AGE BASED STRATIFICATION OF FROZEN OOCYTE THAW OUTCOMES

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Background:

Planned oocyte cryopreservation for fertility preservation is a common patient desire in fertility practices. While much is published on anticipated aneuploidy rates based on a patient's age at the time of preservation, less is reported about expected oocyte survival and fertilization when patients present for oocyte cryopreservation at different ages.

Objective:

To determine if oocyte thaw survival and fertilization outcomes vary based on a patient's age at the time of cryopreservation.

Materials and Methods:

This is a retrospective study of frozen oocyte thaw cycles occurring at our center between May 2013 and December 2022. Cryopreservation dates ranged from March 2011 to November 2022. Analysis was limited to vitrification cycles. Oocytes exposed to *in vitro* maturation were excluded from analysis. Patients undergoing oocyte cryopreservation at an outside center or with a diagnosis of cancer or other medical condition were also excluded. All oocytes surviving the thaw were fertilized with intracytoplasmic sperm injection. Inseminations using surgically extracted sperm or retrograde ejaculation were excluded from fertilization outcome analysis. Patients were stratified by age at cryopreservation (<30, >41, and two year increments from age 30 to 41). Our primary outcome was fertilization results and secondary outcome oocyte thaw survival. Analysis was performed with a mixed model linear regression, accounting for individuals undergoing multiple thaw cycles.

Results:

A total of 597 patients undergoing 813 unique oocyte thaw cycles met inclusion criteria. Overall, 88.1% (6114/6942) of metaphase II oocytes survived the thawing process. Compared to patients under 30 years old at the time of cryopreservation, those over age 41 had lower oocyte thaw survival (86.6% vs 80.1%, p=0.038, β -8.2, 95% CI -16, -0.47) . No statistical difference was seen between patients under age 30 and the other age groups previously defined.

Two pronuclei fertilization occurred in 75.1% (4260/5676) of attempted fertilizations. Patients in age groups (32-33), (34-35), (36-37), (38-39), (40-41) had a higher fertilization rate compared to those under 30. There was no difference in fertilization rate between patients under age 30 and patients age 30-31 or over age 41. See Table 1.

Table 1: Metaphase II Fertilization Outcomes Stratified by Age at Time of Cryopreservation

Age Group	Beta	95% CI[1]	p-value	% Fertilization
< 30	—	—		70.8%
>41	-4.4	-16, 7.1	0.5	65.5%
30-31	4.3	-8.5, 17	0.5	68.5%
32-33	13	1.8, 24	0.023	71.5%
34-35	10	0.28, 21	0.044	75.4%
36-37	13	2.9, 23	0.011	78.0%
38-39	18	8.0, 28	<0.001	80.1%
40-41	14	3.6, 24	0.008	72.8%

[1] CI = Confidence Interval

Conclusion:

Patients over age 41 have poorer oocyte survival on thaw when compared to younger counterparts while displaying similar fertilization outcomes. Findings from this study will serve as a valuable tool in counseling fertility preservation patients on anticipated outcomes based on an individual's age at time of oocyte cryopreservation.

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