INDIVIDUAL AGE SPECIFIC LIVE BIRTH RATES IN PATIENTS UNDERGOING AUTOLOGOUS IN-VITRO FERTILIZATION CYCLES FOR ADVANCED MATERNAL AGE

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Background: In a worldwide 2011 survey study, the proportion of women aged over 40 years undergoing IVF was found to represent 24% of all treatment cycles. [1] However, higher maternal age is associated with decline in oocyte quality, higher rate of aneuploidy, and higher risk for miscarriage. Accurate outcome data for each year of maternal age to appropriately counsel patients on their chance of success with autologous IVF treatment is essential, but data is limited or lacking. Gunnala et al. published results from the largest patient population to date using autologous oocytes cycles in women undergoing fresh embryo transfer. They reported live birth rates of 2.9% at age 45, 0.5% at age 46, and 0.0% at age 47. [2]

Objective: The objective of this study is to evaluate pregnancy outcomes per autologous ART cycle for each year of increasing age among patients 40 years and older.

Materials and Methods:
This was a retrospective cohort study performed at a large multi-center fertility practice. All autologous oocyte retrievals from January 2012 to June 2022 in women ages 40 to 49 years old were included. Age was determined on day of retrieval. The first retrieval and corresponding transfer were used for each patient.

Results:
10,764 patients met criteria for inclusion in the study. Primary infertility diagnosis distribution changed as maternal age increased, with patients becoming more concentrated in the diminished ovarian reserve category, as expected. Number of oocytes retrieved during the cycle decreased as age increased. Live birth rates per oocyte retrieval were 6.21% at age 45 (n=11), 6.25% at age 46 (n=2), 14.29% at age 47 (n=1), 0% at age 48, and 0% at age 49.

Conclusions:
Although outcomes do worsen with advanced maternal age, and each subsequent year has a pattern of poorer pregnancy and live birth rates, it is still possible to achieve pregnancy with autologous oocytes up to 47 years of age. Treatment success rates do become quite low, but a shared decision making process can be used along with this data to counsel patients about outcomes and to make data driven treatment decisions. That being said, there is a upper limit where autologous treatment becomes futile which is 48 and above. Future work will include incorporating patients with multiple transfers and retrievals, as well as a subgroup analysis on only those patients performing PGT-A.

References:
1. Adamson, G.D. et al., *International Committee for Monitoring Assisted Reproductive Technology: world report on assisted reproductive technology, 2011.* Fertility and Sterility, 2018. **110**: p. 1067.
2. Gunnala, V. et al., *One thousand seventy-eight autologous IVF cycles in women 45 years and older: the largest single-center cohort to date.* Journal of assisted reproduction technologies 2018. **35**: p. 435–440.

Manuscript Table:

Table 1: Patient characteristics at first retrieval by age group and corresponding transfer outcomes.

	Maternal age (years) at retrieval									
	40	**41**	**42**	**43**	**44**	**45**	**46**	**47**	**48**	**49**
Patients, n	4337	2765	1894	1054	493	177	32	7	2	3
Infertility diagnosis, n (%)										
Male infertility	720 (17.01)	389 (14.48)	197 (10.64)	109 (10.64)	29 (6.02)	8 (4.82)	2 (7.14)	0 (0.00)	0 (0.00)	1 (33.33)
DOR + Ovulation disorder	1647 (38.90)	1269 (47.23)	986 (53.27)	602 (58.79)	328 (68.05)	119 (71.69)	18 (64.29)	5 (71.43)	0 (0.00)	0 (0.00)
Tubal + Uterine Factor + Endo	539 (12.73)	290 (10.79)	193 (10.43)	96 (9.38)	31 (6.43)	14 (8.43)	3 (10.71)	1 (14.29)	2 (100.00)	1 (33.33)
Unexplained	681 (16.08)	314 (11.69)	211 (11.40)	78 (7.62)	33 (6.85)	8 (4.82)	1 (3.57)	1 (14.29)	0 (0.00)	0 (0.00)
Other	647 (15.28)	425 (15.82)	264 (14.26)	139 (13.57)	61 (12.66)	17 (10.24)	4 (14.29)	0 (0.00)	0 (0.00)	1 (33.33)
BMI, mean (SD)	26.74 (5.63)	26.88 (5.67)	26.66 (5.60)	27.13 (5.85)	26.93 (5.55)	26.68 (5.57)	25.47 (5.95)	26.24 (5.70)	24.30 (2.83)	24.90 (3.30)
Day 3 FSH, mean (SD)	7.88 (3.76)	8.10 (3.98)	8.39 (4,51)	8.58 (4.87)	8.83 (5.55)	8.32 (3.37)	10.32 (9.00)	8.53 (1.73)	12.00 (--)	--
AMH, mean (SD)	2,24 (2.26)	2.03 (2.17)	1.91 (1.87)	1.68 (1.98)	1.64 (2.16)	1.38 (1.26)	1.50 (1.28)	0.40 (0.45)	1.22 (0.60)	1.10 (1.03)
Number of Oocytes Retrieved, mean (SD)	12.02 (7.83)	11.29 (7.60)	11.04 (7.66)	9.77 (7.19)	8.87 (6.76)	8.03 (6.37)	7.18 (6.76)	3.86 (2.61)	6.00 (1.41)	4.33 (2.31)
Positive pregnancy test, n (%) *	2364 (54.80)	1447 (52.56)	853 (45.25)	385 (36.81)	112 (22.90)	33 (19.08)	6 (18.75)	2 (28.57)	0 (0.00)	1 (33.33)
Clinical intra-uterine pregnancy, n (%) *	1987 (46.08)	1206 (43.81)	693 (36.76)	315 (30.11)	86 (17.59)	22 (12.72)	3 (9.38)	2 (28.57)	0 (0.00)	1 (33.33)

Miscarriage, n (%) *	468 (10.79)	292 (10.56)	200 (10.56)	119 (11.29)	30 (6.09)	11 (6.21)	1 (3.13)	1 (14.29)	0 (0.00)	1 (33.33)
Live birth, n (%) *	1423 (32.81)	840 (30.38)	460 (24.29)	180 (17.08)	52 (10.55)	11 (6.21)	2 (6.25)	1 (14.29)	0 (0.00)	0 (0.00)

Abbreviations: AMH = anti-müllerian hormone; BMI = body mass index; FSH = Follicle-stimulating hormone; SD = standard deviation

* The denominator of the outcomes is number of patients.