

Diagnosis of diminished ovarian reserve and preimplantation genetic testing impact frozen embryo transfer laboratory and clinical outcomes: Tracking failed thaw cycles as a key performance indicator

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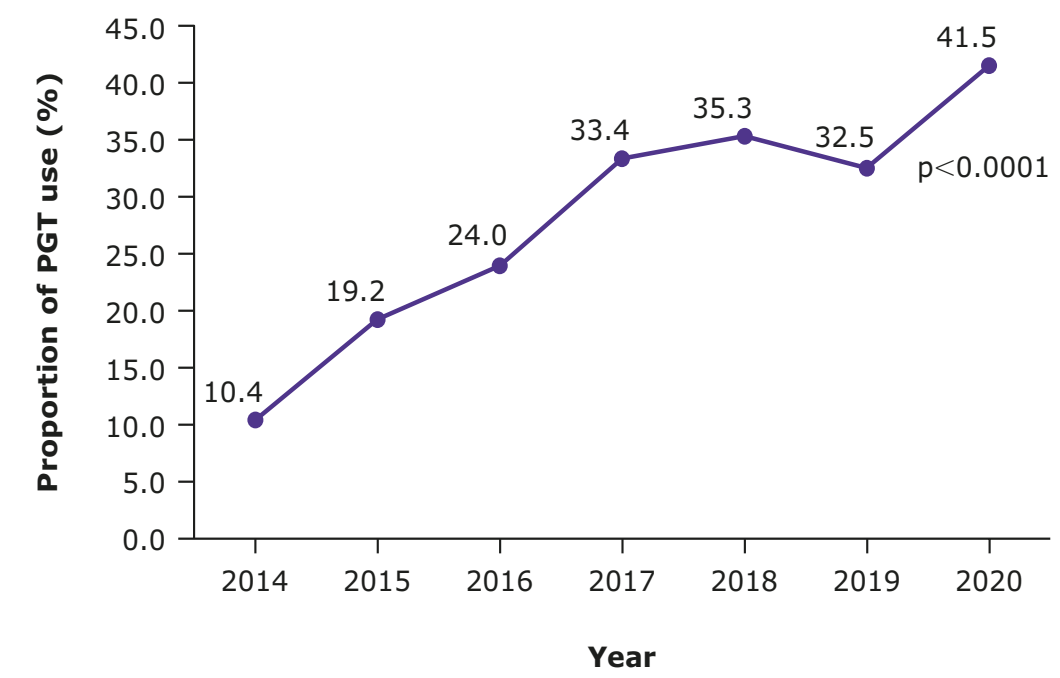
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RESULTS

- From 2014 to 2020, there was a 70.0% increase in the number of thaw cycles in patients with DOR
- Among patients with DOR, 22,596 thaw cycles were reported
- Among patients with DOR, the proportion of PGT use significantly increased from 10.4% in 2014 to 41.5% in 2020; $p < 0.0001$ (Figure 1)

