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INFERTILITY: COMMENTARY

Ovarian Rejuvenation Using Platelet-Rich Plasma: a Promising Option for Women in Early Menopause to Have a Baby

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Today, a large proportion of infertility cases are related to ovarian insufficiency as a result of diminished ovarian reserve. This condition is defined by a loss of small follicles or a decrease in the quality of existing follicles, and thus a reduction in the potential to produce mature oocyte competent for fertilization. In women of reproductive age, ovarian insufficiency can be caused by various factors, including unilateral ovarian absence, previous ovarian surgery, aneuploidy, smoking, unexplained infertility, chemotherapy/radiotherapy exposure, and various environmental factors. Additionally, the trend in delaying childbearing due to lifestyle preferences may culminate in ovarian insufficiency, as the quality and quantity of viable eggs decrease with age. Social egg freezing is a good preventive treatment option, but it remains difficult to counsel patients prior to a diagnosis of diminished ovarian reserve, and it does not guarantee a pregnancy. While in vitro fertilization continues to be the first-line treatment therapy, it may also be unsuccessful due to poor egg quality. The use of donor oocytes is another solid option, but ethical concerns, high cost, and psychological factors may limit its use. Thus, few treatment options are available for restoring fertility in women with low ovarian reserve, and there is a clear need for new approaches to help women suffering from this condition.

Several ongoing trials are investigating approaches to rescue or regenerate oocytes and restore fertility in women with ovarian insufficiency—these approaches include in vitro oocyte activation, stem cell therapies (umbilical cord mesenchymal stem cells and autologous bone marrow stem cells), and the use of platelet-rich plasma (PRP). Many recent regenerative medicine studies support the utility of PRP for the treatment of various diseases. PRP is composed of platelets in a small volume of plasma containing high concentrations of platelet-derived growth factors and cytokines. As an autogenous preparation, treatment with PRP eliminates concerns about transmissible diseases and immune rejection.

Results from the first clinical trial of PRP for female infertility were reported in 2016, and 13 PRP clinical trials are currently registered according to clinicaltrials.gov. Most of these are actively recruiting the participants or patients, and only one has been completed in the USA [1]. A study in 2018 demonstrated that PRP treatment through intraovarian injection under transvaginal ultrasound guidance leads to increased serum AMH and decreased serum FSH, and metaphase II (MII) oocytes were retrieved from all women in the PRP treatment group [2]. After in vitro fertilization, each patient in the PRP group had at least one blastocyst suitable for cryopreservation (4 cases). Another study in 2019 also reported qualitative data on intraovarian ultrasound-guided transvaginal injection of autologous PRP, suggesting that PRP treatment improved metabolism and embryo quality and facilitated euploid blastocyst development [3]. Despite these impressive results, the finding of elevated AMH and other factors does not guarantee healthy term livebirth [1].

In their recent article, Dr. Nataliia Petryk and Dr. Mykhailo Petryk report that injection of a high concentration of PRP into the ovary using an ultrasound-guided transvaginal approach had long-lasting and encouraging effects on various measures of reproductive function [4]. They report that PRP treatment restored serum hormone levels (FSH and LH) out to 12 months. Although they did not see an effect of PRP on the dynamics of AMH, there was a statistically significant increase in AMH level at 12 months after treatment. Interestingly, even women with low AMH levels after PRP treatment produced mature eggs that were retrieved during the study.

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Petryk et al. [4] also report a success rate for oocyte rejuvenation of 79.2% (19/24) and that 16.7% of women (4/24) became pregnant by natural conception and gave birth to healthy children. Of those who successfully underwent IVF, 6 women successfully gave birth to healthy children and 2 more women were pregnant and in their second and third trimester at the time the paper was written. Some study participants chose to freeze their embryos due to insufficient quality of the endometrium at the time of retrieval. Two out of five women who subsequently implanted a cryopreserved-thawed embryo had a positive beta-hCG and visualization of the embryo with heartbeats, and so on.

Compared with previous PRP studies [1, 5], the authors describe a much longer-lasting effect of PRP treatment, as well as a higher pregnancy rate and live birth rate [5]. The findings of this study are both impressive and promising; future studies should compare the efficacy of low- vs. high-dose PRP to determine whether the effects are dose-dependent.

In conclusion, Petryk et al. [4] demonstrated the restoration of hormone levels for 1 year after treatment, along with a 26% pregnancy rate and a 16% childbirth rate, with high-dose intravaginal administration of PRP. These findings lend further support for PRP as a promising approach for women seeking new treatment options to overcome low ovarian reserve and restore fertility. This work adds to a growing body of evidence on PRP effectiveness, safety, cost-effectiveness, and ease-of-use and moves this option closer to FDA approval if administered by an FDA-cleared device. These data could also inform the development of protocols to deliver PRP therapy using a standardized approach. Together, this study indicates that treatment with PRP is safe, uncomplicated, and accessible, bringing new hope to women with ovarian insufficiency due to low ovarian reserve who are seeking to conceive.

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