a complex interplay of endocrine signaling, endometrial biomarker expression avB3 integrin *and* glycodelin), and polygenic risk variants. While genetic markers offer mechanistic insights, their direct predictive clinical utility remains limited by the substantial phenotypic heterogeneity inherent in PCOS populations (33, 34).

CONCLUSION

The use of IVM for infertility treatment has several perceived advantages over conventional IVF for women with a high antral follicle count, such as women with PCOS (32). These include a shorter duration of stimulation and the use of fewer gonadotropins. Additionally, IVM allows for the avoidance of supraphysiological estradiol levels, providing symptomatic benefits and minimizing overall estrogen exposure. This is particularly important for women undergoing ovarian stimulation for fertility preservation in the context of breast cancer or for women with thrombophilia, as well as for the exclusion of OHSS risk (32).

Other procedural modifications in IVF protocols for women with PCOS who are at significant risk of OHSS include the use of GnRH antagonist protocols, the use of a GnRH agonist trigger injection prior to oocyte retrieval, the concurrent use of metformin during stimulation, and the use of dopamine agonists (29, 32). However, despite these strategies, OHSS can still occur, although less frequently (29, 32). Overall, IVM offers several potential advantages over conventional IVF for women with a high natural follicle count, which is common in PCOS patients. These benefits include reduced duration of ovarian stimulation, lower gonadotrophin requirements, avoidance of supraphysiological oestradiol levels, and elimination of the risk of OHSS (32). IVM may be especially advantageous for women undergoing fertility preservation in the context of hormone-sensitive malignancies or for those with thrombophilia, where minimizing oestradiol exposure is clinically desirable (32). While modifications to conventional IVF protocols, such as GnRH antagonist cycles, GnRH agonist triggering, adjunctive metformin, and dopamine agonist use, can reduce the incidence of OHSS in high-risk patients, the syndrome may still occur, albeit less frequently (29, 32). Overall, IVM represents a promising, risk-mitigating alternative to conventional IVF in selected patients, offering reduced hormonal burdens for high-risk cohorts (32). Rather than replacing conventional IVF, which remains a primary standard for achieving high cumulative live birth rates, IVM serves as a targeted option for patients where minimizing estradiol exposure or avoiding stimulation is clinically desirable (32). With ongoing protocol refinements, both techniques continue to expand the safety and efficacy of ART (32).

In addition, IVM can be used in patients with ovarian resistance to follicle-stimulating hormone (FSH), in fertility preservation for cancer patients (particularly women with leukemia and oestrogen-sensitive tumours), and in patients with endometriosis undergoing extensive endometrioma excision. It can also be used as a fertility-preserving option for women at risk of premature ovarian failure. Furthermore, it has

been used in normal responders with a history of poor oocyte or embryo quality, as well as in oocyte donation cycles to avoid the discomfort of ovarian stimulation for donors. Additionally, laboratory processes in IVM involving immature oocytes derived from ovarian tissue allow clinicians to offer another fertility preservation option for women undergoing oophorectomy. Segers et al. reported a successful pregnancy using an ex vivo method of oocyte cryopreservation following oophorectomy and subsequent IVM. In another case, our group performed oophorectomy after a few days of ovarian stimulation without a trigger and obtained 18 mature oocytes after IVM. This demonstrates that IVM may be advantageous due to its lower risk of OHSS and reduced hormonal stimulation requirements (32).

Both IVF and IVM are considered important, assisted reproductive technologies. Many healthcare providers view IVM as a rapidly developing approach in infertility treatment due to its lower hormonal burden and reduced OHSS risk, while still supporting successful oocyte maturation and embryo development. IVM offers a safer alternative to conventional IVF for patients at high risk of severe OHSS, as conventional IVF carries a higher inherent risk of ovarian hyperstimulation based on clinical evidence (32).

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