Figure 1. Proportion of PGT use between 2014 and 2020 in patients with DOR

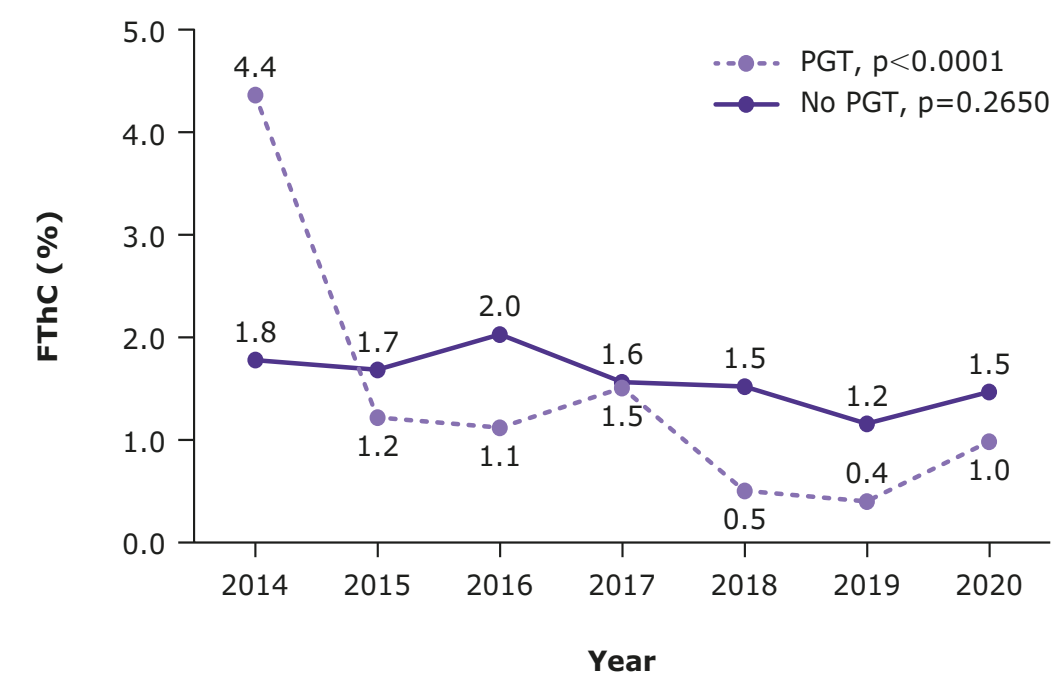


DOR, diminished ovarian reserve; PGT, preimplantation genetic testing

FThC

- FThC significantly improved from 2.0% (45/2201) in 2014 to 1.3% (47/3741) in 2020; $p = 0.0012$
- The PGT group showed significant improvement from 2014 to 2020 in FThC (4.4% [10/229] vs 1.0% [15/1553]; $p < 0.0001$); while the non-PGT group, which had less room for change, showed no change between 2014 and 2020 (1.8% [35/1972] vs 1.5% [32/2188]; $p = 0.2650$; Figure 2)—in 2020, FThC was comparable between PGT and non-PGT embryos

Figure 2. Proportion of FThC over time, stratified by PGT status, in patients with DOR

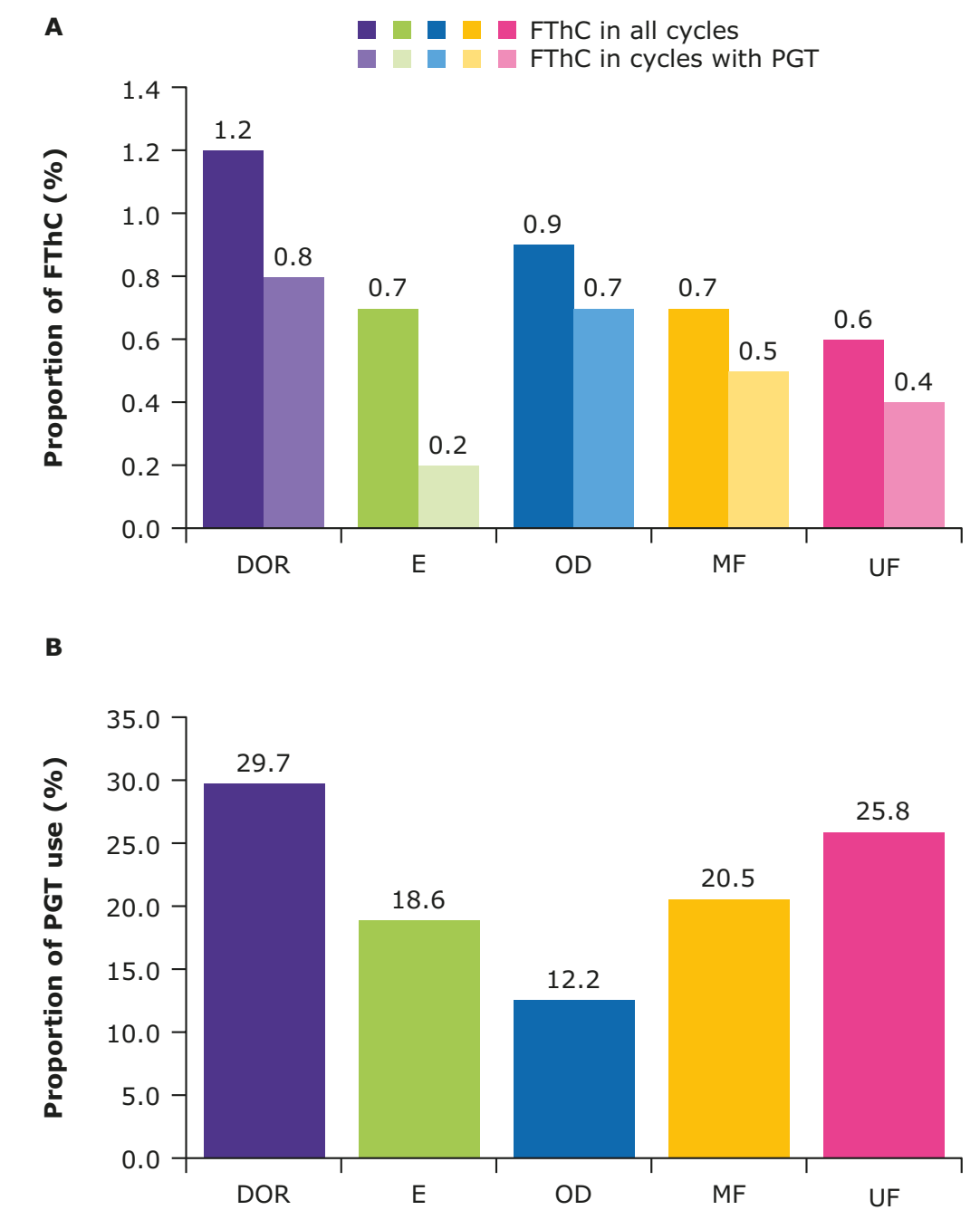


P-values were obtained using Fisher's exact test

DOR, diminished ovarian reserve; FThC, failed thaw cycles; PGT, preimplantation genetic testing

- Compared with other diagnoses (Figure 3), embryos from patients with DOR had the highest proportions of:
 - FThC (1.2%)
 - Thaw cycles with PGT (29.7%)
 - PGT-tested embryos failing thaws (0.8%)

