

The correlation of the degree of abnormal sperm morphology using strict criteria and pregnancy rates following intrauterine insemination (IUI)

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Summary

Objective: To determine the effect of extremely low sperm morphology on pregnancy rates following intrauterine insemination (IUI) where all other semen parameters were normal. **Materials and Methods:** Retrospective review of all IUI cycles over a two-year period on infertile women age ≤ 35 where all parameters, but morphology had to be normal. The data were evaluated according to seven levels of percentage of normal morphology (NM): 0, 1, 2, 3, 4, 5, and $\geq 6\%$. **Results:** The percent live delivery was 9.5, 16.7, 8.8, 16.1, 11.4, 12.3, and 10.9%. **Conclusions:** Morphology of 0% or 1% did not seem to impair pregnancy rates following IUI. More studies are needed but should include determining the confounding effect of the type of morphologic abnormality.

Key words: Sperm morphology; Strict criteria; Intrauterine insemination; Live birth rate.

Introduction

Several studies suggest that the 4% level using strict criteria for morphology separates fertile from subfertile sperm [1-5]. However, not all studies agree on the clinical importance of measuring normal morphology (NM) [6, 7]. One in vivo study found that with normal motile densities (MD), there was a trend for higher pregnancy rates (PRs) when the strict morphology was $>14\%$ compared to those $\leq 4\%$ [6]; however, in that same study, when MD was subnormal, the group with ≤ 4 showed a trend for higher PRs than the group with $> 14\%$ normal morphology [6]. Thus, this study, which evaluated pregnancies following only intercourse and not intrauterine insemination (IUI), found that measuring sperm morphology using strict criteria was not particularly valuable in determining the fertility potential of a given semen sample [6].

A study of 412 first IUI cycles found a clinical PR per IUI cycle of 30% (28/91) for those with subnormal morphology using strict criteria vs. 26% (71/268) for normal morphology 5-14%, and 20% (11/53) for those with normal morphology of $> 14\%$ [7]. Thus in contrast to initial enthusiasm, most studies now conclude that the 4% cut-off for normal morphology using strict criteria does not discriminate subfertile vs. fertile males.

The possibility exists that a lower level of normal morphology may detect the subnormal male. The possibility

exists that the 4% mark was set too high and perhaps most "subnormal" specimens were either 3% or 4% when perhaps the 0% or 1% or even 2% mark can predict male subfertility.

The present study retrospectively evaluated the possibility that a conclusion about lack of efficacy of low morphology on predicting the subfertile male could have been related to the possibility that the majority of test scores could have been at 3-4%. The study would consider the possibility that a zero, 1 or 2% level could predict a male with subfertility.

Materials and Methods

A retrospective review over a two-year period was conducted in women aged ≤ 35 with a minimum of one year of infertility having IUI performed in natural or mildly stimulated cycles. A maximum of three IUI cycles per patient were included in the study.

Most IUIs were performed not for male factor issues but either because of poor post-coital tests related to clomiphene citrate in the female partner or part of a requirement by the insurance company before the couple could attempt in vitro fertilization-embryo transfer (IVF-ET). In fact, cycles were not included in the data unless the male partner had a MD of $\geq 10 \times 10^6/\text{ml}$, had a hypo-osmotic swelling test $> 50\%$, and was negative ($< 50\%$) for anti-sperm antibodies using the direct immunobead assay. Pregnancy rates per IUI cycle were stratified to six morphology groups - 0, 1, 2, 3, 4, 5, and $\geq 6\%$.

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Table 1. — Clinical and live delivered pregnancy rates per IUI cycle according to % of normal strict morphology.

	Normal strict morphology						
	0	1	2	3	4	5	≥6
No. IUI cycle	21	30	34	31	70	65	403
No. with clin. preg. (ultrasound evidence at 6 wks)	2	7	4	5	9	8	54
% clinical pregnancy/IUI cycle	9.5	23.3	11.8	16.1	12.9	12.3	13.4
% live delivery/IUI cycle	9.5	16.7	8.8	16.1	11.4	12.3	10.9

Results

The clinical and live delivered pregnancy rates following IUI according to specific percentage of normal morphology levels is seen in Table 1. There is clearly no significant difference or even trend for the lowest groups of low morphology to correlate with poor pregnancy rates per IUI cycle.

Discussion

Before giving up on morphology completely as a test of male subfertility, we plan on re-evaluating these data based on types of morphology issues, e.g., severe acrosomic abnormalities vs. mid-piece or tail abnormalities. Perhaps a minority subset could be found where some predictability of male subfertility can be made based on subnormal morphology. Thus, finding low morphology using strict criteria should not be a reason for a treating physician to recommend IVF-ET with intracytoplasmic sperm injection (ICSI). In fact there are data suggesting that if IVF-ET is considered as a therapy for subnormal sperm morphology using strict criteria, conventional rather than ICSI is the preferred method of fertilization of the oocyte because it leads to significantly higher pregnancy rates [8]. Thus the zona pellucida chooses the best sperm based on some other sperm factor than morphology.

References

- [1] Grow D., Oehninger S., Seltman H., Toner J., Swanson R.J., Druger T., Muasher S.J.: "Sperm morphology as diagnosed by strict criteria probing the impact of teratozoospermia on fertilization rate and pregnancy outcome in a large in vitro fertilization population". *Fertil. Steril.*, 1994, 62, 559.
- [2] Hammit D.G., Walker D.L., Syrop C.L., Miller T.M., Bennett M.R.: "Treatment of severe male factor infertility with high concentrations of motile sperm by microinsemination in embryo cryopreservation straws". *J. In Vitro Fertil. Embryo Transf.*, 1991, 8, 101.
- [3] Kruger T.F., Acosta A.A., Simmons K.F., Swanson R.J., Matta J.F., Veeck L.L., et al.: "A new method of evaluating sperm morphology with predictive value for in vitro fertilization". *Urology*, 1987, 30, 248.
- [4] Oehninger S., Acosta A.A., Morshedi M., Veeck L., Swanson R.J., Simmons K., Rosenwaks Z.: "Corrective measures and pregnancy outcome in in vitro fertilization in patients with severe sperm morphology abnormalities". *Fertil. Steril.*, 1988, 50, 283.
- [5] Ord T., Patrizio P., Balmaceda J.P., Asch R.H.: "Can severe male factor infertility be treated without micromanipulation?" *Fertil. Steril.*, 1993, 60, 110.
- [6] Check J.H., Adelson H.G., Schubert B.R., Bollendorf A.: "Evaluation of sperm morphology using Kruger's strict criteria". *Arch. Androl.*, 1992, 28, 15.
- [7] Check M.L., Bollendorf A., Check J.H., Katsoff D.: "Reevaluation of the clinical importance of evaluating sperm morphology using strict criteria". *Arch. Androl.*, 2002, 48, 1.
- [8] Check J.H., Bollendorf A., Wilson C., Summers-Chase D., Horwath D., Yuan W.: "A retrospective comparison of pregnancy outcome following conventional oocyte insemination vs. intracytoplasmic sperm injection for isolated abnormalities in sperm morphology using strict criteria". *J. Androl.*, 2007, 28, 607.

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