Title
Does Severe Teratozoospermia Correlate to Embryonic Aneuploidy Rates?

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Objective:
Sperm volume, motility, and morphology are generally accepted as predictors of in vivo and in vitro fertilization. Kruger et al. demonstrated that microscopic assessment of morphology plays an integral role in evaluating a male patient. This study aims to determine if extremely low percentages of structurally normal sperm is correlated with increased rates of embryonic aneuploidy in couples who utilize IVF with preimplantation genetic screening (PGS).

Design:
Retrospective cohort analysis

Materials and Methods:
Couples who underwent an IVF cycle and PGS from July 2010 – October 2015 were included. Sperm were assessed by Kruger's strict criteria. Proportion of Kruger morphology was analyzed by male age (A: ≤35; B: (35-38]; C: (38-41]; D: (41-43]; and E: >43). Cohorts were segregated into two groups: Kruger ≤1%; and Kruger >4%. Couples were binned by female ages (A: ≤35; B: (35-38]; C: (38-41]; D: (41-43]; and E: >43). Aneuploidy rate for each female age group and per study group was calculated, with 95% confidence intervals calculated by Clopper-Pearson method. Chi-square was used to test significance, established at $p<0.05$.

Results:
Couples consisted of females (21.4-47.0 years) with male partners (22.6-70.3 years) who underwent 1105 autologous fresh IVF cycles with PGS. Trophectoderm biopsy was performed on 7927 embryos, of which 38.8% (n=3077) were found aneuploid. The percentage of male patients with a morphology count ≤1% increased with male age (A: 10.4%, B: 12.4%, C: 26.0%, D: 21.9%, E: 37.2%; $p<0.05$). Fertilization rate was similar between group in each female age group. Aneuploidy rate was higher in couples where male Kruger morphology was ≤1% in each female age group, although it did not reach statistical significance (Table 1).

Conclusions:
Multiple studies have shown semen samples with poor Kruger morphology have similar fertilization and pregnancy rates to normal morphology when IVF/ICSI is utilized.
In the present study, no correlation was identified between teratozoospermic specimens and increased incidence of embryonic aneuploidy. Male partners with specimens found to have severe teratozoospermia can be reassured that they do not have an increased incidence of producing chromosomally abnormal embryos. Further large randomize control trials are needed to confirm these findings.

Support:
None.

Table 1:

	A: <35		B: 35-38		C: 38-41		D: 41-43		E: >43	
	≤1% // >4%	>4%	≤1%	>4%	≤1%	>4%	≤1%	>4%	≤1%	>4%
Cycles	101	235	72	163	83	231	45	109	25	41
Patient's Age	31.4±3.0	31.6±2.7, NS	36.6±0.7	36.5±0.8, NS	39.5±0.8	39.5±0.8, NS	41.9±0.3	42.0±0.5, NS	43.9±1.1	43.8±0.8, NS
Partner's Age	38.0±7.9	35.3±5.1, p<0.05	39.2±5.7	38.8±4.1, NS	42.0±4.3	41.4±4.3, NS	43.6±4.1	43.4±4.4, NS	45.3±3.7	44.2±5.1, NS
BMI	23.5±3.9	22.7±5.1, NS	23.7±5.0	22.9±4.0, NS	25.6±5.6	23.31±4.1, NS	25.5±4.0	23.2±4.4, NS	25.6±3.1	23.4±3.5, NS
AMH	3.1±2.1	3.8±3.2, NS	3.5±2.6	3.0±2.6, NS	2.4±2.1	2.6±2.3, NS	1.0±0.7	1.5±1.1, NS	1.2±0.8	1.5±1.2, NS
Retrieved	17.7±11.8	17.4±10.0, NS	13.4±9.4	16.9±9.3, NS	13.4±7.8	13.1±7.9, NS	12.3±8.6	12.1±7.2, NS	16.2±7.4	11.7±7.9, NS
MII	14.3±9.2	13.9±8.5, NS	11.7±6.5	12.7±7.4, NS	9.5±5.7	9.7±6.1, NS	9.2±7.6	9.4±5.8, NS	9.9±7.4	8.3±6.4, NS
D1 Ongoing	11.6±7.5	11.5±7.1, NS	9.1±5.8	10.6±7.1, NS	7.7±5.1	7.6±5.2, NS	6.2±5.5	7.0±4.5, NS	6.8±5.5	6.9±5.4, NS
Fertilization Rate	81.0% (1171/1445)	82.2% (2692/3275) , NS	79.8% (657/823)	81.7% (1730/2117) , NS	76.4% (603/789)	78.6% (1768/2249) , NS	75.4% (279/370)	74.5% (764/1025) , NS	69.2% (171/247)	67.1% (202/301), NS
Aneuploidy rate	26.0% (168/645)	26.6% (404/1520), NS	36.9% (114/195)	31.1% (308/991), NS	54.2% (166/306)	49.9% (402/805), NS	54.7% (133/243)	51.7% (186/360), NS	65.7% (44/67)	60.0% (69/115), NS