Figure 3. Comparison between diagnoses (all years [2014–2020] combined) of A) FThC; B) thaw cycles with PGT



DOR, diminished ovarian reserve; E, endometriosis; FThC, failed thaw cycle; MF, male factor; OD, ovulatory dysfunction; PGT, preimplantation genetic testing; UF, unknown factor

- In patients with DOR, thaw cycles with PGT produced 1.5 times more embryos suitable for transfer compared with thaw cycles without PGT, though it should be noted that the overall FThC was low and similar in both PGT and non-PGT embryos

LBR

- Throughout the study period, patients with DOR had the lowest LBR with the largest delta (17.2%) between PGT and non-PGT embryos (47.3% vs 30.1%)
- In thaw cycles with PGT, the LBR in patients with DOR was comparable to patients with E, OD, MF, and UF (Table 1)

Table 1. LBR^a (2014–2020) by PGT status

	PGT (%)	No PGT (%)	p-value
DOR	47.3	30.1	<0.0001
E	50.0	41.1	<0.0001
OD	42.7	39.6	0.0101
MF	52.3	43.9	<0.0001
UF	48.6	41.0	<0.0001

P-values were obtained using Fisher's exact test

^aLBR is defined by SART as the percentage of thaw attempts subsequent to the first embryo transfer for women of different age groups using their own eggs, whose outcome was birth of at least one living child (defined as a baby born vaginally or abdominally with signs of life and a birth certificate filed).^b Diagnosis-specific LBRs were calculated by averaging the age-specific LBRs, provided by SART, across each diagnosis

DOR, diminished ovarian reserve; E, endometriosis; LBR, live birth rate; MF, male factor; OD, ovulatory dysfunction; PGT, preimplantation genetic testing; SART, Society for Assisted Reproductive Technology; UF, unknown factor

CONCLUSIONS

- Diminished ovarian reserve (DOR) is associated with lower post-thaw embryo survival rates and live birth rates (LBRs) compared with endometriosis (E), ovulatory dysfunction (OD), male factor (MF), or unknown factor (UF)
- Among patients with DOR, the proportion of failed thaw cycles (FThC) improved from 2014 to 2020 and preimplantation genetic testing (PGT) significantly contributed to that improvement. The steep improvement noticed on PGT cycles but not on non-PGT cycles may be attributed to biopsy technique improvement over time
- In 2020, FThC was similar between embryos that underwent PGT and those that did not in patients with DOR
- PGT embryos showed higher LBRs compared with non-PGT embryos, despite the low proportion of FThC for both PGT and non-PGT groups. Such a discrepancy is likely impacted by more stringent morphological selection criteria that are used to determine which embryos can be biopsied for PGT screening
- FThC can be used as a key performance indicator (KPI) to guide embryo thawing expectations for clinicians and patients—especially as the DOR patient population faces lower laboratory and clinical frozen embryo transfer (FET) outcomes (independent of PGT status) compared with other infertility diagnoses and the sharp increase in their use of FET over time

INTRODUCTION

- KPIs are important for assisted reproductive technology for the evaluation of a technique or process, benchmarking, and quality management and improvement¹
- FThC are thaw procedures that fail to produce any embryos suitable for transfer; recently, the proportion of FThC (number of thaw cycles that fail to produce any embryos suitable for transfer divided by the total number of thaw cycles) was suggested as a KPI for FET²
- Between 2014 and 2019, the number of FET procedures increased, but the proportion of FThC significantly decreased across all ages and infertility diagnoses in the United States³
 - PGT was associated with improved proportions of FThC and LBR, particularly in older patients⁴
 - Among five different infertility diagnoses (DOR, E, OD, MF, and UF), the highest proportion of FThC was observed in patients with DOR⁵
 - Blastocysts from patients with DOR—independent of age—are less likely to be euploid, suggesting a reduction in oocyte quality⁶
- The Society for Assisted Reproductive Technology (SART) database captures real-world data related to assisted reproductive technology that can be used for descriptive analyses.⁷ The SART data were employed for this study to explore FThC in patients with DOR, with and without PGT

OBJECTIVE

- To evaluate the proportion of FThC in the presence of DOR, with and without PGT, as a KPI for FET procedures

METHODS

- SART data from thaw cycles between 2014 and 2020 were analyzed by infertility diagnoses and by PGT status
- A total of 268,284 thaw cycles were analyzed. This included first transfer ≥ 12 months after retrieval and second or later FETs, given the database output limitation (fresh and frozen transfers taking place < 12 months combined)
- The analyses focused on the presence of DOR; comparison with other high-prevalence/difficult-to-treat diagnoses (E, OD, MF, UF) was performed, when applicable
- Outcomes included:
 - Proportion of FThC with and without the presence of DOR
 - Proportion of FThC with and without PGT in patients with DOR
 - LBR
- Fisher's exact test was used to examine outcomes over time and by PGT status (dichotomized as yes [any] or no)

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DISCLOSURES

KAW, BH, FC, KM, and ABC are employees of EMD Serono, Rockland, MA, USA. MCM has nothing to disclose.