	A: <35	B: 35-38	C: 38-41	D: 41-43	E: >43
	≤1% (n=101) // >4% (n=235)	≤1% (n=72) // >4% (n=163)	≤1% (n=83) // >4% (n=231)	≤1% (n=45) // >4% (n=109)	≤1% (n=25) // >4% (n=41)
Patient's Age	31.4±3.0 // 31.6±2.7, NS	36.6±0.7 // 36.5±0.8, NS	39.5±0.8 // 39.5±0.8, NS	41.9±0.3 // 42.0±0.5, NS	43.9±1.1 // 43.8±0.8, NS
Partner's Age	38.0±7.9 // 35.3±5.1, p<0.05	39.2±5.7 // 38.8±4.1, NS	42.0±4.3 // 41.4±4.3, NS	43.6±4.1 // 43.4±4.4, NS	45.3±3.7 // 44.2±5.1, NS
BMI	23.5±3.9 // 22.7±5.1, NS	23.7±5.0 // 22.9±4.0, NS	25.6±5.6 // 23.31±4.1, NS	25.5±4.0 // 23.2±4.4, NS	25.6±3.1 // 23.4±3.5, NS
AMH	3.1±2.1 // 3.8±3.2, NS	3.5±2.6 // 3.0±2.6, NS	2.4±2.1 // 2.6±2.3, NS	1.0±0.7 // 1.5±1.1, NS	1.2±0.8 // 1.5±1.2, NS
Retrieved	17.7±11.8 // 17.4±10.0, NS	13.4±9.4 // 16.9±9.3, NS	13.4±7.8 // 13.1±7.9, NS	12.3±8.6 // 12.1±7.2, NS	16.2±7.4 // 11.7±7.9, NS
MII	14.3±9.2 // 13.9±8.5, NS	11.7±6.5 // 12.7±7.4, NS	9.5±5.7 // 9.7±6.1, NS	9.2±7.6 // 9.4±5.8, NS	9.9±7.4 // 8.3±6.4, NS
D1 Ongoing	11.6±7.5 // 11.5±7.1, NS	9.1±5.8 // 10.6±7.1, NS	7.7±5.1 // 7.6±5.2, NS	6.2±5.5 // 7.0±4.5, NS	6.8±5.5 // 6.9±5.4, NS
Fertilization Rate	81.0% (1171/1445) // 82.2% (2692/3275) , NS	79.8% (657/823) // 81.7% (1730/2117) , NS	76.4% (603/789) // 78.6% (1768/2249) , NS	75.4% (279/370) // 74.5% (764/1025) , NS	69.2% (171/247) // 67.1% (202/301), NS
Aneuploidy rate	26.0% (168/645) // 26.6% (404/1520), NS	36.9% (114/195) // 31.1% (308/991), NS	54.2% (166/306) // 49.9% (402/805), NS	54.7% (133/243) // 51.7% (186/360), NS	65.7% (44/67) // 60.0% (69/115), NS